Economics Letters 169 (2018) 31–34

Contents lists available at ScienceDirect

Economics Letters

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

Vertical foreclosure and multi-segment competition☆

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HIGHLIGHTS

- A supplier may foreclose demand-enhancing entry in the downstream market when:
- entrants have stronger positions in different market segments; and
- contracting terms cannot be conditioned on these market segments.
- The conclusion holds with linear and non-linear tariffs, even coupled with RPM.

ARTICLE INFO

Article history:
Received 20 February 2018
Received in revised form 17 April 2018
Accepted 18 April 2018
Available online 5 May 2018

JEL classification:
D43
L12
L42
K21

Keywords:
Foreclosure
Vertical contracting
Customer segments
Downstream competition

ABSTRACT

This paper analyzes a supplier's incentives to foreclose downstream entry when entrants have stronger positions in different market segments, thus bringing added value as well as competition. We first consider the case where wholesale contracts take the form of linear tariffs, and characterize the conditions under which the competition-intensifying effect dominates, thereby leading to foreclosure. We then show that foreclosure can still occur with non-linear tariffs, even coupled with additional provisions such as resale price maintenance.

1. Introduction

Many industries have seen the emergence of new distribution channels, such as mobile virtual network operators (MVNOs) in the telecommunication industry, or platforms such as Amazon.com or Alibaba.com in online retailing. These new channels often appeal to different types of customers. For example, MVNOs typically offer cheaper "no-frills" services, targeting price-sensitive or younger customers. Similarly, online platforms attract a broad audience whereas established brick-and-mortar stores appeal more to consumers with high brand loyalty. A challenge for these entrants, however, is to secure access to established suppliers. For example, MVNOs do not possess their own networks and therefore need access to existing networks. Similarly, online platforms must convince manufacturers to distribute their products through their channels.[1]

When deciding on whether to grant access to their products, the incumbents face a trade-off. Entrants bring value by attracting different types of consumers. In theory, the incumbents may benefit from this through appropriate wholesale arrangements. In practice, however, it may be difficult to limit entry to specific segments and, more generally, to control entrants' marketing strategies; they may then compete with the incumbents, thereby dissipating profit, and may even end-up challenging incumbents' core business.

☆ The financial support of the European Research Council (ERC) under the European Union's Horizon 2020 research and innovation programme (grant agreement No. 670494) is gratefully acknowledged.

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[1] In the telecommunication industry, MNOs foreclosed MVNOs in several countries (e.g., Spain or Poland) without regulation of the market (see European Commission, 2006). Also, many established apparel producers offer no or only a small selection of their products on Internet retailers.

https://doi.org/10.1016/j.econlet.2018.04.023
0165-1765/

To study this trade-off, we develop a simple framework with one incumbent at both upstream and downstream levels, and two market segments. The downstream incumbent has a strong position in the high-end segment, and faces an entrant bringing value in the low-end segment. We first characterize the drivers of the incumbents' decision to accommodate entry or foreclose the market when contractual arrangements are limited to linear wholesale tariffs. We then show that general non-linear tariffs – even coupled with additional vertical restraints such as resale price maintenance (RPM) – may not suffice to maximize industry profit or ensure entry accommodation, as the entrant will target the high-end segment whenever the margins are larger there. As a result, foreclosure may occur.

The literature on vertical foreclosure often focuses on linear tariffs,[2] thus leaving open the question of whether foreclosure may still occur when more elaborate contracts are feasible. The few papers allowing non-linear wholesale tariffs (e.g., Hart and Tirole, 1990; O'Brien and Shaffer, 1992) indeed emphasize that full exclusion is never optimal when the entrant offers a differentiated good, as non-linear tariffs allow the supplier to extract the higher industry profits.[3] In contrast, we find that when firms can target specific market segments, non-linear tariffs, even augmented with RPM, do not guarantee entry.[4]

2. The model

There are two incumbent firms, U and D. U costlessly supplies an input to D, who transforms it into a final good using a one-to-one technology. There is a unit mass of consumers, with a proportion x having valuations V_D and unit costs C, and the others having valuations v_D and unit cost c; the first group of consumers constitutes the "high-end" market segment and are more valuable:

$$V_D - C > v_D - c.$$

We will consider two scenarios, in which either the incumbents are vertically integrated, or they can engage in efficient contracting (e.g., two-part tariffs); all results are valid in both scenarios. Throughout the paper, "the incumbents" will refer to the integrated firm in the former scenario, and to the upstream supplier in the latter scenario.

A new firm E can enter the downstream market, with a comparative advantage in the low-end segment: for the sake of exposition, we suppose that it faces the same costs as D in each segment, C and c, but offer different values to consumers, V_E and v_E, satisfying:

$$v_E > v_D \text{ and } V_D > V_E.$$

Downstream firms can discriminate consumers across the two segments: each firm $i = D, E$ sets two prices, P_i in the high-end and p_i in the low-end segment.[5] By contrast, we assume that wholesale arrangements cannot be made contingent on targeted segments; that is, the tariff is only based on the quantity bought by E, not on which consumers E sells to.[6]

Absent entry, the industry maximizes its profit by setting $P_D = V_D$ and $p_D = v_D$, yielding a profit of

$$\Pi^m \equiv x\,(V_D - C) + (1 - x)\,(v_D - c)\,.$$

We will assume that foreclosure is more profitable than removing D from the market, that is:

$$\Pi^m > x\,(V_E - C) + (1 - x)\,(v_E - c)\,. \tag{1}$$

Throughout the paper, we assume that the incumbents accommodate entry whenever they are indifferent between foreclosing it or not.

3. Linear tariffs

We first consider the case of linear tariffs. The game then consists of the following two stages: in the first stage, U offers a wholesale price w_E to E (and a two-part tariff (F_D, w_D) to D, if separated), which E (and D) can either accept or reject. In the second stage, D and E compete in prices.

We then have:

Proposition 1. *The incumbents foreclose entry if and only if*

$$x\,[(V_E - C) - (v_E - c)] > (1 - x)(v_E - v_D). \tag{2}$$

Proof. The incumbents can secure Π^m by charging $w_E = +\infty$ (and $(F_D = \Pi^m, w_D = 0)$, under separation). Furthermore, in order for the incumbents to obtain more profit than Π^m, E must be serving the low-end segment, which requires $w_E \leq v_E - c$.

Thus, consider $w_E \leq v_E - c$ and a candidate equilibrium in which E serves the low-end segment. If E supplies only the low-end segment, then the price at which D serves the high-end segment must satisfy $V_D - P_D \geq V_E - (C + w_E)$, as E is willing to serve high-end consumers at any price above $C + w_E$; hence, the incumbents cannot obtain more than

$$\Pi_I = x(P_D - C) + (1 - x)w_E \leq x(V_D - V_E) + w_E.$$

If instead E supplies both segments, then the incumbents' profit is equal to w_E. It follows that the maximal profit that the incumbents can obtain does not exceed:

$$x(V_D - V_E) + v_E - c.$$

Comparing this expression with Π^m shows that foreclosure occurs whenever (2) holds.

Conversely, entry occurs whenever (2) is not met. Suppose that U sets $w_E = v_E - c$, inducing E to offer $p_E = v_E$ in the low-end segment and $P_E = v_E - c + C$ in the high-end segment. If $v_E - c > V_E - C$, then E cannot actively compete in the high-end segment (as $P_E > V_E$) and D can thus charge $P_D = V_D$ in that segment. The incumbents (with $w_D = V_D - C$, under separation)[7] can then obtain the entire monopoly profit, equal to

$$\Pi^M = x\,(V_D - C) + (1 - x)\,(v_E - c) > \Pi^m.$$

If instead $v_E - c \leq V_E - C$, then D can serve the high-end segment at price $P_D = C + V_D - V_E + v_E - c$. Under vertical integration, the incumbents thus obtain:

$$\Pi = x(V_D - V_E) + v_E - c,$$

which exceeds Π^m if (2) does not hold. Under separation, charging $w_D = v_D - c$ ensures that D is not willing to serve the low-end segment but is willing to serve the high-end segment at this price P_D, as the margin $P_D - C = V_D - V_E + v_E - c$ exceeds w_D (using $V_D > V_E$ and $v_E > v_D$). ■

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[2] See, e.g., Ordover et al. (1990), Chen (2001), Sappington (2005), Ordover and Shaffer (2007), Hoeffler and Schmidt (2008), and Bourreau et al. (2011).

[3] See Rey and Tirole (2007) for a summary of foreclosure incentives with non-linear tariffs.

[4] Gabrielsen and Johansen (2017) demonstrate that non-linear tariffs and RPM are not sufficient to maximize the industry profit if downstream firms must also make investment decisions. However, they are not concerned with market foreclosure.

[5] Our insights extend to second-degree price discrimination (i.e., when firms cannot distinguish between consumers but can offer several types of contracts), provided that high-end consumers generate larger volumes. See Online Appendix D for a formal analysis.

[6] In practice, firms may not be able or allowed to assign specific customer segments to their distributors — in Europe, for example, manufacturers are prevented from restricting brick-and-mortar retailers to open online stores as well.

[7] This in particular ensures that D is not willing to contest E in the low-end segment.