

Channel Choice in the 21st Century: The Hidden Role of Distribution Services.*

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Abstract

A fundamental distinction between goods and services is that in the retailing of goods and some services the costs of production and distribution are clearly separable in a non-arbitrary fashion, usually identified as costs of goods sold. They have type I separability. Distribution services, which are also known as attributes, marketing mix or output variables, are produced, distributed and consumed just as goods or physical products or core services sold directly to consumers at an explicit price. When online settings generate separability of production distribution and consumption of all these distribution services in space and time we have strong type II separability, which has not been identified in the literature. The latter plays an essential role in the emergence, sustainability and sometimes dominance of online channels. It has profound implications for both the demand side and the supply side of firms in online channels. We develop implications of this result with respect to potential maximum levels of these services in electronic channels and for a broad range of other important topics relevant for marketing and economics.

Keywords: distribution services, separability across space and time, maximum service limits of channels, channel choice and management, online vs. offline retailing.

Introduction

Between 2002 and 2012 e-commerce grew at a rate of 18% per year and it was estimated that Internet sales were 8% of total U.S. retail sales in 2012 (MacKenzie, Meyer, and Noble 2013). Forrester Research estimates that by 2017 Internet sales will be 10.3% of total U.S. retail sales; furthermore, they argue that by 2017 60% of US retail sales will involve the Internet in some way (Dusto 2013). Thus, the phenomenon of B2C Internet sales is important, increasing in magnitude and shows no signs of abatement in the near future. Moreover, it is not a phenomenon limited to the U.S. In the European Union, for example, rates of turnover for e-commerce in 2012 have been reported to be as high as 31% and 26% in Ireland and the Czech Republic, respectively, (Eurostat 2013).

Most companies producing consumer services and goods are selling directly to final customers through their websites as an only channel or combined in a multichannel operation. Internet penetration in modern life is pervasive. Thus, it enhances the importance of channel mix strategy for any retail firm. The above facts and these issues raise three broad topics in this B2C area. What's unique about channel choice in the presence of the Internet? What's unique about online channel management? Finally, what's unique about multichannel management that involves the Internet? In answering these questions, we provide insights that are directly applicable to the retailing of goods and with some qualifications to the retailing of services. Most of these insights are either absent from previous literature in marketing and economics or presented in isolated or piece meal fashion. Our framework provides an integrated view of the source of this uniqueness.

Our main contribution in this paper is to identify a unique feature of channel choice associated with the Internet as a technological innovation that allows separability across space

and time. Namely, in online channels the consumption, distribution and production of each one of a set of five broadly defined distribution services shown to accompany any retail transaction (for example see Betancourt 2004; Kopalle et al 2009) are potentially separable across space and time. No one has shown this result before. Furthermore, separability across space in particular has profound implications for the costs of distribution that become clear in our framework but have not been emphasized before.

Broadly speaking these distribution services can be described *as accessibility of location, information, assortment (breadth and depth), assurance of product delivery (in time and form) and ambiance*. An analysis of how these distribution services affect the demand and supply of retail products in general is available (e.g. Betancourt 2004, Chs. 3 and 4, respectively). These distribution services can be viewed as channel outputs (e.g., Keh 1997; Betancourt 2004, Ch.8). From a marketing perspective, it has been shown that distribution services increase the demand for retail products by enhancing customer satisfaction (e.g. Betancourt et al. 2007). Two essential economic characteristics of brick and mortar retail markets are: usually these five distribution services are not explicitly priced but bundled with the actual good or core service purchased by the customer at an explicit price; and, through the choice of a lower or higher level of each of these outputs provided by the retailer the costs of distribution can be shifted to the consumer or absorbed by the retailer (Betancourt and Gautschi 1993). Succinctly put, online retailing allows the unbundling of these distribution services and the shifting of the costs of an important one, accessibility of location, entirely to the consumer.

A channel has been defined as a means to provide what consumers want in terms of marketing outputs at a minimum cost (Bucklin 1966). What consumers want guides channel design and management in terms of long term attention to end users' demand for the services the

channel offers (Coughlan 2010). Thus, essential differences between offline and online channels lie in their abilities to provide distribution services or levels of channel outputs demanded by customers at minimum costs. In establishing these differences, it is convenient to differentiate between the retailing or distribution of goods and the retailing or distribution of services as the core product.

The reason for the differentiation is that in the retailing of goods it is common and feasible to separate the benefits and costs of the primitive economic activities of production, distribution and consumption of goods when defining profits. Namely the latter are defined as revenues, which capture the consumption side through the impact of demand on revenues, minus the costs of retailing, which capture the distribution side, minus the costs of goods sold, which capture the production side. By contrast, in the retailing of services it is usually not feasible to separate the costs of distribution from the costs of producing the core service sold at an explicit price. Thus, profits are usually defined as revenues, which capture the consumption side just as before, minus the costs of distribution plus production, which capture the costs of both primitive economic activities jointly (Betancourt 2004: Ch.10, Section 2; Betancourt 2016).

In this paper we stress this difference in the retailing of goods and the retailing of services by characterizing the separability among the three primitive economic activities described above for goods as type I separability. This separability is different from the one underlying our contribution in this paper, which is that the consumption, distribution and production of each of the distribution services or outputs in a channel can be separated in space and time. We call the latter type II separability. Furthermore, we also differentiate between weak type II separability, which is defined as separation of consumption, distribution and production of at least one channel output across space and time, from strong type II separability, which is defined as

separation of consumption, distribution and production of each of all five channel outputs identified above across space and time. Finally, we note that type I separability is a necessary condition for strong type II separability.

Since these separability concepts are new and unfamiliar to readers, we begin the discussion with an illustration showing what these concepts mean in the context of a familiar retail institution, restaurants, and its interaction with broad technological change in the form of telephones and the Internet. Subsequently, we place our analysis in the context of the marketing literature contributions to separability and its approach to online retailing. We develop in detail our basic result on strong type II separability of distribution services across channels in the third substantive section. In the fourth section we discuss briefly issues relevant for type II separability that we don't address while also highlighting the ones we do address in the context of channel choice. The fifth substantive section identifies maximum levels of distribution services provided by online and offline channels and important consequences of these differences. The last section covers a broad range of important implications for marketing and economics brought to the surface by our separability concepts.

Separability Concepts: An Illustration Based on Restaurants

This illustration aims to motivate the rest of the discussion in the paper. Restaurants are familiar to readers and, thus, useful to illustrate both distribution services and our separability concepts. We will use them first to provide an example of type I separability by comparing them to shoe stores, which are also familiar to readers. Afterwards we will use the reservation system in a restaurant, which is a mechanism to provide the distribution service or marketing output assurance of product delivery at the desired time, as an example of how technology allows separation of consumption, distribution and production of a distribution service across space and

time. This provides an example of type II separability that also allows differentiation between weak and strong type II separability.

Consider an old fashioned brick and mortar restaurant. The consumption activity is the enjoyment of meals by customers; the production activity is the creation of meals by the restaurant; and the distribution activity is the placement of the restaurant in a convenient location for a segment of consumers while providing them with: an assortment of meals, information on these meals (and their prices), assurance of the availability in terms of quantity and quality of various types of meals on certain days and at certain times as well as an attractive ambiance in which to enjoy the meal.

The profits of the restaurant in any period will be given by the revenues generated by the consumption of meals during that period minus the costs of producing the meals and the costs of distributing them to consumers at the restaurant. The costs of production and distribution of meals for the restaurant can't be separated in a non-arbitrary fashion. By contrast, if we were talking about a shoe store the profits of a shoe store during a given period would be given by the revenues generated by the demand for shoes during that period realized through store sales minus the costs of distributing the shoes through the store, which arise from providing the same five broad types of distribution services as the restaurant, minus the costs of producing the shoes (goods sold) acquired from the manufacturers. Thus the costs of production and distribution can be separated easily in a non-arbitrary fashion in the case of shoes, but not in the case of restaurants. While the retailing of shoes exhibits type I separability, the retailing of restaurant meals does not.

One consequence of technological innovations is that they also allow or facilitate another type of separability: namely, separating consumption, distribution and production of distribution

services associated with the retailing of goods and services across space and time. For instance, consider again the case of a restaurant and one of the distribution services mentioned earlier: assurance of product delivery at the desired time. One way of producing this distribution service in an old fashioned restaurant setting is by having an efficient queuing procedure that expedites the seating of customers with varying arrival times. The distribution service, however, is distributed to the customers jointly with consumption in space and time, i.e. at the restaurant during opening hours. Thus, it is distributed jointly with production and consumption of the core service or product (the restaurant meal) in space and time.

With advent of the telephone, however, this distribution service can be distributed to consumers' homes for consumption separately in space from the restaurant where a reservation for a table can be made for a certain time during opening or working hours. Production of this distribution service still takes place at the restaurant through whatever reservation procedure is used. Consumption of this distribution service, however, now takes place at home jointly with its distribution in space and time whenever the consumer makes the phone reservation for a given size table at a given time.

Before the Internet (and voice mail) this distribution service was produced when the restaurant was open, which meant jointly in time and space with the production of meals or core service. The Internet allows this distribution service to be provided separately from the meal or core service product in time and space by having the customer make a reservation through a computer wherever he /she is located that is connected to one associated with the restaurant but that need not be at the restaurant. Indeed, the Internet has given rise to intermediaries (e.g., Open Table in the US and *Busco Restaurantes* in Spain) that specialize in the distribution of restaurant

meals at the desired time for both restaurants and customers at any time without being located at the same place where either the restaurants or the customers are located.

That is, these intermediaries specialize in the distribution of a distribution service: assurance of product delivery (restaurant meals) at the desired time. This is done separately in space and time from both the production of the distribution service, which still takes place at a restaurant and through its computer system, and the consumption of the distribution service, which still takes place at the consumer's computer when a confirmation number for the reservation is received from the intermediary. Furthermore, it also takes place separately from the consumption, distribution and production of the core service product for which an explicit price is paid, namely the restaurant meal. This example illustrates type II separability with respect to one distribution service in a particular service sector.

What is limiting about services is the difficulty of making the same claim about all five broad distribution services simultaneously, which can also be illustrated with restaurants. For instance, accessibility of location is an important distribution service that can be produced, distributed and consumed separately from the 'store' across space and time, e.g., through home delivery of restaurant meals the consumer has greater accessibility of location to the product at the time of consumption. Providing home delivery for restaurant meals, however, can affect aspects of the production of the core service negatively.

For example, one dimension of meal quality is freshness and the freshness of the meal can be negatively impacted by home delivery. The costs of production can be affected by providing accessibility of location through home delivery if it is necessary to change the production process to control for freshness or to prevent meals where freshness matters to be produced in the same way as meals where it does not matter. This difficulty stems from the lack

of type I separability, i.e., from the inability to separate production of the core service from all aspects of the distribution activity. This inability renders impossible separation of the costs of production from all the costs of distribution in the brick and mortar setting. Thus, a restaurant exhibits type II separability for one distribution service without having type I separability.

Are there any services that exhibit type I separability with respect to all distribution services? Yes, for instance those services that can be distributed through a physical product in a brick and mortar setting. An example are entertainment services such as the enjoyment of music that can be produced in a studio and distributed via records or DVD's. They exhibit type I separability. Live performances of the same music don't exhibit type I separability. Goods, on the other hand, satisfy type I separability in a brick and mortar setting and, thus, can exhibit strong type II separability as would be the case in our previous example of shoe stores.

Marketing Literature Approach to Separability and Online Retailing

Our contribution builds on Betancourt and Gautschi (2001) who developed the possibilities of separating the primitive economic activities of consumption distribution and production with respect to services as the core product across space and time. These possibilities generated a five by five Tableau of Primitive Economic Activities with 25 cells. In the first cell, all three primitive activities take place simultaneously in space and time, illustrating Zeithaml and Bitner's (1996) old fashioned view of a fundamental characteristic of services. On the other hand in the 25th cell all three primitive activities take place separately in space and time, illustrating that simultaneity of consumption and production is not an essential characteristic of services. For, retailing of goods is a service activity that can be described by this cell.

To our knowledge the only contribution directly following up on the above view of separability of services as the core product is Keh and Pang (2010). They rely on experiments to

show that consumers' valuation of services is affected by spatial separation and the nature of the core service product. Nevertheless, there is subsequent literature on technology mediation in services that is related indirectly through the spatial separation feature of production, consumption or aspects of distribution. These newer technologies provide illustrations for many of the other 23 cells in Betancourt and Gautschi's Tableau. They have been classified into three broad groups (Schuman et al. 2012, p.136): self-services (e.g., ATM or online banking); remote services (e.g., long distance surgery or remote repair of IT systems) and interactive consulting services (e.g., e-learning or information systems in train stations). Some are receiving increasing attention for their managerial implications (e.g., Wunderlich, Wangenheim and Bitner 2013).

Mention should also be made, however, of a strand of literature that aims to account for evidence that many services are produced partially or to a large extent spatially separate from the consumer (e.g., Vargo and Lusch 2004). Nevertheless, this strand stresses the whole value that the consumer is purchasing and provides only indirect implications for channel choice, strategy and management. In this paper, on the other hand, we delve more deeply into the topic by focusing on the separability of consumption, distribution and production of distribution services themselves which facilitates drawing managerial implications.

Marketing literature has addressed questions related to online retailing from a more practical point of view. For instance, it has investigated using multiple channels as a customer satisfaction strategy in terms of its impact on customer loyalty (Neslin and Shankar 2009) or profitability (Venkatesan, Kumar, and Ravishanker 2007). It has also shown that these potential benefits depend on product categories (Kushwaha and Shankar 2013). Not surprisingly, given the novelty and dynamism of the Internet, it has been argued that a large number of questions need

to be addressed by research (Neslin and Shankar 2009; van Bruggen et al. 2010), including foundational research (e.g., Verhoef 2012 (p.137) and Yadav 2010).

Recently, Yadav and Pavlou (2014) have proposed a classification of computer mediated environments in terms of four types of potential interactions between firms and customers. One of the four types is the domain of firm-consumer interactions, which includes channel choice and is the same as the B2C environment emphasized here. In terms of our fundamental conceptual contribution there is little or no overlap with the papers discussed in their framework in the context of firm-consumer interactions. The reason is simple. Their analyses focus on the product marketed and/or on one or another distribution service provided with the product, especially information provision (through advertising) or search.

By contrast, our focus is on the set of distribution services associated with any product marketed not on the product itself. While this includes information as an element in the set, it is neither the sole nor the main focus. When it comes to the implications of our results at the practical level, however, there is considerable overlap with extant literature in terms of topics although not necessarily in terms of emphasis. This includes some of the main topics identified in the above contribution as well as others not included. Among the former the overlap is greater with respect to multichannel management than with respect to other issues, but it would also include important aspects of pricing decisions such as delivery costs. Among the latter topics those associated with channel choice in general would be most prominent.

An attractive feature of our analytical framework is that it is a common framework that can be used across online and offline channels, and the variety of formats within these two broad categories. By focusing on distribution services or marketing outputs it stresses the reason for being of distribution channels in terms of end users' demands for the services the channel can

offer (Coughlan 2010) consistent with the feasibility of designing and deploying marketing outputs at minimum cost (Coughlan et al. 2006; Bucklin 1966). These services have been partially covered by different listings of channel attributes in the context of channel attractiveness (Alba et al. 1997) or choice (Blattberg, Kim, and Neslin 2008; Gensler, Leeflang, and Skiera 2012; Valentini, Neslin, and Montaguti 2011; Verhoef, Neslin, and Vroomen 2007).

In a B2C context, channel attributes used in the modeling of consumer choice and satisfaction can be associated with retail attributes for which there is a long strand of research in multi-store (Berne, Mugica, and Rivera 2005; Malthouse et al. 2004) or single store analysis (Gómez, McLaughlin, and Wittink 2004). Moreover, this line of research has already linked the satisfaction of consumers with the distribution services in retail stores and through customer satisfaction with their impact on loyalty (Betancourt et al. 2007).

Type II separability underlies our answers to what's unique about online channel management and multichannel strategies that involve the Internet. Compared to the service performance effectively delivered to final consumers of offline channels, the advantages and limitations of online services are seen as the primary factor driving the growth of online retail sales (Weitz 2005). A useful application of this approach has been to explain why consumers sometimes choose one channel to search and another to purchase and at other times search and purchase in a particular channel (Verhoef, Neslin, and Vroomen 2007). This application identifies three mechanisms that drive these choices: attribute-driven decision making, lack of channel lock-in and cross-channel synergy.

Our reliance on distribution services captures attributes in a more general fashion that identifies maximum levels that can be produced in an online channel relative to an offline one. Furthermore, this eliminates the need to classify attributes and require additional concepts and

assumptions to explain behavior. Our approach switches emphasis from defining, measuring and associating subjective characteristics of behavior to explain intended channel choice to defining and measuring less subjective characteristics of channels that can also be used to explain intended channel choice.

More generally, one can foresee potentially useful consequences for both online management and the design of multichannel strategies in our approach. For instance, when distribution services are effectively separated in time and space in the online channel, there is an impact on the supplied level of the services. When the impact is negative, the lower levels of the separated services may result in a loss of customers and/or sales volume. Hence, distribution channel management would benefit if one knows how important is the negative effect of separation and how it may be compensated by adapting and reinforcing online services with complementary policies, including reliance on other channels within the firm.

Separability of Distribution Services Across Channels: Offline/Online

In this section we identify the differences between offline and online channels regarding separation across time and space in the production, distribution and consumption of each of the five broad types of distribution services discussed in the introduction. This is done in terms summarized by Table 1, columns 2-5.

The main piece of information in the body of the table for these columns is whether or not production, distribution and consumption of a distribution service are undertaken jointly or separately in space and time. Any of these activities that are undertaken jointly or simultaneously in space and time are indicated by their enclosure in curly brackets, separation is indicated by a slash. The rows indicate the distribution service. Columns 2 and 3 identify a typical offline

channel and columns 4 and 5 identify a typical online channel for a manufacturer distributing a product.

(“Insert Table 1 about here”)

Proposition 1: A ‘typical’ online channel allows separation across space and time of production, distribution and consumption for all distribution services, i.e., it exhibits strong type II separability.

Succinctly put, this proposition contains the main novel contribution to the literature in this section. Note that all row entries in Table 1 columns 4 and 5 are exactly the same, i.e., the feature highlighted by the proposition applies to all distribution services and to all types of online channels. In order to show how this potential separation can take place, we describe briefly the operation of a ‘typical’ online store or channel in terms of the primitive economic activities which are as required for distribution services as for any other product whether they be a good or a service.

Production of all distribution services online can take place separately from distribution and consumption of these distribution services in space as follows: The online portal is designed in some studio or office prior to the beginnings of operations of the online retail firm. It is in this space and time that each of the five distribution services provided in the online portal is produced. This separates production from distribution of the service in space and time for each one of them. An interesting feature of Table 1 is that it brings out that there are no differences between online and offline channels in this respect with regards to assortment, assurance of product delivery, ambience and information in the form of advertising. These can also be produced separately in space and time at the design stage for brick and mortar stores.

Distribution of services online, including our five distribution services, can be thought of as taking place once the portal (or any subsequent changes in the portal) goes live by being placed in cyberspace. This distributes the designed portal with whatever set of items the organization has chosen to make available; at this point all five broad distribution services have been distributed in space and time. Thus, they have been made available for consumption separately from their production at the design stage. It is here that differences emerge with offline stores for the distribution services identified in the previous paragraph. In three of them it is impossible in the offline setting to separate distribution from consumption in space.

In the online setting consumption of distribution services occurs wherever a consumer is located at the time he or she visits the portal that has been placed in cyber space. This location can be the home if the consumer is using a home computer or the sidewalk of a busy street if the consumer is using a mobile phone from that location to connect to the website in cyber space. In the offline setting, however, the consumption of accessibility of location, information other than advertising, assortment, assurance of product delivery (in desired form and at desired time) and ambience usually takes place jointly with distribution in space, i.e., at the physical store.

Only information produced through advertising can normally be produced separately in space from distribution and consumption of this distribution service. For instance, the ad can be designed or produced at the ad agency and distributed through media such as radio or TV stations while consumed at home when the radios or TV's are on. Incidentally, this illustrates the continuity of current information and communication technologies (ICT) with older ones in terms of how the information provision function is performed. Notice also that there is no difference between online and offline with respect to separation across time except for information other than through advertising, which is usually in-store information provided

through signs or personnel. Almost by definition, production, distribution and consumption of this distribution service offline are joint in space and time.

Appreciation of what Proposition 1 means, however, requires highlighting several features missing from earlier literature. First, an underlying requirement for the feature of online channels summarized in Proposition 1 to be feasible is the necessity of separability of type I for this proposition to hold. If it is not feasible to separate the costs associated with production from the costs associated with distribution clearly as in the retailing of goods, this version of type II separability (strong type II separability) can't hold. The mere existence of online channels for a physical product illustrates the existence of strong type II separability for that product. For, it implies the separation of distribution of this product from its production and consumption across space and across time when viewed as the core product.

Second, strong type II separability can also hold for services as a core product but this requires that type I separability also holds for the core services identified as the product. The latter separability might be attainable when the core service can be distributed as a physical product. Because this feature allows a clear non-arbitrary separation of the costs of producing the core service from the costs of distributing the core service, i.e. for type I separability to hold. We saw in our example of restaurants in the introduction why strong type II separability does not hold for restaurant meals as a core service. While assurance of product delivery at the desired time through a reservation system can be provided independently of the core product (the restaurant meal), accessibility of location to the core product can't be provided independently of the restaurant meal.

Third, this restaurant example also illustrates that a less restrictive form of separability, weak type II separability, can hold for many if not most services. Namely, it applies to any

setting where the production, distribution and consumption of one or some of the five broad distribution services or their aspects can be separated across space and time. This feature characterizes many if not most core services since it does not require type I separability. It applies to many novel institutions that have arisen in the 21st century as a result of the Internet. It is also the main reason underlying the prediction that by 2017 Internet US retail sales will be 10.3% but that 60% of US retail sales will involve the Internet in some way, which was mentioned in our introductory paragraph.

Finally, we note an example of one of these novel institutions made feasible by the Internet. A broad variety of web service providers have arisen in the 21st century. For instance, a top ten rating of firms providing ecommerce site builders can be found through the Internet (Top 10 eCommerce Builders, 2015). One type that is not on that list is especially interesting in our context. It is a firm named 1&1 (<http://www.1and1.com>). This firm provides a variety of service packages associated with hosting not just building a website. Their most inclusive package could allow a goods retailer, in principle, to outsource their entire distribution function to them.

Separability and Channel Choice

Before discussing the implications of strong type II separability for channel choice it is useful to briefly relate in broad terms weak type II separability to relevant literature settings that will not be pursued here. Weak type II separability is relevant for business to business interactions or B2B just as much as for firm to consumer interactions or B2C. While the concept of distribution services is equally relevant for relations between firms, many applications in this setting would require substantial modifications or adaptations in the underlying economic framework.

For instance, the (consumer) buyer acting as a taker of price and quantity of distribution services levels from the (retailer) seller underlying the B2C literature on distribution services is clearly inapplicable in many B2B settings. Suppose Wal-Mart is the buyer and any manufacturer is the seller. How many of these manufacturers would provide Wal-Mart with take it or leave it offers with respect to price or the level of a distribution service such as assurance of product delivery in desired form or at the desired time? Remote maintenance settings provide another example. Customer satisfaction is affected by who initiates the process of spatial separation of business customers from production and distribution of remote services (Paluch and Blut 2013).

Similar considerations apply to C2C settings and C2B settings in that weak type II separability is relevant for analysis in those settings, precisely because weak type II separability in principle is relevant to all computer mediated environments. At the same time use of the distribution services framework would require substantial adaptations. With respect to C2C, for example, do you treat the consumers in e-Bay as firms when they sell and consumers when they buy or do you treat them as consumers in both cases or as producers in both cases? Are garage sales or flea markets or both the brick and mortar reference point for any one C2C setting?

In the context of B2C weak type II separability usually holds and is easy to implement, because the distribution services framework doesn't need major adaptations or modifications. Yet, strong type II separability does not hold because type I separability in the brick and mortar setting doesn't hold for many if not most services. For instance if the service product is a college education, it is difficult to argue credibly that the core service sold at an explicit price has type I separability in the brick and mortar setting. If student interactions of various types, or campus ambiance, are part of the core service product in a college education, the costs of distribution of the college education and the costs of its production can't be separated non-arbitrarily in the

brick and mortar setting. Therefore, strong type II separability can't hold for this service. Nonetheless, there is weak type II separability for providing some items within the set of characteristics associated with a college education, e.g., courses with content suitable for a lecture format without the need for teaching assistants.

Since our main result is strong type II separability, we focus our analysis on channel choice involving goods or services for which type I separability holds for the brick and mortar reference point, which is quite broad as it includes all goods and potentially services that can be distributed through a physical product. Consider the possible channel choices of a firm planning to distribute a product or set of products to consumers. The first basic choice is whether to use an internal channel, or an external one or both (Coughlan et al. 2006). Sometimes these alternatives are described as direct channels or indirect channels (e.g., Frazier 1999). Important considerations in this choice are the costs of setting up an internal channel, the loss of control over the levels of distribution services associated with providing the products to consumers and the demand characteristics of the market segments reached by the two types of channels (Coughlan et al. 2006, p.332).

A second basic choice is whether or not to set-up a discount channel. Advantages in doing so are the possibility of reaching different market segments and better inventory management; a significant disadvantage in doing so is the potential lowering of brand value associated with the discount channel. One way of preserving brand value is through some differentiation in the characteristics of the products or in their marketing. Indeed, it may even be possible to preserve brand value by differentiating on irrelevant attributes (e.g. Carpenter, Glazer, and Nakamoto 1994). For this purpose the external channel has the intrinsic advantage that, almost by definition through expanded assortment, it loosens the connection between the

brand and the channel entailed in the internal channel (Coughlan et al. 2006). In general discount channels can be viewed as mechanisms for reaching low price market segments at a reasonable cost without diminishing brand value or avoiding brand dilution (Carroll 2012). In practice there are internal discount channels (factory outlets) and external ones (discount stores).

The above two basic issues generate four fundamentally different (but not necessarily mutually exclusive) channels for distributing a product. Associated with each one of these four choices is the possibility of creating the channel as an online channel, which generates eight basic alternatives. Whether or not to set-up the electronic channel in each of the four contexts identified here depends on the impact for each channel of supply (costs) and demand (revenues) considerations incurred by this decision. A main advantage of online channels on the demand side is their ability to reach segments of the market unavailable to or too expensive for offline ones; a main advantage of online channels on the supply side is the substantial savings in providing any level of assortment relative to offline ones.

Just as indicated in Proposition 1, all online channels allow the same potential separation in the production distribution and consumption of the services across space and time for every distribution service. Hence, with respect to the impact of separability on the level of a distribution service that can be provided, online channels are all the same in terms of their maximum or minimum potential relative to offline ones. Thus, the latter levels of service for online channels can only differ along the other two dimensions of channel choice: full price versus discount and external channel versus internal, which leads to the following.

Proposition 2: In considering channel choices in terms of the maximum of any distribution services that can be provided in online channels, strong type II separability reduces the elements of choice by one dimension.

For instance, in the context just outlined channels differ with respect to three dimensions: price, externality and digitalization. This possibility generates in principle eight possible channel choices (2^3). In reality, however, there are at most only two meaningful dimensions of choice over which the eight choices can differ with respect to the potential maximum levels of distribution services that can be provided (since all four online channels are the same with respect to strong type II separability).

Maximum Levels of Distribution Services: Offline/Online Differences

In this section we focus primarily on the impact of demand considerations generated through the provision of different maximum levels of distribution services in offline and online channels, while noting important features of supply side (costs) considerations with respect to accessibility of location and assortment. These two types of channels have different abilities to satisfy demand by final consumers for the distribution services that typically accompany provision of a core physical product or service.

Concerns with specific technological limits of online channels have been identified in the marketing literature. For instance, there are technological limits of online channels in providing distribution services associated with sensory products at the same level as non-sensory products (Degeratu, Rangaswamy, and Wu 2000). Indeed, this distinction has been viewed as crucial for online channels (Pauwels et al. 2011).

We adapt the distribution services framework to include these contributions as part of a general process of disaggregating the five broad categories of distribution services identified earlier. This disaggregation of our broad categories is useful for a comparison of maximum levels of distribution services. Assortment is subdivided into its two main dimensions of breadth and depth. Assurance of product delivery is subdivided into its two main dimensions of time and

form. Finally, both information and assurance of product delivery in the desired form are subdivided into two different dimensions: for sensory and non-sensory items. This last division allows us to capture the insights of the marketing literature into technological limits of online channels, which would obviously affect the maximum levels that can be attained.

Table 2 borrows a tabular form used in marketing (Alba et al. 1997) to differentiate levels of services across seven different retail formats. Their services resemble ours. For instance, what we call assortment they call alternatives for consideration; our subdivision of assortment into breadth and depth they accomplish with the terms number of categories and alternatives per category, respectively. We differentiate offline/online formats by classifying their provision of the maximum level of the distribution service as high or low. The table also uses a two asterisks or a single asterisk on the online column to indicate whether the maximum level is substantially higher or lower in the online setting than in the offline setting whenever appropriate. It provides a useful basis for drawing inferences about online and multichannel management strategy.

(“Insert Table 2 about here”)

Following the presentation order in Table 2 we undertake the offline/online comparisons (columns 2 and 3) in terms of the levels of each distribution service provided and identified in Column 1. Consider *accessibility of location* (Table 2, Row 1), the offline channel provides a low maximum level of this service in comparison to online channels, since the latter can provide the product at the consumer’s home rather than at the store. This is one of the attractive features for consumers of online channels (Lewis, Singh, and Fay 2006). The maximum level of this service that can be provided by online channels is high relative to the offline channel, which is indicated by a double asterisk in the column corresponding to the online channel. This feature allows satisfaction of consumer demand for this service at its maximum level by online channels

and it provides flexibility in satisfying market segments with different demands in a multichannel setting.

It must be noted, however, that the supply side yields additional considerations. In the online channels there is usually explicit pricing for the delivery service. The latter entails a shifting of the costs of providing this service to the consumer when compared to the offline channel, where the usual practice is not to price this service explicitly since the consumer normally picks up the goods at the store. This cost shifting feature is sometimes ignored but it provides a basis for managing distinct segments of the market. Moreover, it raises issues about pricing policy in both a single online channel and a multichannel setting (Lewis 2006).

More generally, cost shifting between consumers and retailers is an essential characteristic of retail markets having important economic consequences (Betancourt and Gautschi 1993). In the online context the costs of providing accessibility of location to physical products are usually shifted to the consumer. Since the online context implies type II separability with respect to this distribution service for physical products by definition, a decision on who pays for this distribution service is required in the online setting.

Moving on to *information* provision (Table 2, Row 2), the offline channel offers higher maximum levels of these services for products that have valuable attributes where information needs to be evaluated through the senses (Row 2.1). We identify this level as high. In this setting the maximum level of the distribution service that can be provided by online channels relative to the offline one is low for what are labelled sensory dependent items, which is indicated by a single asterisk in Table 2, Row 2.1, next to the online channel. Incidentally, this is more important for tact, taste and smell (at least with current technology) which favor on site evaluation more than hearing and sight.

Notwithstanding, online channels can offer more detailed information not especially dependent on the senses (Row 2.2) such as variety and prices of features of electronic products or appliances or reviews by experts or other consumers of product performance (e.g. Degeratu, Rangaswamy, and Wu 2000). Similarly social networks such as Facebook or Twitter enable a direct channel of communication with customers having similar tastes that can allow online channels to build brand recognition more easily for products where heterogeneity of tastes is less of an issue. Thus, online channels can offer a higher maximum level of this service than offline channels for non-sensory items, which we indicate by a double asterisk next to the online channel in this row. We also identify this level as high.

A comparison of *assortments* between channels (Table 2, Row 3) requires differentiation between breadth (Row 3.1) and depth (Row 3.2). The online channel can provide higher levels of both on the basis of costs considerations alone. For, it does not need stores; it only needs warehouses or distribution centers. On this basis alone one can assign a double asterisk to the online one.

Savings associated with storage costs provide one of the greatest sources of differentiation between offline and online channels leading to broader and deeper assortments in the latter channels. Namely, storage costs savings are overwhelmingly favorable to online channels creating the potential for their providing much higher maximum values of this distribution service. An illustration of this feature has been provided in the literature for the case of books. The internal online channel for Barnes and Noble carries 3 million books; a Barnes and Noble superstore carries 175,000 books (Brynjolfsson and Smith 2000). The value to consumers of increased depth provided by the online channel is estimated to be between \$700 million and \$1 billion in 2000 (Brynjolfsson, Hu, and Smith 2003).

Since the fourth distribution service, *assurance of product delivery*, has two very distinct elements (desired time and desired form), each one is explicitly represented by different rows in Table 2 (4.1 for time; 4.2 and 4.3 for form). The need for two rows stems from the same source as in the case of information. That is one needs to differentiate between sensory and non-sensory products in ascertaining whether the product is delivered in the desired form or not.

We begin with assurance of product delivery at the desired time (row 4.1). This service attains a lower maximum value for the online channel than for the offline one, which is indicated with a single asterisk for the online channel. The simple rationale is that the online channel can never provide a level of this service comparable to the offline one when the product is in stock. In this case the consumer can always acquire the product when desired by going to the store and purchasing it at that time. This feature is useful in designing multichannel management strategies for communicating with consumers relying on either or both channels to deal with out of stock situations.

Considering assurance of product delivery in the desired form (rows 4.2 and 4.3) it is worth noting that information and assurance of product delivery in desired form have one feature in common that leads to joint provision. That is, by providing information you are also providing one aspect of assurance of product delivery in the desired form. Hence, it is not surprising that the maximum level attainable by the online channel for sensory items is low and for non-sensory items is high as in the case of information. The rationale is also simple: the possibilities that what one receives differs from what one expects is far greater for items dependent on the senses when one does not have the opportunity to touch, taste, smell, hear or see them at the store. For items that don't depend on the senses, however, the advantages in communicating item features cheaply over the Internet are likely to dominate any advantages of actual inspection by the

customer at the store. Thus, this is indicated by a single asterisk for the online channel in row 4.2 and a double asterisk for the online channel in row 4.3.

Ambiance (Table 2, row 5) is a difficult distribution service to generalize about for a variety of reasons. First, it can be sensitive to the product or item being distributed. For instance, retailers such as Tiffany's provide their most expensive products only offline (Zhang et al. 2010). Second, ambiance is especially context dependent with respect to aspects other than the product being distributed. For instance, the consumer's physical condition or geographic location can matter in ways that even reverse rankings of level of services provided by ambiance. When safety problems or mobility impediments in accessing an offline site are relevant issues for a consumer in his or her purchasing activities, online channels can become more attractive than offline ones as they avoid concerns about these issues.

More generally, ambiance is the one distribution service where it often becomes difficult if not impossible to separate the purely functional aspects of purchase activities from their consumption or utilitarian aspects. Thus, there are no rankings in Table 2, row 5, about relative maximum levels between offline and online channels and the actual evaluations presented about each channel are our judgment for a 'normal' setting. Namely, one in which the patronizing of a channel involves primarily a purchasing activity rather than a consumption one and it takes place under conditions where neither safety issues associated with a location or physical impediments of a consumer play a role.

Our theoretical framework has two unambiguous implications with respect to maximum levels of distribution services in the context of channel choice that are relevant for all products whether they be goods or services:

Proposition 3A: Online channels provide lower maximum levels of distribution services than offline ones with respect to assurance of product delivery at the desired time as well as information and assurance of product delivery in the desired form for sensory dependent items.

Proposition 3B. Online channels provide higher maximum levels than offline ones with respect to accessibility of location, information and assurance of product delivery in the desired form for non-sensory dependent items as well as assortment breadth and depth.

Additional Implications

Unambiguous implications with respect to maximum advantages or limitations of distribution services in online channels are useful in designing empirical analyses of customer satisfaction in which these services play the role of attributes. This is the case whatever the performance variable of interest e.g., profits (Anderson and Mittal 2000) or retention (Rust and Zahorik 1993). Similarly, these unambiguous implications generate a straightforward strategic implication as a practical channel management guide. They identify distribution services for which online channels have a natural advantage or disadvantage. Hence, they inform managers of areas in which special efforts might be needed to supplement weaknesses in the channel or useful to enhance channel strengths.

Intrinsic limitations of online channels in providing some distribution services direct attention to unusual problems and remedies that arise in the online setting. More specifically, the online setting introduces a level of uncertainty with any transaction that leads to qualitative differences across online/offline channels. These qualitative differences are reminiscent of distinctions between risk and uncertainty in economics. For instance, two issues in which this distinction is prominent in the online setting and relevant for marketing managers are return policies and payment methods.

Return or devolution policies are associated with an intrinsically higher level of uncertainty for online channels because there is no possibility of inspection prior to purchase; and there are considerable lags associated with devolution. Indeed, even governments have recognized this qualitative issue through special consumer protection legislation for online purchases, e.g., goods that have not been seen before purchase or the Direct Marketing Cooling-Off Period (Hall 2011). Interestingly, customers of online retailers seem to think they are entitled to some protection from this higher level of uncertainty through free shipping in devolution policies regardless of who is at fault (Bower and Maxham III 2012).

Similarly, in the online channel fear due to payment form is associated with an intrinsically higher level of uncertainty than in the offline one. In the offline channel one can always pay with cash which eliminates concerns about privacy and security of financial information. While these fears can be overcome through positive experiences (Frambach, Roest, and Krishnan 2007), for extreme cases the cash payments feasible at the offline store might be lexicographically superior. For both of these issues a multi-channel strategy provides the option of returning items or paying with cash at the store and addresses this special role of uncertainty in online settings.

More generally, the differences between the maximum levels of services which can be delivered by online and offline channels provide the basis for designing multichannel strategies by managers that generate synergies between these channels. These synergies can empower customers to attain a more efficient use of both channels. For instance, browsing or purchasing at the physical store can lead to subsequent online purchases. These considerations played a role in Inditex's decision to open Zara's online channel (Knowledge@Wharton 2009). Similarly, in grocery retailing an online channel may allow delivery of a shopping basket to any of the retail

stores that customers patronize in one area. Incidentally, not all grocery retailers have discovered this practice (e.g., Chintagunta, Chu and Cebollada 2012).

Strong type II separability concomitant with Proposition 1 provides a powerful framework to understand economic and strategic considerations leading to 1) the natural predominance of online channels in some markets, 2) the steady gain in competitiveness of online channels in other markets, and 3) the ability of online channels to reach a substantial number of market segments more effectively than brick and mortar channels. We use a simple but rigorous example to illustrate the consequences of strong type II separability with respect to two distribution services, assortment and accessibility of location. For, it brings out the main economic and strategic considerations leading to these three consequences.

Consider a setting as general as reaching a given set off consumers with a given assortment of products with a nationwide distribution system. The costs of providing a given level of output or turnover and distribution services with an offline system can be described, in general, in terms of the textbook cost functions (e.g., Deaton and Muellbauer 1980) below

$$C(B\&M) = \sum_i C_i(v_i, Q_i, D_i) + \sum_j C_j(u_j, Q_j, D_j), \quad (1)$$

where C_i is a store cost function that depends on input prices (v) faced by store i . Q_i is an index of the quantity of items sold by the store in a given calendar period and D_i is an index of the level of distribution services provided by store i over this period. C_j is a warehouse cost function facing u_j prices and producing Q_j levels of outputs and D_j levels of distribution services.

Incidentally, these warehouses and their contiguous locations played a critical role in Wal-Mart's expansion (Holmes 2011). The costs of every warehouse and those of every store are assumed to be the same, for simplicity, but they can differ between warehouses and stores. For

any given level of output and assortment per store, the costs of providing the same quantity of items and levels of distribution services exclusively online would be given by.

$$C(\text{Online}) = \sum_j C_j(u_j, Q_j, D_j) + F(\text{online}), \quad (2)$$

where $F(\text{online})$ is the primarily fixed costs of setting up the website and the logistics of delivery, including its pricing. The greater the number of stores that can be satisfied by a given distribution center the greater the savings from an exclusively online operation satisfying the same number of customers as before. That is, the greater the savings from the first term in (1) going to zero in the online setting.

An additional consideration is the following: the greater the economies of scale in the cost functions of any warehouse and the less online costs increase as a result of providing broader and deeper assortments, the more attractive it is to expand assortments as well as to reach an increasing number of customers relative to the offline operation. In the brick and mortar case expanding assortments increases both each C_i and each C_j . Furthermore, increasing the number of customers requires adding stores (C_i) and at some point also adding warehouses (C_j). An important reason for the larger cost increases of the brick and mortar stores is that they share with customers the costs of providing accessibility of location by adding stores closer to where they are. The online operation shifts these costs entirely to the customer through delivery pricing and attains higher accessibility of location through home delivery. Herein are the sources of Amazon's initial success.

More generally, strong type II separability unbundles all distribution services and, thus, provides the basis for the success of online channels in music as a distribution alternative such as iTunes, Spotify or Google Play Music and in films and videos released through PC's, tablets and mobiles. While type II separability generates strategic decisions about channel choice in all

industries, the profitability of exploiting them and whether to do so as an exclusive online channel or a multi-channel one varies with the industry. In all cases, however, the interaction between the pervasiveness of ICT among households and/or individual consumers and advances in the applications-devices duo improves the levels of distribution services provided separately in online channels

Non-store retailers have been around for a long time. For instance, mail order houses were one of the most prominent business innovations associated with 19th century retailing (Chandler 1977). This retail format resembles online retailing. A comparison is facilitated by Michael's (1994) contribution comparing this organizational form to retail stores. It views these two organizational forms as "...the two dominant retailing institutions in the United States during 1910-1940..." (p.269).

Mail order houses and online retailing share three distribution services as key factors in Michael's comparison: information, assurance of product delivery in the desired form and accessibility of location. The costs of providing information per customer are much lower for the Internet than for catalogs. Not surprisingly, we observe currently an evolution in online/offline channels where brick and mortar retailers add online channels far more often than exclusively online channels add brick and mortar operations. This is the opposite trend to that observed for mail order houses which, starting in the 1920's, evolved from exclusively mail order houses to multichannel retailers by adding brick and mortar stores.

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TABLES

TABLE 1. Summary of Separation across Channels

Channel	OFFLINE		ONLINE	
Services	Space	Time	Space	Time
1. Accessibility of Location	{P,D,C}	P/D/C	P/D/C	P/D/C
2. Information*	{P,D,C}	{P,D,C}	P/D/C	P/D/C
3. Assortment	P/{D,C}	P/D/C	P/D/C	P/D/C
4. Assurance of product delivery	P/{D,C}	P/D/C	P/D/C	P/D/C
5. Ambience	P/{D,C}	P/D/C	P/D/C	P/D/C
6. Advertising	P/D/C	P/D/C	P/D/C	P/D/C

* Excluding advertising

TABLE 2. Potential Levels of DS in Different Channels: Offline/Online

Channel	OFFLINE	ONLINE
1. Accessibility of location	Low	**High
2. Information		
2.1. Sensory items	High	*Low
2.2. Non-sensory items	Low	**High
3. Assortment:		
3.1. Breadth	Low	**High
3.2. Depth	Low	**High
4. Assurance of product delivery:		
4.1. At the desired time	High	*Low
4.2. In desired form sensory	High	*Low
4.3. In desired form non-sensory	Low	**High
5. Ambiance (‘normal’ setting)	High	Low

*indicates that online channel attains substantially lower maximum level of this distribution service relative to offline channel.

**indicates that online channel attains substantially higher maximum level of this distribution service relative to offline channel