Journal of Economics and Business 77 (2015) 1–15

Contents lists available at ScienceDirect

Journal of Economics and Business

Product market segmentation and output collusion within substitute products

Xu Xu [a,*], Kalyn T. Coatney [b,1]

[a] Department of Finance and Economics, Mississippi State University, P.O. Box 9580, 323B McCool Hall, Mississippi State, MS 39762, United States
[b] Department of Agricultural Economics, Mississippi State University, P.O. Box 5187, 365 Lloyd-Ricks-Watson Building, Mississippi State, MS 39762, United States

ARTICLE INFO

Article history:
Received 23 October 2013
Received in revised form 11 July 2014
Accepted 22 July 2014
Available online 4 August 2014

JEL classification:
L23
L41

Keywords:
Collusion
Differentiated products
Market segmentation
Trigger strategies

ABSTRACT

We extend the differentiated product model, first developed by Bowley (1924), by relaxing the assumption that each firm produces only one differentiated product. By doing so, we are able to analyze the potential for collusive market segmentation in a two-stage decision framework, first in product space and second in output. We find that when firms cannot coordinate on output, the required discount factor that supports collusive market segmentation is strictly decreasing in product substitutability and is greater than partial output and full collusion. Overall we find that output collusion alone is easier to sustain than collusive product market segmentation.

1. Introduction

Product differentiation and market segmentation have long been recognized as important strategic choices by firms (Smith, 1956). Firms may strategically differentiate their product(s) by brand and/or quality attributes to uniquely position their product(s) with consumers. Market segmentation is the strategy of choosing which products to produce from a finite set of existing or potential product(s).

* Corresponding author. Tel.: +1 419 575 6878.
E-mail addresses: xx44@msstate.edu (X. Xu), coatney@agecon.msstate.edu (K.T. Coatney).
[1] Tel.: +1 662 325 7983.

http://dx.doi.org/10.1016/j.jeconbus.2014.07.002

United States and European courts and antitrust authorities have long recognized the potential reduction in competition from tacit or overt horizontal agreements to allocate consumers, products and/or geographic territories (Belleflamme & Bloch, 2004; Sullivan & Grimes, 2000). Welfare reducing collusion in regards to product space entails an agreement that 'you produce product A while I produce product B' when independent and competitive decisions would dictate both firms produce both products.

The ability of firms to tacitly collude in restricting output or raising prices in repeated games is significantly impacted by the differentiability of the firms' product(s) (e.g. Chang, 1991; Häckner, 1994; Ross, 1992; Singh & Vives, 1984). To date, the differentiated products literature has largely focused on collusive output/pricing decisions rather than also addressing collusive multiproduct (conglomerate) decisions. There is a limited literature that addresses the collusive potential among multiproduct (conglomerate) firms, each tackling the problem from different directions (i.e. Bernheim & Winston, 1990; Symeonidis, 2002).[2] An even smaller amount of literature has considered firm decisions as a two-stage game, first in product space and second in price (Dobson & Waterson, 1996; Shaked & Sutton, 1990) or second in quantity (Fraja, 1992), but this line of literature has not addressed collusion at either stage.

The objective of our research is to analyze the potential for tacit collusion at both the product choice and quantity decision(s) stages. In the first stage, firms make strategic decisions over which of the available differentiated product(s) they will produce and in the second stage make their respective output decisions. To accomplish our objective, we first extend a commonly used differentiated products model developed by Bowley (1924) by relaxing the long running assumption that a finite set of differentiated products are uniquely produced by each firm (i.e. Dixit, 1979; Häckner, 2000; Singh & Vives, 1984; Symeonidis, 2002). By doing so, the market segmentation decisions of firms can be endogenized and allow firms to produce perfect overlapping products.

We further consider instances in which the firms are able to only partially or fully collude across both decision stages. When firms are unable to collude across both product space and output, we find the dominant strategy between symmetric firms during product selection, regardless of product substitutability, is for both firms to conglomerate and produce multiple products in contrast to the findings of earlier work by Shaked and Sutton (1990). Furthermore, the required discount factor that supports collusive market segmentation is strictly decreasing in product substitutability.

Interestingly, we find under partial collusion that the required minimum discount factor that supports output collusion alone given ex ante non-cooperative multiproduct (conglomeration) is strictly less than that required for collusive market segmentation alone. Additionally, the required minimum discount factor is constant; a result contrary to both horizontally and vertically differentiated product modeling thus far. We also find the required minimum discount factor that supports output collusion under non-cooperative market segmentation is monotonically increasing; a result that is consistent with price collusion in Chang's (1991) and Ross's (1992) horizontally differentiated product models, as well as the Cournot setting of Deneckere (1983). However, this result is in contrast to a Bertrand setting where Deneckere (1983) and Häckner (1994) found a non-monotonic and monotonically decreasing result, respectively.

Finally, when firms are able to consider full collusion across both decision stages, we find that the required minimum discount factor that supports both collusive market segmentation and output is monotonically decreasing as products become closer substitutes. The minimum required discount factor in this setting is less than that required for collusive market segmentation alone but greater than that required for output collusion alone. Therefore, if firms are found to collusively segment the market, output collusion is a logical progression of the firms' decision making.

The remainder of the paper is organized as follows: Section 2 provides a review of the literature. Section 3 describes the economic model, the solutions of Nash and sub-game perfect equilibria. Finally, in Section 4 we present our conclusions.

[2] Bernheim and Winston (1990) analyze the incentive constraints of collusive pricing strategies of firms experiencing multimarket contact holding product-firm space, product differentiation and geographic locations constant. Symeonidis (2002) analyzes the impact of exogenous changes in the number of firms, number of products produced by both firms and product substitutability on the likelihood of collusion via comparative statics.