



Vertical integration, bundled discounts and welfare

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ABSTRACT

This paper studies firms' incentives for vertical integration and bundled discounts of complementary components. We assume that firms first choose ownership structures and pricing schemes, and then compete on price. We find that vertical integration and mixed bundling is a dominant strategy for all firms, while, except for systems of components that are highly differentiated, total surplus is maximized under independent ownership with bundled discounts. Thus, our model suggests that vertical separation is beneficial for both firms and consumers in such a situation of competitive bundling. Our results have important policy implications for broadband markets.

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1. Introduction

As the Internet has come into wide use, broadband networks have been spreading rapidly as the major means to achieve high-speed access to it. Broadband Internet access service is a system comprising two major complementary components. The first is broadband access, a service typically provided by network providers (NPs) and consisting of a line that connects the computer to any of a number of Internet service providers (ISPs) via DSL (digital subscriber line), CATV (cable TV), FTTH (fibre to the home), and the like. The second is access to the Internet itself, a service supplied by ISPs, which give access to Internet Protocol networks via backbone channels. These services in-

volve competition among individual components, and market competition among systems.

Recently, much interest has been shown in the market structure and pricing strategies for complementary components. In the Japanese broadband network industry, there are both 'specialist' and 'integrated' firms. NTT East Japan and NTT West Japan are the largest specialist firms for access line services, and there are many specialist firms for Internet access services, while SoftBank BB, K-Opticom, and KDDI are integrated firms that provide both access line service and the ISP function. Firms in these industries have an incentive to use 'price bundling' as a promotion strategy. Price bundling is the practice of selling two or more services in bundled form for a special price. Offering products or services for sale in exclusively bundled form is pure bundling; selling them in bundled and unbundled forms is mixed bundling. Mixed bundling is usually offered by integrated firms. However, in broadband markets, service is

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frequently offered by a pair of independent firms in the form of 'bundled discounts'. For example, pairs of firms such as NTT West and several independent ISPs offer bundled discounts to promote FTTH, which has caused extremely severe price competition.

The purpose of this paper is to examine firms' incentives and the welfare implications of integration and bundled discounts of complementary services, using a component model developed by Matutes and Regibeau (1988), Economides (1989), and Economides and Salop (1992). We will assume that there are two complementary components, A and B , which are only used together. Component A is assumed to be able to combine only with component B , on a one-to-one basis, to form a composite good (system) AB . Each of the two components will be assumed to have two differentiated brands, thus in total the choices are $A1, A2, B1$, and $B2$. We further assume full compatibility among components. Accordingly, consumers can combine any brands of any complementary component, such that there are four possible composite goods: $A1B1, A1B2, A2B1$, and $A2B2$. The four brands of components are independently owned and supplied by four separate firms.

In this paper, we examine the firms' choices of market structures and pricing schemes, employing two-stage games. In stage one, the firm A_i pairs with firm B_i ($i = 1, 2$), and they collectively choose an ownership structure, meaning whether to merge. There are three types of market structures for complementary components: *independent ownership*, *parallel vertical integration*, and *asymmetric structure*. Independent ownership is a market structure, wherein each complementary component is independently owned by a separate firm. Parallel vertical integration is a market structure, wherein pairs of complementary components are owned jointly.¹ And an asymmetric market structure is one wherein there is an integrated firm offering pairs of complementary components, and specialist firms supplying single components. Firms also decide on their pricing schemes in stage one. We assume that the individual firms choose one of three pricing schemes. Each firm can price its components separately (pure component pricing), the integrated firm can engage in mixed bundling, or the pair of independent firms can engage in bundled discounts. In stage two, firms independently set their prices.

We use this model to address the following questions: First, is there an equilibrium incentive for vertical integration and mixed bundling (or bundled discounts) between two complementary firms? Second, if mixed bundling is employed, is that beneficial for the firms involved? Third, which market structure is more competitive and most benefits consumers? Fourth, which regulation is best from a social-welfare perspective?

The analysis in this paper is closely related to previous studies of the market structure of complementary compo-

ments. Economides and Salop (1992) provide a useful model to analyze the effects of competition and integration among complementary components on equilibrium prices, by examining a variety of alternative market structures. Their paper assumes that firms use pure component pricing. However, bundling is a common practice for many complementary products. There are several papers that consider the strategic effects of bundling in a duopoly. Economides (1993) examines a two-stage game of pricing using the same linear demand model as Economides and Salop (1992), and shows that mixed bundling is a dominant strategy. Using a discrete choice framework, Anderson and Leruth (1993) show that pure component pricing is offered in equilibrium. Matutes and Regibeau (1992) investigate a two-stage pricing game based on a Hotelling model, and show that both pure component pricing and mixed bundling can prevail under certain conditions. In all the above oligopoly models of bundling, a particular market structure (parallel vertical integration) is assumed.

In this paper, we add to the pricing game a merger stage, in which firms producing complementary components of a system can choose whether to merge, and examine the strategic interaction of decisions on integration and pricing. Furthermore, most of the literature has focused on mixed bundling by integrated firms. However, bundled discounts by pairs of independent firms are used in a variety of markets. This paper extends previous analysis by allowing pairs of independent firms to use bundled discounts.

A recent paper by Gans and King (2006) presents an analysis of the use of bundled discounts with unrelated products. Gans and King examine a two-stage game using the Hotelling model, and show that offering bundled discounts is a dominant strategy for both pairs of independent firms. They also examine the merger game, and show that a unique equilibrium is parallel vertical integration with 'no bundled discount'. Interestingly, our analysis provides a different result – that vertical integration with mixed bundling is a dominant strategy for all pairs of firms. This is the main contribution of the current paper. We discuss the reasons for our result and from where the difference stems.

We conduct a welfare analysis, showing that the equilibrium with integration and mixed bundling can be improved upon by prohibiting integration and, under certain conditions, can be further improved by prohibiting bundled discounts. Which type of regulation is optimal depends on parameter values (the degree of system substitutability) and the policymaker's objective (consumer surplus or social welfare). This is another contribution of our paper. From the consumer's standpoint, we can show that consumer surplus is maximized under a market structure of independent ownership with bundled discounts. From a social-welfare perspective, we can show that the restriction of vertical integration is beneficial to firms as well as to consumers for a wide range of parameters. We apply these results when considering the effects of 'mandatory unbundling' and competitive price discounts in the Japanese broadband market.

The rest of this paper is organized as follows: In Section 2, the basic model is presented. In Section 3, we discuss the pricing subgame that is played under several market struc-

¹ In this paper, we consider integration/separation across complementary components $A1$ and $B1$ (or $A2$ and $B2$), but not substitutable components $A1$ and $A2$ (or $B1$ and $B2$). In order to show this, following Economides and Salop (1992), we do not use the simple term 'integration', instead we use 'vertical integration' to describe integration among complementary components. It should be noted that the meaning of 'vertical' in this paper is different from the usual meaning, as it involves one player handing something on to another player, in a sequence, within a supply chain.

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