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**Keywords**

**JEL**

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# 1 Introduction

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*Airtours/First Choice*

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fi *efficiency*
*effect*
*foreclo-*
*sure effect*

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ffi

*First*
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ffi fi
*Second*
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fi fi *Third*
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# 2 A Case Study: The Market for Foreign Package Holidays in the UK

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*Airtours*

*First Choice*

*Tour Operation*

*Travel Agencies*

*Airlines*

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**Observation 1 (polarisation)** *The industry consists of a small group of vertically integrated tour operators with high market shares, and a fringe, containing numerous firms with small market shares, most of which are vertically separated.*

*Thomson* *Britannia*

*Lunn*

*Poly* *Air 2000* *First*

*Choice*

*Airtours* *MyTravel*

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**Observation 2 (vertical integration)** *Tour operators typically integrated vertically after having reached considerable market share.*

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**Observation 3 (horizontal expansion)** *Vertical integration was generally followed by further horizontal expansion.*

# 3 Product Market Competition

## 3.1 Assumptions

$I$ fi $J \geq I$ fi
$K < I$ fi
$i$
$V_i,$ $V_i = 0$ $V_i = 1$ fi
$\mathbf{V} = (V\ , ..., V_I)$
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fi $J \geq I$
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fi $J < I.$
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$p_i^U$

ff $p_i^U$

ff fi

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*efficiency effect*

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*foreclosure*

*effect*

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$p_i^U(\mathbf{V})$

$V_i$ $V_j, j \neq i,$

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$c_i^D$ $c_i^D$

ff fi

ff fi

fi $i$ $c_i$ $c -$

$Y_i$ , $c \equiv \max_i \in \{1, ..., I\} (c_i)$ $Y_i$

ffi $y_i$

$Y_i = Y_i + y_i$ ffi

$i$

$$c_i(\mathbf{V}; Y_i) = p_i^U(\mathbf{V}) + c - Y_i - y_i$$

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**Assumption 1** *The marginal cost function $c_i(\mathbf{V}; Y_i)$ is (i) non-increasing in $V_i$, (ii) non-decreasing in $V_j$, (iii) non-increasing and linear in $Y_i$, and (iv) additively separable in $\mathbf{V}$ and $Y_i$.*

$\mathbf{c} = (c , ..., c_I)$

fi $\pi_i^D(\mathbf{c})$,

**Assumption 2** *(i) $\frac{\partial \pi_i^D}{\partial c_i} \leq 0$; (ii) $\frac{\partial \pi_i^D}{\partial c_j} \geq 0$ for $j \neq i$; (iii) $\frac{\partial^2 \pi_i^D}{\partial {c_i}^2} \geq 0$; (iv) $\frac{\partial^2 \pi_i^D}{\partial c_i \partial c_j} \leq 0$ for $i \neq j$; (v) $\frac{\partial^2 \pi_i^D}{\partial c_j \partial c_k} \geq 0$ for $j, k \neq i$.*

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$$\pi_i^D(\mathbf{c}) = q_i^D(\mathbf{c}) \cdot m_i^D(\mathbf{c}),$$

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fl fi

$c_i(\mathbf{V}; \mathbf{Y})$

$q_i^D$ $m_i^D$

$q_i^D$ $m_i^D$

$c_i$ $c_j$

$$\frac{\partial \ \pi_i^D}{(\partial c_i)} = 2\frac{\partial q_i^D}{\partial c_i}\frac{\partial m_i^D}{\partial c_i} \geq 0.$$

ﬂ *demand/mark-up complementarity*

ﬁ ﬀ

$j$ ﬁ $i$ $j$

$k$

ﬁ

$\Pi_i(\mathbf{V};\mathbf{Y})$

$$\Pi_i(\mathbf{V};\mathbf{Y}) = \pi_i(c \ (\mathbf{V};Y \ ), ..., c_I(\mathbf{V};Y_I)).$$

**Notation 1** *Let $\Delta(\mathbf{V}_{-i};\mathbf{Y})$ denote firm $i$'s profit increase associated with vertical integration, given the values of all other variables, i.e.*

$$\begin{aligned} \Delta(\mathbf{V}_{-i};\mathbf{Y}) \quad \equiv \quad & \Pi_i(V \ , ..., V_{i-} \ , 1, V_i \quad , ..., V_I; \mathbf{Y}) \\ & -\Pi_i(V \ , ..., V_{i-} \ , 0, V_i \quad , ..., V_I; \mathbf{Y}). \end{aligned}$$

$\Delta(\mathbf{V}_{-i};\mathbf{Y})$ ﬁ $i$

ﬀ

## 3.2 Results for Two Firm Case

fi $I = 2$

fi $\Pi_i$ ff $\mathbf{Y}$

**Lemma 1** *Suppose $I = 2$ and assumptions 1 and 2 hold.*

*(i) Then the profit function $\Pi_i$ satisfies the following conditions:*

$$\frac{\partial \Pi_i}{\partial Y_i} \text{ is non-decreasing in } Y_i;$$
$$\frac{\partial \Pi_i}{\partial Y_i} \text{ is non-increasing in } Y_j, \text{ for } i \neq j;$$
$$\frac{\partial \Pi_i}{\partial Y_i} \text{ is non-decreasing in } V_i;\ \Delta\left(\mathbf{V}_{-i};\mathbf{Y}\right) \text{ is non-decreasing in } Y_i.$$
$$\frac{\partial \Pi_i}{\partial Y_i} \text{ is non-increasing in } V_j;\ \Delta\left(\mathbf{V}_{-i};\mathbf{Y}\right) \text{ is non-increasing in } Y_j.$$

*(ii) If, in addition, an integrating firm's own cost reduction is not much higher when the other firm is integrated rather than separated, then $V_i$ and $V_j$ are strategic substitutes, i.e.*

$$\Delta\left(\mathbf{V}_{-i};\mathbf{Y}\right) \text{ is non-increasing in } V_j.$$

**Proof.** ■

$V_i$

ffi ff ff

fi

$V_i$ $\frac{\partial \Pi_i}{\partial Y_i}$

fi $i$

ff

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$c_1\left(0,V_2;Y_1\right) - c_1\left(1,V_2;Y_1\right)$ $V_2 = 1$

$V_2 = 0,$ $c_2\left(V_1,0;Y_2\right) - c_2\left(V_1,1;Y_2\right).$

ﬁ $j$ ﬀ

ﬁ $i$ ﬁ $j$

*given*
*size*

ﬀ

ﬀ ﬁ

ﬀ $V_i$

$V_j = 1$ $V_i = 0$ ﬁ $i$ ﬁ $j$

$V_j = 1$, ﬁ $i$

$(V_j = 0)$

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# 4 Analyzing Investment Decisions

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$\Pi_i(\mathbf{V}; \mathbf{Y})$ ﬁ

$I > 2$ ﬁ

**Assumption 3** $\Pi_i$ *is* ***exchangeable****, that is,*

*(i) If, for some* $j, k \neq i$, $(\mathbf{V}^T; \mathbf{Y}^T)$ *is generated from* $(\mathbf{V}; \mathbf{Y})$ *by permutation of* $Y_j$ *and* $Y_k$, *and* $V_j$ *and* $V_k$, *then* $\Pi_i(\mathbf{V}^T; \mathbf{Y}^T) = \Pi_i(\mathbf{V}; \mathbf{Y})$.

*(ii) If, for some* $i, j \neq i$, $(\mathbf{V}^T; \mathbf{Y}^T)$ *is generated from* $(\mathbf{V}; \mathbf{Y})$ *by permutation of* $Y_i$ *and* $Y_j$, *and of* $V_i$ *and* $V_j$, *then* $\Pi_i(\mathbf{V}^T; \mathbf{Y}^T) = \Pi_j(\mathbf{V}; \mathbf{Y})$.

$\mathbf{Y} = (Y \; , ..., Y_I)$ $\mathbf{V} = (V \; , ..., V_I)$

fi ffi

fi

$$Y \; \geq Y \; \geq ... \geq Y_I \, .$$

## 4.1 The Vertical Integration Game

*vertical investment game* fi

$(\mathbf{V} \; = \mathbf{0})$ ffi $\mathbf{Y}$ $v_i$

fi $A > 0$.

$\mathbf{v} = (v \; , ..., v_I)$

$$\Pi_i^I \left(\mathbf{v}, \mathbf{Y} \;\right) \equiv \Pi_i \left(\mathbf{v}, \mathbf{Y} \;\right) - A \cdot v_i$$

fi

fi

$\mathbf{v} = \mathbf{1}$ $\mathbf{v} = \mathbf{0}$

fi $(v_i = 1)$ $(v_i = 0)$

$\mathbf{v}^i$ fi $i$ fi

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**Proposition 1** *Consider the vertical integration game with* $Y \;\; = ... = Y_I$. *Suppose that, for all* $i$,

$$\Delta\left(\mathbf{0}_{-i};\mathbf{Y}\;\;\right) > A > \Delta\left(\mathbf{1}_{-i};\mathbf{Y}\;\;\right).$$

*Then, (i) there exists an asymmetric equilibrium* $\mathbf{v} = \mathbf{v}^{n^*}$ *with* $0 < n^* < I$ *where exactly* $n^*$ *firms integrate. Also, (ii) all pure strategy equilibria must be asymmetric. (iii) If, in addition, (8) holds with strict inequality,* $n^*$ *is unique. (iv) If condition (10) does not hold, then no asymmetric equilibrium exists.*

$\Delta(\mathbf{0}_{-i};\mathbf{Y}\;\;) >$

$\Delta(\mathbf{1}_{-i};\mathbf{Y}\;\;)$

fi

$\Delta(\mathbf{0}_{-i};\mathbf{Y}\;\;) > A$

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$\Delta(\mathbf{1}_{-i};\mathbf{Y}\;\;) < A$ fi

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fi fi

$\Delta(\mathbf{0}_{-i};\mathbf{Y}\;\;) = \Delta\left(\mathbf{v}_{-i};\mathbf{Y}\;\;\right)$ $\Delta(\mathbf{1}_{-i};\mathbf{Y}\;\;) = \Delta\left(\mathbf{v}^{I}_{-i};\mathbf{Y}\;\;\right)$

$n^*$ fi $i$

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$\mathbf{0}_{-i}$ $(I-1)$ $\mathbf{0}$

$i$ $\mathbf{1}_{-i}$

fi

$\Delta\left(\mathbf{v}_{-i}^{n^*-}\;;\mathbf{Y}\;\right)\geq 0$ $\Delta\left(\mathbf{v}_{-i}^{n^*};\mathbf{Y}\;\right)\leq 0$

$n^*$ fi

$\Delta\left(\mathbf{v}_{-i}^{i-}\;;\mathbf{Y}\;\right)$ $i$

$n^*$

fi

$(\Delta\left(\mathbf{0}_{-i};\mathbf{Y}\;\right)<A)$

fi $(A<\Delta\left(\mathbf{1}_{-i};\mathbf{Y}\;\right))\,.$

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fi fi

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fi fi

$\Delta\left(\mathbf{v}_{-i};\mathbf{Y}\;\right)$ $v_j$ $j\neq i$

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ff ffi ff

ffi

ffi ff

ffi fi

ffi fi

**Proposition 2** *Consider the* ***vertical integration game****. Suppose that* $\Pi_i(\mathbf{V}, \mathbf{Y})$ *satisfies (6) and* (7)*. Then,*

*(i) If* $Y_k > Y_\ell$ *and there is a pure strategy equilibrium with* $V_k^* < V_\ell^*$ *there also is a pure strategy equilibrium with* $V_k^* > V_\ell^*$*. In particular, there is an equilibrium* $\mathbf{v} = \mathbf{v}^{n^*}$ *with* $n^*$ *such that* $0 < n^* < I$ *where exactly firms* $1, ..., n^*$ *integrate.*

*(ii) If (8) and*

$$\Delta\left(\mathbf{0}_{-}\ ;\mathbf{Y}\ \right) > A > \Delta\left(\mathbf{1}_{-I};\mathbf{Y}\ \right)$$

*hold, there exists an asymmetric equilibrium where some firms integrate and others stay separated, i.e.* $v_i = 1$ *for* $n^*$ *firms,* $0 < n^* < I$*.*

**Proof.** ■

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ffi fi ffi fi

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ffi fi

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ffi fi

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$Y_k < Y_\ell$ $V_k^* > V_\ell^*$

ffi fi

ffi fi

ffi fi

fi $n^*$ $\Delta\left(\mathbf{v}^{n^*-}_{-n^*};\mathbf{Y}\right) \geq A$ $\Delta(\mathbf{v}^{n^*}_{-n^*};\mathbf{Y}) \leq A$
$n^*$ fi ffi
fi fi $n^*$ fi
fi $n^*+1$ fi $n^*$ $n^*+1$

fi $n^*$
fi ffi fi
ffi $n^*+1)$

fi

## 4.2 The Cost Reduction Game

*cost reduction game* $\mathbf{V}$ $\mathbf{Y}$
fi

$y_i$
$k_i\left(y_i, Y_i\right)$ $y_i$
$k_i$ $\frac{\partial k_i}{\partial y_i}$ $Y_i$ $y_i$
$\mathbf{y} = (y, ..., y_I)$

$$\Pi_i^R \equiv \Pi_i\left(\mathbf{V}, \mathbf{Y} + \mathbf{y}\right) - k_i\left(y_i, Y_i\right)$$

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**Proposition 3** *Consider the* ***cost reduction game*** *and assume it has a unique equilibrium. Further suppose that (5)–(7) hold.*

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*This condition can be released by demanding only conditional uniqueness in the sense of Athey and Schmutzler (2001).*

*(i) If* $V_k \geq V_\ell$ *and* $Y_k = Y_\ell$*, then* $y_k \geq y_\ell$*.*

*(ii) Suppose* $\frac{\partial^2 \pi_i}{\partial Y_i \partial y_i} \geq \frac{\partial^2 k_i}{\partial Y_i \partial y_i}$*. If* $V_k \geq V_\ell$ *and* $Y_k \geq Y_\ell$*, then* $y_k \geq y_\ell$*.*

**Proof.** ■

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$\frac{\partial^2 \pi_i}{\partial Y_i \partial y_i} \geq \frac{\partial^2 k_i}{\partial Y_i \partial y_i}$ ffi
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ffi fi fi

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ffi fi
fi ff

## 4.3 Strategic Vertical Integration

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$\mathbf{V} = \mathbf{Y} = \mathbf{0}$ fi

$v_i$ $\mathbf{V} = \mathbf{v}$

$I = 2$ $\mathbf{V}$

$\mathbf{y}(\mathbf{V}) = \mathbf{y}(\mathbf{v})$

**Notation 2** *Assuming that cost reductions correspond to the equilibrium in the subgame following* $\mathbf{v}$, *firm* $i$*'s* ***profit*** *as a function of integration decisions is given by*

$$\widetilde{\Pi}_i(\mathbf{v}) \equiv \pi_i(\mathbf{v}, \mathbf{y}(\mathbf{v})) - k_i(y_i(\mathbf{v}), 0).$$

*The* ***profit differentials*** *associated with integration, taking the induced changes in the cost reduction game into account, are denoted by*

$$\widetilde{\Delta}(\mathbf{v}_-) \equiv \widetilde{\Pi}(1, v) - \widetilde{\Pi}(0, v);\ \widetilde{\Delta}(\mathbf{v}_-) \equiv \widetilde{\Pi}(v, 1) - \widetilde{\Pi}(v, 0).$$

**Proposition 4** *Suppose in the* ***two-stage game*** *(5)–(7) hold.*

*(i) If* $V_k = 1$, $V_\ell = 0$, *then* $y_k(\mathbf{V}) > y_\ell(\mathbf{V})$.

*(ii)* $\widetilde{\Delta}(\mathbf{v}_-) \geq \widetilde{\Delta}(\mathbf{v}_-; \mathbf{y}(0, v))$; $\widetilde{\Delta}(\mathbf{v}_-) \geq \widetilde{\Delta}(\mathbf{v}_-; \mathbf{y}(v, 0))$.

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*may*

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$\Delta$

$\widetilde{\Delta}$ $\widetilde{\Delta}\left(\mathbf{0}_{-i}\right) > A > \widetilde{\Delta}\left(\mathbf{1}_{-i}\right)$

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# 5 Cautionary Remarks

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## 5.1 Large Numbers of Firms

fi $I > 2$ fi

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fi

fi fi 2

fi 1 fi $3, ..., I$ fi 1

fi ff fi
ff ff
fi
fi fi
fi $3, ..., I$ ff
fi $3, ..., I$
ff
$I > 2$
ff

## 5.2 Upstream Sales

fi $\Pi_i(\mathbf{V}, \mathbf{Y})$ $\Pi_i$
fi $\pi_i^U(\mathbf{V}, \mathbf{Y})$ $q_i^U(\mathbf{V}, \mathbf{Y})$ $m_i^U(\mathbf{V}, \mathbf{Y})$

$$\pi_i^U(\mathbf{V}, \mathbf{Y}) = q_i^U(\mathbf{V}, \mathbf{Y}) \cdot m_i^U(\mathbf{V}, \mathbf{Y}).$$

fi $i$

$$\Pi_i(\mathbf{V}, \mathbf{Y}) = m_i^D(\mathbf{V}, \mathbf{Y}) \cdot q_i^D(\mathbf{V}, \mathbf{Y}) + m_i^U(\mathbf{V}, \mathbf{Y}) \cdot q_i^U(\mathbf{V}, \mathbf{Y}).$$

fi
$q_i^U$ $m_i^U$
ff $V_i$ $Y_i$
fi fi $(V_i = 0)$
fi $q_i^U = 0$ $q_i^U \geq 0$ $m_i^U \geq 0$
fi $(V_i = 1)$
$q_i^U$ $\pi_i^U$ $V_i,$

$Y_i$

$q_i^U$ $m_i^U$ $\pi_i^U$ $Y_i$.

fi

fi $i$

$q_i^U$ $m_i^U$

ff $Y_j$ $V_j$ $q_i^U$ $m_i^U$

ff $V_j$ $q_i^U$

fi $j$

*efficiency effect* fi $j$

fi $i$ fi $j$

*fore-closure effect* ff

ff fi $i$

ff

$m_i^U$

**Definition 1** *The upstream sales model satisfies the "**Dominant-Efficiency-Effect Property**" (DEEP) if $q_i^U$ and $m_i^U$ are non-increasing in $V_j$.*
*The model satisfies the "**Dominant-Foreclosure-Effect Property**" (DFEP) if $q_i^U$ and $m_i^U$ are non-decreasing in $V_j$.*

ff $Y_j$ $q_i^U$ ff

fi $j$ fi

$Y_j$ fi $j$ $q_j^D$ *expan-*

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ffi

ff *intensity of competition*

fi

ff

fi

ffi ff $q_i^U$ $V_j = 1$ $V_j = 0$

*sion effect—* $q_k^D, k \neq j$ *business-stealing effect* ff $Y_j$ $q_j^D$ ff $q_k^D$

$V_j = 0$

$q_i^U$ *increasing* $Y_j$ $V_j = 1$ $Y_j$ $q_j^D$ $q_k^D$ $k \neq j$ ff fi $j$ ff

$q_i^U$ *decreasing* $Y_j$ fi $j$ fi fi $j$ ff ff fi $V_j = 1$ $q_i^U$ $Y_j$ fi

| | $V_i$ | $Y_i$ | $V_j\ (j \neq i)$ | $Y_j\ (j \neq i)$ | |
|---|---|---|---|---|---|
| $q_i^U$ | $+$ | $-$ | $-$ | $-$ | $V_j = 1$ |
| | | | $+$ | $+$ | $V_j = 0$ |
| $m_i^U$ | | $-$ | $-$ | $-$ | $V_j = 1$ |
| | | | $+$ | $+$ | $V_j = 0$ |

$q_i^U$ $m_i^U$

$$\frac{\partial \pi_i^U}{\partial Y_i} \qquad V_i.$$

$\frac{\partial \pi_i^U}{\partial Y_i} = 0$ $V_i = 0$ $\frac{\partial \pi_i^U}{\partial Y_i} \leq 0$ $V_i = 1.$ fi

fi $i$ ffi

ff ffi

fi $i$

$Y_i$

$V_i$ fi

$V_i$ $V_j$ $\pi_i^U$

fi $\pi_i^U = 0$ $V_i = 0$

$V_i = 1$ $\pi_i^U = q_i^U \cdot m_i^U$ $V_j$ $q_i^U$ $m_i^U$

$V_j$

$m_i^U$ fi $V_i$ $V_j$

$j$ $m_i^U$ $q_i^U$ $i$

## 5.3 Endogenous Acquisition Costs

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$i$, fi $A(\mathbf{V}_{-i}, \mathbf{Y})$.

fl fi

fi $i$

ff

$\mathbf{Y}$,

$A$ $Y_i$ $Y_j$.

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fi fi

fi fi fi

ff $\mathbf{V}_{-i}$ $A$ fi

$A$ $V_j$ fi

$A$ $V_j$ fi

fi fi fi

fi $i$ $V_j$.

$V_j$. fi

fi fi

$V_j$.

ffi fi

$Y_i$ $V_i$ ffi

fi $V_i$ $V_j$

ff fi

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fi fi $i$

# 6 Policy Implications and Conclusions

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# 7 Appendix 1: Proofs

## 7.1 Proof of Lemma 1

$$\frac{\partial\ \Pi_i}{(\partial Y_i)} = \frac{\partial\ \pi_i^D}{(\partial c_i)}\left(\frac{\partial c_i}{\partial Y_i}\right) + \frac{\partial \pi_i^D}{\partial c_i}\frac{\partial\ c_i}{(\partial Y_i)} = \frac{\partial\ \pi_i^D}{(\partial c_i)}\left(\frac{\partial c_i}{\partial Y_i}\right) .$$

$$\frac{\partial\ \Pi_i}{\partial Y_i \partial Y_j} = \frac{\partial\ \pi_i^D}{\partial c_i \partial c_j} \cdot \frac{\partial c_i}{\partial Y_i} \cdot \frac{\partial c_j}{\partial Y_j},$$

$$\frac{\partial \Pi_i}{\partial Y_i} = \frac{\partial \pi_i^D}{\partial c_i}\frac{\partial c_i}{\partial Y_i},$$

$\frac{\partial \pi_i^D}{\partial c_i}$ $V_i$ $\frac{\partial \pi_i^D}{\partial c_i}$ $c_i$

$c_i$ $V_i$ $\frac{\partial \pi_i^D}{\partial c_i}$ $V_i$

$\frac{\partial \pi_i^D}{\partial c_i} \leq 0$ $\frac{\partial \Pi_i}{\partial Y_i}$ $V_i$

fi

$i = 1$ $j = 2$ $c\ (1, v\ , Y\ ) \leq$
$c\ (0, v\ , Y\ )$, $c\ (1, v\ , Y\ ) \geq c\ (0, v\ , Y\ )$ fi
$c^L \equiv c\ (1, v\ , Y\ )$ $c^H \equiv c\ (0, v\ , Y\ )$ $c^L \equiv c\ (0, v\ , Y\ )$ $c^H \equiv c\ (1, v\ , Y\ )$

$$\Delta = \pi^D\left(c^L, c^H\right) - \pi^D\left(c^H, c^L\right) =$$
$$\int_r \frac{\partial \pi}{\partial c}\left(c^H + r \cdot \left(c^L - c^H\right), c^H\right) dr + \int_r \frac{\partial \pi}{\partial c}\left(c^H, c^L + r\left(c^H - c^L\right)\right) dr.$$

$c_i\,(1, v\ , Y_i) - c_i\,(0, v\ , Y_i)$ $v$ $v$ ff
$c^H, c^H$ $c^L$ $\left(c^L - c^H\right)$ $\left(c^H - c^L\right)$
$v$ $c^L$ $c^H$
$\frac{\partial \pi_1}{\partial c_1}\left(c^H + r \cdot \left(c^L - c^H\right), c^H\right)$
$v$ $\frac{\partial \pi_1}{\partial c_2}\left(c^H, c^L + r\left(c^H - c^L\right)\right)$
$v$ $v$
$c\ (1, v\ , \mathbf{Y}) - c\ (0, v\ , \mathbf{Y})$ $v$

## 7.2 Proof of Proposition 2

$Y\ = \widetilde{\widetilde{Y}} > \widetilde{Y} = Y$ $v^* = 0 < 1 = v^*$

$$\pi^I\left(1, 0, v_{-}\ ,\ , \widetilde{Y}, \widetilde{\widetilde{Y}}, Y_{-}\ ,\ \right) - \pi^I\left(0, 0, v_{-}\ ,\ , \widetilde{Y}, \widetilde{\widetilde{Y}}, Y_{-}\ ,\ \right) \geq 0$$
$$\geq \pi^I\left(1, 1, v_{-}\ ,\ , \widetilde{Y}, \widetilde{\widetilde{Y}}, Y_{-}\ ,\ \right) - \pi^I\left(1, 0, v_{-}\ ,\ , \widetilde{Y}, \widetilde{\widetilde{Y}}, Y_{-}\ ,\ \right).$$

$$\pi^I\left(0, 1, v_{-}\ ,\ , \widetilde{Y}, \widetilde{\widetilde{Y}}, Y_{-}\ ,\ \right) - \pi^I\left(0, 0, v_{-}\ ,\ , \widetilde{Y}, \widetilde{\widetilde{Y}}, Y_{-}\ ,\ \right)$$
$$= \pi^I\left(1, 0, v_{-}\ ,\ , \widetilde{\widetilde{Y}}, \widetilde{Y}, Y_{-}\ ,\ \right) - \pi^I\left(0, 0, v_{-}\ ,\ , \widetilde{\widetilde{Y}}, \widetilde{Y}, Y_{-}\ ,\ \right)$$
$$\geq \pi^I\left(1, 0, v_{-}\ ,\ , \widetilde{Y}, \widetilde{\widetilde{Y}}, Y_{-}\ ,\ \right) - \pi^I\left(0, 0, v_{-}\ ,\ , \widetilde{Y}, \widetilde{\widetilde{Y}}, Y_{-}\ ,\ \right) \geq 0.$$

$$\pi^I\left(1, 1, \widetilde{Y}, \widetilde{\widetilde{Y}}\right) - \pi^I\left(0, 1, \widetilde{Y}, \widetilde{\widetilde{Y}}\right) \leq 0.$$

$v^* = 0$ $v^* = 1$

$n^*$

$\Delta(\mathbf{v}^{n^*-}_{-n^*}\ ;\mathbf{Y}\ ) \geq A\ ,\qquad \Delta(\mathbf{v}^{n^*}_{-\ n^*}\quad ;\mathbf{Y}\ ) \leq A\ .$ fi

$$\Delta(\mathbf{v}^{n^*-}_{-i}\ ;\mathbf{Y}\ ) \geq A \qquad i < n^*,$$

fi $1, ..., n^*$

$\Delta(\mathbf{v}^{n^*-}_{-i}\ ;\mathbf{Y}\ ) = \Delta((\mathbf{v}^{n^*-}_{n^*-}\ )^T; (\mathbf{Y}\ )^T),$ $(\mathbf{Y}\ )^T$ $(\mathbf{v}^{n^*-}_{n^*-}\ )^T$ $\mathbf{Y}$ $(\mathbf{v}^{n^*-}_{n^*-}\ )$ $i$ $n^*$ $\mathbf{Y}_i \geq \mathbf{Y}_{n^*}$ $i < n^*$ $\Delta((\mathbf{v}^{n^*-}_{n^*}\ )^T; (\mathbf{Y}\ )^T) \geq \Delta(\mathbf{v}^{n^*-}_{n^*-}\ ;\mathbf{Y}\ )$ $\Delta(\mathbf{v}^{n^*-}_{n^*-}\ ;\mathbf{Y}\ ) \geq \Delta(\mathbf{v}^{n^*-}_{n^*}\ ;\mathbf{Y}\ ) \geq A.$ $\Delta(\mathbf{v}^{n^*-}_{i}\ ;\mathbf{Y}\ ) \geq A$ $i < n^*$

$$\Delta(\mathbf{v}^{n^*-}_{i}\ ;\mathbf{Y}\ ) \leq A \qquad i > n^* + 1.$$

fi $n^* + 1, ..., I$

## 7.3 Proof of Proposition 3

$I$

$i$ $\mathcal{X}_i,$ $x_i.$ $\mathcal{X}_i = \mathcal{X}_j$ $i, j.$ $\mathcal{X}_i$ $\mathbb{R}^n, n \leq \infty$ $\mathcal{X} = \times_i \mathcal{X}_i$ $\theta_i \in \Theta_i$ $\Theta_i$ $\mathbb{R}^m, n \leq \infty, \boldsymbol{\theta} = (\theta\ , ..., \theta_I)\,,$ $\Theta = \times_i \Theta_i$ ff $f_i : \mathcal{X} \times \Theta \longrightarrow \mathbb{R}$

$\boldsymbol{\theta}$ $x_{-i}, f_i\,(x_i, x_{-i}; \boldsymbol{\theta})$ $x_i$ $x_i$ $x_i$

fi $x_j$ $j \neq i$ $x_i$ $i$

$f_i$ ff $(x_i; \theta_i)$ $\theta_i$

$x_i$

$f_i$ ff $(x_i; -\theta_j)$ $\theta_i$

$x_j$

ff

**Theorem 1** *If (B1)-(B6) hold, then $\theta_k > \theta_l$ implies $x_k^*(\boldsymbol{\theta}) \geq x_l^*(\boldsymbol{\theta})$.*

**Proof.** ■

$\theta_i = V_i, \Theta_i = \{0,1\}, x_i = y_i$

$\mathcal{X}_i = \mathbb{R}$ $\mathcal{X}_i$

$\theta_i = (v_i, x_i), \Theta_i = \{0,1\} \times \mathbb{R}$

$\frac{\partial^2 \pi_i^D}{\partial Y_i \partial y_i} \geq \frac{\partial^2 k_i}{\partial Y_i \partial y_i}$

## 7.4 Proof of Proposition 4

$$\begin{aligned} \Pi \ (1, v \ ) &= \pi \ (1, v \ ; y \ (1, v \ ), y \ (1, v \ )) - k \ (y \ (1, v \ ), 0) \geq \\ & \pi \ (1, v \ ; y \ (0, v \ ), y \ (1, v \ )) - k \ (y \ (0, v \ ), 0) \end{aligned}$$

fi $y \ (0, v \ )$ fi

$(0, v \ )$ $y \ (0, v \ ) \geq$

$y \ (1, v \ )$

$$\pi \ (1, v \ ; y \ (0, v \ ), y \ (1, v \ )) \geq \pi \ (1, v \ ; y \ (0, v \ ), y \ (0, v \ )) .$$

$$\Pi \ (1, v \ ) \geq \pi \ (1, v \ ; y \ (0, v \ ), y \ (0, v \ )) - k \ (y \ (0, v \ ), 0) .$$

$\Pi \ (0, v\ )$ $\widetilde{\Delta}(\mathbf{v}_{-}\ ) \geq \widetilde{\Delta}(\mathbf{v}_{-}\ ; \mathbf{y}(0, v\ ))$

## 7.5 Appendix 2: $I > 2$ firms

ffi

$I > 2$ fi $\Pi$ ff

$v$ $v$

$$\frac{\partial \ \Pi}{\partial v \ \partial v} = \sum_{k}^{I} \left( \frac{\partial \pi}{\partial c} \frac{\partial \ c}{\partial v \ \partial v} + \frac{\partial c_k}{\partial v} \sum_{\ell}^{I} \frac{\partial \ \pi}{\partial c_k \partial c_\ell} \frac{\partial c_\ell}{\partial v} \right)$$

$$\frac{\partial c_k}{\partial v} \sum_{\ell}^{I} \frac{\partial \ \pi}{\partial c_k \partial c_\ell} \frac{\partial c_\ell}{\partial v} \geq 0$$

$k \neq 2$ $\frac{\partial c_k}{\partial v_1} \geq 0$ $\ell > 2$ $\frac{\partial c_\ell}{\partial v_2}$ $\frac{\partial^2 \pi_1}{\partial c_k \partial c_\ell}$

$k, \ell \geq 2$

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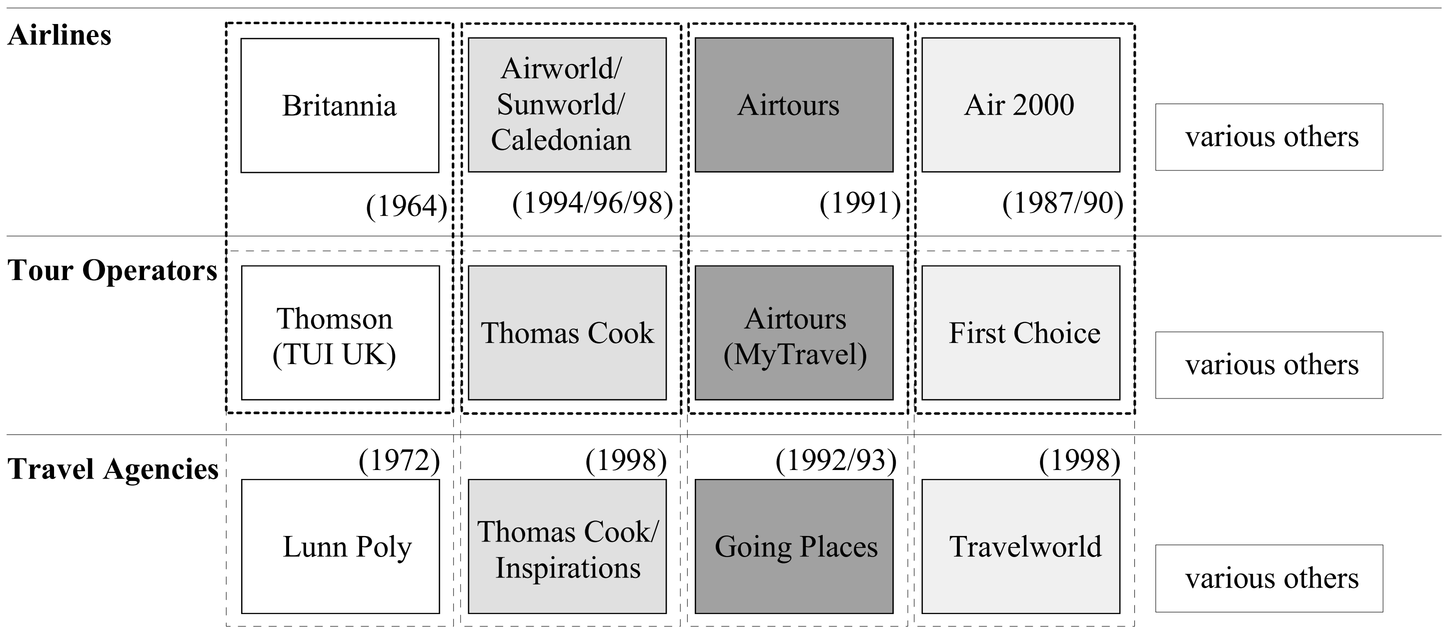


Figure 1: Vertical structure as of 1998 (Source: EC 1999, MMC 1997).

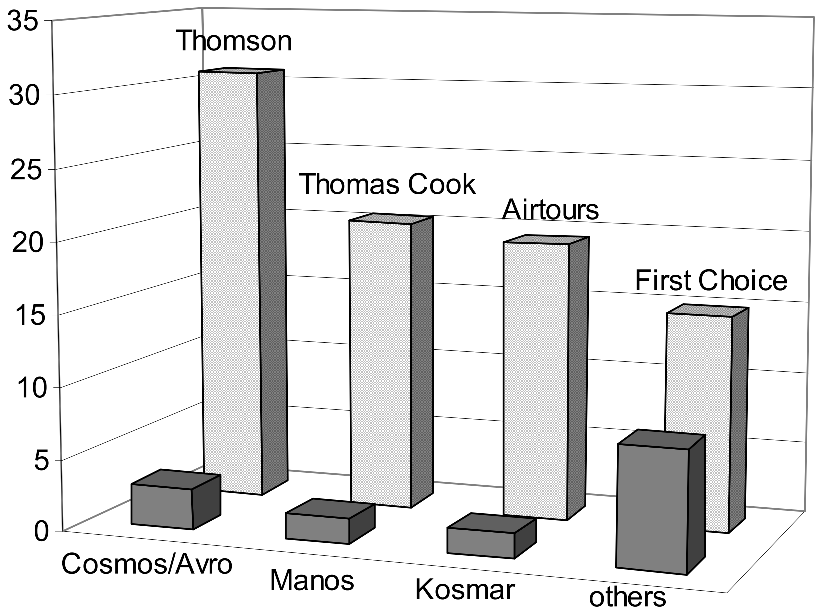


Figure 2: The largest tour operators in 1998 (Source: European Commission 1999)

Table 1: Acquisitions and Other Important Events

| | Thomson (TUI UK) | | Airtours (MyTravel) | | Thomas Cook | | First Choice | |
|---|---|---|---|---|---|---|---|---|
| | acqu./event | type | acqu./event | type | acqu./event | type | acqu./event | type |
| 1964 | *Britannia* | U | | | | | | |
| 1972 | *Lunn Poly* | D | business formed | | | | *Owners Abroad* formed | |
| 1979 | *Portland Direct* | H | | | | | | |
| 1982 | | | divestiture to fund H | | | | | |
| 1986 | *Skytours* | H | | | | | | |
| 1987 | | | | | | | *Air 2000* (76%) | U |
| 1988 | *Horizon* | H | | | | | | |
| 1990 | | | | | | | *Air 2000* (100%) | U |
| 1991 | | | airline operational | U | | | | |
| 1992 | | | *Pickford* | D | | | | |
| 1993 | | | *Aspro* | H/U | | | strategic link with | |
| | | | *Hogg Robinson* | D | | | *Thomas Cook* | H/U/D |
| | | | takeover bid *First Choice* | H/U | | | | |
| 1994 | | | *SLG* | H/D | *Airworld* operational | U | rebranding *First Choice* | |
| 1995 | | | *Sunquest Vacations* | H | | | | |
| 1996 | Holiday Cottage | H/D | *Simon Spies* | H | *Sunworld* | H/U | | |
| | | | Joint Venture *Emerson* | U | *Time Off* | H | | |
| 1997 | | | *Costa Crociere* | U | | | | |
| 1998 | various | H/D | *Sun International* | H | *Caledonian Airline* | U | various | H/U/D |
| | | | *Direct Holidays* | H | *Flying Colours* | H/U | | |
| | | | *Panorama Holiday* | H | *Carlson/Inspirations* | H/D | | |
| | | | *Travelworld* | D | | | | |

Notes: H: horizontal expansion (tour operating)
U: upstream integration (airlines)
D: downstream integration (travel agencies)
Source: Monopolies and Mergers Commission (1997); European Commission (1999); company websites