Demand Estimation Report

Airlines Merger Simulation

August 19, 2025

1 Introduction

This report presents the results of the demand estimation analysis conducted as part of the Airlines Merger Simulation project. The tables and figures included here summarize the key findings.

The model specification follows a logit and nested-logit framework, where consumer utility is modeled as:

- **Logit Model:** $\ln(s_{jt}) - \ln(s_{0t}) = \alpha p_{jt} + x_{jt}\beta + \xi_t + \xi_{jt} + \epsilon_{ijt}$
- **Nested-Logit Model:** $\ln(s_{jt}) - \ln(s_{0t}) = \alpha p_{jt} + x_{jt}\beta + \sigma \ln(s_{jt|g}) + \xi_t + \xi_{jt} + \epsilon_{ijt}$

where:

- p_{jt} is the average fare (price).
- x_{jt} includes regressors such as share nonstop, average distance, squared distance, and log(1 + number of fringe carriers).
- ν_t and ξ_{jt} are fixed effects for origin-destination and product-level unobservables.
- $s_{jt|g}$ is the share of product j in group g.
- σ captures the nesting parameter in the nested-logit model.
- Instruments (z_{jt}^D) include average rival presence, average number of markets served by rivals, and the number of rival carriers.

2 Summary Statistics

Table 1: Summary statistics: variables used in demand estimation

	mean	sd	min	p25	p50	p75	max
Market share	0.001	0.006	0.0000	0.0001	0.000	0.001	0.473
Outside share	0.992	0.016	0.3365	0.9908	0.996	0.998	1.000
Inside share sum	0.008	0.016	0.0002	0.0024	0.004	0.009	0.664
Nest share	0.008	0.016	0.0002	0.0024	0.004	0.009	0.664
Number of rival carriers	5.235	2.250	1.0000	4.0000	5.000	7.000	22.000
Number of destinations served	3583.900	1461.539	1.0000	3038.0000	4067.000	4661.000	5751.000
Average fare (dollars)	224.884	92.992	25.0000	171.7022	212.650	260.195	2492.016
Share nonstop flights	0.202	0.362	0.0000	0.0000	0.000	0.167	1.000
Average Distance (000s miles)	1.494	0.860	0.0670	0.8738	1.297	1.998	10.345
Average Distance sqr (000s miles)	2.971	3.733	0.0045	0.7635	1.683	3.992	107.019
Log(1 + fringe carriers)	0.350	0.455	0.0000	0.0000	0.000	0.693	2.565
Observations	1636916						

3 Demand Estimation Results

Column (1) presents the results of the logit model without instruments, while column (2) shows the logit model results with price instruments. Column (3) shows the nested-logit model without instruments, and column (4) presents the nested-logit model with instruments for both prices and nest shares. The nests are defined as inside goods (carriers that are not the outside good) and outside good. All columns include fixed effects for origin-destination markets. Robust standard errors are reported in parentheses below the coefficients.

Table 2: Demand Estimates (Logit and Nested-Logit)

	(1) ln(s_jt) - ln(s_0t)	(2) ln(s_jt) - ln(s_0t)	(3) ln(s_jt) - ln(s_0t)	(4) ln(s_jt) - ln(s_0t)
Average fare (dollars)	-0.0017***	0.0239***	-0.0005***	-0.0019***
	(0.0000)	(0.0002)	(0.0000)	(0.0001)
Share nonstop flights	1.9504***	2.1079***	0.1189***	0.3048***
	(0.0047)	(0.0087)	(0.0009)	(0.0032)
Average Distance (000s miles)	-4.1437***	-5.0772***	-0.0469***	-0.4330***
	(0.0139)	(0.0435)	(0.0024)	(0.0091)
Average Distance sqr (000s miles)	0.2762***	0.1453***	0.0043***	0.0398***
	(0.0033)	(0.0109)	(0.0005)	(0.0012)
Log(1 + fringe carriers)	-0.5032***	-0.4661***	0.0243***	-0.0335***
	(0.0033)	(0.0060)	(0.0005)	(0.0010)
ln(s_jt) - ln(s_gt)			0.9776***	0.8740***
			(0.0002)	(0.0014)
Observations	1636916	1636916	1636916	1636916
Adjusted R^2	0.503	-0.723	0.983	0.972
F-statistic (IV)		6498.7994		1575.4110

4 Elasticities

Table 3: Elasticities: Own-price (Logit and Nested-Logit)

	count	mean	sd	min	p25	p50	p75	max
Logit Elasticity	1636916	-0.386	0.160	-4.283	-0.447	-0.365	-0.295	-0.043
Nested-Logit Elasticity	1636916	-3.292	1.385	-36.031	-3.853	-3.127	-2.480	-0.092
Observations	1636916							

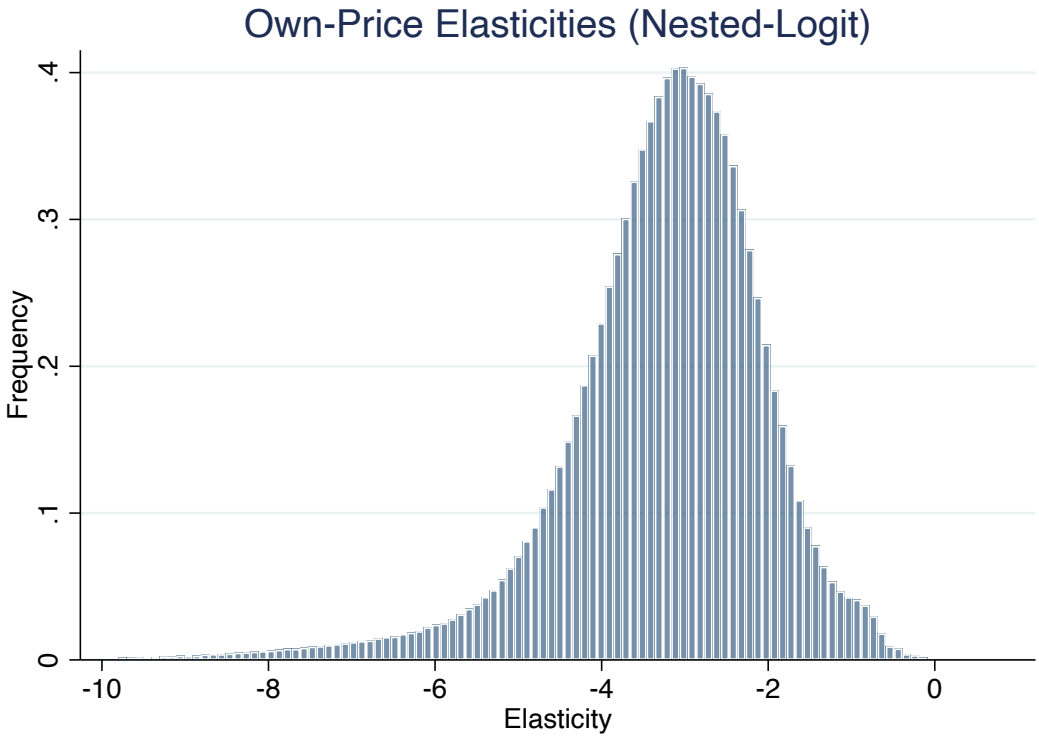

Figure 1: Histogram of Elasticities

5 Appendix: First Stage Results

	(1) Average fare (dollars)
Average distance to rival markets	0.0347***
	(0.0008)
Average number of rival destinations	-1.0555***
	(0.0087)
Number of rival carriers	-5.6664***
	(0.0669)
Share nonstop flights	-4.9498***
	(0.3040)
Average Distance (000s miles)	46.2970***
	(1.8458)
Average Distance sqr (000s miles)	4.3545***
	(0.4784)
Log(1 + fringe carriers)	3.6344***
	(0.2198)
Observations	1636916

Standard errors in parentheses

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

	(1) ln(s_jt) - ln(s_gt)
Average distance to rival markets	0.0016***
	(0.0000)
Average number of rival destinations	-0.0193***
	(0.0002)
Number of rival carriers	-0.2889***
	(0.0011)
Share nonstop flights	1.8861***
	(0.0045)
Average Distance (000s miles)	-3.8357***
	(0.0122)
Average Distance sqr (000s miles)	0.2393***
	(0.0027)
Log(1 + fringe carriers)	-0.0480***
	(0.0038)
Observations	1636916

Standard errors in parentheses

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