Information Economics and Policy 39 (2017) 45–59

Contents lists available at ScienceDirect

Information Economics and Policy

journal homepage: www.elsevier.com/locate/iep

On the private and social desirability of mixed bundling in complementary markets with cost savings☆

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ARTICLE INFO

Article history:
Received 16 December 2015
Revised 16 January 2017
Accepted 3 April 2017
Available online 4 April 2017

JEL classification:
D43
L13
L41

Keywords:
Mixed bundling
Cost savings
Complementary products
Strategic interaction

ABSTRACT

We study the private and the social desirability of mixed bundling that generates cost savings in markets for complementary products. Firms always want to adopt such a strategy, and we find that the prices of stand-alone products may decrease when cost savings are important. We also identify an intriguing case where mixed bundling is beneficial for firms, as it depends on the interplay between product substitutability and cost savings in a *non-monotonic* way. Finally, we highlight situations where private and social interests coincide, and those where they collide.

1. Introduction

Mixed bundling, the practice adopted by many multiproduct firms to sell their products or services both on a stand-alone basis and in bundles, is widespread in many different sectors. Most restaurants offer discounted prices for special menus, but clients can also order *à la carte*. Large hotel groups propose all-inclusive holiday packages, but they also provide meal and accommodation services separately. Record companies make both singles and entire albums available for purchase.

In high-tech industries, this occurs especially when the bundled products are complementary, such as hardware and software, and the integration of the two products within the same "package" may increase their functionality, and/or decrease their cost. However, regulatory intervention is often required in order to ensure the possibility to "mix-and-match". In energy markets traditional monopolies are now open to competition, and consumers can buy gas and electricity from the same supplier or from a combination of different suppliers. Mixed bundling has also become prevalent in the telecommunications and entertainment industries, especially for services that are essential to each other. Broadband access and broadband services are both necessary for high-speed broadband Internet, and consumers can create their customized system when subscribing to both the incumbent's access infrastructure and the entrant's broadband service under partial unbundling of the local loop.[1] Pay-per-view programs require both cable/satellite services and content providers. The recent acquisition of NBC Universal by Comcast was approved under the condition that other providers

☆ We are grateful to the Editor Marc Bourreau and to two anonymous reviewers for precious comments and suggestions. We also thank Rabah Amir, Joan Calzada, David Encaoua, Lukasz Grzybowski, Yassine Lefouili, Francisco Ruiz-Aliseda, Carlo Reggiani, Joao Vareda, and Patrick Waelbroeck for constructive comments and discussion. We thank Lucy Scioscia for editorial assistance. The usual disclaimer applies.

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http://dx.doi.org/10.1016/j.infoecopol.2017.04.002
0167-6245/

[1] In the last two decades many countries have regulated the wholesale access to the vertically-integrated infrastructures of various incumbents. The EU policy on competition in the telecommunications sector, for example, requires the implementation of so-called local loop unbundling (LLU). Under LLU the incumbent operator makes its local network available to other companies (see Nardotto et al., 2015, for the impact of LLU on broadband penetration in the UK). On the contrary, in the US, the Federal Communication Commission (FCC) does not regulate the access to broadband networks. Hence, we observe the presence of integrated firms that provide both services together. In the Japanese broadband network industry, generalist firms that offer both services compete against 'specialist' firms that offer only one of them (see Maruyama and Minamikawa, 2009.

could access NBC programming and that Comcast made an affordable broadband available without forcing customers to subscribe to a cable bundle.

Bundling is often associated to economies of scope and/or transaction cost savings. This may benefit both producers and consumers, given the potential cost savings effect generated by such practice. However, the economic literature has mainly focused on bundling as a form of price discrimination, or as a way to foreclose entry.[2] Little attention has been paid to the impact of cost savings on the resulting market configuration. Yet, their role may become prominent, and not only in terms of evaluating whether or not bundling can be adopted to exclude potential rivals from at least one of the reference markets. Indeed, mixed bundling may pose other challenges for competition authorities and sectoral regulators. In particular, while the price of the bundled services typically decreases, the prices of stand-alone components increase.[3] Consumers accustomed to buying all services from the same producer gain from bundling, while those who prefer to mix-and-match may eventually lose out. However, this outcome may change in the presence of cost savings. It follows that a careful analysis of the impact of cost synergies from bundling on both firms' profitability and social welfare is highly recommended, independently of the use of such strategy to foreclose entry.

For all these reasons, the aim of our paper is to shed more light on the strategic interaction characterizing competition between firms which provide a complementary products/services and their incentives to adopt mixed bundling generating cost synergies. Moreover, interesting issues in terms of social welfare can be addressed by considering such cost synergies. We build on a component model initially developed by Matutes and Regibeau (1988), Economides (1989), and Economides and Salop (1992), and successively used by Choi (2008) and Maruyama and Minamikawa (2009). However, differently from their approach, we do not endogenize the merging decision. Rather, we focus on the decision to bundle in presence of a *cost savings effect*.

We consider two competing multiproduct firms, each producing a specific version of two complementary components/services, which are valuable only when consumed together. Four possible horizontally differentiated composite systems are available for consumers, given that we assume full compatibility between components. A system composed by two complementary components provided by the same firm will be referred to as "pure system", while a system composed by two complementary goods provided by the two different producers will be referred to as "hybrid system". Finally, a system composed by two complementary services provided by the same firm and sold in a package will be referred to as "bundled system".

Firms are engaged in a non cooperative two-stage game. In the first stage they have to decide whether to sell the two goods on a stand-alone basis, or to adopt mixed bundling. In the second stage they compete in prices. We assume that bundling allows to activate marginal cost savings. Potential gains for consumers in terms of improved functionality and/or reduced search are assumed away. Hence, we focus on the *strategic* effect of mixed bundling in the presence of cost synergies on the producers' side. There are two important results that can be identified in our paper, and they depend on the interplay between the degree of substitutability between systems and the intensity of cost savings generated by the bundling decision.

The *first* result is related to the private desirability of mixed bundling. Initially, we confirm the finding (Thanassoulis, 2007; Maruyama and Minamikawa, 2009) *inter alii*) that mixed bundling is a dominant strategy for both firms, which apply a discount on the price of the bundle. Then, we find that the profitability of this strategy may depend on the extent of cost savings. This is new in comparison with previous papers that showed that mixed bundling is Pareto efficient for firms only when systems are extremely substitutable (see Maruyama and Minamikawa, 2009. In particular, we prove that mixed bundling is beneficial for firms also when systems are differentiated and a certain level of cost savings are present. We highlight that, by adopting mixed bundling, each firm enjoys a profit gain from the sale of the bundled system, while it suffers a profit loss from the sale of hybrid systems. When cost savings are intermediate, the balance between gains and losses depends on the degree of product substitutability in a *non-monotonic* way. In fact, when systems become progressively less differentiated, the discounted price on the bundle first increases when hybrid systems are still taken into account, and then decreases when consumers neglect such systems due to the strategic increase of the prices of stand-alone components.

We also show that, although in most cases the prices of stand-alone components increase when both firms adopt mixed bundling, there are also instances where the opposite may occur. Our analysis reveals that stand-alone prices decrease with the intensity of cost savings. This may contribute to driving down component prices with respect to the case of separate pricing, provided that systems are sufficiently differentiated, and that cost savings are high enough. The presence of significant cost synergies may therefore also favor those consumers who still prefer to assemble their composite system on a "mix-and-match" basis. Our analysis extends and complements previous studies in which cost savings were neglected and the price of stand-alone components always increased when firms opted for mixed bundling (see Choi, 2008, *inter alii*).

The previous set of findings has obvious repercussions also on the social desirability of mixed bundling, which represents the *second* contribution of our paper. Our analysis reveals that there exist parametric regions where the private and social interests coincide, and other cases where they collide. For relatively high levels of cost savings, mixed bundling is obviously both socially and privately profitable. Interestingly, the higher the degree of product substitutability, the higher the cost savings required for mixed bundling to be socially preferred compared to separate pricing. Indeed, as we noticed above, the discounted price associated to the bundled products tend to decrease when the degree of product substitutability is high. For intermediate cost savings, when systems are sufficiently differentiated, consumers in aggregate gain while firms may lose with mixed bundling. The opposite holds when systems are perceived as extremely substitutable. Component prices increase substantially, while the discount on the bundled system is modest. It follows that consumers that mix-and-match are extremely penalized, and those who buy the bundled system enjoy only a limited price reduction in comparison with separate prices. Consumer surplus may therefore decrease, unless a large cost savings effect is generated. With regards to total welfare, the decision to allow bundling or not represents an attempt to mediate between the two welfare components, but may favor only one category and damage the other. Finally, when cost savings are low, the policy-maker should prohibit mixed bundling. This would always benefit consumers, whose surplus is higher under separate

[2] Following the seminal paper by Whinston (1990), the entry-deterrence use of bundling has been investigated by Choi and Stefanadis (2001), Carlton and Waldman (2002), Nalebuff (2004) and Peitz (2008), *inter alii*. See also Belleflamme and Peitz (2015, Ch. 11)

[3] Choi (2008) considers the controversial decision of the European Commission in 2001 to block the proposed merger between General Electric and Honeywell on the basis of the possibility of bundling between GE's jet aircraft engines and Honeywell's avionics products. One of the critical point raised by the European Commission was the possibility that prices for stand-alone components would have increased after the merger. Greenlee et al. (2008) demonstrate that bundled loyalty discounts have ambiguous welfare effects precisely because they may favor the increase of the price for stand-alone components.