THE EFFICIENCY OF ALLOTMENT CONTRACTS WITH OPTION

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ABSTRACT
This paper provides an economic analysis of contracts that tour operators usually sign with airline companies and hotels (furniture contracts in the “all inclusive packaging” process). It is known that when tour operators and airline companies invest in a common project (i.e. make investments specific to the relationship) in order to create a positive net surplus that has to be shared between parties, simultaneous investments induce inefficient outcomes. The equilibrium does not coincide with the first best outcome (see literature on property rights theory). This paper considers a situation in which a tour operator has the right/option to become owner of some assets (seats) on particular flights of a company, specified in the contract, paying a fixed price P. Differently from the common “unconditional ownership structure”, this is a case of “conditional ownership structure”, which is conditional on the exercise of the option. The analysis shows that an allotment contract with option induces first best investments under the assumption of sequential investments, when an agent moves first (i.e. invests first) and can influence the other agent’s decision. The result does not depend on the possibility of renegotiation of the initial contract but it is obtained with an appropriate choice of P, i.e. with an appropriate choice of a surplus transfer from one party to another.

1. INTRODUCTION
This paper provides an economic analysis of the two typical contracts usually signed between tour operators and suppliers in order to evaluate their efficiency in terms of incentives to invest. In particular, the case analyzed considers a tour operator and an airline company that invest ex-ante in a common project, generating ex-post, through specific investments, a positive surplus appropriable by parties.
After a synthesis of the relevant phases of the tour operating process underlying the importance of negotiation between suppliers and intermediaries to increase competitiveness of tourist products, fundamental for the success of any destination and organization, the attention is focused on commitment contracts under the assumption of simultaneous investments. The results obtained are those of the standard literature on incomplete contracts (Grossman, Hart, 1986; Hart and Moore,
Then, the efficiency of allotment contracts with option is showed compared to commitment contracts, under the assumptions of i) sequential investments, and ii) ownership structure dependent on the exercise of a right.

2. THE TOUR OPERATING PROCESS

One of the factors influencing the competitiveness of any organization operating in the tourism market, as like as any tourism destination success, is the efficiency of the distributive channels that makes it possible to facilitate most transactions, to answer to a more informed trade partially deriving from the globalization of the tourism industry and to influence consumer behavior anticipating market requirements.

The role played by tour operators is greater than that of intermediaries operating in other sectors: travel agents and tour operators have a relevant influence on market demand because of tourism product intangibility at the moment of purchase, both for experienced and inexperienced travellers. This power on final demand sometimes implies a larger bargaining power towards the suppliers of tourist services, especially the smaller ones, in terms of price and product strategies and/or advertising activity.

The redefinition of distributive channels, started 10-15 years ago and common to different countries with a different degree of intensity, has caused remarkable changes in market competition dynamics. The general trade can be summarized in an increasing vertical and orizzontal integration of tour operators, often supported by legal and political measures as, for example, the transport sector deregulation.

Orizzontal integration usually takes place at a given level of the distribution channel and involves homogeneous firms merging to operate more efficiently. Hotels pools and code-sharing airlines are examples of orizzontally integrated firms.

Vertical integration involves firms operating at different levels of the distribution channel aiming to obtain full advantages from economies of scale, bigger cost control and larger bargaining power.

Consider, in this context, the frequent acquisitions of a (or many) travel agency by a tour operator. As a consequence of this general trend, the concentration of the industry as a whole has increased but the expected effects on prices caused by lower competition have been counterbalanced by strategies of big operators oriented, at a first step, to geographic expansion, to bigger market shares even at the cost of smaller profit margins.

In this context, a relevant position is certainly covered by tour operators carrying out, apart from the known distribution function, the production of tourism services as well. Their typical product is the all inclusive package tour, a more or less standard combination of at least two services of transport, accommodation and other complementary services sold at an inclusive price, so that prices of single components cannot be separately identified. Services sold must cover a period of at least 24 hours and an overnight stay (EC Council Directive 90/314 on Package Travel, Package Holidays and Package Tours). In particular, the “tour operating process” is a complex process consists of the following phases:

i) market researches;
ii) negotiation with suppliers;
iii) marketing;
iv) inclusive tour packages selling;
v) tour administration and monitoring at the destination area;
vi) performance valuation.

With regard to the first phase, most of tour operators identify, through appropriate market researches, consumers’ preferences and motivations, market trends and dimensions in order to satisfy a more informed market demand.

The second step, realized through a negotiation with suppliers, like hotels, airlines companies, etc., some months before the arrivals of tourists, is oriented to establish quality and prices of services sold. There exist two types of contracts basically signed with suppliers:
1) the commitment contract;
2) the allotment or allocation contract.

The first type of contract, signed at time $t$, fixes the price of services, usually accommodation or transport services, to be supplied in $t+k$. The payment can be realized in $t+k$ (pure future commitment contract) or in $t$ (future contract with anticipation) but in both cases the price fixed by the parties is independent from the spot price in $t+k$.

The purchasing of services by tour operators is strictly linked to expectations about consumers’ demand based only on market researches and/or previous experience.

The risk of unsold inclusive tour packages is totally supported by tour operators that, because of this potential loss in profit, can obtain consistent discounts on prices list by suppliers.

For this reason commitment contracts usually refer to old destinations, for which a big experience has been matured with regard to threatening factors, frequent clients requests, climate, local traditions, cultural background, etc. Such experience permits to delineate more reliable market trends and predictions and, consequently, to reduce the risk associated to unsold services.

The commitment contract is frequently used by big operators for charter flights and traditional destinations always relying, apart from contingent factors, on high market demand.

The allotment contract is based on the expected value, at the time of negotiation, of sales that will realize in $t+k$. Tour operators book a certain number of rooms in hotels or seats on carriers and have the right to use them by a given date, known as release, that can be some days before tourists arrivals.

This type of contract reduces the risk relative to unsold products since no condition binds tour operators to buy services in case, for example, of market shock. The only payment regards penalty clauses eventually established by initial contract.

Given the numerous threats characterizing the market, as like as the risk of operations linked to monetary fluctuations, possible social conflicts and terrorist attacks, it is not so difficult to understand the reason leading to a big use and success of allotment contracts.

The purchase of services regulated by an allotment agreement can be provided through different types of clauses:

- free sale, establishing the right to manage, in some periods of the year, a certain number of assets simply giving communication to suppliers of realized sale;
- sale and report, based on continuous and accurate communication by suppliers to tour operators about services availability;
- option clause, through which the supplier reserves a fixed quantity of services to be purchased by tour operators ‘by’ or ‘at’ a given date decided by parties.

Both in case of commitment and allotment contracts, the uncertainty affects $t+k$ prices and the quantity of services to be booked and/or bought, given the risk of demand change.

A combination of both types of contracts is often used, particularly for those destinations with a limited accommodation availability. This way a tour operator can demand services to an air, land or marine carrier for the whole season (“time charter” contract) or, in case of airlines, for specific flights (“whole-plane charter” contracts). There exist cases in which tour operators with a smaller market power decide to create pools in order to share the risk deriving from unsold tickets; in other cases, the possibility to buy only a fraction of seats on a specific flight is explicitly provided (“part charter” contract) by commercial agreements.

When no contract between tour operators and suppliers is signed, then direct call remains the most used channel to contact hotels and carriers: tour operators contact suppliers on the basis of market demand and immediately receive information on accommodation or transport availability.

Negotiation is a central phase in tour operating activities. Lower the price for purchased services, lower the costs of production, more competitive the IT package and so higher the probability to increase market share. In fact, tour operators are often interested in less known areas/destinations to get factors of production, tourism services, at lower prices.

Discounts tour operators obtain, through allotment or commitment contracts, primarily depend on the firm size and the bargaining power exerted; they can vary from 10% to 50% according to the period of the year, the destination, the quantity and quality of services contracted upon. Some big tour operators are able to obtain up to 70% of discount (Buhalis, D. and Laws, E., 2001).
The third and fourth phases are strictly linked to the second one since negotiation is justified by sale perspectives, to which marketing and advertising are in their turn exploitable. Price is an important variable of the marketing mix given the high elasticity of tourism demand to price (the only exception being business travel).

Finally, most tour operators monitor each travel step providing specialized staff able to assist clients and quickly resolve contingent problems relative to package services (transfer from/to the airport, room cleaning, bureaucratic difficulties, food quality, organization of excursions, etc.) often supported by local guides offering explanation of traditions, usages and, in some countries, possible dangers to avoid. An increasing consideration is given to travel valuation and consumer satisfaction, often misused by filling up a questionnaire. This feedback, useful to future planning and marketing, is important for the choice of continuing or not the trade with a given supplier. This way tour operators monitor tourism industry as a whole (the last phase).

From the previous observations derives that the tourism product is a complex and heterogeneous phenomenon involving production by firms and enjoyment of services by consumers at the same time. Firms decide, first of all, between internal or external production.

External production is possible thanks to market relations. The tour operator planning future supply analyzes the market and “assemblies” services offered by suppliers to offer, on its turn, all inclusive packages to potential clients. The products are differentiated and oriented to satisfy different consumer preferences and interests.

In case of internal production, the weight of market trade and transaction costs is limited while the degree of vertical integration increases; as a consequence, a greater role is played by the organization structure and authority relations. Firms expand their size because of an increasing number of activities taking place inside the organization, often because of mergers or frequent suppliers acquisitions.

Consumers decide, on the other side, the firm to contact to buy tourist services. Tourism products distribution involves different channels; the most important of which has been, for many years, the so called “long channel”:

services supplier⇒ tour operator⇒ travel agency⇒ tourist

Recently, because of internet development, tourists consciousness and autonomy regards to travelling, many people have decided to jump the second and third steps of the distribution channel. If any doubt exists on the future role played by travel agencies, it is certainly relevant the core business activities made by tour operators consisting of coordination of different segments of the supply side and travel packages creation in order to guarantee an homogeneous level of quality.

That is why, in the following paragraphs, attention is focused on standard contracts frequently signed in the “tour operating process”. After having showed the typical results of incomplete contracts literature with regard to the choice of internal production or outsourcing, the paper provides an economic analysis of allotment contracts assuming independent firms.
3. COMMITMENT CONTRACTS

Let us consider a tour operator H (or a pool of tour operators), specialized in a tourist destination of an arabian country and owner of an hotels chain, and an airline company A that offers the flight service for such destination, for example Rome-Dubai flights. The airline company is a supplier of H, the tour operator selling IT packages that include, among the others, the transport service as well.

The firms considered can invest, ex-ante, in a project promoting the tourist destination that, with the aim of selling IT packages consisting of flight and accommodation, permits to increase the surplus created in the relationship. H can invest in an intensive advertising activity through brochures, trade fairs, internet pages. The commercial agreement establishes that the airline company invests in workers training, like an arabian language and culture course for the hostess, and guarantees a certain number of seats and dedicated fares for H.

If A and H have outside options, the investment cost is $c(\lambda I_i)$, $i=H,A$, with $\lambda \in [0,1]$. The case $\lambda=0$ corresponds to the maximum level of investment specificity, while $\lambda=1$ is relative to the case of no-specificity, when the investment realized has the same value inside and outside the relationship. The tour operator H could obtain a positive surplus buying return flight tickets from airline companies different from A. Let us assume that the expected profit is remarkably bigger when fares, fixed a long period before clients purchasing, are reduced by commercial agreement providing consistent discounts and quality improvement. On the other side, the airline company can sell the return tickets to tour operators different from H, but can surely rely on a bigger market demand if the destination is actively advertised. In the analysed case, H has an evident advantage to trade with A and viceversa; $\lambda$ is near to zero, so that the surplus associated to outside options is negligible compared to that resulting from the project. As a consequence, there exists a bilateral monopoly between A and H.

Before deciding to invest or not in the common project, firms can decide the ownership structure. The can act independently and regulate the relationship through commercial agreements, like commitment contracts, or move towards merger or acquisitions.

Let the timing be:

<table>
<thead>
<tr>
<th>$t=0$</th>
<th>$t=1/2$</th>
<th>$t=1$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decision on the ownership structure:</td>
<td>Investment</td>
<td>Trade</td>
</tr>
<tr>
<td>Integration/No Integration</td>
<td>No Investment</td>
<td>Rinegotiation</td>
</tr>
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Let us assume that parties have symmetric information and rational expectations about the renegotiation process. Just to simplify the exposition, let us assume that H and A are risk neutral and there is no liquidity constraint and no discounting.

Let $I_H$ and $I_A$ be investment levels realized, in $t=1/2$, by H and A respectively at the cost of $I_H^2/2$ and $I_A^2/2$, $I_H, I_A \in [0,1]$. The investment costs are sustained by parties independendly from the assets ownership structure, i.e. $I_H$ ($I_A$) is sustained by H (A) even if A (H) will be the owner of the assets and investment costs, once sustained, are sunk costs (Grossman, S. and Hart, O., 1986).

H can buy from A, in $t=1$, a number $n$ of return reserved-seat tickets at a given price coinciding with the Nash-bargaining solution.
The states of nature represent a continuum of events but, for simplicity, it is considered a discrete case with two states corresponding to possible decisions (“to invest” or “not to invest”). Let the value of the flight services for H be:

\[ v = \begin{cases} \alpha \\ \beta \end{cases} \]

The probability of \( v \) being equal to \( \alpha \) is \( p = 1-I_H \), while that of being equal to \( \beta \) is \( p = I_H \).

Let us assume that the cost \( A \) has to sustain to offer the flight services, apart from the investment cost, is:

\[ c = \begin{cases} \gamma \\ \tau \end{cases} \]

where the probability associated to \( \gamma \) is \( p = I_A \) and that associated to \( \tau \) is \( p = 1-I_A \).

By assumption \( \alpha, \beta, \gamma, \tau > 0 \) and \( \gamma < \alpha < \tau < \beta < 1 \).

Given \( I_H \) and \( I_A \), let us compute the ex-post surplus value. Four cases can take place assuming independent events:

1) \( c = \gamma \) \( v = \alpha \) \( \text{surplus} = (\alpha - \gamma) > 0 \) \( p = I_A*(1-I_H) \).
2) \( c = \gamma \) \( v = \beta \) \( \text{surplus} = (\beta - \gamma) > 0 \) \( p = I_H*I_A \).
3) \( c = \tau \) \( v = \alpha \) \( \text{surplus} = (\alpha - \tau) < 0 \) \( \text{In this case there will not be any trade.} \)
4) \( c = \tau \) \( v = \beta \) \( \text{surplus} = (\beta - \tau) > 0 \) \( p = I_H*(1-I_A) \).

The expected surplus is:

\[ ES = (\alpha - \gamma) * I_A * (1-I_H) + (\beta - \gamma) * I_H * I_A + (\beta - \tau) * (1-I_A) \]

Surplus will be divided depending on the ownership structure decided in \( t=0 \).

a) If \( H \) is the owner of the assets (A acquisition by H), it will take the whole surplus \( ES \).

\( H \) surplus = \( ES \).

\( A \) surplus = 0.

At the time \( t = 0 \),

\[ H \quad \text{Max} \quad \text{ES} - I_H^2/2 \quad \text{w.r.t.} \quad I_H \]

\[ \text{FOC} \quad - (\alpha - \gamma) * I_A + (\beta - \gamma) * I_H + (\beta - \tau) * (1-I_A) - I_H = 0 \]

\[ I_H = I_A * (\tau - \alpha) + (\beta - \tau) \]

In \( t=0 \)

\[ A \quad \text{Max} \quad 0 - I_A^2/2 \quad \text{w.r.t.} \quad I_A \]

\[ \text{FOC} \quad I_A^H = 0 \]

To summarize,

\[ I_H = (\beta - \tau) \quad H \text{surplus} = \text{ES} = I_H * (\beta - \tau) = (\beta - \tau)^2 \]

\[ I_A = 0 \quad A \text{surplus} = 0 \]

Net surplus = \( ES - I_H^2/2 - I_A^2/2 = (\beta - \tau)^2 - (\beta - \tau)^2/2 - 0 = (\beta - \tau)^2/2 \)

b) If \( A \) is the owner of the assets (H acquisition by A), by simmetry:

in \( t=0 \),

\[ A \quad \text{Max} \quad \text{ES} - I_A^2/2 \quad \text{w.r.t.} \quad I_A \]

\[ \text{FOC} \quad (1-I_H) * (\alpha - \gamma) + I_H * (\beta - \gamma) - (\beta - \tau) * I_H - I_A = 0 \]

\[ I_A^H = (\tau - \alpha) * I_H + (\alpha - \gamma) \]

To summarize,

\[ I_H = 0 \quad H \text{surplus} = 0 \]
\[ I_A = (\alpha - \gamma) \]

A surplus = (\alpha - \gamma)^2

Net surplus = (\alpha - \gamma)^2 / 2

c) The third case involves independent firms. With no vertical integration there will be, in t=1, a negotiation process leading, under the assumption of equal bargaining power (Nash-bargaining), to the following outcome:

in t=0,

\[ \begin{align*}
H & \quad \text{Max ES}/2 - I_H^2/2 \quad \text{w.r.t. } I_H \\
\text{FOC} & \quad I_H = \frac{1}{2} \times [ I_A \times (\tau - \alpha) + (\beta - \tau) ] \\
A & \quad \text{Max ES}/2 - I_A^2/2 \quad \text{w.r.t. } I_A \\
\text{FOC} & \quad I_A = \frac{1}{2} \times [ I_H \times (\tau - \alpha) + (\alpha - \gamma) ] \\
\end{align*} \]

To find \( I_H \) and \( I_A \) and the net surplus value, the system is resolved in equilibrium. In some cases vertical integration is the efficient choice while, in other cases, it is not the right choice.

Given both the transport and accommodation services importance in a package tour, let us assume a small difference of parameters values:

\[ \alpha = 0.6 \quad \beta = 0.8 \quad \gamma = 0.5 \quad \tau = 0.7. \]

The outcomes for the analysed cases will be:

a) \( I_H = 0.1 \) \quad \( I_A = 0 \) \quad Net surplus = 0.005;

b) \( I_H = 0 \) \quad \( I_A = 0.1 \) \quad Net surplus = 0.005;

c) \( I_H = \frac{1}{2} (0.1 \times I_A + 0.1) \)
\[ I_A = \frac{1}{2} (0.1 \times I_H + 0.1). \]

By solving the system, results: \( I_H = I_A = 0.052632 \) and \( \text{Net surplus} = 0.008. \)

In this context, vertical integration implies a larger surplus and more incentives to invest for the owner of the assets while, at the same time, the incentives of the firm transferring the ownership decrease. The net surplus without integration is greater than that obtained with H or A vertical integration (0.008 > 0.005), the reason being the importance of both investments in the package process that, on its turn, calls for equally distributed incentives and surplus share.

It has to be noticed that in no of the three cases analysed, i.e. with no ownership structure, the first best is reached.

Literature on property rights shows that ownership concentration can be optimal if and only if some investments are more important than others; it will not be optimal on the contrary.

If the cost supported for \( I_A \) is considerably greater than \( I_H \), an example being the cost sustained for the acquisition of a larger plane or for more flights provisions with respect to the cost of advertisement, then A integration would be the opportune choice given the relative importance of \( I_A \) with respect to \( I_H \).

Vertical integration could be the efficient choice in other cases as well. If costs supported by A were equal to a constant \( k \), i.e. \( c = \gamma = \tau = k \) (i.e. independent from the investment level \( I_A \)) then A would not get any additional advantage, i.e. efficiency increase, from investments relative to assets owned; that’s as much as to say that ownership has no influence on A investment incentives. In this context, H integration would be the optimal decision: H would get more incentives and larger expected revenues from the hold-up reduction and would not be uselessly conditioned by A’s services availability to satisfy market demand.

In many circumstances, evaluating investments’ relative importance is not so easy. An additional explanation of strategies linked to internal production or outsourcing comes from Hart and Moore contribution (1990). Vertical integration is efficient in case of “complementary assets”. By separating ownership, both firms would invest a sub-optimal level under the threat of the other party

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1 The first best investment levels, \( I_{H*} \in I_{A*} \), are found maximising w.r.t. \( I_H \) and \( I_A \): \[ ES - I_H^2/2 - I_A^2/2 \].
underinvestment. An example of complementarity is given by flying services of airline companies and
the transfer facilities in the airport offered by the airport managing society.
Non-integration structure results to be preferred with “independent assets”. In fact, with integration it
is possible to induce a firm to invest efficiently by giving ownership of the assets and ensuring full
marginal revenues from investments sustained (the acquired party will underinvest). A merger would,
on the other side, imply underinvestment by both parties receiving only a share of the ex-post surplus
as like as established in the ex-ante contract. So non integration comes to be optimal.
In the tourism sector, outsourcing (no-integration) is frequently used. For example, many firms
commit to a third party, called factor, credits management and collection through factoring contracts.
Is is a service essentially requested by firms operating with a large number of clients. Tour operators
using the so called long channel of distribution resort to many travel agencies having contact, on their
turn, with many clients. Thanks to the factoring contract, tour operators do not worry about payments
delays and outstanding credits but concentrate on activities strictly linked to tour organizing, on ‘core
business’ activities.
The same reasons apply to Alitalia’s decision, established in the industrial plan 2004-2006, of external
production relative to data processing systems, apart from a cut of travel agents fees, employees
reduction and a partial transfer of Alitalia Airport, in order to increase efficiency by at least 15-20%.

4. ALLOTMENT CONTRACT WITH OPTION

One of the most important reason for writing contracts, both in the field of law and economics, is the
need to protect relationship-specific investments against the possibility of hold-up. Such contracts are
typically incomplete since, firstly, at the time of contracting it is often impossible or very costly to
specify all the terms of trade for each possible state of the world and, secondly, the outcomes can’t be
usually verified by a third part (i.e. by a court). In the best situation variables are observable but not
verifiable.
Thus, there may be contingencies in which the actions specified in the original contract would yield
inefficient outcomes about which the parties would want to renegotiate. Renegotiation is necessary to
reach an ex-post efficient outcome in each state of the world but, since at the time of renegotiation the
investments are sunk, incentives to invest efficiently may be distorted ex-ante.
Most of the literature on incomplete contracts assumes that it is impossible to write any state-
contingent contract prior to the simultaneous investment decisions. The only contracts that can be
written are contracts on the allocation of ownership rights which determines the relative bargaining
power of each party at the renegotiation stage, that is the bargaining power ex-post. This in turn affects
incentives to invest ex-ante.
The general conclusion of models based on the “property rights approach” is that the ownership
structure is important but, in no case of those usually analysed, it can provide socially efficient
investment incentives [Schmidt, K. M. (1996)].
In the previous paragraph, it has been shown that, in the tourism sector, the commitment contract
with simultaneous investment decisions (and independent investments) gives incentives to invest efficiently
to one party only. Analysing the efficiency of allotment contracts with option, in terms of investment
incentives, is the aim of the present section.
While the commitment contract, so as it has been explained in the previous paragraph, is an example
of “unconditional ownership structure”, the allotment contract with option can be included in the
“conditional ownership structure” contracts. In fact, there is a party who is initially the owner of some
assets that can be sold in future to another party, if some conditions hold. These conditions may
change differently from one case to another but, in our model, can be restrained to the exercise of an
option.
4.1 The allotment contract

Let us consider again the relationship between the tour operator H and the airline company A, depicted in the previous paragraph. The firms can now sign, ex-ante, an allotment contract with option in which it is not possible to establish investment levels, $I_H$ and $I_A$, observable but not verifiable by a court. Moreover, long term contracts are not available and the relationship between A and H lasts only one period, from $t=0$ to $t=1$. It is assumed that H invests after A but before the surplus is realized, differently from simultaneous investments assumed with commitment contracts.

Let $I_H \geq 0$ and $I_A \geq 0$ be the investment levels realized by H e A respectively at the cost: $c(I_H) = I_H^2/2$ and $c(I_A) = I_A^2/2$. There are not other costs of production.

Investment costs are sunk, so that the allocation of ownership rights only influences ex-post contingent division of surplus, referring to which the initial contract establishes that "the surplus originated by the project is due to the owner of the assets (ass. 1)."

Let $v(I_H, I_A)$ be the production function that positively depends on investments realized. In particular, let the production function be: $v = I_H + I_A$.

As a consequence, the net surplus function (fig. 1) will be:

$$S(I_H, I_A) = I_H + I_A - I_H^2/2 - I_A^2/2$$

positive, increasing, continuous, differentiable and strictly concave ($s'>0, s''<0$).

Fig.1 Net surplus function.

With commitment contracts, the ownership of the assets was decided in the initial contract and ex-post division of the surplus derived from the (assumed equal) bargaining power of the parties (Nash bargaining solution). In the case here studied, the ownership structure is not decided in the initial contract but depends on the exercise of a specific right. A contract of allotment with option simply establishes that H can, at a given deadline and after both investments are realized (sunk costs), decide to exercise his option and become residual claimant (owner) of $n$ seats on a flight (or on a certain number of flights) paying a fixed price P (European call option). The option price, $P_o$, has to be paid in any case, even if H decides to not exercise the option. Consequently, P is nothing but $P_o + \sigma \sigma > 0$. For example, the tour operator H could sign with the airline company a contract with option that
establishes a payment \( P_o \) euros for the booking of each seat on the fixed flights, but with the right to confirm or not it at the price of 20 euros \( (= P) \). In this example, \( \sigma = 16 \) euros.

To summarize, the initial contract, signed in \( t=0 \), specifies the option price in case of exercise \( (P) \) and not \( (P_0) \), it establishes the deadline for investments, \( t=1/2 \), the deadline for the option (european call option) and the date for the realization of trade, \( t=1 \).

Given the sequentiality of investments, higher the investment realized by the airline company, \( I_A \), higher the valuation of the transport service by \( H \). To be clearer, \( H \) observes the level of investment of \( H \) and decides: i) to invest or not to invest, ii) the level of his investment and iii) to exercise or not to exercise the option.

\( H \) exercises the option if and only if the level of \( I_A \) is sufficiently high.

The final payoffs, respectively in the case of exercise of the option or not, are:

\[
\text{Payoff}_H (I_H, I_A) = \begin{cases} 
I_H + I_A - I_H^2/2 - P \\
- I_H^2/2 - P_0 
\end{cases}
\] (1.2)

\[
\text{Payoff}_A (I_H, I_A) = \begin{cases} 
P - I_A^2/2 \\
P_0 + I_H + I_A - I_A^2/2 
\end{cases}
\] (1.3)

Let us assume that there is no-discounting and, furthermore, that:
- the trade is realized with symmetric information \( (\text{ass. 2}) \);
- both parties, rational and risk-neutral, have no problem of liquidity constraint \( (\text{ass. 3}) \);
- being equal the expected payoff, \( H \) strictly prefers the exercise of the option. The incentive to invest for \( H \) derives from the possibility to become owner of some assets of the carrier that can freely use (i.e. without being conditioned by availability of the supplier) to tempestively answer to demand changes or variation of client preferences \( (\text{ass. 4}) \).
The firms operate in a situation of noncooperative strategic interdependence, well describable with elements of game theory being known:

i) the number of players involved;
ii) the rules of the game: who moves and when, what the firms know when they move, what they can do;
iii) the outcomes for each possible set of actions;
iv) the payoffs of each firm over the possible outcomes.

In the following text it is, at a first step, analyzed the situation in which the possibility of renegotiation of the initial contract is not explicitly established (4.1.1) and, then, the case in which the possibility of renegotiation is explicitly mentioned in the initial contract (4.1.2). Moreover, in the first case, a static game is initially studied in which the players invest at the same time (i.e. simultaneous move game) and, secondly, the attention is focused on a dynamic game with sequential investments in which a firm, moving first, can influence investment decision of the other firm.

4.1.1 No Renegotiation

4.1.1.1 Centralized Solution (Central Planner)

If A and H integrate, it is necessary to distinguish the situation in which the sole owner of the carrier and the hotels chain sustains the cost both for \( I_H \) and \( I_A \), from that in which, as in Grossman-Hart (1986) and the relevant literature on incomplete contracts, it is assumed that the cost for \( I_i \) is always sustained by \( i, i = A, H \), no matter of the ownership structure. In the first case, the problem reduces to:

\[
\text{Max}_{I_{H,A}} S(I_H, I_A) = I_H + I_A - I_H^2/2 - I_A^2/2
\]

with the following first-best solution

F.O.C. 1-I_i = 0 \( i = A, H \)

From the first order condition it is possible to derive the efficient investments levels, \( I_H^* = I_A^* = 1 \). The outcome derives from the fact that the owner of the assets will receive all the marginal revenue from the investments realized and so receives, ex-ante, incentives to invest efficiently.

On the contrary, if it is assumed [Grossman, Hart (1986)] that the cost for \( I_i \) is sustained by the tour operator \( i, i = 1,2 \), independently from the ownership structure, then incentives to invest for the merged party are reduced by the consideration that benefits from investment are divided with the party which, on the other side, has not sustained any cost for it. This supports the result obtained with commitment contracts.

4.1.1.2 Decentralized static solution

The following section provides an analysis of investment incentives in case of decentralized solution, with separate firms and non cooperative decisions.

With simultaneous (static) investments, the timing depicted is not considered since, obviously, the time for the realization of investments and the exercise of the option coincide with \( t=1 \).

Let us analyze the investment choices of each firm.

**H investment choices**

By rationality, if H does not intend to exercise the option, then it does not invest. What’s the investment level of H in case of exercise of the option?

From the analysis carried out descends that H has convenience to invest and to exercise the option until:
Given $P$, it is the level of $I_A$ and the level of $P_0$ that make the exercise of the option convenient or not: greater the value of $I_A$ or $P_0$, greater the incentive to exercise the option. Certainly, for high levels of $I_A$ (i.e. such that the 1.7 is satisfied) $H$ invests an high level of $I_H$ since, through the option, it can become residual claimant of the relationship and can get the total created surplus. If $I_A = I_A^*$, then $H$ invests $I_H^*$ as well considered that the surplus is maximized by $I_H = I_H^*$ and $I_A = I_A^*$.

A investment choices
The choice of the airline company derives from a comparison of the following payoffs:

$$[ P - I_A^2/2 ] \quad \text{with} \quad [ P_0 + I_H + I_A - I_A^2/2 ]$$

(1.8)

If $H$ plays:

i) ($I_H = 0$ ; no-option ), the best reply for $A$ is $I_A = I_A^*$, outcome of the maximization of $[ P_0 + I_A - I_A^2/2 ]$ with respect to $I_A$. In this context, the airline company is the residual claimant in the relationship.

If $H$ plays:

ii) ($I_H = I_H^*$; yes option), the best reply for $A$ is $I_A = 0$ since $[ P - 0 ]$ is greater than $[ P - I_A^2/2 ]$ for each value of $I_A$ greater than zero. When $A$ sells the ownership of its assets, it has no incentive to invest because the full benefit of the investment will be received by the counterpart.

An high level of $P_0$ appears to be of great importance. It comes out from the bargaining process between the parties and, because of the “disincentive to not exercise the option”, it can be compared to a penalty clause established by parties in order to “disincentive $H$ to not comply with the initial allotment contract”.

An high level of $P_0$ could lead $H$ to comply with the initial contract for low levels of $I_A$, corresponding to which $H$ would prefer to not buy return tickets from $A$, as well as in case of demand shock for that destination that would lead $H$, in absence of legal constraints, to modify its portfolio inserting a different tourist destination. In the last case, it would be advantageous for $H$ to rescind the initial contract only if the (per person) profit margin of the new alternative was greater than the option price $P_0$. Relatively high option prices can lead $H$ to give up profitable destinations.

As a consequence, it can be assumed that, with an equal bargaining power between parties, $A$ accepts a relatively low $P_0$, near to zero at the limit, under the condition that the price $P$ is relatively high, such that a consistent transfer of surplus from $H$ to $A$ is guaranteed. If all the surplus was transferred from $H$ to $A$ (maximum incentive for $A$ to invest), leaving $H$ with a payoff equal to zero, then, by assumption 4, $H$ would exercise the option since its payoff would be equal to that obtained without any common project (i.e. with no investment and no option).

An allotment contract with option reserve could establish the right to buy $n$ seats on specific flights at a price that, given the optimal investment levels, permits to transfer all the surplus from the firm exercising the option to the firm that, owner of the assets, decides to sell them:

$$P^* = I_H^* + I_A^* - I_H^*^2/2$$

(1.9)

$P^*$ gives to $A$ (and consequently to $H$) incentives to invest efficently:

$$\text{Max}_{I_A} \quad P^* - I_A^2/2$$

F.O.C.: $I_A = 1 = I_A^*$

(1.10)

An important point to be noted is that the price $P^*$ is a function of the optimal investment levels, not of the actual investment levels. The optimal investment levels can easily be computed even if the actual investment levels cannot be verified by courts.

In the following section, a negligible $P_0$ and a price equal to $P^*$ are considered in order to evaluate the effects on investment incentives of both tourist firms.

The strategies of the firms are pure strategies. Fig. 3 shows the game in normal form thanks to which it is possible to find, if it exists, a Nash Equilibrium (1951), in which the strategic choice of a firm is the best reply to strategies played by the other firm.

By a comparison of the payoffs, it comes out that the Nash equilibrium is:
N.E. \( \Rightarrow (\sigma_H, \sigma_A) = (\text{no option if } I_A \neq 0, I_A^* \text{ if } I_A \neq 0) \)

None of the two operators prefers to deviate, but only A invests efficiently. Consequently, the Nash equilibrium corresponds to only a partially efficient solution: N.E. \( \neq FB \)

The outcome that, with simultaneous investments, at the best only one firm invests efficiently confirms the result obtained with commitment contracts. Furthermore, it is easy to observe that the outcome obtained is not a sensible prediction since A can foresee that, if he will choose \( I_A^* \), the optimal choice for H will be the exercise of the option. It derives that the strategy of H "no option if \( I_A = I_A^* \)" is not a credible strategy.

Fig. 3 Payoffs in strategic form

<table>
<thead>
<tr>
<th>A strategy</th>
<th>H strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>( I_A = 0 )</td>
<td>( 0, 0 )</td>
</tr>
<tr>
<td>( I_A \neq 0 )</td>
<td>( P^* - I_A^{<strong>}/2, I_H^{</strong>} + I_A^{<strong>} - I_H^{</strong>}/2 - P^* = 0 )</td>
</tr>
<tr>
<td>( I_A^* )</td>
<td>( P^* - I_A^{<strong>}/2, I_H^{</strong>} + I_A^{<strong>} - I_H^{</strong>}/2 - P^* &lt; 0 )</td>
</tr>
</tbody>
</table>

4.1.1.3 Decentralized dynamic solution

What does it change if investments are sequentially realized? How firms’ choices vary if the decision of an agent is conditioned by the decision taken by the other agent? What are the effects of an initial contract that subordinates the ownership of some assets to the exercise of an option?

Considering the description of the sequential game taken in the introduction, the timing is:

Fig.4 Timing and flows

<table>
<thead>
<tr>
<th>t=0</th>
<th>t=1/2</th>
<th>option</th>
<th>t=1</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>(-I_A^{**}/2)</td>
<td>(+P_o)</td>
<td>(+P^*)</td>
</tr>
<tr>
<td>H</td>
<td>(-I_H^{**}/2)</td>
<td>(-P_o)</td>
<td>(-P^*)</td>
</tr>
</tbody>
</table>

From what has been observed, it derives that two are the possibile strategies for H: \( L_H = \{ (I_H^*, yo) \ (0, no) \} \)
To give the idea of sequentiality, let us represent the extensive form game (fig. 5). It is a game of perfect information; each player can observe previous moves and the structure of the game is common knowledge. At the initial decision node, A takes his investment decision. Each of the two possible choices for A is represented by a branch from this initial decision node. H observes A choice and decides between two actions: investing efficiently and exercising the option or no investment and no option. After H’s move we reach the end of the game, represented by terminal nodes at which we indicate the tour operators’ payoffs arising from the sequence of moves leading to each terminal node.

The procedure used to identify the desirable (i.e. sequentially rational) Nash Equilibrium is the backward induction which involves solving first for optimal behavior at the “end” of the game and then determining what optimal behavior is earlier in the game given the anticipation of this later behavior. By Zermelo’s Theorem [Mas-Colell, A. et el.(1995), p. 272] every finite game of perfect information has a pure strategy Nash equilibrium that can be derived through backward induction. Broken lines represent H’s choices resulting from the comparison of payoffs. In the central branch H chooses (0, no) and the outcome is (iii). In the case yo (outcome iv), the difference \[ I_h^* + I_h^* - 3/2 - P^* \] can be interpreted as the surplus H looses (i.e. the cost it sustains) due to the low level of investment by A. The loss is higher, lower the level of investment \( I_h \); it disappears only if A make the socially optimal investment decision. Comparing the outcomes (i) and (ii), H strictly prefers the second one by assumption 4. A then compares the payoffs associated to the outcomes (ii), (iii) and (v) and clearly chooses \( I_A = I_A^* \) since the payoff obtained is equal to the maximum socially desiderable net surplus (\( S^* \) in fig. 1). By rationality, A will not realize a greater investment than that sufficient to convince H to invest \( I_h^* \) and to exercise the option (\( I_A^* \) will not be superior to \( I_A^* \), so there will not be ‘overinvestment’).

Therefore, A will play \( I_A = I_A^* \) and the Nash equilibrium will be:

\[
\text{N.E. } \Rightarrow \ (\sigma_h, \sigma_A) = (\text{yes option if } I_A \neq 0, I_A^* \text{ if } I_A \neq 0)
\]

With sequential investments, the Nash equilibrium coincides with the first-best: N.E. \( \equiv \) FB
Fig. 5  Extensive form game
4.1.2 Renegotiation

Tourism demand is influenced by numerous and different factors often leading to unexpected shocks, even in small periods of time. This observation could lead tourist firms to establish, in the initial contract, the possibility to renegotiate the allotment agreement to change the original price $P^*$. 

Relatively to the possibility of renegotiation, two cases have to be distinguished:

1) If $I_{H}^{*} + I_{A} - I_{H}^{*}/2 - P^* \geq -P_0$, (1.11)
that is, if the payoff $H$ would obtain if invested efficiently, given $I_A$, and exercised the option at the original price $P^*$ is greater than the payoff obtained without exercising the option, then $A$ will reject any offer/proposal for a lower price. $A$ knows that the optimal choice for $H$ would be exercising the option and paying $P^*$ for requested services if the renegotiation failed.

At the same time, $H$ will reject any kind of a offer proposing a higher price $P^*$, since the original contract holds until one party is not satisfied of the renegotiation’ outcome. In this case there is no aim for renegotiation and the payoffs are determined by the original contract.

2) Let us now consider: $I_{H}^{*} + I_{A} - I_{H}^{*}/2 - P^* < -P_0$ (1.12)
If the renegotiation induces $H$ to exercise the option, an additional surplus is created and shared between the parties. Again, an allotment contract for the acquisition of $n$ seats on some flights at price:

$P^* = I_{H}^{*} + I_{A} - I_{H}^{*}/2$
implies the first best levels of investment. The reasoning previously followed applies here as well: since the original contract is still valid and $A$ can’t receive more than $S^*$, $I_A^*$ is the optimal level of investment for $A$.

5. CONCLUSIONS

In this research paper it has been shown that the allotment contract with option gives both parties incentives to invest efficiently and so it can, under some assumptions, implement the first best. It is socially optimal that, in the tourism market, $P_0$ is usually fixed equal to zero when there is an equal bargaining power between suppliers and tour operators. The allotment contract with option is more efficient than the commitment contract with regard to many aspects, independently from the possibility to renegotiate the fixed price.

Firstly, with regard to investments, the commitment contract guarantees, through the ownership allocation, only a partially efficient outcome (i.e only one investment is efficient in the best case).

Secondly, we have focused attention on risk-neutral agents to simplify the analytical framework but it is not rarely observed tour operators’ risk-aversion due to tourism market variability and uncertainty. It is clear that $H$, through an allotment booking, supports a lower risk deriving from unsold tickets than that supported signing a commitment contract. In case of a demand shock for a specific tourism destination, $H$ could decide to not exercise the option without big financial losses for the firm. Let us assume that the choice is between: a) buying 20 seats on 10 flights at the price of 20 euros each, through a commitment contract, and b) booking the same number of seats through an option contract establishing the payment of 4 euros for each of them and the right to confirm at the full price of 20 euros. If the value of the flight in an all inclusive package tour sold by $H$ amounts to 40 euros to 4000 euros ( 20 for each client buying the package). After the agreement signed, a demand shock could take place for a specific destination caused, for example, by terroristic attacks or social conflicts, in such a manner that $H$ could find convenient to change its travels portfolio. A different destination could permit to obtain revenues of 25 euros per tourist, with total revenues equal to 5000 euros. In the case analysed, the increase in revenues is equal to:

\[5000-4*200] – 4000 = 200 euros.

As previously observed, breaching the contract with option is profitable if the profit margin (per person) coming from the new alternative destination is greater than the option price; it is not convenient on the opposite case.

Finally, the bargaining power tour operators have relative to suppliers’ power decreases, as well as discounts, with the decrease of risk shared. The allotment contract guarantees a lower risk and a lower discount compared to commitment contracts, so $H$ demands a lower discount. The difference ammounts to 30-40% (Buhalis, D. and Laws, E., 2001). Booking $n$ seats for $H$, $A$ receives an higher per ticket profit compared to that obtained by signed a commitment contract. That supports the previous assumption of a relatively high $P^*$. 17
APPENDIX

In fig. 6 and 7 the payoffs of H and A are graphically represented, considering a generic production function \( v(I_H, I_A) \) and investment costs measured by investment levels.

Fig. 6  H’s payoff \( [I_A = I_A^* \text{ and } P_o=0] \)

\[
\begin{align*}
\text{yes option: } & \pi_H = v(I_H, I_A) - P^* \\
\text{no option: } & \pi_H = -P_o - I_H
\end{align*}
\]

Graphically, it can be observed that:

a) given \( P_o=0 \), the intercept of the no option line coincides with the origin. If \( P_o \) assumes positive values, the no option line moves down and the intercept (i.e. when \( I_1=0 \)) is represented by a point under the origin of the axes (H’s payoff is negative).

b) The intercept of the yes option curve (i.e. for \( I_H=0 \)),\[ v(0, I_A^*) - v(I_H^*, I_A^*) + I_H^* \]
has a negative sign because\[ S(I_H^*, I_A^*) > S(I_H, I_A^*) \ \forall \ I_H \neq I_H^* \Rightarrow v(I_H^*, I_A^*) - I_H^* - I_A^* > v(0, I_A^*) - 0 - I_A^*. \]
When \( I_H>0 \), the intercept reaches the origin because \( v(\bullet) \) increases (the yes option curve becomes flatter) and they coincide if \( I_H=I_H^* \).

Greater the effort to obtain a profitable project higher the incentive for H to exercise the option in order to receive the full marginal revenue of investments realized.

c) Symmetrically, when \( P^* \) decreases, the disincentive for the exercise of the option decreases and, on the other side, the incentive to invest increases given that the payoff depends positively on the level of investment realized.

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2 Higher \( P_o \), higher the incentive to exercise the option. For example, for a value of \( P_o \) s.t. \( P_o>v(0, I_A^*)-P^* \), there would be a downward translation of the yes option line by a segment equal to \( P_o \) and the yes option curve would stay over the no option one even if \( I_H=0 \). In that case the threat of \( H \) to not invest would not be credible.
Let us indicate on the vertical axis A’s payoff given the curves:

yes option: $\pi_A = P^* - I_A$

no option: $\pi_A = Po + v(I_H^*, I_A^*) - I_A$
References

Alitalia, obiettivo primo l’efficienza. Trend. Il settimanale dell’industria turismo (26 Settembre 2003), Anno 14 n. 27.


