Effect of merger on market price and product quality: American Airlines and US Airways

Somnath Das

Purdue University

August 18, 2017

Road Map for the Presentation

- Summary

Road Map for the Presentation

- Summary
- Overview of the results

Road Map for the Presentation

- Summary
- Overview of the results
- Merger Process

Road Map for the Presentation

- Summary
- Overview of the results
- Merger Process
- Literature Review

Road Map for the Presentation

- Summary
- Overview of the results
- Merger Process
- Literature Review
- Data

Road Map for the Presentation

- Summary
- Overview of the results
- Merger Process
- Literature Review
- Data
- Identification Strategy

Road Map for the Presentation

- Summary
- Overview of the results
- Merger Process
- Literature Review
- Data
- Identification Strategy
- Results

Road Map for the Presentation

- Summary
- Overview of the results
- Merger Process
- Literature Review
- Data
- Identification Strategy
- Results
- Conclusion

Summary

Summary

- Impact of the recent U.S. Air-American Airlines merger on airfares and product quality (flight frequency).

Summary

- Impact of the recent U.S. Air-American Airlines merger on airfares and product quality (flight frequency).
- Difference in difference (DID) analysis, and merger simulation.

Summary

- Impact of the recent U.S. Air-American Airlines merger on airfares and product quality (flight frequency).
- Difference in difference (DID) analysis, and merger simulation.
- The decrease in price is higher in larger markets and less in smaller markets.

Summary

- Impact of the recent U.S. Air-American Airlines merger on airfares and product quality (flight frequency).
- Difference in difference (DID) analysis, and merger simulation.
- The decrease in price is higher in larger markets and less in smaller markets.
- No significant effect on flight frequency and delay.

Summary

- Impact of the recent U.S. Air-American Airlines merger on airfares and product quality (flight frequency).
- Difference in difference (DID) analysis, and merger simulation.
- The decrease in price is higher in larger markets and less in smaller markets.
- No significant effect on flight frequency and delay.
- Less number of canceled flights in the larger markets.

Overview of the Results

Overview of the Results

- DID analysis

Overview of the Results

- DID analysis
  - Significant negative effects on the market price.

Overview of the Results

- DID analysis
  - Significant negative effects on the market price.
  - DID statistic is positive for smaller markets.

Overview of the Results

- DID analysis
  - Significant negative effects on the market price.
  - DID statistic is positive for smaller markets.
  - No significant effect on flight frequency.

Overview of the Results

- DID analysis
  - Significant negative effects on the market price.
  - DID statistic is positive for smaller markets.
  - No significant effect on flight frequency.
- Merger Simulation

Overview of the Results

- DID analysis
  - Significant negative effects on the market price.
  - DID statistic is positive for smaller markets.
  - No significant effect on flight frequency.
- Merger Simulation
  - Price increased by 3% due to the change in ownership as a result of the merger $\Rightarrow$ positive level of cost reduction.

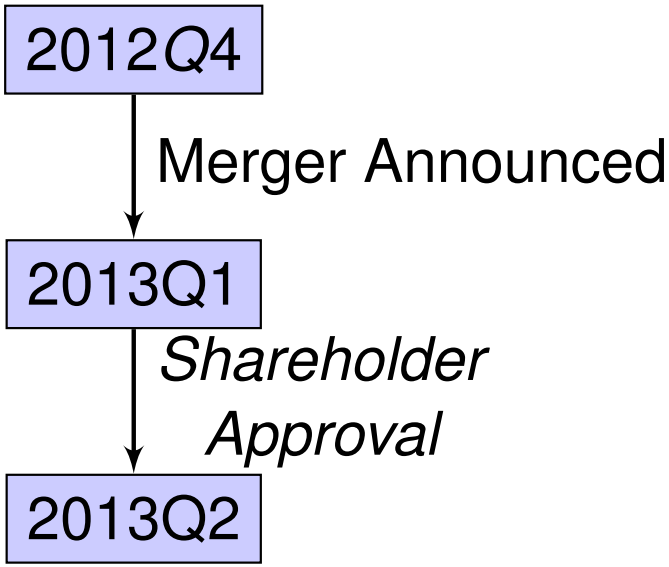
Merger Process

The Merger Process

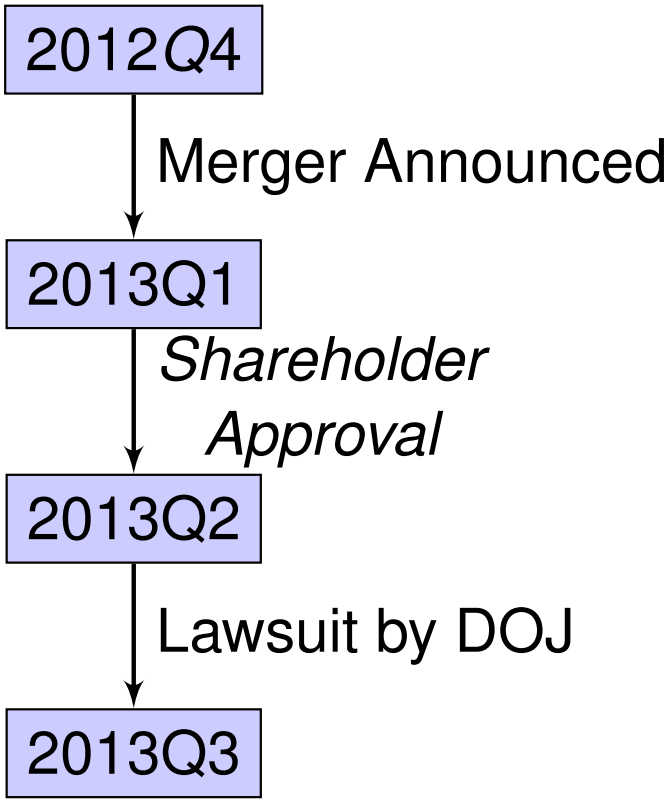
2012Q4

The Merger Process

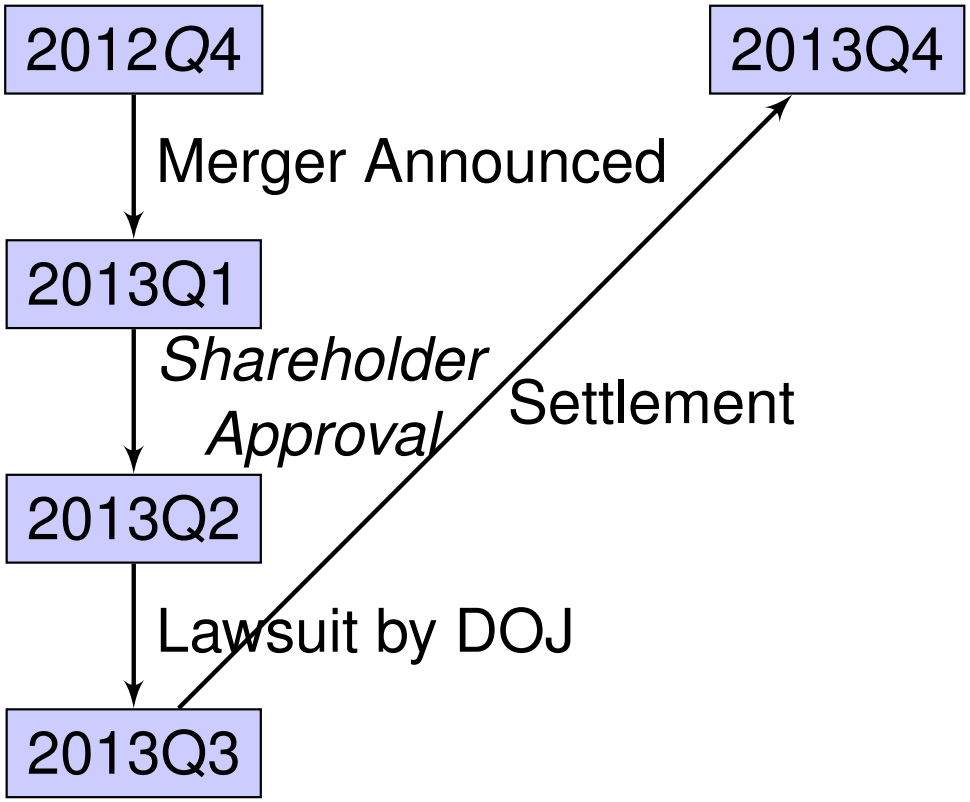
The Merger Process



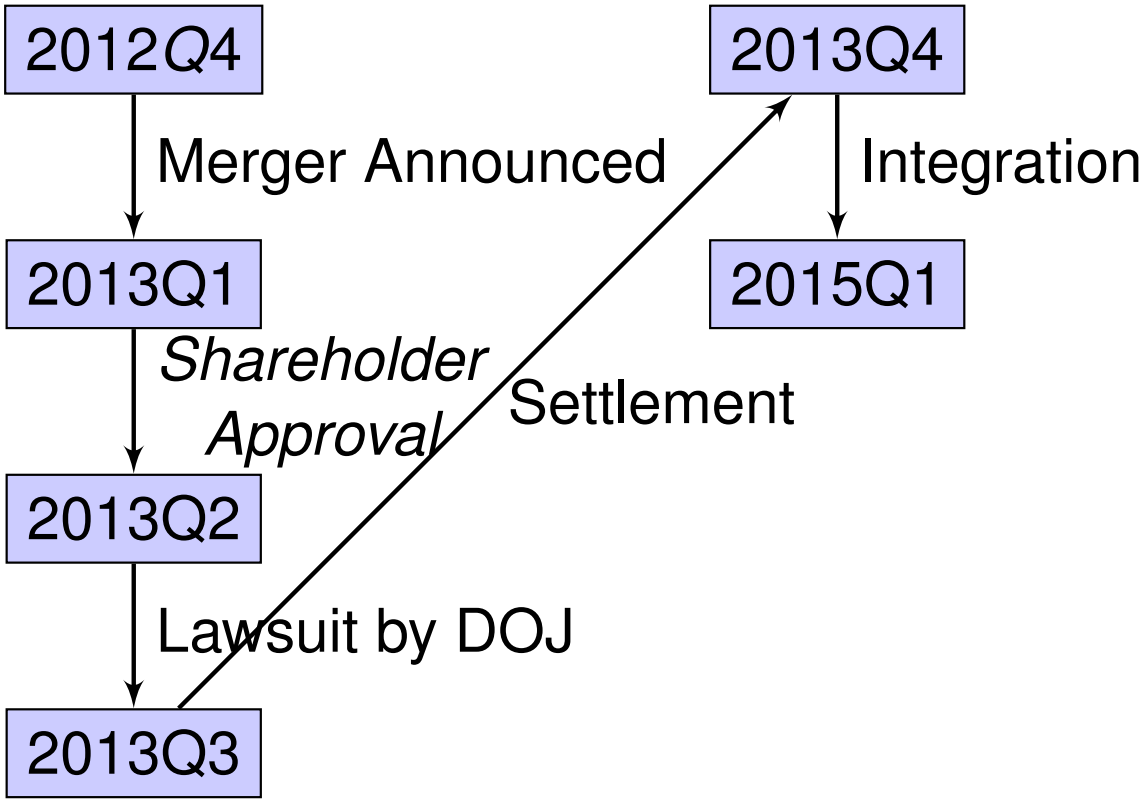
The Merger Process



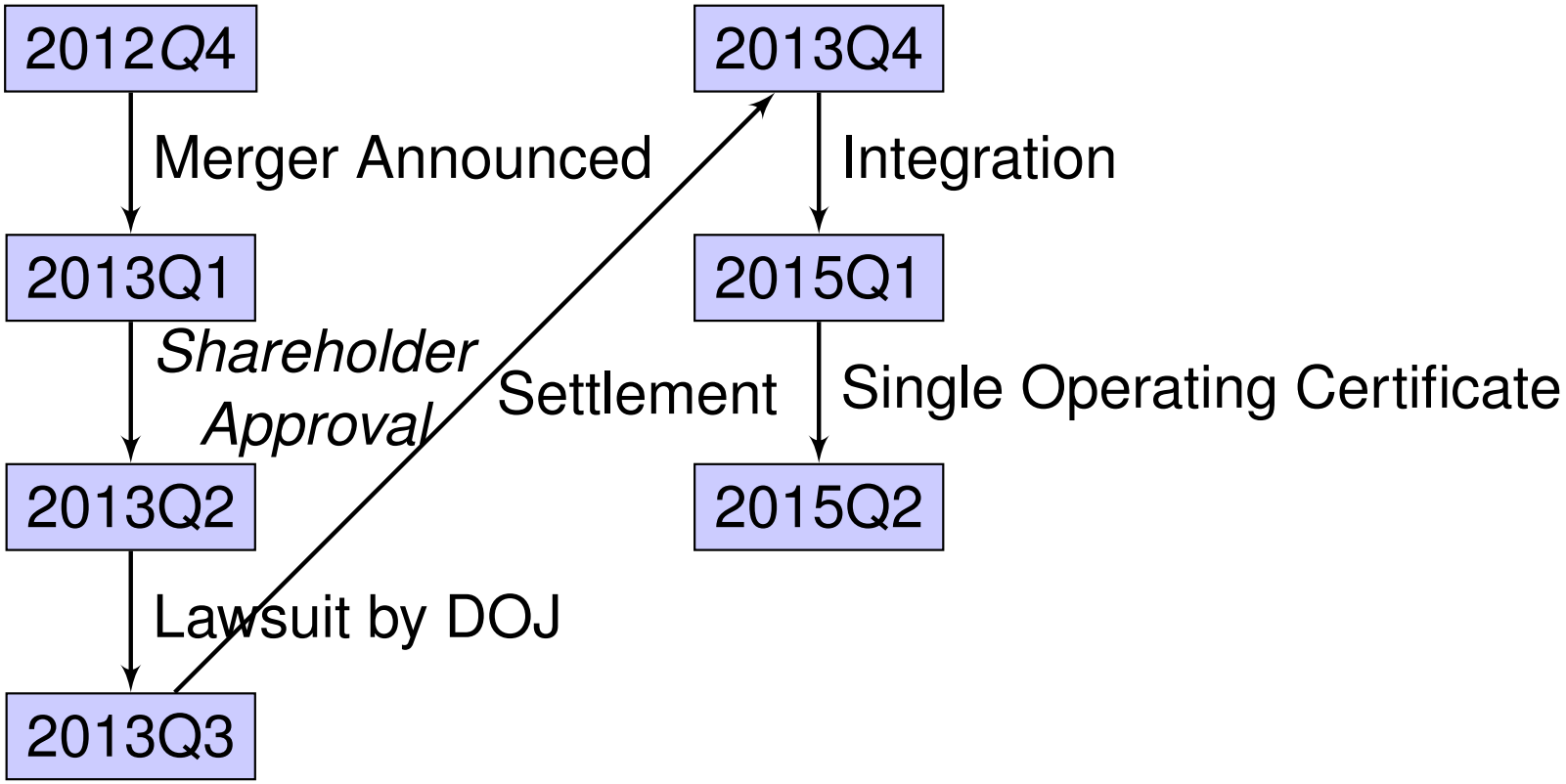
The Merger Process



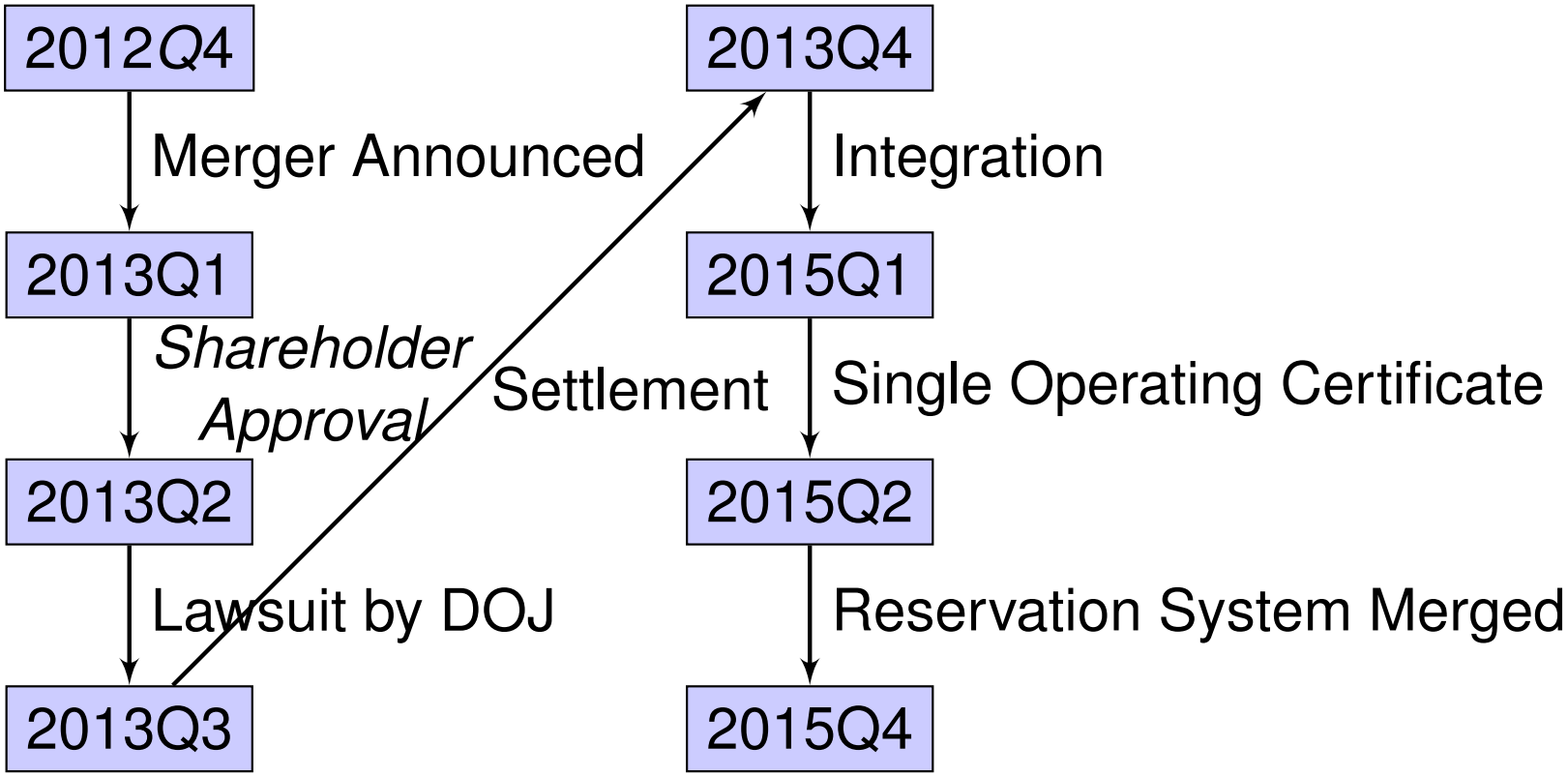
The Merger Process



The Merger Process



The Merger Process



Competitive Corrections by DOJ Divestitures and De-hubbing

- Divestitures at Airports in Boston, Chicago, Dallas, Los Angeles, Miami, New York and Near Washington, D.C.

Competitive Corrections by DOJ Divestitures and De-hubbing

- Divestitures at Airports in Boston, Chicago, Dallas, Los Angeles, Miami, New York and Near Washington, D.C.
  - 104 air carrier slots at Reagan National

Competitive Corrections by DOJ Divestitures and De-hubbing

- Divestitures at Airports in Boston, Chicago, Dallas, Los Angeles, Miami, New York and Near Washington, D.C.
  - 104 air carrier slots at Reagan National
  - 34 slots at LaGuardia

Competitive Corrections by DOJ Divestitures and De-hubbing

- Divestitures at Airports in Boston, Chicago, Dallas, Los Angeles, Miami, New York and Near Washington, D.C.
  - 104 air carrier slots at Reagan National
  - 34 slots at LaGuardia
  - 2 airport gates at each of Boston Logan, Chicago OHare, Dallas Love Field, Los Angeles International and Miami International.

Competitive Corrections by DOJ Divestitures and De-hubbing

- Divestitures at Airports in Boston, Chicago, Dallas, Los Angeles, Miami, New York and Near Washington, D.C.
  - 104 air carrier slots at Reagan National
  - 34 slots at LaGuardia
  - 2 airport gates at each of Boston Logan, Chicago OHare, Dallas Love Field, Los Angeles International and Miami International.
- Opens door for low cost carriers to compete resulting in more choices and more competitive airfares for consumers.

Competitive Corrections by DOJ Divestitures and De-hubbing

- Divestitures at Airports in Boston, Chicago, Dallas, Los Angeles, Miami, New York and Near Washington, D.C.
  - 104 air carrier slots at Reagan National
  - 34 slots at LaGuardia
  - 2 airport gates at each of Boston Logan, Chicago OHare, Dallas Love Field, Los Angeles International and Miami International.
- Opens door for low cost carriers to compete resulting in more choices and more competitive airfares for consumers.
- Maintain all the hub airports for at least 3 years after the merger is completed.

What makes this merger special?

- American Airlines filed for Chapter 11 in November 2011 in the U.S. Bankruptcy Court for the Southern District of New York.

What makes this merger special?

- American Airlines filed for Chapter 11 in November 2011 in the U.S. Bankruptcy Court for the Southern District of New York.
- The proposed merger was going to create the biggest airline in the world during the time of the announcement in 2012.

What makes this merger special?

- American Airlines filed for Chapter 11 in November 2011 in the U.S. Bankruptcy Court for the Southern District of New York.
- The proposed merger was going to create the biggest airline in the world during the time of the announcement in 2012.
- The two airlines had approximately 30% appendix overlapping airport-pair markets in 2012 before the merger.

What makes this merger special?

- American Airlines filed for Chapter 11 in November 2011 in the U.S. Bankruptcy Court for the Southern District of New York.
- The proposed merger was going to create the biggest airline in the world during the time of the announcement in 2012.
- The two airlines had approximately 30% appendix overlapping airport-pair markets in 2012 before the merger.
- So it was natural for the DOJ to raise anti competitive concerns against this merger.

Research Question

- Is there an ***increase*** in price due to the merger?

Research Question

- Is there an ***increase*** in price due to the merger?
- Is there a ***decrease*** in output (i.e. flight frequency) due to the merger?

Channels affecting price

- When there is a merger between two firms there are two opposite effects that works against the other.

Williamson

Channels affecting price

- When there is a merger between two firms there are two opposite effects that works against the other.
  - Cost saving (synergy): Synergy is the concept that the performance of two companies combined will be greater than the sum of the performances of the separate individual companies. It can occur due to cost reduction, economies of scale, combined human resources, and technology.

Williamson

Channels affecting price

- When there is a merger between two firms there are two opposite effects that works against the other.
  - Cost saving (synergy): Synergy is the concept that the performance of two companies combined will be greater than the sum of the performances of the separate individual companies. It can occur due to cost reduction, economies of scale, combined human resources, and technology.
  - Market power effect: Due to removal of a competitor and fewer number of firms in the market, a firm might be able to profitably raise the market price of a good or service over marginal cost.

Williamson

Channels affecting price

- When there is a merger between two firms there are two opposite effects that works against the other.
  - Cost saving (synergy): Synergy is the concept that the performance of two companies combined will be greater than the sum of the performances of the separate individual companies. It can occur due to cost reduction, economies of scale, combined human resources, and technology.
  - Market power effect: Due to removal of a competitor and fewer number of firms in the market, a firm might be able to profitably raise the market price of a good or service over marginal cost.
  - Merger between American and US Airways gives a opportunity to analyze which of the above two effects dominates the other.

Williamson

Channels affecting quality

- Positive effect

Channels affecting quality

- Positive effect
  - Better network

Channels affecting quality

- Positive effect
  - Better network
  - Combined resource pool

Channels affecting quality

- Positive effect
  - Better network
  - Combined resource pool
  - Internalizing congestion externality

Channels affecting quality

- Positive effect
  - Better network
  - Combined resource pool
  - Internalizing congestion externality
  - Best practices

Channels affecting quality

- Positive effect
  - Better network
  - Combined resource pool
  - Internalizing congestion externality
  - Best practices
- Negative effect

Channels affecting quality

- Positive effect
  - Better network
  - Combined resource pool
  - Internalizing congestion externality
  - Best practices
- Negative effect
  - Difficulty in integration process (IT, labor).

Channels affecting quality

- Positive effect
  - Better network
  - Combined resource pool
  - Internalizing congestion externality
  - Best practices
- Negative effect
  - Difficulty in integration process (IT, labor).
  - Reduced threat of competition.

Literature Review

Literature Review

- Trade off between efficiency gain and market power

Literature Review

- Trade off between efficiency gain and market power
  - Theoretical: Williamson (1968), Farrell and Shapiro (1990).

Literature Review

- Trade off between efficiency gain and market power
  - Theoretical: Williamson (1968), Farrell and Shapiro (1990).
  - Airline: Carlton et al (1980), Kim and Singal (1993), Luo (2014).

Literature Review (Cont.)

- Airport dominance and market power due to merger

Literature Review (Cont.)

- Airport dominance and market power due to merger
  - Borenstein (1989), Borenstein (1990).

Literature Review (Cont.)

- Airport dominance and market power due to merger
  - Borenstein (1989), Borenstein (1990).
  - Evans and Kessides (1993), Abramowitz and Brown (1993).

Literature Review (Cont.)

- Airport dominance and market power due to merger
  - Borenstein (1989), Borenstein (1990).
  - Evans and Kessides (1993), Abramowitz and Brown (1993).
- Merger simulation

Literature Review (Cont.)

- Airport dominance and market power due to merger
  - Borenstein (1989), Borenstein (1990).
  - Evans and Kessides (1993), Abramowitz and Brown (1993).
- Merger simulation
  - Peters (2006).

Literature Review (Cont.)

- Airport dominance and market power due to merger
  - Borenstein (1989), Borenstein (1990).
  - Evans and Kessides (1993), Abramowitz and Brown (1993).
- Merger simulation
  - Peters (2006).
- Conduct parameter

Literature Review (Cont.)

- Airport dominance and market power due to merger
  - Borenstein (1989), Borenstein (1990).
  - Evans and Kessides (1993), Abramowitz and Brown (1993).
- Merger simulation
  - Peters (2006).
- Conduct parameter
  - Ciliberto and Williams (2014).

Contribution to the existing literature

- Addition to the retrospective study of mergers.

Contribution to the existing literature

- Addition to the retrospective study of mergers.
- Using structural model and therefore able to provide counter factual analysis.

Contribution to the existing literature

- Addition to the retrospective study of mergers.
- Using structural model and therefore able to provide counter factual analysis.
- One of the important policy question is whether the observed post merger price is due to lack of pre merger competition? (few studies on conduct)

Contribution to the existing literature

- Addition to the retrospective study of mergers.
- Using structural model and therefore able to provide counter factual analysis.
- One of the important policy question is whether the observed post merger price is due to lack of pre merger competition? (few studies on conduct)
  - This paper attempts to quantify conduct parameter.

Contribution to the existing literature

- Addition to the retrospective study of mergers.
- Using structural model and therefore able to provide counter factual analysis.
- One of the important policy question is whether the observed post merger price is due to lack of pre merger competition? (few studies on conduct)
  - This paper attempts to quantify conduct parameter.
- Attempt to disentangle the cost efficiency and conduct parameter by providing an estimate of marginal cost.

Data

Data Source

- Main source of data for this project is **DB1B** database of Department of Transportation.
- The database is a **10**% quarterly sample of airline origin and destination survey.
- **T100 Domestic Segments** database of Department of Transportation is used for flight frequency. appendix
- **On time performance** database of DOT.
- 2010 $Q2$ to 2012 $Q2$ as pre-merger.
- 2016 $Q1$ to 2016 $Q4$ for post-merger.

Identification and Results

Identification

- DID analysis

Identification

- DID analysis
- Merger Simulation

DID Analysis

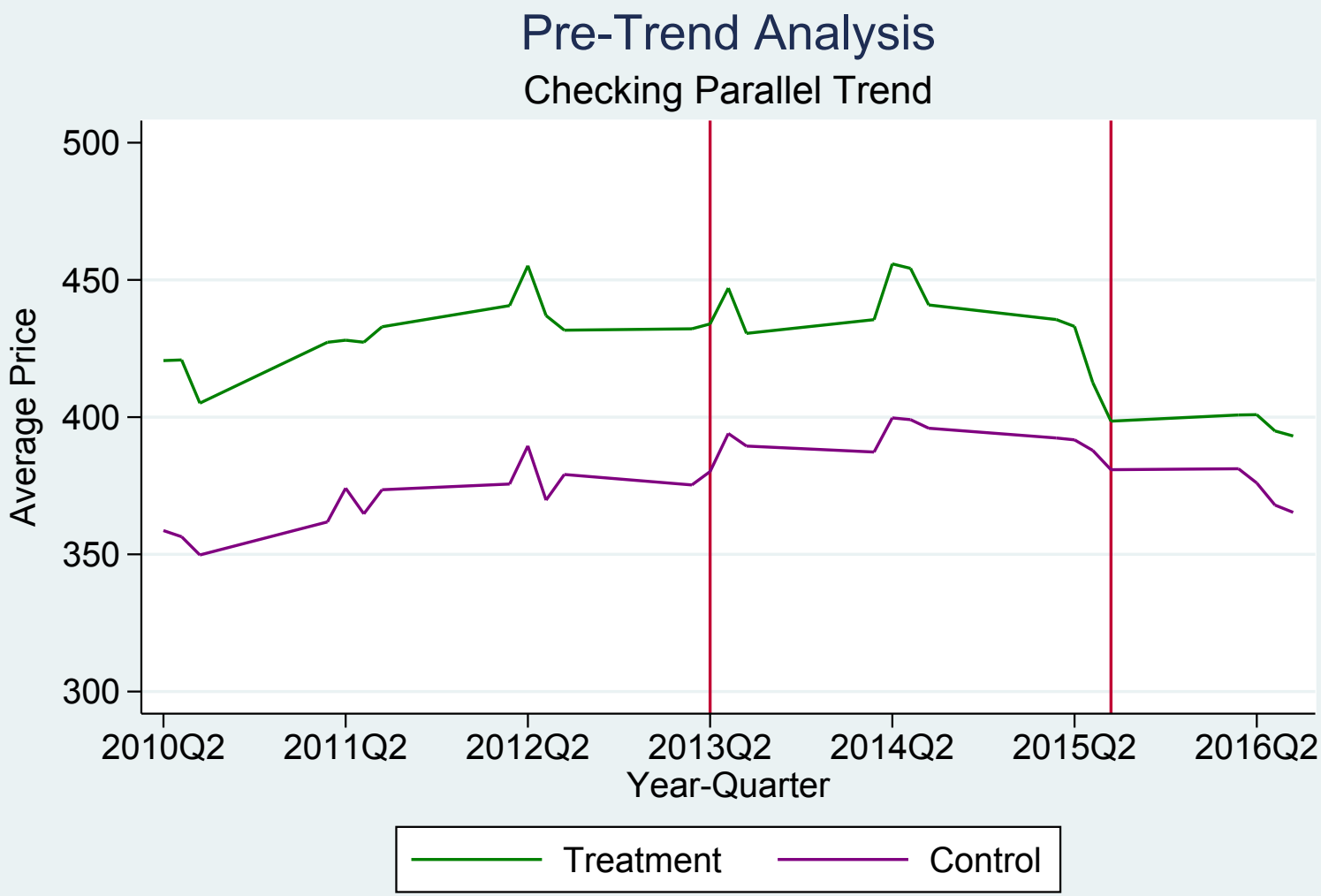
$$P_{jmt} = \gamma_m + \lambda_t + \delta * D_{mt} + \epsilon_{jmt}$$

$$\hat{\delta} = \frac{1}{M}\sum_{m=1}^{M}\left(\bar{P_{m1}} - \bar{P_{m2}}\right) - \frac{1}{N}\sum_{n=1}^{N}\left(\bar{P_{n1}} - \bar{P_{n2}}\right)$$

$$\bar{P_{mt}} = \sum_{j=1}^{J} P_{jmt} w_j \qquad \forall t = 1, 2$$

$$\bar{P_{nt}} = \sum_{j=1}^{J} P_{jnt} w_j \qquad \forall t = 1, 2$$

Pre-Trend Analysis



DID Analysis Result (Price)

- Treatment: markets where both AA and US were present before the merger, only US was present, and only AA was present . I treated other markets as control.
- The result shows that the **difference** between the average decrease in price between the **treatment** and **control** airport pair markets is **negative** and statistically **significant** overall.
- In smaller markets the difference is positive i.e. the decrease in price in control is higher than the decrease in price in treatment group.

DID Analysis Result (Price)

Table: Effect of Merger on Price

	(1) Price <5K	(2) Price <10K&>5K	(3) Price <25K&>10K	(4) Price >25K	(5) Price All
time	2.948	-4.842	-1.955	-0.335	-6.787***
	(1.26)	(-1.57)	(-0.67)	(-0.06)	(-3.37)
treated	38.84***	57.95***	66.36***	67.99***	45.60***
	(21.17)	(21.67)	(24.90)	(16.55)	(25.35)
did	21.46***	8.736*	-15.20***	-23.75***	-9.044***
	(6.50)	(1.88)	(-3.31)	(-3.27)	(-2.75)
_cons	372.7***	340.3***	304.5***	274.1***	322.8***
	(294.08)	(184.43)	(182.37)	(94.25)	(302.44)
N	19628	8609	7356	2663	38256
adj. R^2	0.048	0.084	0.106	0.102	0.047

Divestiture

DID Analysis Result (Frequency)

Table: Effect of Merger on Frequency of Flights

	(1) Freq <5K	(2) Freq <10K&>5K	(3) Freq <25K&>10K	(4) Freq >25K	(5) Freq All
time	-31.72***	-25.90***	-51.07***	-11.44	-35.51***
	(-6.49)	(-3.11)	(-4.18)	(-0.33)	(-5.29)
treated	56.79***	52.66***	-35.82***	285.0***	113.8***
	(13.69)	(9.32)	(-4.48)	(13.69)	(23.03)
did	-6.093	2.129	14.90	-57.29	-9.230
	(-0.82)	(0.20)	(0.96)	(-1.28)	(-0.95)
_cons	224.1***	393.2***	744.2***	1155.9***	484.8***
	(82.74)	(91.29)	(119.72)	(74.64)	(143.92)
N	18954	14888	15269	5952	55063
adj. R^2	0.016	0.009	0.003	0.027	0.013

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

DID Analysis Result (Seats)

Table: Effect of Merger on Number of Seats

	(1) Freq <5K	(2) Freq <10K&>5K	(3) Freq <25K&>10K	(4) Freq >25K	(5) Freq All
time	-802.1	696.8	297.4	5221.5	139.0
	(-1.29)	(0.61)	(0.16)	(1.02)	(0.14)
treated	1138.3***	2765.7***	-5218.1***	32955.6***	12373.2***
	(2.73)	(3.93)	(-4.79)	(11.41)	(17.99)
did	210.4	424.0	459.9	-3782.4	-754.8
	(0.26)	(0.29)	(0.20)	(-0.60)	(-0.54)
_cons	22126.7***	47378.7***	98192.2***	166892.0***	61015.1***
	(70.56)	(86.36)	(114.03)	(73.07)	(127.72)
N	18954	14888	15269	5952	55063
adj. R^2	0.001	0.001	0.002	0.021	0.007

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

DID Analysis Result (Delay in Departure)

Table: Effect of Merger on Delay in Departure

	(1) DD <5K	(2) DD <10K&>5K	(3) DD <25K&>10K	(4) DD >25K	(5) DD All
time	-18.89	310.7**	918.4***	1761.6***	529.2***
	(-0.18)	(2.16)	(4.52)	(2.64)	(4.09)
treated	400.7	-14.49	475.2	2806.9***	1889.2***
	(1.22)	(-0.05)	(1.27)	(3.00)	(5.30)
did	87.39	-97.93	-317.7	589.3	382.1
	(0.16)	(-0.25)	(-0.54)	(0.42)	(0.68)
_cons	1480.4***	2097.3***	3440.5***	6690.5***	2829.4***
	(19.15)	(22.53)	(27.70)	(14.91)	(34.09)
N	810	851	944	372	2979
adj. R^2	0.001	0.002	0.020	0.071	0.039

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

DID Analysis Result (Delay in Arrival)

Table: Effect of Merger on Delay in Arrival

	(1) DA <5K	(2) DA <10K&>5K	(3) DA <25K&>10K	(4) DA >25K	(5) DA All
time	-46.99	317.7**	995.8***	2067.0***	575.9***
	(-0.42)	(2.09)	(4.63)	(2.61)	(3.94)
treated	536.0	102.5	893.0**	3344.1***	2376.4***
	(1.41)	(0.35)	(2.19)	(3.31)	(6.02)
did	160.5	-118.1	-384.6	47.49	279.6
	(0.26)	(-0.27)	(-0.61)	(0.03)	(0.46)
_cons	1644.7***	2294.0***	3776.6***	7688.3***	3146.2***
	(19.56)	(23.01)	(28.45)	(14.63)	(33.58)
N	810	851	944	372	2979
adj. R^2	0.004	0.002	0.025	0.064	0.044

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

DID Analysis Result (Canceled Flights)

Table: Effect of Merger on Canceled Flights

	(1) NoC <5K	(2) NoC <10K&>5K	(3) NoC <25K&>10K	(4) NoC >25K	(5) NoC All
time	-0.771***	-0.349***	-0.664***	-0.543	-0.607***
	(-7.22)	(-2.95)	(-2.90)	(-0.46)	(-3.81)
treated	0.822	0.693*	1.282***	6.299***	3.192***
	(1.49)	(1.84)	(3.04)	(3.00)	(4.99)
did	-0.184	-0.763*	-1.144**	-6.370***	-2.285***
	(-0.26)	(-1.81)	(-2.23)	(-2.69)	(-3.32)
_cons	1.133***	1.102***	2.189***	5.614***	1.934***
	(11.41)	(11.09)	(12.61)	(7.74)	(17.62)
N	810	851	944	372	2979
adj. R^2	0.070	0.020	0.023	0.040	0.037

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Merger Simulation

Merger Simulation

- Estimating demand from nested logit model.

Merger Simulation

- Estimating demand from nested logit model.
- Backing out marginal cost from a Nash-Bertrand game.

Merger Simulation

- Estimating demand from nested logit model.
- Backing out marginal cost from a Nash-Bertrand game.
- Simulating the post merger price assuming that marginal cost is unchanged with a new ownership matrix.

Merger Simulation

- Estimating demand from nested logit model.
- Backing out marginal cost from a Nash-Bertrand game.
- Simulating the post merger price assuming that marginal cost is unchanged with a new ownership matrix.
- Doing counterfactual analysis with different level of cost reduction and conduct parameter.

conduct

Demand

- A consumer maximizes her utility function while choosing among different products. appendix

$$\underset{j\in(0,\ldots,J_m)}{Max}\ U_{ijm} = x_{jm}\beta - \alpha ln(p_{jm}) + \xi_{jm} + v_{it}(\lambda) + \lambda\epsilon_{ijm}$$

$$ln(s_j) - ln(s_0) = x_j\beta - \alpha ln(p_j) + \xi_j + (1-\lambda)ln(s_{j|g}) \quad (1)$$

- Instruments
  - Cost side: A fourth order polynomial in distance
  - Demand side: Hub status of the connecting airport
  - Product characteristics of competitors: Average inconvenience, connections, no of other products by competitor etc.
  - Market: HHI
- Connection is defined as number of stops between the origin and destination.
- Inconvenience is defined as distance over market distance.

derivation

Demand Estimation Results

Table: Demand Estimation

log of fare	-2.920***
	(0.0898)
log of within group share	0.655***
	(0.00813)
connections	-0.209***
	(0.00699)
inconvenience	-0.386***
	(0.0411)
market distance	0.0437***
	(0.00128)
N	61902
adj. R^2	0.784

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Demand Estimation Results

Table: Demand Estimation

origin hub	0.896***
	(0.0341)
origin hub*market distance	0.00179**
	(0.000866)
destination hub	0.413***
	(0.0276)
destination hub*market distance	0.00296***
	(0.000853)
constant	14.95***
	(0.481)
N	61902
adj. R^2	0.784

Standard errors in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Estimated Elasticity

Table: Elasticity Matrix of ORD-PHX Market, 2012 Q2

Carrier	Passengers	Fare	Connections	Elasticity					
American	610	454.49	One	-8.3	2.5	1.3	.2	.03	1.7
American	18310	423.75	Non stop	0.1	-5.7	1.4	.2	.03	1.9
United	9520	422.63	Non stop	0.1	2.7	-7.0	.2	.03	1.8
United	950	510.43	One	0.1	2.3	1.2	-8.3	.03	1.5
US Airways	160	595.37	One	0.1	1.9	1.0	.12	-8.4	1.3
US Airways	13570	388.21	Non stop	.1	2.9	1.5	.18	.04	-6.5

Note that elasticity of the non-stop flights is lower than one-connection flights for all the airlines.

Supply

- Following Berry and Jia (2010), I assume that firms play a static Bertrand-Nash price setting game. I use the first order conditions and the estimated demand parameters to back out the marginal cost of each product as in Berry et al. (1995). derivation

Following this notation, I can write the first order condition as follows,

$$s(p) - \Omega^{pre}(p)(p - mc) = 0$$

where Ω^{pre} is the matrix that indicates ownership relationshi

(2)

$$\hat{mc} = p - (\hat{\Omega}^{pre})^{-1} s^{observed} \quad (3)$$

I simulate the post-merger price by appropriately changing the ownership matrix

$$\hat{mc} = p' - \left(\Omega^{post}(p')\right)^{-1} s(p') \quad (4)$$

Counterfactual Analysis

Number of Overlapping Markets

Table: No of Overlapping Markets: 2012 Q2

	DL	US	AA	UA	AS	B6	F9	G4	NK	SY	VX	WN
DL	1194	446	302	369	32	112	109	7	56	27	18	720
US	446	754	195	333	19	59	57	0	26	9	23	372
AA	302	195	598	355	31	42	26	1	40	5	30	245
UA	369	333	355	873	59	57	130	9	37	4	46	426
AS	32	19	31	59	126	11	7	7	5	1	21	71
B6	112	59	42	57	11	162	0	0	13	0	13	64
F9	109	57	26	130	7	0	219	2	9	5	0	149
G4	7	0	1	9	7	0	2	23	2	0	0	0
NK	56	26	40	37	5	13	9	2	82	1	4	29
SY	27	9	5	4	1	0	5	0	1	27	0	15
VX	18	23	30	46	21	13	0	0	4	0	49	25
WN	720	372	245	426	71	64	149	0	29	15	25	1151

Number of Overlapping Markets

Table: No of Overlapping Markets: 2016 Q2

	DL	US	AA	UA	AS	B6	F9	G4	NK	SY	VX	WN
DL	1348	0	821	385	120	152	170	1	159	32	29	791
US	0	0	0	0	0	0	0	0	0	0	0	0
AA	821	0	1201	453	50	114	147	0	155	19	33	599
UA	385	0	453	746	57	50	156	1	131	12	44	346
AS	120	0	50	57	188	8	13	1	14	4	10	121
B6	152	0	114	50	8	224	3	0	34	0	16	82
F9	170	0	147	156	13	3	263	1	45	6	13	148
G4	1	0	0	1	1	0	1	3	0	0	0	1
NK	159	0	155	131	14	34	45	0	253	14	7	124
SY	32	0	19	12	4	0	6	0	14	32	0	16
VX	29	0	33	44	10	16	13	0	7	0	64	30
WN	791	0	599	346	121	82	148	1	124	16	30	1153

Estimated Conduct Pairwise

Table: Estimated Conduct: 2012 Q2

	DL	US	AA	UA	AS	B6	F9	G4	NK	SY	VX	WN
DL	1.00	0.60	0.32	0.44	0.05	0.09	0.09	0.04	0.06	0.05	0.05	0.93
US	0.60	1.00	0.17	0.37	0.05	0.06	0.06	0.04	0.05	0.04	0.05	0.45
AA	0.32	0.17	1.00	0.42	0.05	0.06	0.05	0.04	0.05	0.04	0.05	0.23
UA	0.44	0.37	0.42	1.00	0.06	0.06	0.11	0.04	0.05	0.04	0.06	0.56
AS	0.05	0.05	0.05	0.06	1.00	0.04	0.04	0.04	0.04	0.04	0.05	0.07
B6	0.09	0.06	0.06	0.06	0.04	1.00	0.04	0.04	0.04	0.04	0.04	0.06
F9	0.09	0.06	0.05	0.11	0.04	0.04	1.00	0.04	0.04	0.04	0.04	0.12
G4	0.04	0.04	0.04	0.04	0.04	0.04	0.04	1.00	0.04	0.04	0.04	0.04
NK	0.06	0.05	0.05	0.05	0.04	0.04	0.04	0.04	1.00	0.04	0.04	0.05
SY	0.05	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	1.00	0.04	0.04
VX	0.05	0.05	0.05	0.06	0.05	0.04	0.04	0.04	0.04	0.04	1.00	0.05
WN	0.93	0.45	0.23	0.56	0.07	0.06	0.12	0.04	0.05	0.04	0.05	1.00

Estimated Conduct Pairwise

Table: Estimated Conduct: 2016 Q2

	DL	US	AA	UA	AS	B6	F9	G4	NK	SY	VX	WN
DL	1.00	0.04	0.97	0.48	0.10	0.12	0.14	0.04	0.13	0.05	0.05	0.96
US	0.04	1.00	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
AA	0.97	0.04	1.00	0.61	0.06	0.09	0.12	0.04	0.13	0.05	0.05	0.83
UA	0.48	0.04	0.61	1.00	0.06	0.06	0.13	0.04	0.11	0.04	0.06	0.40
AS	0.10	0.04	0.06	0.06	1.00	0.04	0.04	0.04	0.04	0.04	0.04	0.10
B6	0.12	0.04	0.09	0.06	0.04	1.00	0.04	0.04	0.05	0.04	0.05	0.07
F9	0.14	0.04	0.12	0.13	0.04	0.04	1.00	0.04	0.06	0.04	0.04	0.12
G4	0.04	0.04	0.04	0.04	0.04	0.04	0.04	1.00	0.04	0.04	0.04	0.04
NK	0.13	0.04	0.13	0.11	0.04	0.05	0.06	0.04	1.00	0.04	0.04	0.10
SY	0.05	0.04	0.05	0.04	0.04	0.04	0.04	0.04	0.04	1.00	0.04	0.05
VX	0.05	0.04	0.05	0.06	0.04	0.05	0.04	0.04	0.04	0.04	1.00	0.05
WN	0.96	0.04	0.83	0.40	0.10	0.07	0.12	0.04	0.10	0.05	0.05	1.00

Counterfactual Analysis

Table: With Nash-Bertrand in Pre-merger and Post-merger Period

Cost Saving	**Industry**					
Merger	**0%**	**2.5%**	**5%**	**7.5%**	**10%**	**12.5%**
0%	2.5	-0.5	-2.5	-5.0	-7.5	-9.9
2.5%	1.5	-0.8	-3.6	-5.9	-8.5	-10.9
5%	0.6	-1.4	-4.4	-6.5	-9	-11.5
7.5%	-0.4	-2.6	-4.8	-7.3	-9.7	-12.2
10%	-1.1	-3.5	-5.6	-7.9	-10.5	-12.7
12.5%	-1.9	-4.2	-6.6	-8.7	-11.2	-13.6

Counterfactual Analysis

Table: With Tacit Collusion in Pre-merger and Post-merger Period

Cost Saving	**Industry**					
Merger	**0%**	**2.5%**	**5%**	**7.5%**	**10%**	**12.5%**
0%	2.9	-0.2	-2.4	-4.8	-7.2	-9.7
2.5%	1.5	-0.7	-3.3	-5.8	-8.2	-10.7
5%	0.5	-1.3	-3.9	-6.3	-8.7	-11.2
7.5%	-0.1	-2.5	-4.7	-7.1	-9.5	-11.9
10%	-1.0	-3.4	-5.4	-7.6	-10.4	-12.5
12.5%	-1.8	-3.9	-6.5	-8.6	-11.1	-13.4

Counterfactual Analysis

Table: With Tacit Collusion[1] only in Pre-merger Period

Cost Saving	**Industry**					
Merger	**0%**	**2.5%**	**5%**	**7.5%**	**10%**	**12.5%**
0%	1.8	-0.8	-3.3	-5.6	-8.2	-10.5
2.5%	1.1	-1.2	-3.9	-6.7	-8.7	-11.1
5%	0.3	-2.2	-4.9	-7.1	-9.4	-11.9
7.5%	-0.6	-2.9	-5.2	-7.6	-10.1	-12.7
10%	-1.5	-3.8	-6.1	-8.6	-10.9	-13.1
12.5%	-2.1	-4.8	-6.7	-9.4	-11.2	-14.1

[1] using pairwise conduct parameter estimated from multi-market contact

Counterfactual Analysis

Table: With Tacit Collusion only in Pre-merger Period ($\kappa = .4$)[2]

Cost Saving	**Industry**			
Merger	**0%**	**2.5%**	**5%**	**7.5%**
0%	-4.8	-6.8	-9.4	-11.5
2.5%	-5.5	-8.1	-10.4	-12.5
5%	-6.5	-8.4	-10.8	-13.1
7.5%	-7.2	-9.3	-11.7	-13.5

[2] κ=conduct parameter

Conclusion

Conclusion:

- Difference in differences analysis analysis shows that there is a negative significant impact of the merger on the price.

Conclusion:

- Difference in differences analysis analysis shows that there is a negative significant impact of the merger on the price.
- Smaller markets have not benefited in terms of lower price.

Conclusion:

- Difference in differences analysis analysis shows that there is a negative significant impact of the merger on the price.
- Smaller markets have not benefited in terms of lower price.
- Merger has no significant effect on the frequency of flights, number of seats, and delay.

Conclusion:

- Difference in differences analysis analysis shows that there is a negative significant impact of the merger on the price.
- Smaller markets have not benefited in terms of lower price.
- Merger has no significant effect on the frequency of flights, number of seats, and delay.
- Merger has significant effect in reduction of the number of canceled flights in larger markets.

Conclusion:

- Difference in differences analysis analysis shows that there is a negative significant impact of the merger on the price.
- Smaller markets have not benefited in terms of lower price.
- Merger has no significant effect on the frequency of flights, number of seats, and delay.
- Merger has significant effect in reduction of the number of canceled flights in larger markets.
- Merger simulation shows that change in the market structure without any cost reduction leads to 3% increase in price.

Conclusion:

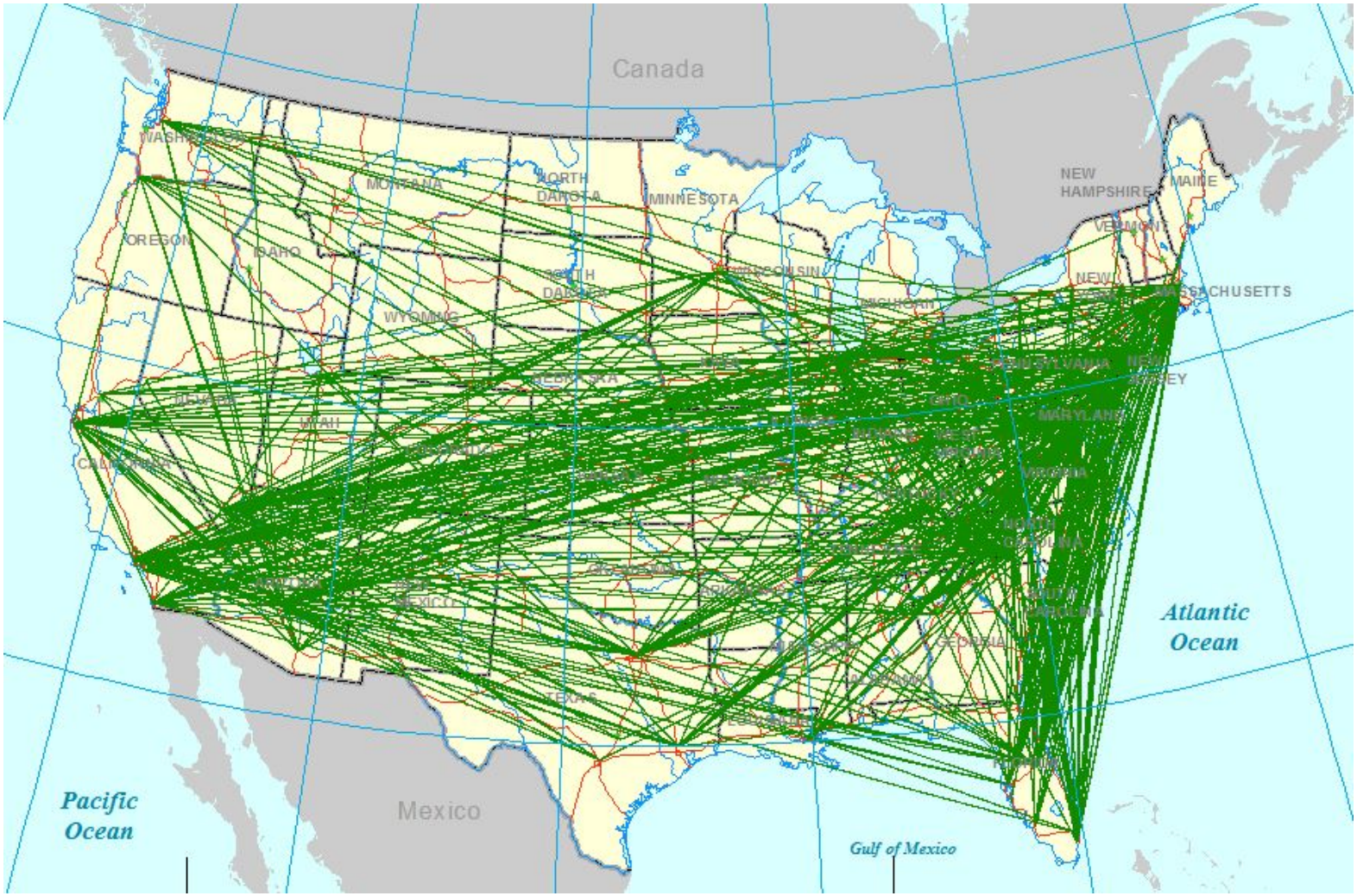
- Difference in differences analysis analysis shows that there is a negative significant impact of the merger on the price.
- Smaller markets have not benefited in terms of lower price.
- Merger has no significant effect on the frequency of flights, number of seats, and delay.
- Merger has significant effect in reduction of the number of canceled flights in larger markets.
- Merger simulation shows that change in the market structure without any cost reduction leads to 3% increase in price.
- A combination of 10% cost reduction industry wide and due to merger is able to predict the post-merger price quite accurately.

Thank You

Route Network: American Airlines

Back to main.

Route Network: US Airways



Back to main.

Route Network: Overlap AA and US

Back to main.

Definition of Merger Dummy

$$merger = \begin{cases} 1 & AA^{pre} \text{ and US both used to provide service before the merger and only } AA^{post} \text{ is providing service after the merger} \\ 0 & \text{otherwise} \end{cases}$$

d_ln_fare =Change in the log of fare between the post and the pre merger period

d_ln_freq =Change in the log of frequency between the post and the pre merger period

pre_hhi =Herfindahl index in the pre merger period

$nlcc\_pre$ =Number of low cost airlines in the pre merger period

Back to main.

Pre-merger Data Summary

Table: Summary statistics pre-merger Period

Variable	Obs	Mean	Std. Dev.	Min	Max	P25	P50	P75
price	73142	395.14	107.82	84.09	1340.4	317.88	382.04	455.81
connections	73142	.97	.84	0	2	0	1	2
inconvenience	73142	1.07	.1	1	2.05	1	1.03	1.09
mkt dist	73142	2571.07	1218.51	694.6	5442.58	1623.02	2238.12	3469.27
hub origin	73142	.19	.32	0	1	0	0	.5
hub destination	73142	.19	.31	0	1	0	0	.5
distance	73142	2720.97	1264.37	692	6566.83	1724	2391.73	3650
nop other carriers	73142	2.86	2.37	0	17	1	2	4
conn other carriers	73142	3.04	2.92	0	20	0	2	5
tot inconv oc	73142	3.05	2.51	0	17.56	1.02	2.38	4.31
no other carriers	73142	1.75	1.27	0	7	1	2	2
avg con oc	61902	1.05	.65	0	2	.5	1	1.5
avg inconv oc	61902	1.07	.08	1	1.99	1.02	1.05	1.09
HHI	73142	.59	.23	.17	1	.42	.54	.73
hub connections	73142	.31	.34	0	1	0	.21	.5

Back to main.

Post-merger Data Summary

Table: Summary statistics post-merger Period

Variable	Obs	Mean	Std. Dev.	Min	Max	P25	P50	P75
price	40848	380.71	121.05	65.31	1108.16	300.29	377.48	456.79
connections	40848	.88	.84	0	2	0	1	2
inconvenience	40848	1.07	.11	1	2.17	1	1.03	1.09
mkt dist	40848	2428.66	1234.41	502.27	5442.58	1457.02	2132.19	3334.04
hub origin	40848	.19	.32	0	1	0	0	.5
hub destination	40848	.19	.31	0	1	0	0	.5
distance	40848	2578.28	1284.5	502	7092	1599.1	2289.41	3488
nop other carriers	40848	2.79	2.43	0	15	1	2	4
conn other carriers	40848	2.73	2.77	0	15	0	2	4
tot inconv oc	40848	2.98	2.58	0	15.82	1	2.28	4.32
no other carriers	40848	1.7	1.3	0	6	1	2	3
avg con oc	33344	.98	.65	0	2	.5	1	1.4
avg inconv oc	33344	1.07	.08	1	2.05	1.02	1.05	1.09
HHI	40848	.59	.24	.18	1	.41	.53	.74
hub connections	40848	.28	.32	0	1	0	.13	.5

Back to main.

Example of Different Products

Table: Example of Different Products

YR	QTR	ORG	CON	DEST	CAR	PROD	MKT
2016	1	IND	DFW	AUS	AA	1	1
2016	1	IND	NS	AUS	AA	2	1
2016	1	IND	DEN	AUS	UA	3	1
2016	1	IND	NS	AUS	UA	4	1
2016	2	IND	DFW	AUS	AA	1	2
2016	2	IND	NS	AUS	AA	2	2
2016	2	IND	DEN	AUS	UA	3	2
2016	2	IND	NS	AUS	UA	4	2

Source:DB1B

Back to main.

Derivation Steps

$$\delta_j = x_j\beta + \xi_j - \alpha ln(p_j)$$

$$s_{j|g} = \frac{exp(\frac{\delta_j}{\lambda})}{\sum_{k=1}^{J} exp(\frac{\delta_k}{\lambda})}$$

$$s_g = \frac{D^\lambda}{1 + D^\lambda}$$

$$s_0 = 1 - s_g = \frac{1}{1 + D^\lambda}$$

$$D = \sum_{k=1}^{J} exp(\frac{\delta_k}{\lambda})$$

$$s_j = s_{j|g} * s_g = \frac{exp(\frac{\delta_j}{\lambda})D^{\lambda-1}}{1 + D^\lambda}$$

Back to main.

Derivation Steps

$$\frac{s_j}{s_0} = \frac{s_g * s_{j|g}}{s_0} = \left(\frac{D^\lambda}{D^\lambda + 1}\right)\left(\frac{D^\lambda + 1}{1}\right)\left(\frac{exp(\frac{\delta_j}{\lambda})}{D}\right)$$

$$= D^{\lambda-1} exp(\frac{\delta_j}{\lambda})$$

$$= D^{\lambda-1}\left(exp(\frac{\delta_j}{\lambda})\right)^{1-\lambda}\left(exp(\frac{\delta_j}{\lambda})\right)^{\lambda}$$

$$= (s_{j|g})^{1-\lambda}\left(exp(\frac{\delta_j}{\lambda})\right)^{\lambda}$$

Back to main.

BLP Estimation

GMM estimator of BLP-model

GMM weight matrix: robust

Number of obs = 61902
Number of markets = 13925
Number of Halton draws = 25

	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
Mean utility						
cons	6.380282	1.023721	6.23	0.000	4.373826	8.386737
connections	-.5970091	.012936	-46.15	0.000	-.6223632	-.5716549
inconv	-2.203312	.0833948	-26.42	0.000	-2.366762	-2.039861
AA	.3973013	.0927533	4.28	0.000	.2155081	.5790944
AS	-.1805739	.0984708	-1.83	0.067	-.3735731	.0124254
B6	.3397769	.09732	3.49	0.000	.1490333	.5305205
CO	.9849157	.121595	8.10	0.000	.746594	1.223237
DL	.4895497	.0925872	5.29	0.000	.3080821	.6710173
F9	.249477	.0958474	2.60	0.009	.0616196	.4373343
FL	.0671424	.1628305	0.41	0.680	-.2519995	.3862842
NW	0	(omitted)				
UA	-.2149756	.0854686	-2.52	0.012	-.3824909	-.0474603
US	.0447555	.0903698	0.50	0.620	-.1323662	.2218771
WN	.1163761	.0867509	1.34	0.180	-.0536526	.2864048
huborg	.6512159	.1058134	6.15	0.000	.4438256	.8586063
horg_md	-.0059507	.0038915	-1.53	0.126	-.0135779	.0016764
hubdest	.250909	.0800484	3.13	0.002	.094017	.4078011
hdes_md	.001853	.0036265	0.51	0.609	-.0052549	.0089608
ln_p_j	-1.882775	.2193836	-8.58	0.000	-2.312759	-1.452791
ln_p_j						
d1	.6892005	.0848106	8.13	0.000	.5229748	.8554261
d2	.0766136	.0721532	1.06	0.288	-.0648041	.2180314
SD	2.40e-10	.6041569	0.00	1.000	-1.184126	1.184126

Back to main.

Why not using BLP?

- Estimated elasticities using BLP low
- For identifying the parameters in BLP it requires rich data of consumer characteristics and importantly variation in that data across markets.
- BLP more appropriate when consumer choosing different products with similar prices but with different observed characteristics (e.g, cereal). For airline travel most important characteristics connections and option of outside good are captured in the nested logit model.
- Other unobserved characteristics such as morning flights etc will be reflected in price.

Back to main.

Derivation Steps

$$\pi_f = \sum_{j \in \mathcal{F}_f} (p_j - mc_j) s_j(x, \xi, p, \theta_d) M - C_f$$

$$\frac{\partial \pi_f}{\partial p_j} = s_j(p) + \sum_{r \in \mathcal{F}_f} (p_r - mc_r) \frac{\partial s_r(p)}{\partial p_j}$$

$$O_{jr} = \begin{cases} 1 & , \text{ if } \exists f : \{j, r\} \subset \mathcal{F}_f \\ 0 & , \text{ otherwise} \end{cases}$$

$$\Omega_{jr}^{pre}(p) = O_{jr} \odot E_{jr} = \begin{cases} -\frac{\partial s_r(p)}{\partial p_j} & , \text{if } \exists f : \{j, r\} \subset \mathcal{F}_f \\ 0 & , \text{otherwise} \end{cases}$$

$$\frac{\partial s_r(p)}{\partial p_j} = \begin{cases} s_j s_{r|g} \left(\frac{\alpha}{p_j}\right) \left(1 - s_g - \frac{1}{\lambda}\right) & , \text{if } r \neq j \\ s_j \left(\frac{\alpha}{p_j}\right) \left(\frac{1}{\lambda}(1 - s_{j|g}) + s_{j|g}(1 - s_g)\right) & , \text{if } r = j \end{cases}$$

Back to main.

DID Analysis Result (Price) Treatment (4→3) Control (3→3)

Table: Effect of Merger on Price

	(1) Price <5K	(2) Price <10K&>5K	(3) Price <25K&>10K	(4) Price >25K	(5) Price All
time	5.578	-16.70	-11.08	-39.51	-16.17*
	(0.50)	(-0.94)	(-0.70)	(-1.09)	(-1.69)
treated	41.21	57.64**	112.0***	5.756	44.31**
	(1.56)	(1.98)	(3.15)	(0.19)	(2.11)
did	-22.10	42.78	-18.47	-12.38	-18.15
	(-0.62)	(0.90)	(-0.33)	(-0.31)	(-0.52)
_cons	442.0***	421.3***	352.0***	345.8***	401.3***
	(56.73)	(33.15)	(30.79)	(11.49)	(60.31)
N	124	125	140	39	430
adj. R^2	-0.013	0.013	0.052	-0.024	0.009

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Back to main.

DID Analysis Result (Price) Treatment (4→3) Control (3→3) Connecting Routes

Table: Effect of Merger on Price

	(1) Price <5K	(2) Price <10K&>5K	(3) Price <25K&>10K	(4) Price >25K	(5) Price All
time	8.761	-16.22	-13.26	-43.13	-14.66
	(0.78)	(-0.91)	(-0.79)	(-1.11)	(-1.53)
treated	44.39*	52.69*	105.2***	-15.26	38.73*
	(1.68)	(1.81)	(2.94)	(-0.48)	(1.85)
did	-25.28	42.30	-16.29	-8.760	-19.66
	(-0.70)	(0.89)	(-0.29)	(-0.21)	(-0.57)
_cons	438.8***	426.2***	358.8***	366.9***	406.9***
	(57.09)	(33.73)	(29.68)	(11.83)	(61.91)
N	122	117	127	32	400
adj. R^2	-0.009	0.010	0.048	-0.014	0.007

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Conduct

$$\pi_f = \pi_{own} + (\kappa) * \pi_{others}$$

$$\pi_f = \sum_{j \in \mathcal{F}_f} (p_j - mc_j) s_j(x, \xi, p, \theta_d) M$$

$$+ (\kappa) \sum_{j \notin \mathcal{F}_f} (p_j - mc_j) s_j(x, \xi, p, \theta_d) M - C_f$$

$$\Omega_{jr}^{pre}(p) = (O_{jr} + \kappa O_{jr}^c) \odot E_{jr}$$

$$O_{jr}^c = \begin{cases} 0 & , \text{ if } \exists f : \{j, r\} \subset \mathcal{F}_f \\ 1 & , \text{ otherwise} \end{cases}$$

$$\kappa = f(mmc_{kh}^t) = \frac{\exp(\phi_1 + \phi_2 mmc_{kh}^t)}{1 + \exp(\phi_1 + \phi_2 mmc_{kh}^t)}$$

Back to main.

Conduct (contd.)

$$\pi_A = (p_a - mc_a)s_a M + \kappa(p_b - mc_b)s_b M - (C_a + \kappa C_b)$$

$$\pi_B = (p_b - mc_b)s_b M + \kappa(p_a - mc_a)s_a M - (C_b + \kappa C_a)$$

$$\frac{\partial \pi_A}{\partial p_a} = s_a M + (p_a - mc_a)M\frac{\partial s_a}{\partial p_a} + \kappa(p_b - mc_b)M\frac{\partial s_b}{\partial p_a} = 0$$

$$\frac{\partial \pi_B}{\partial p_b} = s_b M + (p_b - mc_b)M\frac{\partial s_b}{\partial p_b} + \kappa(p_a - mc_a)M\frac{\partial s_a}{\partial p_b} = 0$$

$$\begin{pmatrix} s_a \\ s_b \end{pmatrix} + \begin{pmatrix} 1 & \kappa \\ \kappa & 1 \end{pmatrix} .* \begin{pmatrix} \frac{\partial s_a}{\partial p_a} & \frac{\partial s_b}{\partial p_a} \\ \frac{\partial s_a}{\partial p_b} & \frac{\partial s_b}{\partial p_b} \end{pmatrix} \begin{pmatrix} p_a - mc_a \\ p_b - mc_b \end{pmatrix} = 0$$

Back to main.

DID Analysis Result (Price) Overlap (T) Other(C) Only-AA(C) Only-US(C)

Table: Effect of Merger on Price

	(1) Price <5K	(2) Price <10K&>5K	(3) Price <25K&>10K	(4) Price >25K	(5) Price All
time	13.20***	0.106	-4.327*	-8.987*	-5.427***
	(7.27)	(0.04)	(-1.77)	(-1.90)	(-3.06)
treated	66.54***	76.44***	105.2***	67.92***	61.94***
	(23.90)	(22.70)	(28.09)	(14.51)	(23.18)
did	4.395	5.304	-34.15***	-26.49***	-30.82***
	(0.82)	(0.84)	(-5.32)	(-3.33)	(-6.40)
_cons	382.6***	356.1***	319.9***	298.6***	334.8***
	(385.79)	(240.18)	(230.03)	(107.54)	(347.97)
N	19628	8609	7356	2663	38256
adj. R^2	0.027	0.058	0.146	0.107	0.047

Back to main.

DID Analysis Result (Price) Overlap (T) Other(C) Only-AA(T) Only-US(T)

Table: Effect of Merger on Price

	(1) Price <5K	(2) Price <10K&>5K	(3) Price <25K&>10K	(4) Price >25K	(5) Price All
time	2.948	-4.842	-1.955	-0.335	-6.787***
	(1.26)	(-1.57)	(-0.67)	(-0.06)	(-3.37)
treated	38.84***	57.95***	66.36***	67.99***	45.60***
	(21.17)	(21.67)	(24.90)	(16.55)	(25.35)
did	21.46***	8.736*	-15.20***	-23.75***	-9.044***
	(6.50)	(1.88)	(-3.31)	(-3.27)	(-2.75)
_cons	372.7***	340.3***	304.5***	274.1***	322.8***
	(294.08)	(184.43)	(182.37)	(94.25)	(302.44)
N	19628	8609	7356	2663	38256
adj. R^2	0.048	0.084	0.106	0.102	0.047

Back to main.

DID Analysis Result (Price) Overlap (T) Other(C)

Table: Effect of Merger on Price

	(1) Price <5K	(2) Price <10K&>5K	(3) Price <25K&>10K	(4) Price >25K	(5) Price All
time	6.488**	-2.360	1.875	-1.008	-3.034
	(2.53)	(-0.70)	(0.68)	(-0.22)	(-1.57)
treated	66.94***	120.8***	152.3***	155.4***	116.5***
	(7.52)	(13.82)	(20.85)	(15.86)	(21.30)
did	13.57	0.407	-78.21***	-88.68***	-58.44***
	(1.29)	(0.03)	(-7.47)	(-6.89)	(-7.69)
_cons	360.4***	329.2***	287.5***	255.7***	311.8***
	(263.96)	(165.14)	(184.31)	(100.62)	(296.60)
N	10542	4060	3023	676	18301
adj. R^2	0.023	0.070	0.277	0.498	0.099

Back to main.

DID Analysis Result (Price) Overlap (T) Other(C) Only-AA(T)

Table: Effect of Merger on Price

	(1) Price <5K	(2) Price <10K&>5K	(3) Price <25K&>10K	(4) Price >25K	(5) Price All
time	7.030***	-1.010	0.318	-3.635	-5.748***
	(2.89)	(-0.31)	(0.12)	(-0.92)	(-3.13)
treated	52.48***	67.45***	93.61***	100.7***	64.94***
	(24.93)	(22.01)	(28.13)	(21.17)	(28.16)
did	16.47***	3.786	-32.88***	-35.75***	-21.35***
	(4.31)	(0.66)	(-6.01)	(-4.48)	(-5.06)
_cons	365.1***	333.4***	292.6***	261.3***	316.3***
	(280.19)	(175.06)	(187.91)	(101.37)	(309.86)
N	15070	5984	4717	1618	27389
adj. R^2	0.063	0.098	0.214	0.227	0.090

Back to main.

DID Analysis Result (Price) Overlap (T) Other(C) Only-US(T)

Table: Effect of Merger on Price

	(1) Price <5K	(2) Price <10K&>5K	(3) Price <25K&>10K	(4) Price >25K	(5) Price All
time	2.715	-5.086	-1.342	5.402	-4.388**
	(1.10)	(-1.61)	(-0.48)	(0.93)	(-2.14)
treated	35.00***	61.07***	70.55***	61.94***	44.37***
	(13.81)	(17.58)	(21.60)	(13.45)	(19.94)
did	26.33***	14.13**	-12.95**	-22.47***	-5.685
	(6.14)	(2.41)	(-2.35)	(-2.79)	(-1.50)
_cons	368.2***	335.0***	296.5***	264.4***	316.4***
	(276.46)	(177.07)	(178.98)	(101.56)	(296.29)
N	14779	6516	5448	1647	28390
adj. R^2	0.033	0.083	0.122	0.114	0.044

Back to main.

DID Analysis Result (Price) Other(C) Only-AA(T)

Table: Effect of Merger on Price

	(1) Price <5K	(2) Price <10K&>5K	(3) Price <25K&>10K	(4) Price >25K	(5) Price All
time	7.189***	-1.774	0.0817	-4.060	-6.140***
	(2.95)	(-0.54)	(0.03)	(-1.13)	(-3.37)
treated	46.39***	52.62***	64.99***	81.71***	51.00***
	(20.42)	(14.48)	(16.90)	(9.67)	(15.93)
did	18.87***	8.211	-9.555	-22.50	-1.388
	(4.62)	(1.24)	(-1.42)	(-1.52)	(-0.23)
_cons	364.8***	333.2***	292.0***	260.0***	315.9***
	(279.51)	(174.09)	(188.24)	(106.92)	(310.24)
N	14345	5324	3957	988	24614
adj. R^2	0.048	0.053	0.115	0.176	0.054

Back to main.

DID Analysis Result (Price) Other(C) Only-US(T)

Table: Effect of Merger on Price

	(1) Price <5K	(2) Price <10K&>5K	(3) Price <25K&>10K	(4) Price >25K	(5) Price All
time	2.743	-5.247*	-1.423	-2.189	-5.578***
	(1.11)	(-1.66)	(-0.51)	(-0.54)	(-2.99)
treated	29.54***	48.76***	38.64***	37.52***	24.92***
	(11.14)	(13.03)	(11.48)	(8.68)	(11.29)
did	26.94***	19.44***	-0.0137	1.655	10.98***
	(6.09)	(3.09)	(-0.00)	(0.23)	(2.82)
_cons	368.0***	334.7***	295.9***	262.2***	315.8***
	(276.08)	(176.85)	(180.36)	(110.91)	(301.22)
N	14440	6156	4734	1277	26607
adj. R^2	0.026	0.056	0.047	0.093	0.020

Back to main.

DID Analysis Result (Price) Other(C) Only-AA(T) Only-US(T)

Table: Effect of Merger on Price

	(1) Price <5K	(2) Price <10K&>5K	(3) Price <25K&>10K	(4) Price >25K	(5) Price All
time	3.542	-5.658*	-2.455	-5.368	-7.943***
	(1.51)	(-1.83)	(-0.85)	(-1.25)	(-4.26)
treated	32.77***	46.13***	41.08***	48.78***	31.34***
	(16.91)	(15.56)	(14.62)	(9.65)	(15.45)
did	22.17***	11.07**	-2.754	-6.083	4.576
	(6.41)	(2.18)	(-0.55)	(-0.71)	(1.23)
_cons	371.9***	339.6***	302.8***	271.3***	321.6***
	(292.94)	(183.48)	(183.29)	(98.28)	(305.18)
N	18517	7632	6114	1799	34062
adj. R^2	0.036	0.054	0.052	0.078	0.027

Back to main.

DID Analysis Result (Price) Treatment (2→1) Control (1→1)

Table: Effect of Merger on Price

	(1) Price <5K	(2) Price <10K&>5K	(3) Price <25K&>10K	(4) Price >25K	(5) Price All
time	-6.759	-7.347	-10.45	20.04***	-7.867
	(-0.80)	(-0.70)	(-1.11)	(4.35)	(-1.23)
treated	97.08***	150.5***	200.5***	0	124.2***
	(3.04)	(13.89)	(25.27)	(.)	(5.78)
did	28.97	-126.9*	-49.34***	0	-13.81
	(0.73)	(-1.79)	(-5.23)	(.)	(-0.36)
_cons	405.2***	348.9***	291.4***	257.9***	376.2***
	(66.60)	(45.32)	(36.72)	(113.65)	(80.75)
N	741	303	145	11	1200
adj. R^2	0.012	0.011	0.110	0.545	0.016

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

appendix

DID Analysis Result (Price) Treatment (2→1) Control (1→1) Connecting Routes

Table: Effect of Merger on Price

	(1) Price <5K	(2) Price <10K&>5K	(3) Price <25K&>10K	(4) Price >25K	(5) Price All
time	-3.083	-5.398	-53.80***	27.06*	-11.88
	(-0.29)	(-0.49)	(-3.84)	(2.97)	(-1.50)
treated	123.9***	140.0***	154.2***	0	129.2***
	(4.15)	(12.08)	(12.75)	(.)	(6.69)
did	-12.12	-128.9*	-5.986	0	-30.66
	(-0.32)	(-1.80)	(-0.43)	(.)	(-0.83)
_cons	415.8***	359.4***	337.8***	258.4***	392.2***
	(57.26)	(41.34)	(27.94)	(53.44)	(70.97)
N	419	187	71	5	682
adj. R^2	0.020	0.023	0.308	0.599	0.027

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Number of Overlapping Markets

Table: No of Overlapping Markets: 2012 Q2

	DL	US	AA	UA	AS	B6	F9	G4	NK	SY	VX	WN
DL	1194	446	302	369	32	112	109	7	56	27	18	720
US	446	754	195	333	19	59	57	0	26	9	23	372
AA	302	195	598	355	31	42	26	1	40	5	30	245
UA	369	333	355	873	59	57	130	9	37	4	46	426
AS	32	19	31	59	126	11	7	7	5	1	21	71
B6	112	59	42	57	11	162	0	0	13	0	13	64
F9	109	57	26	130	7	0	219	2	9	5	0	149
G4	7	0	1	9	7	0	2	23	2	0	0	0
NK	56	26	40	37	5	13	9	2	82	1	4	29
SY	27	9	5	4	1	0	5	0	1	27	0	15
VX	18	23	30	46	21	13	0	0	4	0	49	25
WN	720	372	245	426	71	64	149	0	29	15	25	1151

Back to main.

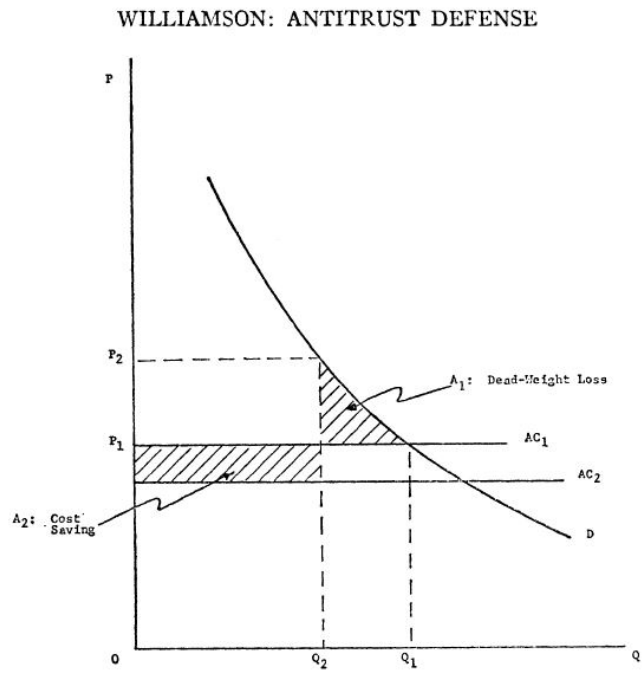
DID Analysis Result (Price) Excluding Divestiture

Table: Effect of Merger on Price

	(1) Price <5K	(2) Price <10K&>5K	(3) Price <25K&>10K	(4) Price >25K	(5) Price All
time	2.917	-4.849	-1.911	-0.264	-6.497***
	(1.25)	(-1.58)	(-0.65)	(-0.05)	(-3.23)
treated	38.87***	57.85***	66.41***	69.37***	47.61***
	(21.19)	(21.54)	(24.78)	(16.29)	(26.15)
did	21.45***	8.815*	-15.24***	-23.90***	-9.227***
	(6.49)	(1.89)	(-3.32)	(-3.30)	(-2.83)
divest	-24.11***	8.465	-2.187	-10.60**	-33.20***
	(-3.48)	(1.01)	(-0.33)	(-2.22)	(-8.73)
_cons	372.7***	340.3***	304.5***	274.1***	322.9***
	(293.82)	(184.42)	(182.36)	(94.24)	(302.42)
N	19628	8609	7356	2663	38256
adj. R^2	0.048	0.084	0.106	0.103	0.051

Back to main.

Trade-off between Cost saving and Market Power



Back to main.