

Internet Appendix for “Anticompetitive Effects of Common Ownership”

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ABSTRACT

This internet appendix complements the paper “Anticompetitive Effects of Common Ownership” and is organized as follows: Section I outlines a model of competition under common ownership that yields the network density measure of common ownership concentration we use in the empirical analysis. The data appendix in section II provides details on data set construction and variable definitions. Section III contains robustness checks and provides additional results described in the main paper.

I. Motivational Theory

The measure of common ownership concentration that we employ in our empirical tests, MHHI delta, captures the density of the ownership and control network among competitors in a given market and is an accepted antitrust tool used to assess the extent of anticompetitive

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threats from partial cross-ownership links. Interestingly, however, MHHI can also be derived from a Cournot model of competition in which firms maximize a weighted average of their shareholders' interests. While our empirical analysis does not test this model and does not depend on its assumptions, we provide a brief review to aid interpretation of our empirical results and to clarify potential sources of endogeneity. In what follows, we sketch the logic behind O'Brien and Salop's (2000) version of MHHI delta.¹

Suppose an industry or market (indexed by r in our empirical analysis; omitted here) has N natural competitors, which are owned by M shareholders. The ownership share of firm j accruing to shareholder i is given by β_{ij} , and the control share of firm j held by shareholder i is given by γ_{ij} . Total portfolio profits of shareholder i are given by $\pi^i = \sum_k \beta_{ik} \pi_k$, where π_k are the profits of portfolio firm k . It seems intuitive to assume that managers pay most attention to the goals of their most powerful shareholders. When these shareholders hold stakes in competitors, these goals may include refraining from increasing capacity or starting price wars in markets in which these shareholders hold large ownership interests. By contrast, managers of firms with powerful concentrated shareholders may not be constrained from aggressively pursuing a growth strategy at the expense of rivals, even if doing so reduces industry-wide profits. Formally, this intuition can be captured by the following objective function:

$$\max_{x_j} \tilde{\Pi}_j = \sum_{i=1}^M \gamma_{ij} \sum_{k=1}^N \beta_{ik} \pi_k = \pi_j + \sum_{k \neq j} \frac{\sum_i \gamma_{ij} \beta_{ik}}{\sum_i \gamma_{ij} \beta_{ij}} \pi_k. \quad (\text{IA.1})$$

In words, firm j maximizes its own profits, plus a linear combination of the profits of other

¹ The authors focused on partial ownership acquisitions in competitors (cross-ownership), but their model can be applied to a situation in which the same investors hold shares in natural competitors (common ownership).

firms in which the shareholders with control hold ownership stakes. The manager therefore weighs two effects when considering alternative strategic actions: the benefits to the firm on the one hand, and the portfolio gains or losses for diversified shareholders on the other hand, where the latter are weighted by how much control these shareholders have in the firm and hence how much they gain or are hurt financially by the respective action. The assumption does not imply that firms would hurt their own profits just to benefit others. Rather, it implies that if the portfolio losses to the other firms' most powerful shareholders are greater than the gains to the own firm, the growth strategy will not find support. Note that this objective nests the standard model in which firms maximize their own profits. Applying this generalized objective function (instead of the special case of own-firm profit maximization) to a Cournot setting implies that the market share-weighted average markup in the market is

$$\eta \sum_j s_j \frac{P - C'_j(x_j)}{P} = \underbrace{\sum_j \sum_k s_j s_k \frac{\sum_i \gamma_{ij} \beta_{ik}}{\sum_i \gamma_{ij} \beta_{ij}}}_{\text{MHHI}} = \underbrace{\sum_j s_j^2}_{\text{HHI}} + \underbrace{\sum_j \sum_{k \neq j} s_j s_k \frac{\sum_i \gamma_{ij} \beta_{ik}}{\sum_i \gamma_{ij} \beta_{ij}}}_{\text{MHHI delta}}, \quad (\text{IA.2})$$

where η is the price elasticity of demand and s_j is the market share of firm j . In a classic Cournot setting with separately owned firms, the market share-weighted average markup is proportional to the Herfindahl-Hirschman Index (HHI), $\sum_j s_j^2$. However, when firms are not separately owned, common ownership concentration, MHHI delta, is part of total market concentration, MHHI. MHHI delta is a measure of the anticompetitive incentives due to common ownership.

For example, consider two firms that have 50% market share each. The HHI is equal to 5,000 on a scale from 0 (perfect competition) to 10,000 (monopoly). If the firms are separately owned, MHHI delta is equal to 0 and MHHI equals HHI, 5,000. If the two shareholders swap

50% of their shares, they now both receive 50% of the profits from each firm, and thus would want the two firms to act as if they were two divisions of a monopoly. The HHI is still 5,000 because the two firms are still formally independent, but the effective market concentration, reflected by a MHHI of 10,000, is identical to that of a monopoly.

Common ownership concentration as measured by MHHI delta is a precise measure of the anticompetitive incentives of common ownership if commonly owned firms compete à la Cournot, just like HHI is a precise measure of market concentration in a Cournot model when firms are assumed to maximize nothing but their own profits. However, we do not take a literal interpretation of the Cournot model. Instead, we use MHHI delta as a reduced-form measure of common ownership concentration, similar to any other study that uses HHI as a reduced-form measure of market concentration.

Note also that the model is static. Furthermore, it does not feature tacit or explicit collusion – it is a model of competition under common ownership, not a model of collusion due to common ownership.²

II. Data Appendix

This appendix provides details on how we process the data and construct the variables used in the paper.

² Collusion under common ownership is studied, for example, by [Gilo, et al. \(2006\)](#) and [de Haas and Paha \(2016\)](#). These authors show that common ownership can make sustained collusion harder or easier depending on the mode of competition and various other assumptions. For example, when common ownership and the resulting unilateral reduction in capacity or increase in prices are already high, the *additional* price effect from collusion can become increasingly hard to realize.

A. Data Set Construction

We construct data on airline prices, passengers, and market shares from the publicly available Department of Transportation’s Airline Origin and Destination Survey (DB1B) database. The DB1B database contains a random sample of 10% the domestic airline tickets each quarter.

The raw DB1B data are at the ticket level and include the origin, destination, and price paid for a ticket, as well as how many passengers traveled on that ticket. Each ticket is divided into one or multiple coupons, which represent the flights that are part of the ticket. For example, a one-stop roundtrip ticket has four coupons, two for the outbound itinerary and two for the inbound itinerary. Each coupon has a marketing carrier, the airline that sold the ticket, and an operating carrier, the airline that operated the flight. We exclude tickets with multiple marketing carriers from the analysis. For all remaining tickets, we treat the marketing carrier as the airline that sets the price for the ticket, and thus assign the price and passengers of the ticket to the marketing carrier. The main reason for using the marketing carrier, rather than the operating carrier, as the competitively significant carrier is that in the data available to us, the operating carrier is frequently a regional affiliate of a major airline that does not directly compete for passengers.

We further exclude tickets from the data that cannot be unambiguously assigned to a market, that is, an origin-destination pair. In particular, we only include tickets with at most one directional break and with at most three coupons in each direction. We also exclude (1) roundtrip tickets that do not return to their origin airport (so-called “open-jaw” tickets), (2) tickets that include a surface segment, that is, a part of the itinerary to which the plane does not travel, and (3) tickets on which the origin or destination are also visited as intermediary airports.

We treat roundtrip tickets as comparable to one-way tickets by splitting them into the inbound and the outbound itineraries and considering each itinerary as a separate one-way ticket. The price for roundtrip tickets is divided equally between the inbound and the outbound itineraries to yield the “one-way-equivalent” price. We exclude tickets with a one-way-equivalent fare below \$25 or above \$2,500 (in 2008 dollars), or with fares that are flagged as “not credible” by the DOT. We exclude charter and non-U.S. airlines because they do not compete for regularly scheduled service on U.S. routes.

The T100 database contains information on scheduled and performed flights by operating carrier. We consider a ticketing carrier as competing nonstop in a market if it tickets at least one coupon in the DB1B data for which the operating carrier is operating nonstop in the market according to the T100 database. We consider an operating carrier as operating nonstop in a market and quarter if it performs at least 60 flights in each direction during the quarter. We consider Southwest and other LCCs as serving a market nonstop if they perform at least 24 flights per quarter in each direction.

To construct institutional common ownership variables, we use data on institutional holdings from the Thomson-Reuters Spectrum data set on 13F filings. This data set includes institutional holdings for all firms publicly traded in U.S. stock markets. The Thomson-Reuters data identify managers by SEC filing and assign them a manager number. Some institutions are assigned more than one manager number. In these cases, we deviate from the manager numbers assigned by Thomson Reuters and assign the same identifier to all occurrences of an institution based on the institution name. The Thompson Reuters data include data on voting shares separately, which allows us to construct for each fund manager and each airline the fraction of shares that are voting shares.

We restrict the data to holdings of at least 0.5% (counting voting and nonvoting shares)

of shares outstanding. Holdings are not observed during bankruptcy periods. During the bankruptcies of American Airlines, Delta Airlines, Northwest Airlines, United Airlines, and US Airways, we repeat the last observed value for percentage of shares owned.

We also include institutional owners from SEC proxy statements that are not present in the Thomson data if they hold 5% or more of shares outstanding in any company in our sample. We add owners from the SEC filings to our data only for the year of the corresponding shareholder meeting.

B. Variable Definitions

The data sets above, together with the additional data sources described below, are used to construct the following variables:

- Average fare: We calculate the average fare for a carrier in a given market-quarter as the sum of the revenue in that market-quarter divided by the total passengers in the market-quarter. We CPI-adjust average fares to 2008 dollars.
- HHI (Herfindahl-Hirschman Index): We calculate the index as the sum of squared passenger shares for a given route and quarter. As mentioned in the data description above, we exclude non-U.S. and charter airlines in the calculation of passenger shares.
- MHHI (modified HHI): We calculate the index using the formula $MHHI = HHI + \sum_{k \neq j} s_j s_k \frac{\sum_i \gamma_{ij} \beta_{ik}}{\sum_i \gamma_{ij} \beta_{ij}}$, where s_j is the passenger share of carrier j , γ_{ij} is proportional to the voting shares of shareholder i in carrier j , and β_{ij} is the share of carrier j owned by shareholder i .
- MHHI delta: This variable, a measure of common ownership of airlines in a route, is given by the difference between the MHHI and the HHI.

- Number of nonstop carriers: We classify a carrier as operating nonstop in a given market-quarter if it performs at least 60 nonstop flights each way in the quarter according to the T100 database. We then classify the number of carriers in the route-quarter as the number of marketing carriers associated with a nonstop operating carrier on the route. We do not count carriers that are excluded from the HHI calculation.
- Southwest indicator: This variable is an indicator that is equal to one if Southwest operates at least 24 nonstop flights in each direction in a market-quarter, and zero otherwise.
- Other LCC indicator: This variable is an indicator that is equal to one if an LCC other than Southwest operates at least 24 nonstop flights in each direction in a market-quarter, and zero otherwise. We consider the following LCC carriers: Southwest, Frontier, JetBlue, Virgin, AirTran, Spirit, Allegiant, Sun Country, Independence, ATA Airlines, Skybus, and North American Airlines.
- Population: We calculate the population in a market-quarter as the geometric mean of the endpoint populations in millions. Data on MSA populations come from the Bureau of Economic Analysis.
- Income per capita: We measure income per capita in a market-quarter as the geometric mean of endpoint incomes per capita in thousands of 2008 dollars. Data on MSA income per capita come from the Bureau of Economic Analysis.
- Share of passengers traveling connect, market level: This variable is the fraction of passengers in a market-quarter that use connecting flights.

- Share of passengers traveling connect: This variable is the fraction of passengers of a given carrier in a market-quarter that use connecting flights.
- Fraction institutional ownership: This variable is the fraction of shares held by institutional investors according to the Thomson 13F database.
- Institutional ownership concentration: This variable is the Herfindahl index of institutional ownership, defined as the squared sum of shares across institutional owners for a given firm and period, according to the Thomson 13F database.
- Top five institutional holdings as a fraction of all institutional holdings: This variable is measured as the holdings of the top five institutional shareholders in a firm as a percentage of all institutional holdings, according to the Thomson 13F database.
- Carrier-route-level common ownership (CRCO): We define common ownership at the carrier-route level as the market-share-weighted average of the weight that the carrier places on the profits of other carriers in the route relative to its own profits. The CRCO for carrier j in route r and year-quarter t is calculated as $CRCO_{jrt} = \sum_{k \neq j} \frac{\sum_i \gamma_{ij,t} \beta_{ik,t} s_{k,rt}}{\sum_i \gamma_{ij,t} \beta_{ij,t} (1 - s_{j,rt})}$.
- Carrier-level MHHI delta: This variable is a measure of common ownership in a given carrier and year-quarter. We define the carrier-level MHHI delta as the average MHHI delta for a given carrier and year-quarter across all markets in which the carrier is present.
- Average carrier-level MHHI delta of competitors: We define this variable as the average carrier-level MHHI delta for the carriers in a route at a given point in time, excluding the carrier of the observation.

- Churn ratio: We define shareholder i 's churn ratio at time t (as in Gaspar, Massa, and Matos (2005)) as

$$CR_{it} = \frac{\sum_{j \in Q} |N_{jit}P_{jt} - N_{ji,t-1}P_{j,t-1} - N_{ji,t-1}\Delta P_{j,t}|}{\sum_{j \in Q} \frac{N_{jit}P_{jt} + N_{ji,t-1}P_{j,t-1}}{2}},$$

where Q is the set of companies held by investor i , N_{jit} is the number of shares in firm j held by shareholder i , and P_{jt} is the price of firm j at time t . We calculate the churn ratio of each shareholder at each point in time using all firms, not just airlines.

- Average route contact: Following [Evans and Kessides \(1994\)](#), we measure multimarket contact in route r as average route contact, $MMC_r = \frac{1}{N_r(1-N_r)/2} \sum_j \sum_{k>j} a_{jk} D_{jr} D_{kr}$, where N_r is the number of airlines operating in route r , D_{jr} is a dummy variable equal to one if carrier j operates in route r , and a_{jk} is the number of routes in which both carriers are active with a market share of at least 1%.

III. Internet Appendix Tables and Figures

Table IA.I

Effect of Common Ownership on Airline Ticket Prices for Market-Carriers and Markets Affected and Unaffected by Major Bankruptcy Events: Panel Regressions

This table shows how the results presented in Table III depend on various alternative ways of treating, excluding, or including markets affected by bankruptcies. We classify as major bankruptcy events the bankruptcies of United Airlines, Delta, American Airlines, US Airways, Northwest, and Mesa Airlines. Common ownership is measured by MHHI delta. Data are for the period 2001Q1–2014Q4. We exclude routes with less than 20 passengers per day on average. For the market-carrier-level regressions, we weight by average passengers for the market carrier over time and double-cluster standard errors at the market-carrier and year-quarter levels. For the market-level regressions, we weight by average passengers in the market over time and double-cluster standard errors at the market and year-quarter levels. The MHHI delta is the increase in concentration due solely to common ownership. Other variable definitions are provided in Section II.B of the Internet Appendix. While in the paper HHI and MHHI are expressed on a scale of 0 to 10,000, we use a scale of 0 to 1 in the regressions. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

	Dependent Variable: Log(Average Fare)					
	Market-carrier level				Market level	
	Bankrupt Carriers (1)	Nonbankrupt Carriers (2)	Bankruptcy Markets (3)	Nonbankruptcy Markets (4)	Bankruptcy Markets (5)	Nonbankruptcy Markets (6)
MHHI delta	0.0383 (0.0711)	0.156*** (0.0404)	0.134*** (0.0350)	0.177*** (0.0578)	0.188*** (0.0412)	0.252*** (0.0488)
HHI	0.0473 (0.0615)	0.150*** (0.0226)	0.143*** (0.0340)	0.187*** (0.0252)	0.231*** (0.0372)	0.289*** (0.0273)
Number of Nonstop Carriers	-0.0104 (0.00622)	-0.00978*** (0.00276)	-0.00344 (0.00343)	-0.0139*** (0.00374)	0.000230 (0.00456)	-0.0137*** (0.00491)
Southwest Indicator	-0.127*** (0.0381)	-0.116*** (0.00921)	-0.107*** (0.0120)	-0.123*** (0.0112)	-0.138*** (0.0156)	-0.149*** (0.0152)
Other LCC Indicator	-0.0637*** (0.0193)	-0.0585*** (0.00724)	-0.0599*** (0.0107)	-0.0524*** (0.00775)	-0.0931*** (0.0122)	-0.0924*** (0.0114)
Share of Passengers Traveling Connect, Market Level	0.143** (0.0572)	0.118*** (0.0163)	0.196*** (0.0254)	0.0919*** (0.0188)	0.195*** (0.0279)	0.141*** (0.0222)
Share of Passengers Traveling Connect	0.189*** (0.0255)	0.103*** (0.0149)	0.0867*** (0.0179)	0.0979*** (0.0172)		
Log(Population)	0.248 (0.427)	0.305*** (0.112)	0.160 (0.137)	0.379*** (0.109)	0.175 (0.147)	0.463*** (0.126)
Log(Income Per Capita)	0.150 (0.260)	0.414*** (0.106)	-0.0627 (0.133)	0.459*** (0.109)	-0.0839 (0.137)	0.408*** (0.125)
Log(Distance) \times Year-Quarter FE	✓	✓	✓	✓	✓	✓
Year-Quarter FE	✓	✓	✓	✓	✓	✓
Market-Carrier FE	✓	✓	✓	✓		
Market FE					✓	✓
Observations	139,003	1,068,300	532,420	673,198	98,429	156,124
R ²	0.814	0.847	0.835	0.858	0.882	0.889
Number of market-carrier pairs	18,585	44,746	36,962	41,298		
Number of markets					5,615	6,665

Table IA.II
**Effect of Common Ownership on Airline Ticket Prices: IV Regressions Using
Continuous Treatment – First Stage**

This table shows first-stage regressions of common ownership concentration (MHHI delta) on the instrument (the change in common ownership concentration implied by the combination of BlackRock and BGI's pre-merger portfolios) and various controls. Common ownership is measured as MHHI delta. The pre-period is 2009Q1 (the quarter before the BlackRock acquisition of Barclays BGI was announced). We divide markets into treatment and control groups as follows: (i) we calculate the actual MHHI delta in 2009Q1, (ii) we calculate a counterfactual MHHI delta in 2009Q1 combining the holdings of Barclays and BlackRock, and (iii) we calculate the difference between the counterfactual and the actual for each market. We use the resulting implied change in MHHI delta as a continuous treatment variable. We exclude markets with less than 20 passengers per day on average. We exclude market carriers with missing observations during the period 2006Q2–2014Q4. We weight by passengers the market carrier in 2009Q1. Standard errors are robust to heteroskedasticity. Variable definitions are provided in Section II.B of the Internet Appendix. While in the paper HHI and MHHI are expressed on a scale of 0 to 10,000, we use a scale of 0 to 1 in the regressions. *** p<0.01, ** p<0.05, * p<0.1.

Post-period:	Dependent Variable: Change in MHHI delta 2009Q1-Post					
	2010Q1 (1)	2011Q1 (2)	2012Q1 (3)	2013Q1 (4)	2014Q1 (5)	2010–2014 Q1 (6)
Implied Change in MHHI delta	6.123*** (0.340)	2.968*** (0.398)	5.270*** (0.442)	4.392*** (0.422)	5.457*** (0.581)	4.842*** (0.389)
HHI _{2009Q1}	-0.0153 (0.0114)	-0.0353** (0.0148)	0.00270 (0.0149)	-0.0351** (0.0159)	-0.0637*** (0.0204)	-0.0293** (0.0139)
Number of Nonstop Carriers _{2009Q1}	-0.000490 (0.00138)	0.000601 (0.00180)	-0.00217 (0.00189)	-0.00316 (0.00194)	-0.00366 (0.00245)	-0.00178 (0.00172)
Southwest Indicator _{2009Q1}	-0.0120*** (0.00371)	-0.00502 (0.00466)	-0.0226*** (0.00480)	-0.00998** (0.00465)	-0.0254*** (0.00609)	-0.0150*** (0.00425)
Other LCC Indicator _{2009Q1}	-0.0102** (0.00429)	-0.0216*** (0.00537)	-0.00695 (0.00577)	-0.0108* (0.00554)	-0.0307*** (0.00719)	-0.0160*** (0.00498)
Share of Passengers Traveling Connect _{2009Q1}	-0.00349 (0.00374)	0.00148 (0.00431)	-0.00241 (0.00475)	0.00329 (0.00446)	0.000501 (0.00604)	-0.000125 (0.00409)
Share of Passengers Traveling Connect, Market Level _{2009Q1}	0.0327*** (0.00914)	0.0296*** (0.0111)	0.0333*** (0.0118)	0.0152 (0.0117)	-0.00812 (0.0147)	0.0205** (0.0104)
Log (Population) _{2009Q1}	0.000396 (0.00249)	-0.00124 (0.00288)	0.00897*** (0.00302)	0.00817*** (0.00303)	0.0103*** (0.00392)	0.00533** (0.00273)
Log (Income Per Capita) _{2009Q1}	-0.00660 (0.0166)	0.00915 (0.0197)	0.000361 (0.0201)	0.0251 (0.0211)	0.00205 (0.0254)	0.00601 (0.0189)
Log (Distance) _{2009Q1}	0.00532** (0.00263)	0.00676** (0.00335)	0.000203 (0.00325)	0.00720** (0.00339)	0.0111** (0.00437)	0.00612** (0.00302)
Share DL × Share NW in 2008Q4	0.398*** (0.0737)	0.321*** (0.0659)	0.648*** (0.0962)	0.490*** (0.0858)	0.862*** (0.106)	0.544*** (0.0742)
Share UA × Share CO in 2009Q1	0.705*** (0.100)	-0.706*** (0.107)	-0.288* (0.155)	-0.346*** (0.130)	-0.295* (0.153)	-0.186 (0.115)
Share AA × Share US in 2009Q1	-0.751*** (0.0471)	-0.878*** (0.0739)	-0.896*** (0.0756)	-0.781*** (0.0925)	-1.455*** (0.0849)	-0.952*** (0.0594)
Share FL × Share WN in 2009Q1	0.131*** (0.0426)	0.0158 (0.0408)	-0.567*** (0.0424)	-0.658*** (0.0375)	-0.615*** (0.0510)	-0.338*** (0.0362)
Share AA in 2009Q1	0.0295*** (0.00630)	0.0644*** (0.00887)	0.0353*** (0.00895)	0.0348*** (0.0110)	0.0432*** (0.0139)	0.0414*** (0.00810)
Percent Change in Income during Great Recession	0.296*** (0.0576)	0.167*** (0.0616)	0.302*** (0.0667)	0.348*** (0.0717)	0.341*** (0.0905)	0.291*** (0.0625)
Constant	0.0259 (0.0567)	-0.0327 (0.0664)	0.0268 (0.0703)	-0.0694 (0.0748)	0.0427 (0.0918)	-0.00134 (0.0641)
Observations	7,890	7,890	7,890	7,890	7,890	7,890
F-stat (Weak Identification Test)	324.6	55.66	142.1	108.1	88.28	155

Table IA.III
Effect of Common Ownership on Airline Ticket Prices: IV Regressions Using Discrete Treatment – First Stage

This table shows first-stage regressions of common ownership concentration (MHHI delta) on the instrument (the change in common ownership concentration implied by the combination of BlackRock and BGI's pre-merger portfolios) and various controls. Common ownership is measured as MHHI delta. The pre-period is 2009Q1 (the quarter before the BlackRocks aquisition of Barclays BGI was announced). We divide markets into treatment and control groups as follows: (i) we calculate the actual MHHI delta in 2009Q1, (ii) we calculate a counterfactual MHHI delta in 2009Q1 combining the holdings of Barclays and BlackRock, (iii) we calculate the difference between the counterfactual and the actual for each market, and (iv) markets in the top tercile of the difference between counterfactual and actual MHHI delta are assigned to the treatment group, while markets in the bottom tercile are assigned to the control group. We exclude markets with less than 20 passengers per day on average. We exclude market carriers with missing observations during the period 2006Q2–2014Q4. We weight by passengers the market carrier in 2009Q1. Standard errors are robust to heteroskedasticity. Variable definitions are provided in Section II.B of the Internet Appendix. While in the paper HHI and MHHI are expressed on a scale of 0 to 10,000, we use a scale of 0 to 1 in the regressions. *** p<0.01, ** p<0.05, * p<0.1.

Post-period:	Dependent Variable: Change in MHHI delta 2009Q1-Post					
	2010Q1 (1)	2011Q1 (2)	2012Q1 (3)	2013Q1 (4)	2014Q1 (5)	2010–2014 Q1 (6)
Treatment (Discrete)	0.0871*** (0.00511)	0.0492*** (0.00642)	0.0716*** (0.00661)	0.0534*** (0.00639)	0.0681*** (0.00904)	0.0659*** (0.00599)
HHI _{2009Q1}	-0.0365*** (0.0140)	-0.0455*** (0.0171)	-0.0324* (0.0179)	-0.0678*** (0.0194)	-0.101*** (0.0247)	-0.0565*** (0.0170)
Number of Nonstop Carriers _{2009Q1}	-0.00386** (0.00172)	-0.000572 (0.00217)	-0.00569** (0.00238)	-0.00577** (0.00252)	-0.00555* (0.00306)	-0.00429* (0.00219)
Southwest Indicator _{2009Q1}	-0.0159*** (0.00455)	-0.0102* (0.00543)	-0.0288*** (0.00584)	-0.0201*** (0.00580)	-0.0364*** (0.00754)	-0.0223*** (0.00524)
Other LCC Indicator _{2009Q1}	-0.00748 (0.00521)	-0.0221*** (0.00635)	-0.00552 (0.00680)	-0.00819 (0.00683)	-0.0249*** (0.00861)	-0.0136** (0.00602)
Share of Passengers Traveling Connect _{2009Q1}	-0.00655 (0.00472)	-0.00128 (0.00546)	-0.000832 (0.00592)	0.00400 (0.00603)	0.00104 (0.00821)	-0.000725 (0.00539)
Share of Passengers Traveling Connect, Market Level _{2009Q1}	0.0209* (0.0113)	0.0167 (0.0133)	0.00876 (0.0144)	-0.00577 (0.0149)	-0.0318* (0.0182)	0.00177 (0.0130)
Log (Population) _{2009Q1}	0.00378 (0.00285)	0.00413 (0.00335)	0.0126*** (0.00347)	0.00981*** (0.00362)	0.0153*** (0.00447)	0.00913*** (0.00319)
Log (Income Per Capita) _{2009Q1}	-0.0510** (0.0211)	-0.00835 (0.0244)	-0.0262 (0.0250)	0.00720 (0.0274)	-0.0179 (0.0329)	-0.0192 (0.0242)
Log (Distance) _{2009Q1}	0.00390 (0.00362)	0.00455 (0.00403)	-0.00456 (0.00421)	0.00588 (0.00452)	0.00977* (0.00576)	0.00391 (0.00403)
Share DL × Share NW in 2008Q4	0.342*** (0.109)	0.359*** (0.117)	0.640*** (0.142)	0.516*** (0.127)	0.965*** (0.149)	0.565*** (0.118)
Share UA × Share CO in 2009Q1	0.644*** (0.0930)	-0.828*** (0.101)	-0.398** (0.174)	-0.492*** (0.140)	-0.463*** (0.164)	-0.308*** (0.119)
Share AA × Share US in 2009Q1	-0.758*** (0.0555)	-0.948*** (0.0863)	-0.801*** (0.0709)	-0.608*** (0.0759)	-1.394*** (0.128)	-0.902*** (0.0651)
Share FL × Share WN in 2009Q1	-0.134* (0.0784)	-0.234** (0.0911)	-0.828*** (0.0929)	-0.682*** (0.0926)	-0.606*** (0.116)	-0.497*** (0.0754)
Share AA in 2009Q1	0.0218*** (0.00753)	0.0554*** (0.0103)	0.0282*** (0.00998)	0.0309** (0.0128)	0.0419** (0.0163)	0.0356*** (0.00943)
Percent Change in Income during Great Recession	0.212*** (0.0623)	0.195*** (0.0732)	0.228*** (0.0764)	0.345*** (0.0861)	0.309*** (0.113)	0.258*** (0.0745)
Constant	0.230*** (0.0676)	0.0641 (0.0792)	0.199** (0.0829)	0.0483 (0.0930)	0.165 (0.115)	0.141* (0.0786)
Observations	5,022	5,022	5,022	5,022	5,022	5,022
F-stat (Weak Identification Test)	290.4	58.88	117.3	69.79	56.78	121

Table IA.IV
(continued). Effect of Common Ownership on Airline Ticket Prices: IV
Regressions Using Discrete Treatment – Second Stage

This table shows the second stage of instrumental-variables regressions similar to Table VI, but using the implied change in MHHI delta as a discrete treatment variable. MHHI delta measures the part of market concentration that is due to common ownership. The pre-period is 2009Q1 (the quarter before the BlackRock acquisition of Barclays BGI was announced). We divide markets into treatment and control groups as follows: (i) we calculate the actual MHHI delta in 2009Q1, (ii) we calculate a counterfactual MHHI delta in 2009Q1 combining the holdings of Barclays and BlackRock, (iii) we calculate the difference between the counterfactual and the actual for each market, and (iv) markets in the top tercile of the difference between counterfactual and actual MHHI delta are assigned to the treatment group, while markets in the bottom tercile are assigned to the control group. We exclude markets with less than 20 passengers per day on average. We exclude market carriers with missing observations during the period 2006Q2–2014Q4. We weight by passengers the market carrier in 2009Q1. Standard errors are robust to heteroskedasticity. Variable definitions are provided in Section II.B of the Internet Appendix. While in the paper HHI and MHHI are expressed on a scale of 0 to 10,000, we use a scale of 0 to 1 in the regressions. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$.

Post-period:	Dependent Variable: Change in Log(Average Fare) 2009Q1-Post					
	2010Q1 (1)	2011Q1 (2)	2012Q1 (3)	2013Q1 (4)	2014Q1 (5)	2010–2014 Q1 (6)
Change in MHHI delta 2009Q1-Post	0.142 (0.151)	0.199 (0.275)	0.765*** (0.196)	0.357 (0.279)	0.824*** (0.234)	0.462** (0.186)
HHI _{2009Q1}	0.0190 (0.0344)	0.0299 (0.0452)	0.00243 (0.0435)	0.0455 (0.0502)	0.0724 (0.0596)	0.0308 (0.0389)
Number of Nonstop Carriers _{2009Q1}	0.00960** (0.00471)	0.0127** (0.00602)	0.00659 (0.00616)	0.0172*** (0.00574)	0.0131* (0.00683)	0.0115** (0.00526)
Southwest Indicator _{2009Q1}	0.0238* (0.0135)	0.0461*** (0.0145)	0.0550*** (0.0155)	0.0852*** (0.0164)	0.0853*** (0.0198)	0.0567*** (0.0136)
Other LCC Indicator _{2009Q1}	-0.0184 (0.0140)	-0.0400** (0.0158)	-0.0237 (0.0157)	-0.0184 (0.0168)	-0.0167 (0.0182)	-0.0238* (0.0138)
Share of Passengers Traveling Connect _{2009Q1}	0.0312*** (0.0105)	0.0648*** (0.0125)	0.0324** (0.0127)	0.0236* (0.0140)	0.0334** (0.0156)	0.0375*** (0.0107)
Share of Passengers Traveling Connect, Market-Level _{2009Q1}	-0.0445* (0.0243)	-0.00519 (0.0305)	-0.0103 (0.0318)	0.144*** (0.0312)	0.0747** (0.0375)	0.0279 (0.0261)
Log (Population) _{2009Q1}	-0.0108 (0.00887)	0.00504 (0.00975)	-0.0208* (0.0107)	-0.000446 (0.0101)	0.000798 (0.0112)	-0.00403 (0.00889)
Log (Income Per Capita) _{2009Q1}	-0.0705* (0.0401)	0.0409 (0.0417)	0.0298 (0.0488)	0.128*** (0.0496)	-0.00672 (0.0545)	0.0250 (0.0378)
Log (Distance) _{2009Q1}	-0.00791 (0.00726)	-0.0321*** (0.00768)	-0.0376*** (0.00843)	-0.0448*** (0.00809)	-0.0674*** (0.00911)	-0.0381*** (0.00660)
Share DL × Share NW in 2008Q4	0.234 (0.236)	0.256 (0.234)	0.561** (0.267)	0.730** (0.301)	0.550 (0.403)	0.523** (0.236)
Share UA × Share CO in 2009Q1	0.138 (0.195)	0.976*** (0.352)	1.134*** (0.368)	1.605*** (0.420)	1.623*** (0.372)	1.050*** (0.251)
Share AA × Share US in 2009Q1	0.414** (0.172)	0.294 (0.309)	0.793*** (0.291)	0.807*** (0.262)	1.144*** (0.376)	0.652*** (0.230)
Share FL × Share WN in 2009Q1	-0.0368 (0.223)	0.220 (0.231)	1.266*** (0.292)	0.797** (0.310)	1.190*** (0.331)	0.628*** (0.242)
Share AA in 2009Q1	-0.0100 (0.0211)	0.00531 (0.0241)	-0.00954 (0.0260)	-0.0195 (0.0252)	0.00750 (0.0259)	-0.00545 (0.0204)
Percent Change in Income during Great Recession	-0.123 (0.144)	0.0935 (0.162)	0.0366 (0.189)	-0.329 (0.205)	-0.246 (0.205)	-0.109 (0.151)
Constant	0.346** (0.162)	0.127 (0.163)	0.254 (0.189)	-0.186 (0.191)	0.470** (0.218)	0.207 (0.151)
Observations	5,022	5,022	5,022	5,022	5,022	5,022
R ²	0.044	0.089	0.076	0.112	0.044	0.103

Table IA.V
Effect of Common Ownership on Airline Market Passenger Volume

This table shows panel regressions similar to those presented in Table III, but replacing ticket prices with passenger volume as the outcome variable. MHHI delta measures the part of market concentration that is due to common ownership. Data are for the period 2001Q1–2014Q4. We exclude routes with less than 20 passengers per day on average. We weight by average passengers in the market over time and double-cluster standard errors at the market and year-quarter levels. Other variable definitions are provided in Section II.B of the Internet Appendix. While in the paper HHI and MHHI are expressed on a scale of 0 to 10,000, we use a scale of 0 to 1 in the regressions. *** p<0.01, ** p<0.05, * p<0.1.

	Dependent Variable: Log(Market Passengers)		
	(1)	(2)	(3)
MHHI delta	-0.665*** (0.0876)	-0.607*** (0.0824)	-0.213*** (0.0527)
HHI	-0.519*** (0.0662)	-0.496*** (0.0660)	-0.583*** (0.0443)
Number of Nonstop Carriers			0.00575 (0.00474)
Southwest Indicator			0.258*** (0.0211)
Other LCC Indicator			0.191*** (0.0143)
Share of Passengers Traveling Connect, Market Level			-1.369*** (0.0502)
Log(Population)			0.674*** (0.181)
Log(Income Per Capita)			0.663*** (0.193)
Log(Distance) × Year-Quarter FE		✓	✓
Year-Quarter FE	✓	✓	✓
Market FE	✓	✓	✓
Observations	262,350	262,350	254,999
R ²	0.946	0.950	0.965
Number of markets	7,185	7,185	6,906

Table IA.VI
**Effect of Common Ownership on Airline Ticket Prices: Using Only Largest 10,
5, 3, and 1 Shareholders**

This table shows panel regression results similar to those presented in Table III, whereas MHHI delta is alternatively computed assuming that only the largest 10 (5, 3, and 1) shareholders have or exercise their control rights. Data are for the period 2001Q1–2014Q4. We exclude routes with less than 20 passengers per day on average. For the market-carrier-level regressions, we weight by average passengers for the market carrier over time and double-cluster standard errors at the market-carrier and year-quarter levels. For the market-level regressions, we weight by average passengers in the market over time and double-cluster standard errors at the market and year-quarter levels. We calculate MHHI delta setting the control rights to zero for shareholders other than the largest 10, largest five, largest three, and largest shareholder for each market-carrier and date. Variable definitions are provided in Section II.B of the Internet Appendix. While in the paper HHI and MHHI are expressed on a scale of 0 to 10,000, we use a scale of 0 to 1 in the regressions. *** p<0.01, ** p<0.05, * p<0.1.

	Dependent Variable: Log(Average Fare)							
	Market-carrier level				Market level			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
MHHI delta (Top 10 Shareholders)	0.149*** (0.0373)				0.198*** (0.0352)			
MHHI delta (Top 5 Shareholders)		0.136*** (0.0368)				0.173*** (0.0340)		
MHHI delta (Top 3 Shareholders)			0.114*** (0.0333)				0.145*** (0.0310)	
MHHI delta (Top 1 Shareholder)				0.0717*** (0.0220)				0.0889*** (0.0198)
HHI	0.163*** (0.0206)	0.158*** (0.0206)	0.153*** (0.0202)	0.141*** (0.0186)	0.251*** (0.0242)	0.244*** (0.0240)	0.237*** (0.0238)	0.220*** (0.0222)
Number of Nonstop Carriers	-0.00980*** (0.00269)	-0.00967*** (0.00267)	-0.00967*** (0.00266)	-0.00992*** (0.00267)	-0.00811** (0.00371)	-0.00796** (0.00368)	-0.00800** (0.00367)	-0.00837** (0.00369)
Southwest Indicator	-0.120*** (0.00928)	-0.120*** (0.00927)	-0.120*** (0.00933)	-0.120*** (0.00936)	-0.149*** (0.0135)	-0.149*** (0.0135)	-0.149*** (0.0136)	-0.149*** (0.0137)
Other LCC Indicator	-0.0620*** (0.00717)	-0.0627*** (0.00717)	-0.0634*** (0.00725)	-0.0648*** (0.00730)	-0.101*** (0.00988)	-0.102*** (0.00990)	-0.103*** (0.00998)	-0.105*** (0.0100)
Share of Passengers Traveling Connect (Market-Level)	0.124*** (0.0167)	0.124*** (0.0167)	0.125*** (0.0166)	0.127*** (0.0165)	0.158*** (0.0189)	0.158*** (0.0189)	0.159*** (0.0189)	0.160*** (0.0189)
Share of Passengers Traveling Connect	0.0987*** (0.0143)	0.0984*** (0.0143)	0.0979*** (0.0143)	0.0970*** (0.0143)				
Log(Population)	0.304*** (0.106)	0.302*** (0.106)	0.304*** (0.105)	0.303*** (0.106)	0.341*** (0.122)	0.339*** (0.122)	0.341*** (0.122)	0.339*** (0.123)
Log(Income Per Capita)	0.370*** (0.102)	0.367*** (0.101)	0.368*** (0.102)	0.368*** (0.102)	0.299*** (0.110)	0.296*** (0.110)	0.298*** (0.110)	0.298*** (0.110)
Log(Distance) × Year-Quarter FE	✓	✓	✓	✓	✓	✓	✓	✓
Year-Quarter FE	✓	✓	✓	✓	✓	✓	✓	✓
Market-Carrier FE	✓	✓	✓	✓				
Market FE					✓	✓	✓	✓
Observations	1,209,517	1,209,517	1,209,517	1,209,517	254,999	254,999	254,999	254,999
R ²	0.836	0.836	0.836	0.836	0.876	0.876	0.876	0.876
Number of market-carrier pairs	45,248	45,248	45,248	45,248				
Number of markets					6,906	6,906	6,906	6,906

Table IA.VII
**Effect of Common Ownership on Airline Ticket Prices: MHHI delta Using
Only Shareholders Ranked Below Top 10 (Placebo)**

This table shows regressions similar to those presented in Table III, whereas MHHI delta is computed assuming that the largest 10 shareholders don't exercise control. Data are for the period 2001Q1–2014Q4. We exclude routes with less than 20 passengers per day on average. For the market-carrier-level regressions, we weight by average passengers for the market carrier over time and double-cluster standard errors at the market-carrier and year-quarter levels. For the market-level regressions, we weight by average passengers in the market over time and double-cluster standard errors at the market and year-quarter levels. We calculate MHHI delta setting the control rights to zero for shareholders ranked 1-10 for each market-carrier and date. Variable definitions are provided in Section II.B of the Internet Appendix. While in the paper HHI and MHHI are expressed on a scale of 0 to 10,000, we use a scale of 0 to 1 in the regressions. *** p<0.01, ** p<0.05, * p<0.1.

	Dependent Variable: Log(Average Fare)	
	Market-carrier level (1)	Market level (2)
MHHI delta (Shareholders Ranked Below Top 10)	-0.0436 (0.0314)	-0.0312 (0.0275)
HHI	0.105*** (0.0243)	0.184*** (0.0256)
Number of Nonstop Carriers	-0.0101*** (0.00270)	-0.00859** (0.00377)
Southwest Indicator	-0.116*** (0.00941)	-0.145*** (0.0137)
Other LCC Indicator	-0.0698*** (0.00779)	-0.111*** (0.0105)
Share of Passengers Traveling Connect, Market Level	0.135*** (0.0164)	0.166*** (0.0189)
Share of Passengers Traveling Connect	0.0948*** (0.0144)	
Log(Population)	0.298*** (0.111)	0.331** (0.128)
Log(Income Per Capita)	0.379*** (0.104)	0.307*** (0.112)
Log(Distance) × Year-Quarter FE	✓	✓
Year-Quarter FE	✓	✓
Market-Carrier FE	✓	
Market FE		✓
Observations	1,209,517	254,999
R ²	0.836	0.875
Number of market-carrier pairs	45,248	
Number of markets		6,906

Table IA.VIII
Effect of Carrier-Level Common Ownership on Airline Ticket Prices: Panel Regressions

This table shows panel regressions similar to those presented in Table III using carrier-level MHHI delta as the explanatory variable. Common ownership is measured as MHHI delta. Carrier-level MHHI delta is the average MHHI delta for a given carrier and year-quarter across all markets in which the carrier is present. Average carrier-level MHHI delta of competitors is the average carrier-level MHHI delta for the carriers in the route, excluding the carrier of the observation. Data are for the period 2001Q1–2014Q4. We exclude routes with less than 20 passengers per day on average. For the market-carrier-level regressions, we weight by average passengers for the market carrier over time and double-cluster standard errors at the market-carrier and year-quarter levels. For the market-level regressions, we weight by average passengers in the market over time and double-cluster standard errors at the market and year-quarter levels. MHHI delta is the increase in concentration due solely to common ownership. Other variable definitions are provided in Section II.B of the Internet Appendix. While in the paper HHI and MHHI are expressed on a scale of 0 to 10,000, we use a scale of 0 to 1 in the regressions. *** p<0.01, ** p<0.05, * p<0.1

	Dependent Variable: Log(Average Fare)					
	Market-carrier level					
	(1)	(2)	(3)	(4)	(5)	(6)
Carrier-Level MHHI delta	0.983*** (0.205)	0.910*** (0.185)	0.996*** (0.184)			
Average Carrier-Level MHHI delta of Competitors				0.0740 (0.153)	0.172 (0.151)	0.0576 (0.160)
MHHI delta	0.140*** (0.0425)	0.172*** (0.0374)	0.0947*** (0.0337)	0.199*** (0.0460)	0.212*** (0.0394)	0.140*** (0.0385)
HHI	0.215*** (0.0241)	0.225*** (0.0242)	0.160*** (0.0200)	0.219*** (0.0250)	0.227*** (0.0247)	0.164*** (0.0210)
Number of Nonstop Carriers			-0.00962*** (0.00277)			-0.00959*** (0.00270)
Southwest Indicator			-0.120*** (0.00922)			-0.120*** (0.00933)
Other LCC Indicator			-0.0633*** (0.00742)			-0.0621*** (0.00730)
Share of Passengers Traveling Connect, Market-Level			0.128*** (0.0167)			0.125*** (0.0168)
Share of Passengers Traveling Connect			0.0987*** (0.0141)			0.102*** (0.0140)
Log(Population)			0.308*** (0.103)			0.288** (0.110)
Log(Income Per Capita)			0.350*** (0.0963)			0.338*** (0.109)
Log(Distance) × Year-Quarter FE		✓	✓		✓	✓
Year-Quarter FE	✓	✓	✓	✓	✓	✓
Market-Carrier FE	✓	✓	✓	✓	✓	✓
Observations	1,237,584	1,237,584	1,209,517	1,225,170	1,225,170	1,198,782
R ²	0.821	0.826	0.837	0.813	0.818	0.830
Number of market-carrier pairs	46,513	46,513	45,248	46,048	46,048	44,860

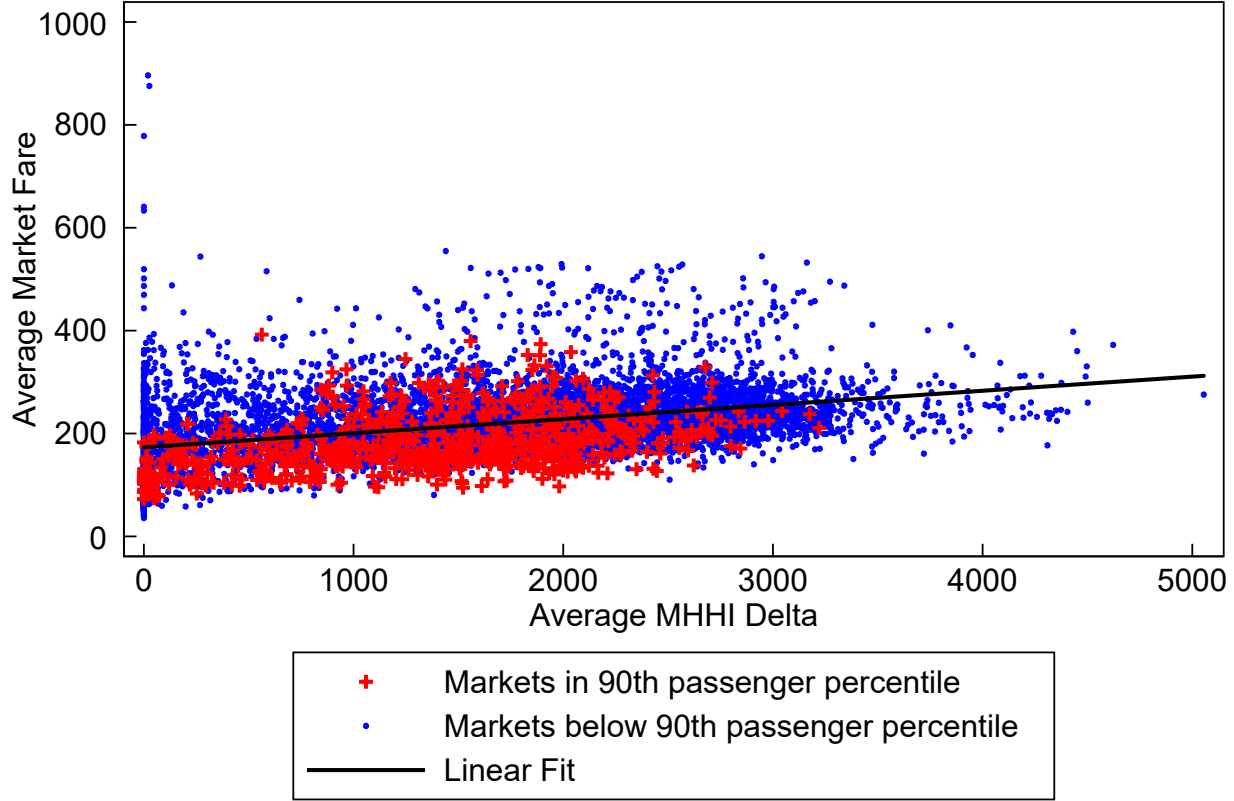


Figure IA.1. **Raw correlation between average airfares and average MHHI delta at the market level, averages using data from 2001Q1 to 2014Q4.**

The graph plots the raw cross-sectional correlation between airfares and MHHI delta. MHHI delta, which is a measure of common ownership among airlines in a route, is the difference between MHHI and HHI. HHI is the Herfindahl-Hirschman Index. We calculate the index as the sum of the squared market shares for a given route and year-quarter. We exclude international carriers and charter carriers. MHHI is the modified HHI of O'Brien and Salop (2000). We calculate the index using $MHHI = HHI + \sum_{k \neq j} s_j s_k \frac{\sum_i \gamma_{ij} \beta_{ik}}{\sum_i \gamma_{ij} \beta_{ij}}$, where s_j is the market share of carrier j , γ_{ij} is proportional to the voting shares of shareholder i in carrier j , and β_{ij} is the share of carrier j owned by shareholder i . We exclude routes with less than 20 passengers per day on average. Variable definitions are provided in Section II.B of the Internet Appendix.

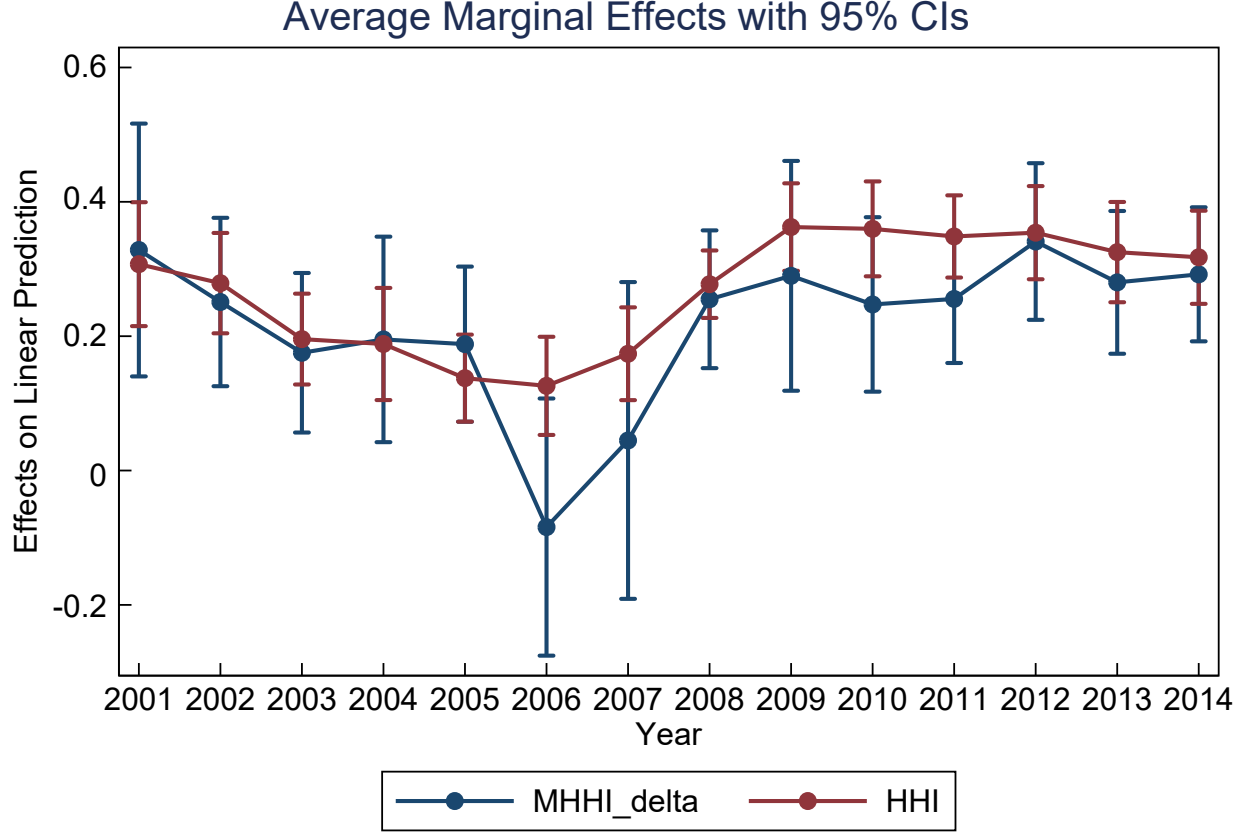


Figure IA.2. **Estimated effect of HHI and MHHI delta on ticket prices, by year.**

The graph plots the estimated effect of HHI and MHHI delta in each year as estimated from a market-level regression of prices based on Table III specification (6), but with MHHI delta and HHI each interacted with year fixed effects. We weight by average passengers for the market over time and double-cluster standard errors at the market and year-quarter levels. MHHI delta, which is a measure of common ownership among airlines in a route, is the difference between MHHI and HHI. HHI is the Herfindahl-Hirschman Index. We calculate the index as the sum of the squared market shares of a given route and year-quarter. We exclude international carriers and charter carriers. MHHI is the modified HHI of O'Brien and Salop (2000). We calculate the index using $MHHI = HHI + \sum_{k \neq j} s_j s_k \frac{\sum_i \gamma_{ij} \beta_{ik}}{\sum_i \gamma_{ij} \beta_{ij}}$, where s_j is the market share of carrier j , γ_{ij} is proportional to the voting shares of shareholder i in carrier j , and β_{ij} is the share of carrier j owned by shareholder i . We exclude routes with less than 20 passengers per day on average. Variable definitions are provided in Section II.B of the Internet Appendix.

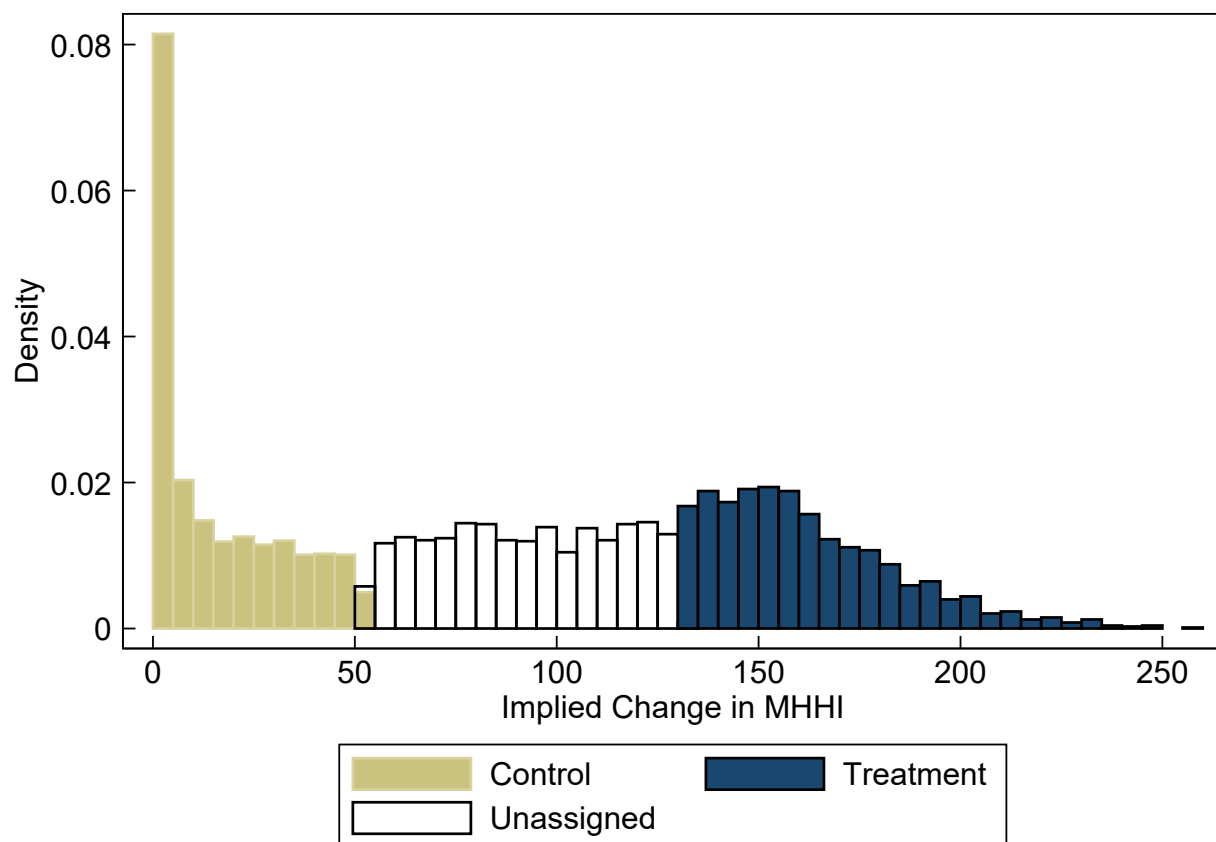


Figure IA.3. **Distribution of implied MHHI delta across markets (BlackRock-BGI DiD).** This graph plots the cross-sectional distribution of the increase in route-level MHHI delta implied by a hypothetical combination of BlackRock and BGI's pre-acquisition portfolios. The implied MHHI delta reflects the increase in market concentration implied by the hypothetical combination of BlackRock's and Barclays Global Investors' equity portfolios in 2009Q1. The shaded areas are those markets used as treatment and controls in the discrete implementation of the instrument. We use the entire distribution in a continuous-treatment specification.

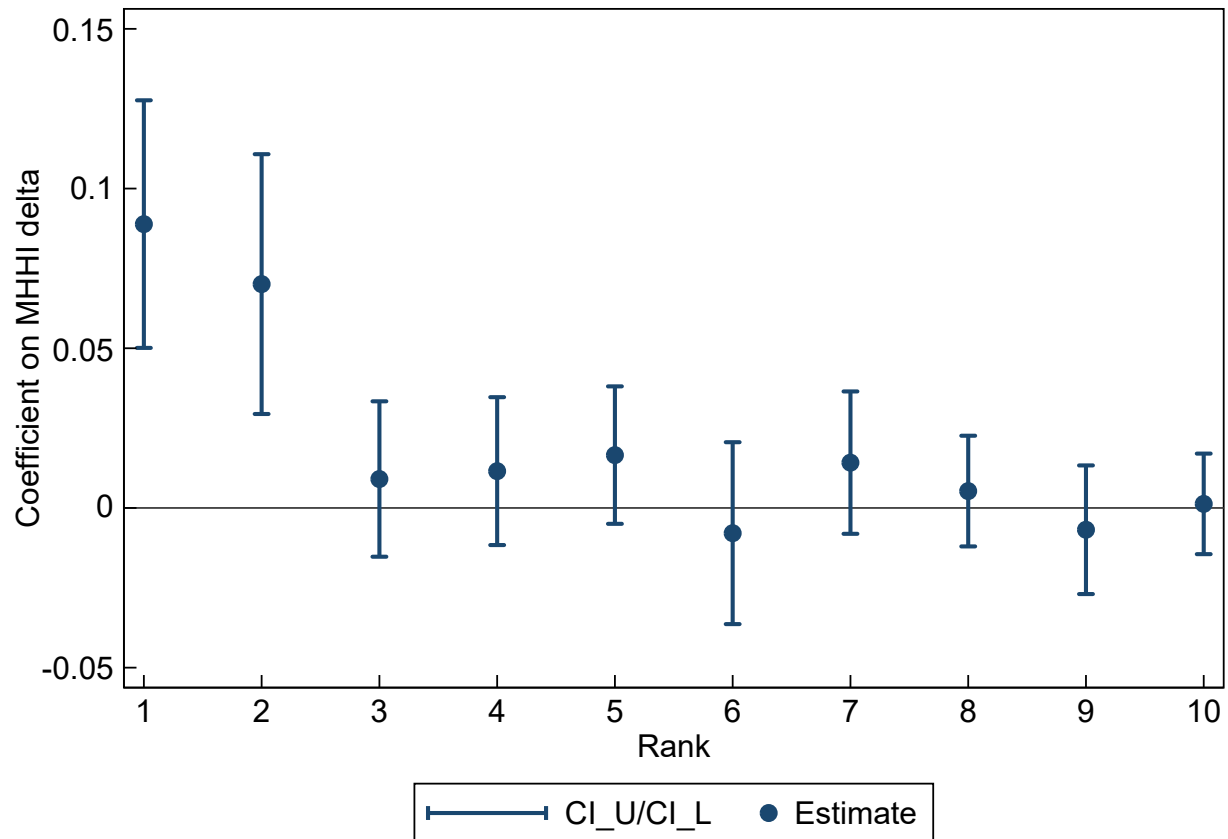


Figure IA.4. **Effect of common ownership on ticket prices by shareholder rank.**

This graph plots the effect of MHHI delta calculated as if only the shareholder of a given rank controlled the firm. We show the effect for shareholder ranks from 1 to 10. It is derived from a market-level regression of prices based on Table III specification (6), but with the alternative calculation of MHHI delta instead of the one in the baseline. We weight by average passengers for the market carrier over time and double-cluster standard errors at the market-carrier and year-quarter levels.

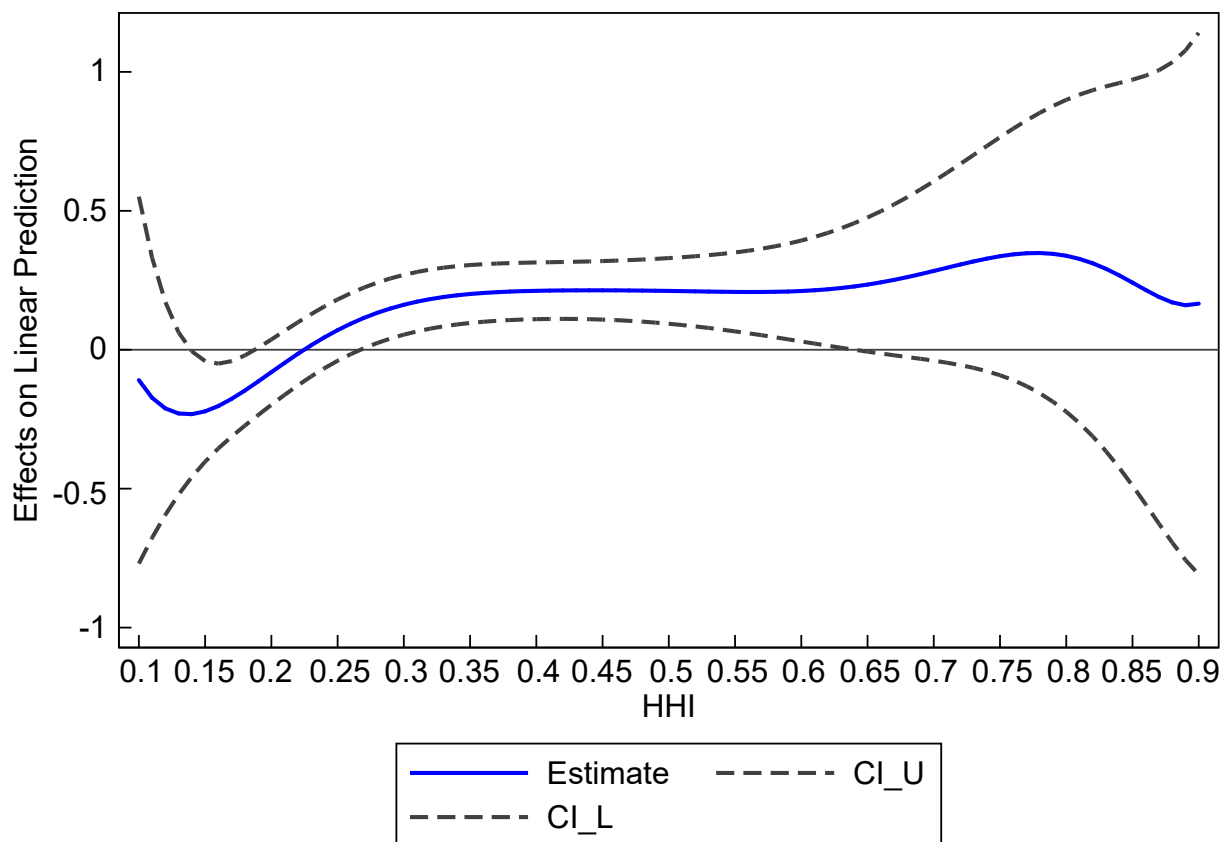


Figure IA.5. **Effect of common ownership on ticket prices, by levels of market concentration as measured by HHI.**

This graph plots the effect of MHHI delta by HHI, where HHI is measure on a scale from 0 to 1. It is derived from a market-level regression of prices based on Table III specification (6), but with MHHI delta interacted with a 10th-order polynomial in HHI. We weight by average passengers for the market over time and double-cluster standard errors at the market and year-quarter levels.

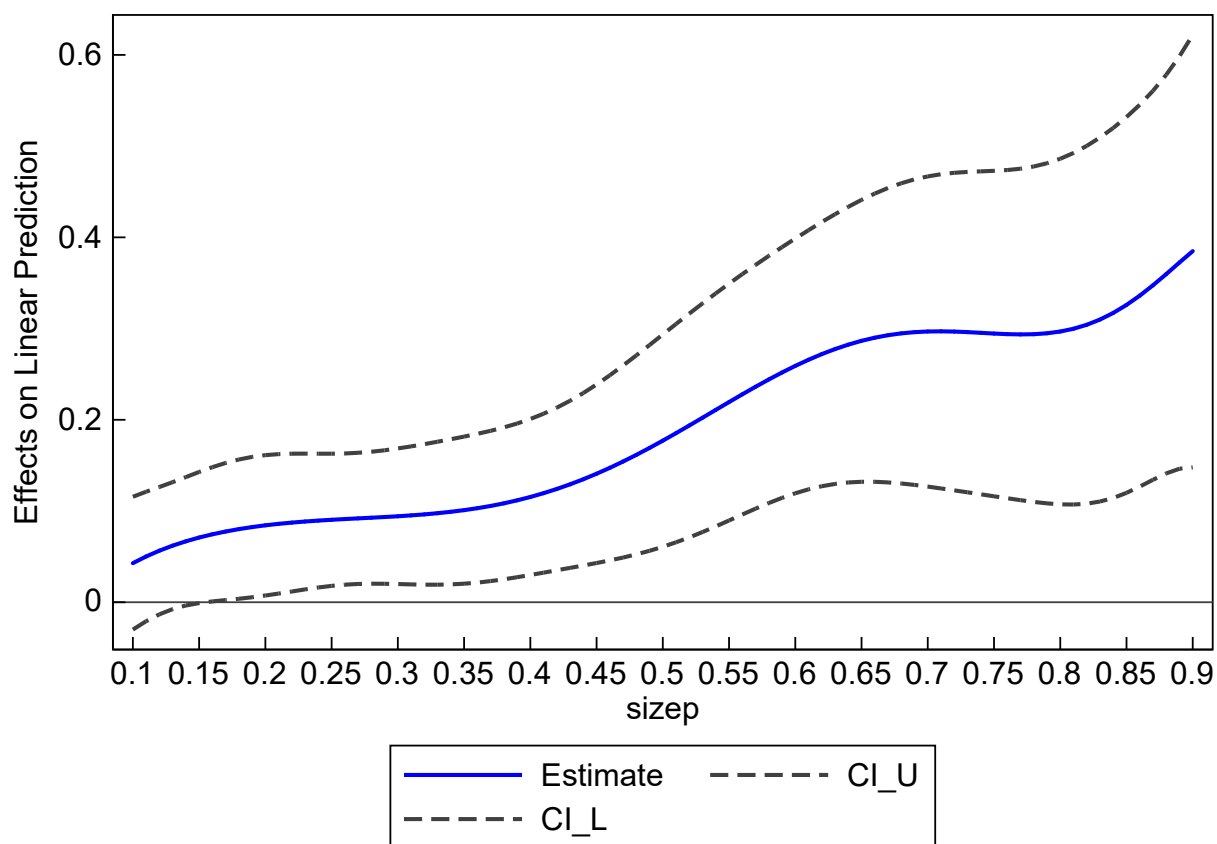


Figure IA.6. Effect of common ownership on ticket prices, by market size percentile. This graph plots the effect of MHHI delta by market size percentiles, expressed as a fraction from 0 to 1. It is derived from a market-level regression of prices based on Table III specification (6), but with MHHI delta interacted with a 10th-order polynomial in market size percentiles. We weight by average passengers for the market over time and double-cluster standard errors at the market and year-quarter levels.

References

- de Haas, Samuel, and Johannes Paha, 2016, Partial cross ownership and collusion, Discussion paper, Joint Discussion Paper Series in Economics.
- Evans, William N., and Ioannis N. Kessides, 1994, Living by the “Golden Rule”: Multimarket contact in the U.S. airline industry, *Quarterly Journal of Economics* 109, 341–366.
- Gilo, David, Yossi Moshe, and Yossi Spiegel, 2006, Partial cross ownership and tacit collusion, *RAND Journal of Economics* 37, 81–99.
- O’Brien, Daniel P., and Steven C. Salop, 2000, Competitive effects of partial ownership: Financial interest and corporate control, *Antitrust Law Journal* 67, 559–614.