Internet Appendix for “Boom and Gloom”

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This Internet Appendix contains the following:

• Proofs and derivations for Section I (Appendix A, starting on this page, below)

• Details on the classification of hotels into quality segments, including examples of brand names for each segment (Appendix B, starting on page 16 below)

• NPV calculations using data for average Economy hotels (Appendix C, starting on page 17 below)

• Estimates for regressions using ZIP codes instead of counties as boundaries for a hotel’s “market” (Appendix D, starting on page 18 below).

Appendix A: Proofs and Derivations

A.1 Derivation of Equation (1)

The average value of informed entry, contingent on entry taking place, is

\[ E \left[ t + v_j + a_{ij} \mid t + v_j + a_{ij} > K \right] \]

\[
= \int_{K-2}^{1} \int_{K-t-1}^{1} \left( \int_{-1}^{K-t-v_j} \left( \int_{-1}^{1} \left( \int_{-1}^{v_j+a_{1j}-v_k} \frac{1}{2}da_{1j} \right) \frac{1}{2}dv_k \right) \frac{1}{2}dv_j \right) \frac{1}{2}dt
\]

\[
= \int_{K-2}^{1} \int_{K-t-1}^{1} \left( \int_{-1}^{K-t-v_j} \left( \int_{-1}^{1} \left( \int_{-1}^{v_j+a_{1j}-v_k} \frac{1}{2}da_{1j} \right) \frac{1}{2}dv_k \right) \frac{1}{2}dv_j \right) \frac{1}{2}dt
\]

\[ = K + 10 \frac{3 - K}{31 + 6K - K^2}. \]
A.2 Derivation of Equations (2), (3) and (4)

If the informed entrant entered segment \( j \), the expected value of \( t + v_j \), contingent on that informed entry decision, is

\[
E [ t + v_j | \delta_1 = j ]
\]

\[
= \int_{K-2}^{K} \left( \int_{K-t-1}^{t+1} \left( \int_{-1}^{K-t-v_j} \left( \int_{-1}^{v_k+a_{1j}-v_k} \left( \int_{-1}^{v_j+\frac{1}{2}a_{1j}} \left( \int_{-1}^{v_k+a_{1j}-v_k} \left( \int_{-1}^{v_j} \frac{1}{2}dv_k \right) \right) \frac{1}{2}dv_j \right) \right) \frac{1}{2}dt \right) \right) \frac{1}{2}dv_j \frac{1}{2}dt
\]

\[
= -7K^3 + 39K^2 + 195K + 213
\]

\[
\frac{12(-K^2 + 6K + 31)}{12(-K^2 + 6K + 31)}
\]

If the informed entrant entered segment \( k \), the expected value of \( t + v_j \), contingent on that informed entry decision, is

\[
E [ t + v_j | \delta_1 = k ]
\]

\[
= \int_{K-2}^{K} \left( \int_{K-t-1}^{t+1} \left( \int_{-1}^{K-t-v_j} \left( \int_{-1}^{v_k+a_{1j}-v_k} \left( \int_{-1}^{v_j+\frac{1}{2}a_{1j}} \left( \int_{-1}^{v_k+a_{1j}-v_k} \left( \int_{-1}^{v_j} \frac{1}{2}dv_k \right) \right) \frac{1}{2}dv_j \right) \right) \frac{1}{2}dt \right) \right) \frac{1}{2}dv_j \frac{1}{2}dt
\]

\[
= -K^3 + 3K^2 + 105K - 21
\]

\[
\frac{6(-K^2 + 6K + 31)}{6(-K^2 + 6K + 31)}
\]

If the informed entrant decided to stay out altogether, the expected value of \( t + v_j \), contingent
on that informed non-entry decision, is

\[
E \left[ t + v_j \mid \delta_1 = 0 \right]
\]

\[
f_{K-2} \int t^\frac{1}{2} \, dt + \int_{K-2}^1 \left( f_{K-t-1} \left( t + v_j \right) \left( f_{K-t-1} \left( \frac{1}{2} dv_k \right) + \int_{K-t-1}^1 \left( f_{K-t-1} \left( \frac{1}{2} da_{1j} \right) \right) \frac{1}{2} dv_k \right) \right) \frac{1}{2} dt
\]

\[
= f_{K-2} \int t^\frac{1}{2} \, dt + \int_{K-2}^1 \left( f_{K-t-1} \left( \frac{1}{2} dv_k \right) + \int_{K-t-1}^1 \left( f_{K-t-1} \left( \frac{1}{2} da_{1j} \right) \right) \frac{1}{2} dv_k \right) \frac{1}{2} dt
\]

\[
= \frac{2 \left( -2K^4 + 15K^3 + 18K^2 - 117K - 54 \right)}{3 \left( -3K^3 + 27K^2 - K + 321 \right)}.
\]

### A.3 Proof of Proposition 1

For parsimony, we omit subscripts that identify the uninformed entrant (writing \( s, m_j, u_j \) instead of \( s_i, m_{ij}, u_{ij} \)).

#### A.3.1 Entry in the same segment as the informed entrant

If \( \delta_1 = j \), uninformed entry happens in segment \( j \) if

\[
\begin{align*}
\varphi (s + m_j + u_j) + (1 - \varphi) E \left[ t + v_j \mid \delta_1 = j \right] & \geq K \\
\varphi (s + m_j + u_j) + (1 - \varphi) E \left[ t + v_j \mid \delta_1 = j \right] & \geq \varphi (s + m_k + u_k) + (1 - \varphi) E \left[ t + v_k \mid \delta_1 = j \right]
\end{align*}
\]
Replace \( E \{ t + v_j \mid \delta_1 = j \} \) and \( E \{ t + v_k \mid \delta_1 = j \} \),

\[
\begin{cases}
\varphi (s + m_j + u_j) + (1 - \varphi) \frac{-7K^3 + 39K^2 + 195K + 213}{12(-K^2 + 6K + 31)} \geq K \\
\varphi (s + m_j + u_j) + (1 - \varphi) \frac{-7K^3 + 39K^2 + 195K + 213}{12(-K^2 + 6K + 31)} \geq \varphi (s + m_k + u_k) + (1 - \varphi) \frac{-K^3 - 3K^2 + 105K - 21}{6(-K^2 + 6K + 31)}
\end{cases}
\]

and rearrange,

\[
\begin{cases}
s + m_j + u_j \geq K + \frac{1 - \varphi}{\varphi} \left( K - \frac{-7K^3 + 39K^2 + 195K + 213}{12(-K^2 + 6K + 31)} \right) \\
m_k + u_k \leq m_j + u_j + \frac{1 - \varphi}{\varphi} \left( \frac{-7K^3 + 39K^2 + 195K + 213}{12(-K^2 + 6K + 31)} - \frac{-K^3 - 3K^2 + 105K - 21}{6(-K^2 + 6K + 31)} \right)
\end{cases}
\]

The fraction in the first condition is increasing in \( K \) and except for very small \( K \) it is positive — for very low \( K \), a slightly negative sum of signals \( s + m_j + u_j \) is sufficient to make entry attractive.

The fraction in the second condition is increasing in \( K \) and positive for all \( K \) — the signals for the other segment (not chosen by the informed entrant) must be significantly better, for the uninformed entrant to prefer the other segment. Both fractions attain the value of 1 if \( K = 3 \).

In the following, we will convert two signals into compound variables, where the sum of the two signals is relevant. For two random variables uniformly distributed with supports \([-1, 1]\), the probability that their sum is below a value \( x \) is

\[
\Pr \{ m_j + u_j \leq x \} = \begin{cases}
\int_{-1}^{x+1} \left( \int_{-1}^{x-m_j} \frac{1}{2} du_j \right) \frac{1}{2} dm_j & \text{if } -2 \leq x \leq 0 \\
\int_{-1}^{x-1} \frac{1}{2} dm_j + \int_{x-1}^{1} \left( \int_{-1}^{x-m_j} \frac{1}{2} du_j \right) \frac{1}{2} dm_j & \text{if } 0 \leq x \leq 2.
\end{cases}
\]
Solving the integrals, and taking derivatives, we obtain the cdf and the pdf,

\[
F(x) = \begin{cases} 
\frac{4+4x+x^2}{8} & \text{if } -2 \leq x \leq 0 \\
\frac{4+4x-x^2}{8} & \text{if } 0 \leq x \leq 2 
\end{cases}
\]

\[
f(x) = \begin{cases} 
\frac{2+x}{4} & \text{if } -2 \leq x \leq 0 \\
\frac{2-x}{4} & \text{if } 0 \leq x \leq 2 
\end{cases}
\]

Replacing \( x \equiv m_j + u_j \) and \( y \equiv m_k + u_k \), the conditions for uninformed entry can be written as

\[
\begin{cases} 
s + x \geq K + \frac{1-\varphi}{\varphi} \frac{-5K^3+33K^2+177K-213}{12(-K^2+6K+31)} \\
y \leq x + \frac{1-\varphi}{\varphi} \frac{5(-K^3+9K^2-3K+51)}{12(-K^2+6K+31)}
\end{cases}
\]

These terms (and similar terms for the other cases) are not tractable. As described above, we therefore assume that \( K = 1 \). The conditions can then be rewritten as

\[
\begin{cases} 
s + x \geq 1 - \frac{1-\varphi}{\varphi} \frac{1}{54} \\
y \leq x + \frac{1-\varphi}{\varphi} \frac{35}{54}
\end{cases}
\]

The first condition is satisfied with certainty if \(-3 \geq 1 - \frac{1-\varphi}{\varphi} \frac{1}{54}\), which requires that \( \varphi \) is very low, \( \varphi \leq \frac{1}{217} = 0.0046083 \). For larger values of \( \varphi \), entry is not certain.

The second condition is satisfied with certainty if \( \frac{1-\varphi}{\varphi} \frac{35}{54} \geq 4 \iff \varphi \leq \frac{35}{251} = 0.13944 \).

**Case (1):** \( 0 \leq \varphi \leq \frac{1}{217} \) (\( \varphi \in [0, 0.0046083] \)).

Uninformed entry is certain after informed entry. The second condition is satisfied with certainty. The expected value of uninformed entry is

\[
\frac{\int_{-1}^{1} \left( \int_{-2}^{0} (\varphi (s + x) + (1 - \varphi) \frac{55}{54}) \frac{2+x}{4} dx + \int_{0}^{2} (\varphi (s + x) + (1 - \varphi) \frac{55}{54}) \frac{2-x}{4} dx \right) \frac{1}{2} ds}{\int_{-1}^{1} \left( \int_{-2}^{0} \frac{2+x}{4} dx + \int_{0}^{2} \frac{2-x}{4} dx \right) \frac{1}{2} ds}
\]

\( = (1 - \varphi) \frac{55}{54} \).

(The uninformed entrant’s signals average to zero.) This average value is decreasing in \( \varphi \), taking
on values between $\frac{55}{34} = 1.0185$ and $\frac{220}{217} = 1.0138$ over the relevant range of $\varphi$.  

[End of Case (1)]

If $\frac{1}{217} \leq \varphi$, uninformed entry is not certain. Uninformed non-entry is never certain, since that would require $3 < 1 - \frac{1-\varphi}{\varphi} \frac{1}{54}$, which in turn requires that $\varphi$ is negative. So the entry decision depends on how high the sum of the signals is.

Entry is possible for any signal $s$ if $-1 + 2 \geq 1 - \frac{1-\varphi}{\varphi} \frac{1}{54}$, which is satisfied if $\varphi \in (0,1]$. So the expected value of uninformed entry is

$$
\frac{\int_{-1}^{1} \int_{x | x \geq 1 - s - \frac{1-\varphi}{\varphi} \frac{1}{54}} (\varphi(s+x) + (1-\varphi) \frac{55}{34}) \Pr \left\{ y \leq x + \frac{1-\varphi}{\varphi} \frac{35}{54} \right\} f(x) dx \frac{1}{2} ds}{\int_{-1}^{1} \int_{x | x \geq 1 - s - \frac{1-\varphi}{\varphi} \frac{1}{54}} \Pr \left\{ y \leq x + \frac{1-\varphi}{\varphi} \frac{35}{54} \right\} f(x) dx \frac{1}{2} ds}.
$$

The cut-off $x \geq 1 - s - \frac{1-\varphi}{\varphi} \frac{1}{54}$ is below the upper bound of the support of $x$ if $1 - s - \frac{1-\varphi}{\varphi} \frac{1}{54} \leq 2$, which is always satisfied since $s \leq 1$ and $\varphi \in (0,1]$. The cut-off $x \geq 1 - s - \frac{1-\varphi}{\varphi} \frac{1}{54}$ is above the lower bound of the support of $x$ if $1 - s - \frac{1-\varphi}{\varphi} \frac{1}{54} \geq -2$. That is violated for any $s$ if $1 - (1 - \frac{1-\varphi}{\varphi} \frac{1}{54} < -2 \iff \varphi < \frac{1}{217}$, which does not hold. So the lower cutoff is above $-2$ if the signal $s$ is sufficiently high. It is above $-2$ with certainty if $1 - 1 - \frac{1-\varphi}{\varphi} \frac{1}{54} \geq -2 \iff \varphi \geq \frac{1}{109}$. So if $\frac{1}{217} \leq \varphi \leq \frac{1}{109}$, the lower cut-off $x \geq 1 - s - \frac{1-\varphi}{\varphi} \frac{1}{54}$ is below the lower bound $-2$ if $s \geq 3 - \frac{1-\varphi}{\varphi} \frac{1}{54}$, and above it if $s \leq 3 - \frac{1-\varphi}{\varphi} \frac{1}{54}$.

**Case (2):** $\frac{1}{217} \leq \varphi \leq \frac{1}{109}$ ($\varphi \in [0.0046083, 0.0091743]$).

The second condition is satisfied with certainty. The expected value of uninformed entry is

$$
\left( \int_{-1}^{3} \frac{1-\varphi}{\varphi} \frac{1}{54} \int_{1-s}^{2} \frac{1-\varphi}{\varphi} \frac{1}{54} (\varphi(s+x) + (1-\varphi) \frac{55}{34}) f(x) dx \frac{1}{2} ds \right)

+ \left( \int_{-1}^{1} \frac{1-\varphi}{\varphi} \frac{1}{54} \int_{1-s}^{2} (\varphi(s+x) + (1-\varphi) \frac{55}{34}) f(x) dx \frac{1}{2} ds \right)

+ \left( \int_{-1}^{3} \frac{1-\varphi}{\varphi} \frac{1}{54} \int_{1-s}^{2} f(x) dx \frac{1}{2} ds \right)

+ \left( \int_{3}^{1} \frac{1-\varphi}{\varphi} \frac{1}{54} \int_{1-s}^{2} f(x) dx \frac{1}{2} ds \right).
$$

The cut-off $1 - s - \frac{1-\varphi}{\varphi} \frac{1}{54}$ is negative if $1 - s - \frac{1-\varphi}{\varphi} \frac{1}{54} < 0 \iff s > 1 - \frac{1-\varphi}{\varphi} \frac{1}{54}$, which is below the cut-off for the $s$ signal, $3 - \frac{1-\varphi}{\varphi} \frac{1}{54}$. It is below the lower bound for the $s$ signal: $1 - \frac{1-\varphi}{\varphi} \frac{1}{54} < -1 \iff \varphi < \frac{1}{109}$, which holds. So for all $s \leq 3 - \frac{1-\varphi}{\varphi} \frac{1}{54}$, the cut-off $1 - s - \frac{1-\varphi}{\varphi} \frac{1}{54}$ is negative. The expected value of
This average value is U-shaped in $\varphi$, taking on values $\frac{220}{217} = 1.0138$ and $\frac{1103}{1090} = 1.0119$ at the boundaries of the relevant range of $\varphi$.  

[End of Case (2)]

If $\varphi > \frac{1}{109}$, the cut-off $x \geq 1 - s - \frac{1-\varphi}{\varphi} \frac{1}{54}$ is in the interior of the support of $x$ for all $s$. The expected value of uninformed entry is

$$
\left( \int_{-1}^{3-\frac{1-\varphi}{\varphi} \frac{1}{54}} \left( \int_{1-s-\frac{1-\varphi}{\varphi} \frac{1}{54}}^{1} \left( \varphi (s+x) + (1-\varphi) \frac{55}{54} \right) \frac{2+x}{4} dx \right) \right) \frac{1}{2} ds 
\right)
\left( \int_{-1}^{3-\frac{1-\varphi}{\varphi} \frac{1}{54}} \left( \int_{1-s-\frac{1-\varphi}{\varphi} \frac{1}{54}}^{1} \left( \varphi (s+x) + (1-\varphi) \frac{55}{54} \right) \frac{2+x}{4} dx \right) \right) \frac{1}{2} ds 

= \frac{1}{216} (1 - \varphi) \left( 554554081\varphi^3 - 30654939\varphi^2 + 141267\varphi - 217 \right)

\frac{2660041\varphi^3 - 141267\varphi^2 + 651\varphi - 1}{\varphi^3 - 141267\varphi^2 + 651\varphi - 1}.

The cut-off $1 - s - \frac{1-\varphi}{\varphi} \frac{1}{54}$ is positive if $1 - s - \frac{1-\varphi}{\varphi} \frac{1}{54} > 0 \iff s < 1 - \frac{1-\varphi}{\varphi} \frac{1}{54}$, which is above the lower bound for the $s$ signals, $-1$, if $1 - \frac{1-\varphi}{\varphi} \frac{1}{54} > -1 \iff \varphi > \frac{1}{109}$, which holds. It is negative for higher signals $s$. The expected value of uninformed entry is

$$
\left( \int_{-1}^{3-\frac{1-\varphi}{\varphi} \frac{1}{54}} \left( \int_{1-s-\frac{1-\varphi}{\varphi} \frac{1}{54}}^{1} \left( \varphi (s+x) + (1-\varphi) \frac{55}{54} \right) \frac{2+x}{4} dx \right) \right) \frac{1}{2} ds 
\right)
\left( \int_{-1}^{3-\frac{1-\varphi}{\varphi} \frac{1}{54}} \left( \int_{1-s-\frac{1-\varphi}{\varphi} \frac{1}{54}}^{1} \left( \varphi (s+x) + (1-\varphi) \frac{55}{54} \right) \frac{2+x}{4} dx \right) \right) \frac{1}{2} ds 

= \frac{1}{216} (1 - \varphi) \left( 554554081\varphi^3 - 30654939\varphi^2 + 141267\varphi - 217 \right)

\frac{2660041\varphi^3 - 141267\varphi^2 + 651\varphi - 1}{\varphi^3 - 141267\varphi^2 + 651\varphi - 1}.

\frac{2660041\varphi^3 - 141267\varphi^2 + 651\varphi - 1}{\varphi^3 - 141267\varphi^2 + 651\varphi - 1}.
Case (3): $\frac{1}{109} \leq \varphi \leq \frac{35}{237}$ ($\varphi \in [0.0091743, 0.13944]$).

The second condition is satisfied with certainty. The expected value of uninformed entry is

$$\frac{1}{2} \int_{-1}^{1} \frac{1-\varphi}{3} \int_{1-s}^{1-s} \frac{1-\varphi}{3} (\varphi (s+x) + (1-\varphi) \frac{55}{54}) \frac{2-x}{4} dx \frac{1}{2} ds \left( \int_{-1}^{1} \frac{1-\varphi}{3} \int_{1-s}^{1-s} \frac{1-\varphi}{3} (\varphi (s+x) + (1-\varphi) \frac{55}{54}) \frac{2-x}{4} dx \frac{1}{2} ds \right)$$

$$= \frac{65539799\varphi^4 + 134755060\varphi^3 + 3742842\varphi^2 + 35860\varphi - 217}{216(612523\varphi^2 + 17169\varphi^2 + 165\varphi - 1)}.$$ 

This average value is increasing in $\varphi$, taking on values between $\frac{1093}{1099} = 1.0119$ and $\frac{27289871}{254115758} = 1.0737$ over the relevant range of $\varphi$. [End of Case (3)]

If $\varphi \geq \frac{35}{237}$, the second condition may be violated for low $x$, such that the uninformed entrant prefers to enter a segment different from that chosen by the informed entrant. $\Pr \left\{ y \leq x + \frac{1-\varphi}{3} \frac{35}{54} \right\}$ is positive for any $x$.

$\Pr \left\{ y \leq x + \frac{1-\varphi}{3} \frac{35}{54} \right\}$ equals one if $2 \leq x + \frac{1-\varphi}{3} \frac{35}{54} \iff x \geq 2 - \frac{1-\varphi}{3} \frac{35}{54}$, which is in the interior of the support of $x$ if $2 - \frac{1-\varphi}{3} \frac{35}{54} \geq -2 \iff \varphi \geq \frac{35}{237}$, satisfied.

The cut-off $x \geq 2 - \frac{1-\varphi}{3} \frac{35}{54}$ is irrelevant if it is below the cut-off $x \geq 1 - s - \frac{1-\varphi}{3} \frac{1}{54}$, i.e., if $2 - \frac{1-\varphi}{3} \frac{35}{54} < 1 - s - \frac{1-\varphi}{3} \frac{1}{54} \iff s < -1 + \frac{1-\varphi}{3} \frac{34}{54}$. That is certain if $-1 + \frac{1-\varphi}{3} \frac{34}{54} > 1 \iff \varphi < \frac{17}{71} = 0.23944$.

If $\varphi < \frac{17}{71} = 0.23944$, we have $\Pr \left\{ y \leq x + \frac{1-\varphi}{3} \frac{35}{54} \right\} = 1$ for all relevant signals. If $\varphi > \frac{17}{71} = 0.23944$, we may have $\Pr \left\{ y \leq x + \frac{1-\varphi}{3} \frac{35}{54} \right\} < 1$ for low signals $x$.

Case (4): $\frac{35}{237} \leq \varphi \leq \frac{17}{71}$ ($\varphi \in [0.13944, 0.23944]$).

We have $\Pr \left\{ y \leq x + \frac{1-\varphi}{3} \frac{35}{54} \right\} = 1$ for all relevant signals. The expected value of uninformed
entry is
\[
\begin{align*}
&\left( -1 - \frac{1 - \varphi}{\varphi} \right. \\
&\frac{1}{54} \int_{-1}^{1} \frac{1 - \varphi}{\varphi} \left( \varphi (s + x) + (1 - \varphi) \frac{55}{54} \right) \frac{2 - x}{4} dx \frac{1}{2} ds \\
&\left. + \int_{1}^{1} \frac{1 - \varphi}{\varphi} \left( \varphi (s + x) + (1 - \varphi) \frac{55}{54} \right) \frac{2 - x}{4} dx \frac{1}{2} ds \right) \\
&\left( f_{1}^{2} \frac{1 - \varphi}{\varphi} + 2 \frac{2 - x}{4} dx \frac{1}{2} ds + f_{1}^{1} \frac{1 - \varphi}{\varphi} \left( f_{1}^{0} \frac{1 - \varphi}{\varphi} \frac{2 - x}{4} dx + f_{1}^{2} \frac{2 - x}{4} dx \right) \frac{1}{2} ds \right) \\
&= \frac{65539799 \varphi^{4} + 134755060 \varphi^{3} + 3742842 \varphi^{2} + 35860 \varphi - 217}{216 (612523 \varphi^{4} + 17169 \varphi^{2} + 165 \varphi - 1)}. \\
\end{align*}
\]

This average value is increasing in \( \varphi \), taking on values between \( \frac{27289871}{25415758} = 1.0737 \) and \( \frac{6838135}{6087521} = 1.1232 \) over the relevant range of \( \varphi \). \[\text{End of Case (4)}\]

If \( \varphi > \frac{17}{71} = 0.23944 \), we have …

… if \( s < -1 + \frac{1 - \varphi}{\varphi} \cdot \frac{34}{54} \) then \( x \geq 2 - \frac{1 - \varphi}{\varphi} \cdot \frac{35}{54} \) for all relevant signals \( x \), and therefore \( \text{Pr} \left\{ y \leq x + \frac{1 - \varphi}{\varphi} \cdot \frac{35}{54} \right\} = 1 \) for all \( x \).

… if \( s > -1 + \frac{1 - \varphi}{\varphi} \cdot \frac{34}{54} \) then \( \text{Pr} \left\{ y \leq x + \frac{1 - \varphi}{\varphi} \cdot \frac{35}{54} \right\} < 1 \) if \( 1 - s - \frac{1 - \varphi}{\varphi} \cdot \frac{1}{54} \leq x < 2 - \frac{1 - \varphi}{\varphi} \cdot \frac{35}{54} \) and

\[
\text{Pr} \left\{ y \leq x + \frac{1 - \varphi}{\varphi} \cdot \frac{35}{54} \right\} = 1 \text{ if } 2 - \frac{1 - \varphi}{\varphi} \cdot \frac{35}{54} < x < 2.
\]

From above: \( x \geq 2 - \frac{1 - \varphi}{\varphi} \cdot \frac{35}{54} \) is in the interior of the support of \( x \).

Is that cutoff positive? \( 2 - \frac{1 - \varphi}{\varphi} \cdot \frac{35}{54} \geq 0 \iff \varphi \geq \frac{35}{143} = 0.24476 \), satisfied. Determines \( x \)-integrals.

If \( \varphi < \frac{35}{143} = 0.24476 \), then \( 2 - \frac{1 - \varphi}{\varphi} \cdot \frac{35}{54} < 0 \). If \( \varphi \geq \frac{35}{143} = 0.24476 \), then \( 2 - \frac{1 - \varphi}{\varphi} \cdot \frac{35}{54} \geq 0 \).

Check: \( -1 + \frac{1 - \varphi}{\varphi} \cdot \frac{34}{54} < 1 \iff \varphi > \frac{17}{71} = 0.23944 \), satisfied.

Where is the additional \( s \)-integral split? \( -1 + \frac{1 - \varphi}{\varphi} \cdot \frac{34}{54} < 1 \iff 1 - \frac{1 - \varphi}{\varphi} \cdot \frac{1}{54} \iff \varphi > \frac{35}{143} = 0.24476 \).

Determines \( s \)-integrals.

**Case (5):** \( \frac{17}{71} \leq \varphi \leq \frac{35}{143} \) \( (\varphi \in [0.23944, 0.24476]) \).

If \( \varphi < \frac{35}{143} = 0.24476 \), there are three \( s \)-integrals, with supports

\[
\begin{align*}
&\left[ -1, 1 - \frac{1 - \varphi}{\varphi} \cdot \frac{1}{54} \right] \cdot \text{Pr} \left\{ y \leq x + \frac{1 - \varphi}{\varphi} \cdot \frac{35}{54} \right\} = 1 \\
&\left[ 1 - \frac{1 - \varphi}{\varphi} \cdot \frac{1}{54}, -1 + \frac{1 - \varphi}{\varphi} \cdot \frac{34}{54} \right] \cdot \text{Pr} \left\{ y \leq x + \frac{1 - \varphi}{\varphi} \cdot \frac{35}{54} \right\} = 1 \\
&\left[ -1 + \frac{1 - \varphi}{\varphi} \cdot \frac{34}{54}, 1 \right] \cdot \text{Pr} \left\{ y \leq x + \frac{1 - \varphi}{\varphi} \cdot \frac{35}{54} \right\} < 1 \text{ if } 1 - s - \frac{1 - \varphi}{\varphi} \cdot \frac{1}{54} < x < 2 - \frac{1 - \varphi}{\varphi} \cdot \frac{35}{54} < 0
\end{align*}
\]
and \( \Pr \left\{ y \leq x + \frac{1 - \varphi 35}{\varphi 54} \right\} = 1 \) if \( 2 - \frac{1 - \varphi 35}{\varphi 54} < x < 0 \) or \( 0 < x < 2 \).

If \( \varphi < \frac{35}{143} = 0.24476 \), then \( 2 - \frac{1 - \varphi 35}{\varphi 54} < 0 \).

Where \( \Pr \left\{ y \leq x + \frac{1 - \varphi 35}{\varphi 54} \right\} < 1 \), the cut-off \( x + \frac{1 - \varphi 35}{\varphi 54} \) is positive if \( x + \frac{1 - \varphi 35}{\varphi 54} \). The lowest feasible signal is \( x \geq 1 - s - \frac{1 - \varphi}{\varphi 54} \), so the cut-off is positive if \( 1 - s - \frac{1 - \varphi}{\varphi 54} + \frac{1 - \varphi 35}{\varphi 54} \geq 0 \iff s \leq 1 + \frac{1 - \varphi 34}{\varphi 54} \), which is always satisfied. In those cases, we have

\[
\Pr \left\{ y \leq x + \frac{1 - \varphi 35}{\varphi 54} \right\} = \frac{4 + 4 \left( x + \frac{1 - \varphi 35}{\varphi 54} \right) - \left( x + \frac{1 - \varphi 35}{\varphi 54} \right)^2}{8}.
\]

The expected value of uninformed entry is

\[
\begin{align*}
&\int_{-1}^{1} \frac{1 - \varphi 1}{\varphi 54} \left( \int_{-1}^{2} \frac{1 - \varphi 1}{\varphi 54} (\varphi (s + x) + (1 - \varphi) \frac{55}{54}) \frac{2-x}{4} dx \right) \frac{1}{2} ds \\
&+ \int_{-1}^{1} \frac{1 - \varphi 1}{\varphi 54} \left( \int_{-1}^{0} \frac{1 - \varphi 1}{\varphi 54} (\varphi (s + x) + (1 - \varphi) \frac{55}{54}) \frac{2+x}{4} dx \right) \frac{1}{2} ds \\
&+ \int_{-1}^{1} \frac{1 - \varphi 1}{\varphi 54} \left( \int_{-1}^{2} \frac{1 - \varphi 1}{\varphi 54} (\varphi (s + x) + (1 - \varphi) \frac{55}{54}) \frac{2-x}{4} dx \right) \frac{1}{2} ds \\
&+ \int_{-1}^{1} \frac{1 - \varphi 1}{\varphi 54} \left( \int_{-1}^{0} \frac{1 - \varphi 1}{\varphi 54} (\varphi (s + x) + (1 - \varphi) \frac{55}{54}) \frac{2+x}{4} dx \right) \frac{1}{2} ds
\end{align*}
\]

\[
= \frac{5}{3} \frac{1908 193 685 \varphi^6 - 7637 053 011 \varphi^5 - 8520 448 851 \varphi^4 + 4006 515 182 \varphi^3 - 859 195 029 \varphi^2 + 85 117 725 \varphi - 3090 277}{3205 112 869 \varphi^6 - 22 531 859 645 \varphi^4 + 9018 225 730 \varphi^3 - 1794 767 770 \varphi^2 + 171 095 225 \varphi - 6097 033}.
\]

This average value is increasing in \( \varphi \), taking on values between \( \frac{6838 135}{6087 824} = 1.1232 \) and \( \frac{1840 240 200 85}{163 448 760 904} = 1.1259 \) over the relevant range of \( \varphi \).

**Case (6):** \( \frac{35}{143} \leq \varphi \leq \frac{1}{3} \) (\( \varphi \in [0.24476, 0.33333] \)).

If \( \varphi > \frac{35}{143} = 0.24476 \), then \( 2 - \frac{1 - \varphi 35}{\varphi 54} > 0 \).
First $s$-integral: $1 - s - \frac{1 - \varphi}{\varphi} > 0$? We have $s < -1 + \frac{1 - \varphi}{\varphi}$, so $1 - s - \frac{1 - \varphi}{\varphi} > 1 - (1 - \frac{1 - \varphi}{\varphi}) - \frac{1 - \varphi}{\varphi} = 2 - \frac{1 - \varphi}{\varphi}$, which is positive.

Second $s$-integral: $1 - s - \frac{1 - \varphi}{\varphi} < 0$? We have $s > -1 + \frac{1 - \varphi}{\varphi}$, so $1 - s - \frac{1 - \varphi}{\varphi} < 1 - (1 - \frac{1 - \varphi}{\varphi}) - \frac{1 - \varphi}{\varphi} = 2 - \frac{1 - \varphi}{\varphi}$, which is positive.

If $\varphi > \frac{35}{113} = 0.24476$, there are three $s$-integrals, with supports

$[-1, -1 + \frac{1 - \varphi}{\varphi}]$: Pr \(\{ y \leq x + \frac{1 - \varphi}{\varphi} \} \) = 1

$[-1 + \frac{1 - \varphi}{\varphi}, 1 - \frac{1 - \varphi}{\varphi}]$: Pr \(\{ y \leq x + \frac{1 - \varphi}{\varphi} \} < 1 \text{ if } 1 - s - \frac{1 - \varphi}{\varphi} < \{x, 0\} < 2 - \frac{1 - \varphi}{\varphi}$

and Pr \(\{ y \leq x + \frac{1 - \varphi}{\varphi} \} = 1 \text{ if } 2 - \frac{1 - \varphi}{\varphi} < x < 2$.

$[1 - \frac{1 - \varphi}{\varphi}, 1]$: Pr \(\{ y \leq x + \frac{1 - \varphi}{\varphi} \} < 1 \text{ if } 1 - s - \frac{1 - \varphi}{\varphi} < 0 < x < 2 - \frac{1 - \varphi}{\varphi}$

and Pr \(\{ y \leq x + \frac{1 - \varphi}{\varphi} \} = 1 \text{ if } 2 - \frac{1 - \varphi}{\varphi} < x < 2$.

Where Pr \(\{ y \leq x + \frac{1 - \varphi}{\varphi} \} < 1$, the cut-off $x + \frac{1 - \varphi}{\varphi}$ is positive if $x + \frac{1 - \varphi}{\varphi}$. The lowest feasible signal is $x \geq 1 - s - \frac{1 - \varphi}{\varphi}$, so the cut-off is positive if $1 - s - \frac{1 - \varphi}{\varphi} + \frac{1 - \varphi}{\varphi} \geq 0 \iff s \leq 1 + \frac{1 - \varphi}{\varphi}$, which is always satisfied. In those cases, we have

$$
\text{Pr} \{ y \leq x + \frac{1 - \varphi}{\varphi} \} = \frac{4 + 4 \left( x + \frac{1 - \varphi}{\varphi} \right) - \left( x + \frac{1 - \varphi}{\varphi} \right)^2}{8}.
$$

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The expected value of uninformed entry is

\[
\begin{align*}
&\left(\int_{-1}^{1} \frac{1 - \varphi}{\varphi} \left(\varphi(s + x) + (1 - \varphi) \frac{55}{54}\right) \frac{2 - x}{4} dx \right) \int_{1}^{2} ds \\
&+ \left(\int_{-1}^{1} \frac{1 - \varphi}{\varphi} \left(\varphi(s + x) + (1 - \varphi) \frac{55}{54}\right) \frac{4 + 4(x + \frac{1 - \varphi}{\varphi})^2 - (x + \frac{1 - \varphi}{\varphi})^2}{8} \frac{2 + x}{4} dx \right) \frac{1}{2} ds
\end{align*}
\]

This average value is increasing in \(\varphi\), taking on values between \(\frac{184024020085}{103448760904} = 1.1259\) and \(\frac{21406545578}{17982092097} = 1.1904\) over the relevant range of \(\varphi\).

[End of Case (6)]

A.3.2 Entry in a different segment than the informed entrant

If \(\delta_1 = k\), uninformed entry happens in segment \(j\) if

\[
\begin{align*}
&\varphi(s + m_j + u_j) + (1 - \varphi) E[t + v_j | \delta_1 = k] \geq K \\
&\varphi(s + m_j + u_j) + (1 - \varphi) E[t + v_j | \delta_1 = k] \geq \varphi(s + m_k + u_k) + (1 - \varphi) E[t + v_k | \delta_1 = k]
\end{align*}
\]
Replace $E[ t + v_j \mid \delta_1 = k]$ and $E[ t + v_k \mid \delta_1 = k]$,

$$\begin{align*}
\varphi (s + m_j + u_j) + (1 - \varphi) \frac{-K^3 - 3K^2 + 105K - 21}{6(-K^2 + 6K + 31)} & \geq K \\
\varphi (s + m_j + u_j) + (1 - \varphi) \frac{-K^3 - 3K^2 + 105K - 21}{6(-K^2 + 6K + 31)} & \geq \varphi (s + m_k + u_k) + (1 - \varphi) \frac{-7K^3 + 39K^2 + 195K + 213}{12(-K^2 + 6K + 31)} .
\end{align*}$$

Replacing $K = 1$, $x \equiv m_j + u_j$ and $y \equiv m_k + u_k$, the conditions for uninformed entry can be written as

$$\begin{align*}
\begin{cases}
\varphi (s + x) + (1 - \varphi) \frac{10}{27} \geq 1 \\
\varphi (s + y) + (1 - \varphi) \frac{55}{84} \leq \varphi (s + x) + (1 - \varphi) \frac{10}{27}
\end{cases}
\begin{align*}
&\begin{cases}
s + x \geq 1 + \frac{1 - \varphi}{\varphi} \frac{17}{27} \\
y \leq x - \frac{1 - \varphi}{\varphi} \frac{35}{54}
\end{cases}
\end{align*}
\end{align*}$$

Uninformed entry in a segment different from that chosen by an informed entrant is never certain, since the sum of signals must be larger than one. It is possible if $3 > 1 + \frac{1 - \varphi}{\varphi} \frac{17}{27} \iff \varphi > \frac{17}{27} = 0.3944$. It requires a signal $s > -1$ since $-1 + 2 < 1 + \frac{1 - \varphi}{\varphi} \frac{17}{27}$ for any $\varphi \in (0, 1)$. So it requires $s \geq -1 + \frac{1 - \varphi}{\varphi} \frac{17}{27}$. (That is below 1 if $-1 + \frac{1 - \varphi}{\varphi} \frac{17}{27} < 1 \iff \varphi > \frac{17}{71}$.)

Given a feasible signal $s$, the first condition is satisfied if $x \geq 1 - s + \frac{1 - \varphi}{\varphi} \frac{17}{27}$.

That is above $-2$ if $1 - s + \frac{1 - \varphi}{\varphi} \frac{17}{27} > -2 \iff s < 3 + \frac{1 - \varphi}{\varphi} \frac{17}{27}$, which is satisfied.

It is below 2 if $1 - s + \frac{1 - \varphi}{\varphi} \frac{17}{27} < 2 \iff s > -1 + \frac{1 - \varphi}{\varphi} \frac{17}{27}$, which is satisfied.

So the cut-off $x \geq 1 - s + \frac{1 - \varphi}{\varphi} \frac{17}{27}$ is inside the support $[-2, 2]$.

The cut-off $x \geq 1 - s + \frac{1 - \varphi}{\varphi} \frac{17}{27}$ is positive if $1 - s + \frac{1 - \varphi}{\varphi} \frac{17}{27} \geq 0$. Since $s \leq 1$, that is always satisfied, so $x \geq 1 - s + \frac{1 - \varphi}{\varphi} \frac{17}{27} \geq 0$.

The expected value of uninformed entry is

$$\begin{align*}
\frac{\int_{-1}^{1} \frac{1 - \varphi}{\varphi} \frac{17}{27} \left( \int_{1 - s + \frac{1 - \varphi}{\varphi} \frac{17}{27}}^{2 - \frac{x}{4}} (\varphi (s + x) + (1 - \varphi) \frac{10}{27}) \Pr \left\{ y \leq x - \frac{1 - \varphi}{\varphi} \frac{35}{54} \right\} 2 - \frac{x}{4} dx \right) \frac{1}{2} \frac{1}{2} ds \
\int_{-1}^{1} \frac{1 - \varphi}{\varphi} \frac{17}{27} \left( \int_{1 - s + \frac{1 - \varphi}{\varphi} \frac{17}{27}}^{2 - \frac{x}{4}} \Pr \left\{ y \leq x - \frac{1 - \varphi}{\varphi} \frac{35}{54} \right\} 2 - \frac{x}{4} dx \right) \frac{1}{2} \frac{1}{2} ds 
\end{align*}$$

The second condition is not violated with certainty, since that would require $-2 > 2 - \frac{1 - \varphi}{\varphi} \frac{35}{54} \iff \varphi < \frac{35}{251} = 0.13944$, which is not the case.

The second condition is not satisfied with certainty, since it is violated when $y = x$. 

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Can it happen that \( x - \frac{1 - \varphi}{\varphi} \frac{35}{54} \leq -2 \)? The lowest feasible \( x \) is \( x \geq 1 - s + \frac{1 - \varphi}{\varphi} \frac{17}{27} \). So a truncation of the \( y \)-integral is necessary if \( 1 - s + \frac{1 - \varphi}{\varphi} \frac{17}{27} - \frac{1 - \varphi}{\varphi} \frac{35}{54} \leq -2 \iff s \geq 3 - \frac{1 - \varphi}{\varphi} \frac{1}{54} \), which requires
\[
3 - \frac{1 - \varphi}{\varphi} \frac{1}{54} < 1 \iff \varphi < \frac{1}{109} = 0.0091743.
\]
So it is not necessary to truncate the \( y \)-integral.

What remains to be checked is whether
\[
x - \frac{1 - \varphi}{\varphi} \frac{35}{54} \geq 0 \iff x \geq \frac{1 - \varphi}{\varphi} \frac{35}{54}.
\]
We have \( \frac{1 - \varphi}{\varphi} \frac{35}{54} > 2 \) if and only if \( \varphi < \frac{35}{143} = 0.24476 \). So if \( \varphi < \frac{35}{143} = 0.24476 \), we have \( x < \frac{1 - \varphi}{\varphi} \frac{35}{54} \) with certainty, and the cutoff for the \( y \)-integral is at a negative value of \( y \).

**Case (a) \( \frac{17}{11} \leq \varphi \leq \frac{35}{143} \) (\( \varphi \in [0.23944, 0.24474] \)).** The expected value of uninformed entry is

\[
\int_{1+1}^{1+\varphi} \frac{17}{27} \left( \int_{1-s+1}^{1} \frac{17}{27} \varphi (s + x) + (1 - \varphi) \frac{10}{27} \right) \frac{4+4(x-\frac{1 - \varphi}{\varphi} \frac{35}{54})+\left(x-\frac{1 - \varphi}{\varphi} \frac{35}{54}\right)^2}{2} \frac{2-\varphi}{dx} \right) \frac{1}{2} \frac{ds}{dx}
\]

This average value is increasing in \( \varphi \), taking on values between 1 and \( \frac{1708115}{1702129} = 1.0035 \) over the relevant range of \( \varphi \).

**Case (b) \( \frac{35}{143} \leq \varphi \leq \frac{1}{3} \) (\( \varphi \in [0.24476, 0.33333] \)).**

For high signals \( x \), we have \( x > \frac{1 - \varphi}{\varphi} \frac{35}{54} \), and the cutoff for the \( y \)-integral is at a positive value of \( y \). The \( x \)-integral needs to be split at \( x = \frac{1 - \varphi}{\varphi} \frac{35}{54} \). The expected value of uninformed entry is

\[
\int_{1+1}^{1+\varphi} \frac{17}{27} \left( \int_{1-s+1}^{1} \frac{17}{27} \varphi (s + x) + (1 - \varphi) \frac{10}{27} \right) \frac{4+4(x-\frac{1 - \varphi}{\varphi} \frac{35}{54})+\left(x-\frac{1 - \varphi}{\varphi} \frac{35}{54}\right)^2}{2} \frac{2-\varphi}{dx} \right) \frac{1}{2} \frac{ds}{dx}
\]

This average value is increasing in \( \varphi \), taking on values between \( \frac{1708115}{1702129} = 1.0035 \) and \( \frac{634284413}{503439995} = \).
A.3.3 Entry after informed non-entry

If $\delta_1 = 0$ (non-entry), uninformed entry happens in segment $j$ if

$$
\begin{align*}
\varphi (s + m_j + u_j) + (1 - \varphi) E[t + v_j | \delta_1 = 0] &\geq K \\
\varphi (s + m_j + u_j) + (1 - \varphi) E[t + v_j | \delta_1 = 0] &\geq \varphi (s + m_k + u_k) + (1 - \varphi) E[t + v_k | \delta_1 = 0]
\end{align*}
$$

Note that $E[t + v_j | \delta_1 = 0] = E[t + v_k | \delta_1 = 0] < 0$ if $K \in [1, 3)$. Since $\varphi < \frac{K}{3}$, the first condition cannot be satisfied, so there will be no uninformed entry.
Appendix B: Product Differences Across Segments and Examples of Brand Names Associated with each Segment

Table AI

This table provides a brief description for STR segments and examples of brands in each of the segments. STR distinguishes between Luxury and Upper Upscale hotels. However, since there are very few luxury hotels, we combine luxury and upper upscale hotels into a single category. Sources: Canina, Enz and Harrison (2005), Freedman and Kosová (2012).

<table>
<thead>
<tr>
<th>Segment</th>
<th>Description — Product/Service Quality</th>
<th>Example — Chain/Brand Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luxury/Upper Upscale</td>
<td>Elegant, distinctive, highest quality décor, upscale restaurants, full range of first-class amenities and customized services</td>
<td>Four Seasons, Fairmont, Ritz-Carlton, Wyndham, Sheraton</td>
</tr>
<tr>
<td>Upscale</td>
<td>Well-integrated décor, quality furnishings, premium guestroom, amenities and facilities, high staff to guest ratio</td>
<td>Crowne Plaza, Courtyard, Residence Inn</td>
</tr>
<tr>
<td>Midscale w/ Food &amp; Beverage (F&amp;B)</td>
<td>Nicely appointed rooms, range of facilities, good quality amenities, some special services available, restaurants</td>
<td>Holiday Inn, Best Western, Four Points</td>
</tr>
<tr>
<td>Midscale w/o F&amp;B</td>
<td>Nicely appointed rooms, range of facilities may be limited, good-quality amenities</td>
<td>Comfort Inn, Hampton Inn,</td>
</tr>
<tr>
<td>Economy</td>
<td>Clean and comfortable, minimum of services and amenities</td>
<td>Microtel Inn, Motel 6, Days Inn</td>
</tr>
</tbody>
</table>
Appendix C: NPV of an Economy Hotel

In this Appendix, we describe the data used to compute the NPV of an average Economy hotel, as discussed in Section V.C.

The average Economy hotel in our sample has 82 rooms and generates annual room revenues of $928,000. The cost of building such a hotel is $5.255 million, out of which $736,000 is the cost of purchasing land, according to HVS Global Hospitality Service (see Hotel Development Cost Survey 2011). We deflate these amounts to 2009, as the performance is measured in 2009 US dollars.

According to STR, 98% of the total revenues of Economy hotels come from room revenues, the variable operating expenses represent 19.3% of the total revenue, and the estimated yearly fixed cost for the average hotel in our sample is $300,000. Following standard industry practices, we allow 40 years of depreciation for the initial construction cost. We assume a corporate income tax rate of 35% and that property taxes can be deducted from taxable income. Using the revenue, cost and depreciation information, the annual unlevered free cash flow for the first 40 years is $342,000. In addition, hotels regularly undergo renovations. Based on the HVS Hotel Cost Estimating Guide 2011, we estimate capital expenditures of $274,000 every ten years, which create additional tax shields in years 11 and later.

The typical hotel development is financed using 40% of equity and 60% of debt. To compute the WACC (discount rate), we use the rates of return suggested by deRoos and Rushmore (2003), 8% for debt and 13% for equity. Assuming that the hotel operates perpetually, and that cash flows grow at the rate of inflation, we obtain an NPV of $301,000.

Next, we use the parameters from Table IV, Panel A, to compute the revenue reduction for Economy hotels built during market booms. A one standard deviation increase in the number of Entrants (5.67 hotels) in the same county-year reduces a hotel’s RevPAR by 4.99% in the first 5 years of operations; by 4.76% in years 5-10; by 2.38% in years 10-20 and by 5.67% in years 20-30. Using the weight each period represents in the total present value of room revenues a hotel produces, room revenues are reduced by 3.5%. Applying the same assumptions we used above to compute the NPV of the hotel, a hotel opened during a market boom has an NPV of $2,000. That is a reduction of $299,000 in NPV.
Appendix D: Same-Segment and Other-Segment Entrants at the ZIP Code Level

Table AII

This table replicates Table VII, replacing Entrants (same segment) and Entrants (other segments), which are constructed at the county level, by Entrants in Zip (same segment) and Entrants in Zip (other segments), which count the number of hotels entering in the same year and zip code (in the same and other quality segments) as a given hotel. Similarly, Hotels in County (same segment) and Hotels in County (other segments) are replaced by Hotels in Zip (same segment) and Hotels in Zip (other segments). In all regressions, robust standard errors are adjusted for heteroscedasticity and county-level clusters. Significant at: *10%, **5%, ***1%.

<table>
<thead>
<tr>
<th>Hotel Age</th>
<th>&quot;1-5&quot;</th>
<th>&quot;6-10&quot;</th>
<th>&quot;11-20&quot;</th>
<th>&quot;21-30&quot;</th>
<th>&quot;&gt;30&quot;</th>
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<tbody>
<tr>
<td><strong>Variable</strong></td>
<td>log(RevPAR)</td>
<td>log(RevPAR)</td>
<td>log(RevPAR)</td>
<td>log(RevPAR)</td>
<td>log(RevPAR)</td>
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<tr>
<td>Cohort Effect</td>
<td>(-0.0124^{***})</td>
<td>0.0003</td>
<td>-0.0014</td>
<td>-0.0059</td>
<td>1.2370^{***}</td>
</tr>
<tr>
<td></td>
<td>(0.0037)</td>
<td>(0.0031)</td>
<td>(0.0024)</td>
<td>(0.0061)</td>
<td>(0.4652)</td>
</tr>
<tr>
<td>Entrants in Zip (same segment)</td>
<td>(-0.0196^{***})</td>
<td>(-0.0146^{**})</td>
<td>0.0041</td>
<td>0.0123</td>
<td>0.0103</td>
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<tr>
<td></td>
<td>(0.0071)</td>
<td>(0.0070)</td>
<td>(0.0085)</td>
<td>(0.0168)</td>
<td>(0.0666)</td>
</tr>
<tr>
<td>Entrants in Zip (other segments)</td>
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<td>(-0.0096^{**})</td>
<td>(-0.0177^{**})</td>
<td>(-0.0212^{**})</td>
<td>-0.0472</td>
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<tr>
<td></td>
<td>(0.0061)</td>
<td>(0.0042)</td>
<td>(0.0073)</td>
<td>(0.0090)</td>
<td>(0.0614)</td>
</tr>
<tr>
<td>Hotels in Zip (same segment)</td>
<td>(-0.0059^{**})</td>
<td>(-0.0038^{**})</td>
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<td>-0.0032</td>
<td>-0.0120</td>
</tr>
<tr>
<td></td>
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<td>(0.0018)</td>
<td>(0.0024)</td>
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<td></td>
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<td>(0.0009)</td>
<td>(0.0012)</td>
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<td>Location Type Fixed Effects</td>
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<tr>
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