Berry Airline Entry Model: Estimation Results

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1 Introduction

This note estimates a static entry model for US airline markets using the Berry (1992) framework. The data cover 2,742 origin–destination markets with up to six potential carriers. Firm profits are

$$\pi_{im} = V_{im} - \delta N_{-im} + \varepsilon_{im}, \tag{1}$$

where V_{im} is a profit index from market covariates, N_{-im} is the number of rivals, $\delta > 0$ is the competition effect, and $\varepsilon_{im} \sim N(0,1)$. We observe entry decisions but not profit shocks.

2 Model specifications

2.1 Symmetric-firm specification

All firms are treated as identical. The profit index is

$$V_{im} = X'_m \beta, \quad X_m = (1, \log(\text{pop}_m), \log(\text{dist}_m), \log(\text{dist}^2_m)), \tag{2}$$

with market size, distance, and distance squared. Firms differ only through ε_{im}. Parameters are estimated by maximum likelihood.

2.2 Heterogeneous-firm specification

This specification allows firm-specific effects. The profit index is

$$V_{im} = X'_m \beta + s_i, \tag{3}$$

where X_m includes intercept, average log population, tourism, log distance, and log passengers. The s_i are airline-specific size parameters. Entry probabilities use a sequential rule where the highest-profit firm enters first.

3 Results

Table 1 shows estimates for the symmetric specification.

Table 1: Symmetric-firm specification

Parameter	Estimate
Constant	1.296
log(population)	−0.078
log(distance)	0.096
log(distance^2)	−0.095
Competition effect δ	5.032

The competition parameter $\delta = 5.03$ is large, meaning additional entrants reduce profits substantially. Log-likelihood is -2318.47 and prediction accuracy is $62\,\%$.

Table 2 shows the heterogeneous specification.

Table 2: Heterogeneous-firm specification

Parameter	Estimate
Constant	0.329
Average log population	−0.126
Tourism	−0.087
log(distance)	0.287
log(passengers)	0.840
Competition effect δ	1.481

Log passengers has a large positive coefficient (0.84), consistent with demand driving entry. The competition parameter $\delta = 1.48$ is smaller than in the symmetric model. Log-likelihood is -1908.39 and accuracy is $64\,\%$.

4 Comparison

Table 3 compares the two models. The heterogeneous specification fits better with a higher log-likelihood and accuracy. Adding airline-specific effects improves the model.

Table 3: Model comparison

Specification	Log-likelihood	δ	Accuracy (%)
Symmetric firms	−2318.47	5.03	62.1
Heterogeneous firms	−1908.39	1.48	64.3

Both models show that competition reduces profits ($\delta > 0$). The symmetric model has a larger δ to compensate for ignoring firm differences. Once we add airline-specific size terms, a smaller δ is sufficient to match the data.

References

[1] Berry, S. T. (1992). "Estimation of a model of entry in the airline industry." *Econometrica*, 60(4), 889–917.