

Chapter 14

Coopetition in Infomediation: General Analysis and Application to e-Tourism

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14.1 Introduction

The integration of the Internet within human organizations and, in particular, in the mechanisms of business administration has already caused multiple organizational changes. Some economic actors disappeared while other actors appeared because of the opportunities created by the Internet and, in a more general way, by the revolution associated with the information and communication technologies (ICT). Among these new actors of the virtual economic field, we find electronic platforms which enable buyers and sellers on a particular market to exchange information on the products, to compare the characteristics of various products and, if necessary, to carry out online transactions (Lin 2006). Such platforms are perceived at the same time as means of treating and diffusing information, and as new resources enabling firms to increase their competitiveness (Baile and Trahand 1999). In this article, we propose to distinguish between two types of platforms: the *electronic marketplace* (EMP) and the *online information platform* (OIP). Whereas the first type allows buyers and sellers to operate and to conclude online transactions, the second type focuses more specifically on the informational exchange without playing a role in the transaction.

These two types of virtual platforms often coexist within the same sector. For instance, in the tourism sector, online directories, web portals, classified ads, etc. are examples of OIPs (Buhalis and Licata 2002). Their business is defined by the gathering of the whole existing and recognized supply of holiday services (flights, accommodations, leisure parks, restaurants, etc). This information is then available at a single place in order to propose an aggregate offer to the attention of potential buyers (tourists seeking places for their next holiday time). On the other hand, online booking centers or electronic travel agencies are examples of EMPs; these ones

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allow users to choose a product, to carry out the reservation, and even to secure the payment of the stay by electronic payment (González 2004).

Going beyond the mere terminological distinction between EMP and OIP, we aim to analyze the main similarities and differences between these two types of electronic platforms. On the one hand, the two types are both characterized by the paradox of any participation in a marketplace: by offering similar goods and services, all the suppliers present on an EMP or an OIP are competitors, but at the same time they collaborate in making this virtual marketplace successful. On the other hand, EMPs and OIPs differ in the services they offer to their participants, but compete for the participation of the same sets of users (basically, sellers and buyers). Moreover, the competition between EMPs and OIPs takes place within an intricate web of externalities: (i) within a platform, there are indirect network externalities (buyers favor the participation of more sellers and sellers favor the participation of more buyers); also, because sellers compete with one another, there are negative externalities among them; (ii) across different platforms, the benefits offered to users by platform A are likely to spill over to platform B (because users can “multi-home”, i.e., they can register with several intermediaries as explained in footnote 1) and free-riding may then occur. Our objective in this article is to propose a rigorous framework in order to disentangle these various effects and, thereby, to highlight the main management issues surrounding competition and cooperation within EMPs or OIPs. Indeed, we already know that the digitalization of all the processes in the tourism industry enables organizations to enhance their efficiency (Buhalis and Licata 2002). Throughout the paper, we illustrate our general analysis through the case of e-tourism, with suppliers (accommodation owners) and buyers (tourists buying online). In this article, electronic platforms are tourism organizations that have to face new realities of strategic relationships with all their stakeholders.

The remainder of the article is organized as follows. In Sect. 14.2, we replace the concept of electronic platforms in its context, namely the context of market intermediation. We contrast the hypotheses of *disintermediation* and *re-intermediation*; we describe how *infomediation* is a concept that rises directly from the re-intermediation concept and, thereby, we explain why it is necessary to distinguish between EMPs and OIPs. In Sect. 14.3, we study the collaboration paradox on a platform by referring to the concept of *coopetition*, which combines competition and cooperation. In Sect. 14.4, we formalize the intuitions drawn from the previous sections by developing an industrial organization model. Finally, we conclude by a discussion of our paper and we state a number of important issues for future research.

14.2 Intermediation and ICT

In order to understand the implications of the distinction between an EMP and an OIP, it is necessary to refer to the intermediation theory. Actually, these virtual entities are intermediaries whose roles rise directly from the evolution of the intermediation in parallel with the evolution of ICTs over the last decades (Curchod 2006).

An intermediary is an economic agent who helps a supplier/seller and a buyer/consumer to meet and to carry out a particular transaction, either by buying to the supplier in order to resell to the purchaser, or by simply helping these two protagonists to find each other (Spulber 2003). Let us notice that in both cases, the intermediary does not derive any utility from the consumption of the exchanged goods (Biglaiser 1993). His profit either comes from the margin of its buy and resell operations or is represented by the wage for his intermediation role. The work of an intermediary generally leads to a centralized offer by minimizing search costs for the two parts of the transaction (Rubinstein and Wolinsky 1987).

14.2.1 The Disintermediation Hypothesis

With the development of ICT and more specifically the Internet, the traditional intermediary enters reluctantly in direct competition with decentralized electronic exchanges where consumers and producers meet in order to negotiate directly the final prices and the transaction terms. The Internet is thus perceived as a virtual tool that establishes direct relations between suppliers and consumers. Hence, the disintermediation hypothesis supposing a gradual elimination of the various actors of the value chain (Malone et al. 1987).

However, there are several reasons for which this hypothesis cannot be validated in its extreme version (disappearance of any economic actor acting as an intermediary). Firstly, it is difficult to believe in a completely digitalized market because of technological barriers. Undeniably, the current state of technology does not make it possible to find satisfactory electronic equivalent for all types of transactions. Secondly, the concerned actors may not always find it beneficial to make the transactions become entirely electronic, be it for strategic reasons or even to ensure that information remains private (Brousseau 2002). Finally, the producer is not always able to ensure a routing of his products towards the purchaser. Indeed, even if negotiations, contractual agreement and invoicing (electronic payment) can be made digital, the routing of the product remains a material problem. As reminded by Brousseau (2002), the space proximity and the physical meeting between protagonists thus remain significant.

Consequently, the disintermediation hypothesis is not entirely justified since it is stated only in terms of cost reduction (transaction costs theory), without tackling the question of the added value of intermediation (Benda 2004) and the role of the intermediary as an economic agent (Tran 2004).

14.2.2 From Electronic Intermediation to Infomediation

The previous analysis leads us to conclude the following: while it is clear that the existence of the intermediaries is not threatened, it is also clear that their role has to change considerably (Baile and Trahand 1999). Consequently, one can expect an adaptation of the traditional intermediaries to the new needs generated by the

information society, but also the emergence of new virtual actors with a tendency to exploit specific niches (Biglaiser 1993).

The so-called re-intermediation hypothesis finds its roots in the latter observation. It comes as a reaction to the preceding disintermediation theory, which is considered as too peremptory and not realistic enough. Behind the re-intermediation term thus hides the electronic intermediation which, as we mentioned earlier, is inherent in various electronic platforms (Brynjolfsson and Seidmann 1997). Electronic intermediaries turn out to be essential from a strategic point of view because information on the Internet reaches an extreme level of complexity (in quantitative as well as qualitative terms). The latter finding casts serious doubts on the earlier argument according to which the Internet minimizes search costs (Giaglis 2002). In addition, electronic intermediaries represent a significant medium for firms confronted with an increasingly uncertain environment, as it allows sharing information in a very short period of time (Baumard and Benvenuti 1998). An EMP is defined as an interorganizational information system that allows and facilitates Internet-based commercial relationships among multiple buyers and sellers (Akoka and Lang 2002). So, EMPs might be considered as virtual shopping malls and in the existing literature it is usual to find EMPs and OIPs used as synonyms (Benda 2004). However, we wish here to establish a distinction between these two virtual entities.

At first glance, OIPs and EMPs seem to be relatively similar since both are electronic places that provide higher market-exposure to the seller and attract a great number of buyers. Nevertheless, their roles are quite different. On the one hand, EMPs act as traditional intermediaries, which means that they do not just play a role of matching both sides of the market. They also provide a complete service from the beginning to the finalization of the transaction, so that both sides never enter directly in contact. For providing this service, EMPs generally charge a commission, which represents transaction costs and a profit margin. On the other hand, OIPs only play an information role. They do not care whether the transaction works successfully out, but they improve coordination between the two sides of the market, allowing buyers and sellers to manage the whole transaction by themselves. In this latter case, it is not longer possible for the infomediary to control transactions, so that they prefer to charge one or both sides of the market with a fixed fee (wright 2004).

So, while an EMP clearly allows participants to trade directly, the OIP only aims at providing information (Spulber 2003).

In the present article, we refer to an OIP as any system whose objective is to collect the information available on particular products and services in order to present it in a comprehensive, organized, synthetic and easily accessible form, to the attention of the buyer. Consequently, it represents an information tool and not a transaction tool, as is the case for an EMP. An OIP can thus be considered as a type of innovating intermediary thanks to which information gains in credibility (Oxley and Yeung 2001). To support this terminological differentiation, the literature has coined the term of *infomediary* (Ordanini and Pal 2001), which usefully characterizes an OIP. An infomediary is traditionally defined as a merchant of information. This information concerns either the buyer or the supplier of goods and services.

In the first case, the infomediary collects data concerning a particular population of buyers, it analyses and structures this data to obtain useful information that it then sells to a supplier, which is directly concerned with the population and the corresponding market. Hence, the infomediary in contact with the market follows the evolution and the tendency of this market and contributes to a certain extent to the development of the offer (Giaglis 2002). In the second case, the infomediary collects data about multiple producers and suppliers of the same good or service in order to propose this information to the potential buyers present on this market segment and requesting a high degree of transparency and comparability of information.

Figure 14.1 presents the most outstanding differences between an EMP and an OIP as we conceive them here. This shows that these two different platforms do not respond to identical needs. Actually, an EMP is more specifically addressed to a supplier who wants to outsource his sale function, whereas an OIP responds to a promotion need. Hence, while a supplier who is not able -or does not want- to ensure transactions tends to join an EMP, a supplier who is not able -or does not want- to ensure its promotion function tends to join an OIP.¹

For infomediation to exist, it is necessary that the activity add some value, exactly as for traditional intermediation. If information relates to the buyer side, there is room for an infomediary only if the supplier is not able to observe, to collect and to treat the data itself. If information relates to the seller side, the infomediation activity is useful if it is difficult for a buyer to observe the whole supply of goods and services. The latter situation can be attributed to various reasons: very fragmented market, difficult access to information, lack of time, consumer not very inclined to support the search costs, etc.

EMP	OIP
Ensures a restrictive promotion (without informational transparency)	Ensures a wide promotion (with informational transparency)
Becomes actor of the transaction	Remains outside the transaction
Endorse responsibilities as for the realization of the transaction	Endorses responsibilities as for the veracity of information
The intermediation cost is generally supported by the buyer	The infomediation cost is generally supported by the supplier

Fig. 14.1 Differences between EMP and OIP

¹Clearly, reality is a bit more complex than that as an EMP also achieves a promotional role, and as sellers have the opportunity to simultaneously register with an EMP and an OIP (for instance, a supplier may go to an OIP because this gives him a larger promotion scope, and simultaneously adhere to an EMP in order to increase his sales). The latter phenomenon is usually referred to as “multihoming”. Considering the complexities resulting from multihoming (which can also exist on the buyers’ side) goes beyond the scope of the present analysis.

Fig. 14.2 Organization of concepts

General	Interorganizational Information Systems on the Internet	
Category	Electronic Marketplaces (EMP)	Online Information Platforms (OIP)
Tourism	eTravel Agencies	eTravel Databases
Activity	Intermediation	Infomediation

In the e-Tourism sector, lots of websites are OIPs.² Information concerns the supply of tourism services as noted above and is proposed to people organizing a city trip or any other kind of holiday. It is useful to recall that the tourism sector benefits considerably from the possibilities offered by the Internet (Rayman and Molina 2001, Buhalis 2001). Indeed, a large range of transactions related to the tourism sector is nowadays very common (buying plane tickets on the web; participating to holidays online auctions; searching sunny destinations on the web instead of using paper catalogues; etc). In such a context, the presence of an OIP can therefore prove to be necessary and justified (Doolin et al. 2002).

EMPs can also be identified in the tourism sector as electronic travel agencies on which it is possible to choose a product, to carry out the reservation, and even to secure the payment of the stay by electronic payment.³ As for the case of traditional agencies, they are remunerated on the basis of a commission, which is generally directly integrated by marking up the basic price of the product established by the supplier. Contrary to the information platform, the booking platform does not support informational transparency. Firstly, regarding product information, we note that EMPs do not post the real prices of the products or services: prices include an additional fee (the commission) that is meant to compensate the EMP for its services. Secondly, regarding information about suppliers, travel agencies maintain it secret in order to prevent buyers from directly contacting suppliers and thereby, bypassing the EMP's intermediation process. Indeed, an increasing number of suppliers are equipped in computer systems, which allows them to manage themselves the requests and services related to the booking. Figure 14.2 summarizes our comparison between EMP and OIP. We now turn to the analysis of the relationships between participants in the same platform.

14.3 Coopetition on an Electronic Platform

Before analyzing the links existing between platform participants, we will first see why these different actors join an OIP or an EMP. As for a buyer, the benefit of joining an electronic platform is twofold. Firstly, the buyer has access to a large number

²Here are a few examples of tourism oriented OIPs: calagtour.org, egypthotelsdb.com, ruralindex.net, ruraltrip.com.

³Some examples of tourism oriented EMPs are: booking.com, nouvelles-frontieres.com, travelonline.com, govoyages.com.

of suppliers in a single place, which clearly reduces his search costs. Indeed, as we mentioned before, the profusion of information currently available on the Internet does not make it possible any more to consider this medium of communication as a low search cost tool. Let us notice that if the monetary cost has strongly dropped (because telecommunication tariffs have been in constant fall over the last years and also because of the emergence of free online communication tools), the search cost due to the constant growth of the mass of information on the Internet appreciably increased.⁴ Secondly, the buyer is confronted with information coming straight from the supplier, which guarantees prices that are not skewed by a commissioning mechanism and also a direct bond with the supplier to start a transaction.

Concerning the supplier, his interest is economic as well as strategic. The economic advantage stems from the fact that by joining a platform the supplier partly externalizes his promotion function to an agent, which carries it out at a lower cost (economies of scale) and facilitates coordination between the two sides of the market. Participating in an electronic platform also yields strategic benefits as it allows the supplier to access new markets and thus to gain new market shares at the expense of suppliers who remain outside the network (Benda 2004). However, the supplier who joins an EMP or an OIP is forced to share these competitive advantages with the rival suppliers who already joined the platform.

In her work about EMPs, Benda identifies three types of suppliers on the basis of their perception of the stakes they have in the collaboration: *refractories*, *non refractories* and *proactives* (Benda 2004). Instead of giving a formal definition for each category, we adapt it hereafter to our e-Tourism framework.

Refractory suppliers are not present on a platform because they consider that their own online promotion methods or their other advertising campaigns are largely sufficient. In the majority of the cases, these suppliers ensure an effective presence on the Internet by using their advanced competences in computer science. By doing this and despite lower means than those implemented by the intermediary, they attract enough visitors to be satisfied.

Non refractory suppliers are participating in the platform as long as their participation in it gets them a higher turnover. Moreover, they require that the profits be higher than the cost of participation. If the intermediary is in its development stage, such suppliers minimize their participation (for example by subscribing to a free trial promotion) while waiting to see whether the platform's development will be beneficial for them or not.

Proactive suppliers are also on the platform. They consider that it can help them at various levels. Firstly, they are convinced that as an actor of the tourism sector, a successful presence on the Internet is essential. Secondly, they find the intermediary useful to benefit from a virtual quality window, which will give a positive image of their services. Thirdly, they note an increase of their sales, even if it is difficult to quantify these repercussions.

⁴As Varian et Lyman (2002) document it, 550 billion new documents and more than 7,5 million Web pages are created every day.

Whether they are non-refractory or proactive, suppliers collaborate in the construction and the development of the electronic platform simply through their participation in it. From this point of view, it seems correct to say that they act like partners pursuing a common goal: the mutualisation of means in order to conquer a larger share of the market. However, from the fact that these suppliers propose services and products relating to the same sector, there exists a possibility of comparability. They remain thus also competitors. We wish to underline the paradoxical character of an ambivalent relationship between several suppliers active on the same market, which can be established conceptually in two steps: initially, cooperation between economic agents to achieve a satisfactory common goal for all (in the present case, an increase in the market size); then, competition between the same agents in order to enjoy individually the benefits of the cooperation (here, the largest possible share of the market).

Such a competing collaboration is usually justified by three goals: the research of a critical size, the mutualization of costs and the introduction of barriers for new entrants (Tran 2004). For the tourism sector facing globalization, the research of a critical size is fundamental. In a context of global competition, it is easy to understand that cost mutualization appears as a natural way to a widened and effective action. Lastly, given that the sector under review remains largely open (the leisure and accommodation supply increases significantly every year), the participation to an electronic platform can, from a strategic point of view, be used to minimize strong competition by establishing barriers to entry.

The main characteristic of the coopetition phenomenon (Koenig 1996) is to combine simultaneously a collective strategy (cooperation, i.e. participation to the same platform and contribution of each supplier to the development of this platform) and several individual strategies (competition as the participants to the same platform remain competitors with one another) (Nalebuff and Brandenburger 1996, Bengtsson and Kock 2002). Coopetition is a helpful theory to analyze tourism economics and strategy. Moreover, the concept has been recently used in the case of tourism firms (Pesämaa and Eriksson 2006, Della Corte and Sciarelli 2006).

Figure 14.3 illustrates this concept starting from two competing suppliers active on the same market and potentially on the same platform. If the two agents stay out of the platform, they play the traditional game of competition. If only one of the suppliers joins the platform, then he has a competitive advantage over the other, insofar as he benefits alone from the entire common infrastructure created. However, it is obvious that for this participation to be transformed into a durable competitive advantage, it is necessary that the intermediary gives itself the means of being known on the buyers' side. Lastly, as we already described it, if both suppliers join the platform, they play the ambivalent game of coopetition: competition is

Fig. 14.3 Coopetition vs. competition

		Does S1 join the platform?	
		Yes	No
Does S2 join the platform?	Yes	Coopetition	Advantage for S2
	No	Advantage for S1	Competition

strong because suppliers are on an equal foot, but joint participation makes the platform more attractive for buyers, which increases expected profits for both suppliers. In the next section, we develop an industrial organization model to formalize this situation.

14.4 A Formal Model of Coopetition on a Platform

To analyze the strategic interaction between an intermediary holding a virtual platform and its potential adherents, we consider the following three-stage game: in the first stage, the intermediary sets a registration fee F that suppliers must pay to use its services; in the second stage, the suppliers observe F and simultaneously decide whether or not to register with the intermediary; in the third stage, the suppliers simultaneously choose the quantity of services they provide. We solve the game backwards for its subgame-perfect Nash equilibria.

To get the main insights from the modelization, we start with a simplified situation with only two suppliers of accommodation. Next, we generalize our results assuming an arbitrary number of suppliers.

14.4.1 A Model with 2 Suppliers

Suppose there are two suppliers of accommodation, noted 1 and 2, and a single intermediary. The inverse demand function for the service provided by supplier i is given by $p_i = 1 + m_i - q_i - dq_j$ ($i \neq j \in \{1,2\}$) where

- p_i is the price for one unit of service (say, e.g., one night per person in the accommodation),
- q_i and q_j are the quantities of service provided respectively by suppliers i and j (these quantities can be thought of as the accommodation capacity, e.g., the number of rooms or of beds),
- $d \in (0,1)$ is an inverse measure of product differentiation between the services of the two suppliers (the lower d , the more services are differentiated; for $d = 0$, the two services are totally differentiated and the two demands are independent; at the other extreme, for $d = 1$, the two services are seen as perfectly substitutable), and
- m_i indicates the “market-exposure” (or *brand recognition*) of service i (the larger m_i , the higher the willingness to pay of each consumer whatever the quantities q_i and q_j produced by the firms).

Before competing *à la Cournot* on the product market (i.e., suppliers simultaneously set their quantity, taking the quantity of the rival as given), suppliers observe the registration fee F charged by the intermediary and decide whether or not to register. Being listed on the intermediary’s website has the effect of increasing the

supplier's market exposure (with respect to self-promotion via other means). Moreover, infomediation generates network effects insofar as each supplier's exposure further increases when the other supplier also registers with the intermediary. As explained above, such network effects can be justified by scale and scope economies in promotional activities enjoyed by the intermediary, and because consumers are willing to pay more for both services when they are given the opportunity to compare them more easily. We translate this idea by assuming that $m_i = 0$ when supplier i does not adhere to the intermediary, $m_i = m$ when supplier i is the only supplier who adheres to the intermediary, and $m_i = M$ when both suppliers adhere to the intermediary, with $0 < m < M$.

The registration with the intermediary also lowers the cost of supplying accommodation. The supplier indeed outsources a share of its transaction costs to the intermediary. When an accommodation is on the intermediary's website for instance, the supplier does not have to promote its services anymore since it is already done by the intermediary. Let us remind that we assume here that the supplier does not have the opportunity to multihome since there exists only one intermediating platform. Accordingly, we denote the constant marginal cost of accommodation services by c for a supplier who does not register with the intermediary, and by γ for a supplier who does, and we assume $\gamma < c < 1$.

14.4.1.1 Production Decisions

We start by solving the Cournot game suppliers play at stage 3. Supplier i 's profit function can be written as $\pi_i = (1 + m_i - q_i - dq_j)q_i - c_i q_i$. Setting to zero the derivative of profit with respect to q_i , we derive supplier i 's reaction function: $q_i(q_j) = \frac{1}{2}(1 + m_i - c_i - dq_j)$. We proceed in the same way for the other supplier. Solving for the system of equations in two unknowns given by the two reaction functions, we find the Nash equilibrium quantities and profits:

$$q_i^* = \frac{2 - d + 2(m_i - c_i) - d(m_j - c_j)}{4 - d^2}, \pi_i^* = (q_i^*)^2, i \neq j \in \{1, 2\}. \quad (14.1)$$

In the above expression, the exact values of (m_i, c_i) and (m_j, c_j) depend on the adhesion decisions made by the suppliers at stage 2 (we note A for 'adhesion' and N for 'non adhesion'). There are three situations to consider.

- If no supplier adheres to the platform, then $(m_i, c_i) = (m_j, c_j) = (0, c)$. Substituting these values into expression (1.1), we obtain the equilibrium profits, which are the same for the two suppliers:

$$\pi_i = \pi_j = \pi^{NN} = \left(\frac{1 - c}{2 + d} \right)^2.$$

- If supplier i adheres while supplier j does not, then $(m_i, c_i) = (m, \gamma)$ and $(m_j, c_j) = (0, c)$. In that case, the suppliers' equilibrium profits differ and are

respectively given by⁵

$$\begin{aligned}\pi_i &= \pi^{AN} = \left(\frac{2 - d + 2(m - \gamma) + dc}{4 - d^2} \right)^2 - F, \\ \pi_j &= \pi^{NA} = \left(\frac{2 - d - 2c - d(m - \gamma)}{4 - d^2} \right)^2.\end{aligned}$$

- Finally, if both suppliers adhere to the platform, then $(m_i, c_i) = (m_j, c_j) = (M, \gamma)$. We use again expression (1.1) to find the equilibrium profits for the two suppliers as

$$\pi_i = \pi_j = \pi^{AA} = \left(\frac{1 + M - \gamma}{2 + d} \right)^2 - F.$$

14.4.1.2 Coopetition

Before looking for the equilibrium adhesion decisions at stage 2, we want to illustrate what coopetition means in the present setting. As explained in the previous section, *coopetition* mixes some form of *cooperation* (which is translated here by the assumption that $M > m$, i.e. market exposure is larger when both suppliers register with the intermediary) and of *competition* (adhesion decisions are strategic, i.e. they are carried out with a view to affecting the environment in which product market competition is played). To assess how these two opposite forces balance each other, we compute how equilibrium profit changes when the other supplier also registers with the intermediary. That is, we compare π^{AN} with π^{AA} . Simple computations establish that:

$$\pi^{AA} > \pi^{AN} \Leftrightarrow 2(M - m) > dM + d(c - \gamma). \quad (14.2)$$

Condition (14.2) says that each supplier welcomes the adhesion of the other supplier to the platform as long as this adhesion generates more benefits (on the left-hand side) than costs (on the right-hand side). The benefits (or the *cooperation effect*) stem from the increased exposure, $(M - m)$, that affects the Cournot equilibrium quantity by a factor 2. The costs (or the *competition effect*) are due to the improved competitive position of the rival supplier: by adhering, the rival supplier boosts its exposure (from 0 to M) and reduces its marginal cost (from c to γ); the impact of these two effects on the Cournot equilibrium quantity are proportional to d . We thus see that the cooperation effect is more likely to dominate the competition effect (i) the larger the network effects (measured by the increased exposure, $M - m$) and (ii) the lower the intensity of competition between the two suppliers (measured by the degree of product substitutability, d).

⁵We restrict the attention to parameter configurations such that $2 - d - 2c - d(m - \gamma) > 0$.

14.4.1.3 Registration Decisions

We now turn to stage 2 of the game and analyze the suppliers' decision to register with the intermediary. Supposing that supplier j does not register, supplier i prefers to register provided that

$$\pi^{AN} \geq \pi^{NN} \Leftrightarrow F \leq \left(\frac{2-d+2(m-\gamma)+dc}{4-d^2} \right)^2 - \left(\frac{1-c}{2+d} \right)^2 \equiv F_1. \quad (14.3)$$

It is clear that each supplier is willing to pay a positive amount, i.e. $F_1 > 0$, to be the sole adherent to the intermediary, as it increases exposure (from 0 to m) and reduces marginal cost (from c to γ), without improving the rival firm's situation.

Similarly, supposing now that supplier j does register, supplier i prefers to register as well provided that

$$\pi^{AA} \geq \pi^{NA} \Leftrightarrow F \leq \left(\frac{1+M-\gamma}{2+d} \right)^2 - \left(\frac{2-d-2c-d(m-\gamma)}{4-d^2} \right)^2 \equiv F_2. \quad (14.4)$$

As in the previous case, adhesion reduces marginal cost from c to γ . In terms of exposure, the effect is mixed. Compared to the previous case, the increase in exposure is larger (from 0 to M) but the rival supplier also benefits (its exposure increases from m to M). Yet, the former effect clearly dominates the latter, meaning that each supplier is also willing to pay a positive amount, i.e. $F_2 > 0$, to join the other supplier on the intermediary's platform.⁶

The ranking of the two thresholds, F_1 and F_2 , depends on the parameter values. We need thus to distinguish between two cases.

Case A: $F_2 > F_1$. In that case, a supplier is willing to pay more for the intermediary's services when the two suppliers use them. This means that the cooperation effect dominates the competition effect. The Nash equilibrium of the second stage is then characterized as follows:

$$\begin{cases} \text{for } F \leq F_1, & 2 \text{ registrations,} \\ \text{for } F_1 < F \leq F_2, & 0 \text{ or 2 registrations,} \\ \text{for } F > F_2, & \text{no registration.} \end{cases}$$

We observe that an intermediate fee ($F_1 < F \leq F_2$) generates multiple equilibria (0 or 2 registrations). We are then in a typical coordination game: each supplier finds it optimal to mimic the choice of the other supplier because registration is worthwhile if it increases market exposure from m to M , but not from 0 to m .

⁶However, as we discussed above, a supplier might not want to be joined if the competition effect dominates the cooperation effect (that is, it is possible to have $\pi^{AN} > \pi^{AA} > \pi^{NA}$).

Case B: $F_2 < F_1$. Here, a supplier is willing to pay more for the intermediary's services when it is the only one to use them. For that case to be observed, the competition effect must be sufficiently stronger than the cooperation effect (i.e., d must be large and $(M - m)$ small). The Nash equilibrium of the second stage is then characterized as follows:

$$\begin{cases} \text{for } F \leq F_2, & 2 \text{ registrations,} \\ \text{for } F_2 < F \leq F_1, & 1 \text{ registration,} \\ \text{for } F > F_1, & \text{no registration.} \end{cases}$$

In contrast with Case A, we observe here that any fee set by the intermediary generates a unique equilibrium.

14.4.1.4 Intermediary's Pricing Decision

We are now in a position to derive the intermediary's optimal conduct in stage 1. We distinguish again between two cases. In Case A, the intermediary attracts either the two suppliers or none of them. He is sure to attract them if he sets $F \leq F_1$. If he raises the fee up to F_2 , he still has a chance of attracting the two suppliers, but this depends on the suppliers coordinating on this equilibrium. However, the suppliers might as well coordinate on the other equilibrium and refrain both from registering. If the intermediary is unable to coordinate the choices of the suppliers, it seems reasonable to predict that he will prefer to play it safe by setting $F = F_1$.

In Case B, the intermediary knows that to attract the two suppliers, it has to lower the registration fee from F_1 to F_2 (as each supplier is willing to pay less when the other supplier also joins). The intermediary finds it profitable to do so as long as $2F_2 > F_1$. Whether this inequality is satisfied or not depends on the parameter values.

Collecting the previous results, we can characterize the subgame-perfect equilibrium of the game as follows:

- if $F_1 \leq F_2$, the intermediary sets $F = F_1$ and the two suppliers register;
- if $F_2 \leq F_1 \leq 2F_2$, the intermediary sets $F = F_2$ and the two suppliers register;
- if $F_1 \geq 2F_2$, the intermediary sets $F = F_1$ and only one supplier registers.

14.4.1.5 EMP vs OIP

The previous analysis can easily be enriched by considering that the intermediary can either be an EMP or an OIP. As argued in the previous sections, an EMP has both a transactional and informational role, while an OIP only has the latter. It seems thus reasonable to assume that an EMP generates a larger reduction in transaction costs for its adherents than an OIP. In the present model, we could write $\gamma^e < \gamma^o$, where the superscripts e and o refer respectively to an EMP and an OIP. A quick look at expressions (14.3) and (14.4) reveals that both F_1 and F_2 decrease with γ . Hence, we have $F_1^e > F_1^o$ and $F_2^e > F_2^o$. This implies, not surprisingly, that an EMP is able

to charge higher fees than an OIP. Alternatively, if an EMP charges the same fee as an OIP, it is able to capture a share of its members' profits by charging variable fees (i.e. a commission, up to the difference $\gamma^o - \gamma^e$), without losing adherents.

14.4.2 Extension to Several Suppliers

The previous model can be generalized to an arbitrary number of suppliers, $N > 2$, by letting the exposure parameter m_i be equal to αn when supplier i adheres to the intermediary along with $(n - 1)$ other suppliers (with $\alpha > 0$) and, as before, equal to zero when supplier i does not adhere. Naturally, this increases the complexity of the model. So, to gain some insight, we compensate by simplifying the cost structure. In what follows, we assume that registration with the intermediary does not reduce the marginal cost of supplying accommodation; in particular, we pose $c = \gamma = 0$.

Under these assumptions, we can again solve for the subgame-perfect equilibria of the three-stage game. Supposing that n (with $0 < n < N$) suppliers have joined the intermediary at stage 2 of the game, we denote by $\pi^{in}(n)$ the equilibrium profit at stage 3 of a typical supplier who joined the intermediary (and who is thus among the n "in" suppliers); similarly, let $\pi^{out}(n)$ denote the equilibrium profit of a typical supplier who did not join the intermediary (and who is thus among the $N - n$ "out" suppliers).⁷

Let us first give a more precise assessment of the coopetition phenomenon. As above, we want to assess how a member's equilibrium profit changes when an additional supplier joins the intermediary. We therefore compute the difference $\pi^{in}(n+1) - \pi^{in}(n)$. Focusing here on the case of homogeneous products (i.e., $d = 1$), we can readily establish that *the change in profit is positive if and only if the intermediary comprises less than half of the population of suppliers* (i.e., if $n < N/2$). The corollary of this result is that, as the intermediary grows larger than this critical size, the equilibrium profit of each member decreases when an additional firm joins the intermediary. The intuition for this result is akin to the one we described in the case with two suppliers. In such a setting, the enlargement of the intermediary's member base induces two simultaneous contrasting effects on the members' profits: on the one hand, the members benefit from the increase in the demand they face (a positive "cooperation effect"), but on the other hand, they suffer from increased competition due to the increased demand that their competitors enjoy as well (a negative "competition effect"). As a result, there is a critical size after which the admission of new members on an electronic platform has an adverse effect on the initial members' profit.

Now, turning to stage 1 of the game, we would like to measure how much a supplier is willing to pay in order to become the n th member of the intermediary. This supplier would be willing to pay up to its change in profits: $f(n) \equiv \pi^{in}(n) -$

⁷ A technical appendix containing the detailed computations can be obtained from the authors upon request.

$\pi^{out}(n - 1)$, i.e., the difference between the profit after joining the intermediary (when n suppliers are with the intermediary) and the profit before joining (when only $n - 1$ were with the intermediary).⁸ The function $f(n)$ can be interpreted as a demand function for the intermediary's services: for a given quantity of service (i.e., for a given number n of members), $f(n)$ indicates the highest membership fee at which the service can be sold. The optimal level of the membership fee can thus be indirectly obtained by letting the intermediary select the optimal number of members, i.e., the number n^* that maximizes the intermediary's profit, $\Pi(n) = nf(n)$. Some line of computations establish that the first derivative of $\Pi(n)$ with respect to n is negative at $n = N$. This implies that *the intermediary never finds it profitable to induce full membership: the intermediary's optimum is to attract a strict subset of the existing pool of suppliers*. The intuition for this result is again to be found in the coopetition phenomenon.

14.5 Discussion and Research Questions

In this paper, we introduce various business issues related to intermediation and electronic markets. First, even if intermediaries will continue to play a role in the digital economy, we note that they will be increasingly confronted to infomediation. Indeed, infomediation emerges nowadays as a new category of intermediaries in a business context where buyers and sellers interact more easily with one another but still need to process a lot of information. Second, whether they are buyers or sellers, participants in the same electronic platform are in a particular position since they cooperate to the collective success of the platform while they remain competitors. We refer to the strategic concept of *coopetition* to describe this ambivalent reality. Third, we develop an economic model of an electronic platform built on industrial organization theory. The main analytical results drawn from this simple model are that (i) suppliers might suffer from the participation of other suppliers in the same platform (because the competition effect might be stronger than the cooperation effect), and (ii) the platform owner never finds it optimal to attract all suppliers.

To conclude our analysis, we propose several directions for future research. First, several empirical studies show the importance of the competing advantages related to the participation in an electronic platform (Brousseau 2002) and of the integration of the Internet –and the ICT in general– to the strategy of the firm. However, if one considers the same market or common branch of industry, it is possible to meet several platforms that enter in competition (Tran 2004). This latter phenomenon can be seen as a move of competition from an individual dimension (agent against agent) to a collective dimension (platform against platform). In order to shed some light on

⁸It can be shown that $f(n)$ first increases with n , then reaches a maximum and then starts to decrease with n ; the reason for the decrease is to be found in the competition effect which makes $\pi^{in}(n)$ decrease with n for $n > N/2$.

this platform competition, we can rely on the industrial organization theory and its concept of *two-sided market* (Jullien 2005, Rochet and Tirole 2003, Armstrong and Wright 2007). Indeed, with electronic platforms we are in the presence of positive indirect network effects since the more agents there are on one side of the platform (e.g., suppliers), the higher the agents' utility on the other side (e.g., buyers).

With respect to the model we developed in the previous section (with a single intermediary and several suppliers), the literature on two-sided markets offers two useful extensions. First, the buyers' side is explicitly modelled. That is, buyers also choose whether or not to register with a platform and their willingness to do so increases with the (expected) number of sellers present on the platform.⁹ Second, several platforms compete to get both the suppliers and the buyers on board.

Concerning the latter issue, existing models examine the competition between two symmetric, possibly horizontally differentiated, platforms. However, this approach is not completely satisfactory for the tourism sector, as we observe two important additional complexities. First, the competition is between vertically differentiated platforms. That is, EMPs and OIPs target the same two groups (suppliers of accommodation and tourists) but offer different intermediation services, and may use different pricing modes. Second, buyers and sellers keep the opportunity to transact directly, i.e. without using the intermediation services provided by the platforms.

To the best of our knowledge, such issues have not been tackled so far in the literature (either in industrial organization or in strategy). We see thus there a promising area for future research. In particular, we identify a number of questions that should be investigated, both on theoretical and on empirical grounds:

- What are the best pricing strategies in the competition between vertically differentiated platforms? Is the high-quality platform able to charge higher prices on both sides of the market? Is the low-quality platform forced to pursue a niche strategy?
- Since buyers and suppliers facing several platforms may decide to multihome, what does it imply for the competitive game among platforms?
- Beyond competition between various types of platforms, there exist positive externalities between their activities, which are advantageous for each of them. What is the exact nature of such externalities and how do they affect competition?

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⁹In our model, the indirect network effects on the buyers' side are implicitly taken into account through the demand expansion resulting from increased suppliers' participation.

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