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The Effects of Uncertain Divestiture as Regulatory Threat

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Abstract

It has been argued that the threat of regulatory intervention affects firm behavior. We investigate the pricing decision of the dominant firm under regulatory threat, considering the probability of intervention as a function of the price. Our focus is on the case where the potential divestiture of the firm serves as a threat of regulatory intervention. Specifically, we compare regulatory threat, which can be regarded as uncertain intervention, with deterministic intervention. It is shown that under certain conditions associated with the marginal expected penalty, regulatory threat induces the firm to lower prices even more than deterministic intervention. Numerical examples illustrate that with relatively small-scale divestiture, the firm's price under regulatory threat may be lower than that under deterministic intervention within a relatively broad range of regulator's attitudes toward intervention.

Key words: regulatory threat, uncertain intervention, divestiture, dominant firm and competitive fringe

JEL classification: L51

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1 Introduction

This paper addresses the hypothesis that the threat of government intervention affects firms' behavior. Firms would internalize the regulatory threat and change their decisions in order to lower the probability of potential regulatory intervention. More specifically, it has been argued that firms may hold prices down in face of a credible threat of regulatory intervention.

Olmstead and Rhode (1985) discuss the situation in the 1920s where some Californian oil companies suppressed gasoline prices, even though the real price of light crude had doubled. They suggest the hypothesis that these oil companies may have feared a hostile response from the government and consequent unfavorable intervention. More recently, Wolfram (1999) investigates the liberalized British electric power industry of the 1990s, and argues that generators may have restrained power prices in an effort to demonstrate that prices were not too high while the regulator's attention focused on the electricity spot market.

The literature includes empirical studies that directly test the hypothesis of regulatory threat in specific industries. Using the 1979 oil crisis as a case study, Erfle and McMillan (1990) compare the prices charged by companies that differed primarily in their exposure to regulatory threat. They argue that major US oil companies held down product prices under the pressure of threatened government intervention during the price shocks of the late 1970s. They conclude that major oil companies responded to regulatory pressure during a politically sensitive period. Likewise, Driffield and Ioannidis (2000) observe a long-term decline in profit margins in the UK petrol industry as a result of the 1979 Monopolies and Merger Commission investigation, despite the fact that no undertakings were made. On the other hand, Ellison and Wolfram (2006) examine the possible effects of regulatory threat on pharmaceutical prices, focusing on the health care reform period in the US of the early 1990s. They find evidence of vulnerable pharmaceutical companies distorting price increases during the early years of the Clinton Administration, possibly altering their price increases to forestall potential regulation.

However, only a small amount of theoretical work analyzes the effects of regulatory threat on firm behavior. Glazer and McMillan (1992) consider a firm that is yet unregulated but faces the risk of regulation, and develop a model in which the probability of regulatory intervention is greater the higher the price the firm charges. They then show that the threat of regulation induces a monopolist to charge a price lower than the monopoly price because it significantly reduces the probability of regulatory intervention. They particularly emphasize the marginal effects of changes in price on this probability. Brunekreeft (2004) also considers the probability of regulatory intervention as a function of price, and extends the model in Glazer and McMillan to vertically related markets, focusing on the electricity supply industry in Germany.

In this paper, we present a simple model of regulatory threat that describes the pricing decision of the dominant firm under uncertain intervention. We define the probability of intervention as a function of the price, as in Glazer and McMillan (1992). However, our analysis differs from previous work in two major ways. First, our paper develops a model in which the potential divestiture of the firm serves as regulatory threat. In reality, there has been the tendency of the regulator to examine the divestiture of dominant firms to mitigate market power in such industries as electric power, gas, and telecommunications industries. We demonstrate how the risk of divestiture affects the pricing decision of the firm. Second, this paper compares regulatory threat, which can be viewed as uncertain (stochastic) intervention, with one hundred percent certain (deterministic) intervention. The regulator may want to rely on deterministic regulatory intervention to decrease the price. However, we show that under certain conditions, regulatory threat induces the firm to decrease the price even more than under deterministic intervention.

The paper is organized as follows. In Section 2, we present a simple model of regulatory threat, focusing on the uncertain divestiture of the firm. Section 3 analyzes the effects of uncertain divestiture on prices. Section 4 provides numerical examples to illustrate the results. Section 5 concludes.

2 The Model

2.1 Overview

It is common in some industries that one or only a few dominant firms have large market share and exercise market power. Suppose that the regulator (e.g., a market surveillance committee) considers that the price seems to be at a high level, and starts to examine the divestiture of the firm as a means of regulatory intervention. In some industries, such as the electric power industry, there has been the tendency of the regulator to examine the divestiture of the dominant firm to mitigate market power.

In our model, the regulator can divest a certain portion of the firm's plants. This portion is predetermined politically based on some political or legal constraints. If the regulator actually undertakes the divestiture of the firm, the divested portion will become a competitive fringe firm, assuming that it will remain small. In this sense, the model can be viewed as an application of a dominant firm-competitive fringe model.

As in Glazer and McMillan (1992), the probability of regulatory intervention is greater the higher the price the firm charges. If the firm faces the possibility of regulatory intervention, it would internalize the regulatory threat and change its pricing decision in order to lower the probability of unfavorable actions by the regulator. We assume that a risk neutral firm chooses a price that maximizes its expected profit by considering the probability of divestiture as a function of the price.

2.2 Basic setup

Throughout the paper, it is assumed that all functions are twice continuously differentiable.

For the sake of simplicity, we assume that there is currently a single dominant firm, i.e., a monopoly firm in the market in line with the arguments in Glazer and McMillan (1992). A monopolist would engage in standard monopoly pricing when it does not face either regulation or regulatory threat. Let p_m denote the monopoly price that maximizes the firm's profit when any divestiture plan is not in place. This is the benchmark price initially charged by the firm before the threat of regulatory intervention arises.

Choosing prices greater than the monopoly price, p_m, does reduce the firm's profit. Moreover, in face of regulatory threat, it would be harmful for the firm to charge prices even greater than the monopoly price as this would make the regulator more severe in terms of its attitudes toward regulatory intervention. Thus, we can focus our attention on the relevant interval $[0, p_m]$.[1] In other words, the firm will choose a price such that $p \in [0, p_m]$.

Let $\pi(p)$ denote the profit of the firm without divestiture, which we assume to be strictly concave in p, that is, $\pi''(p) < 0$.[2] Here, p_m is such that

[1] The regulator may cap the price at p_m.

[2] One of the sufficient conditions for the concavity of $\pi(p)$ is that the demand function

$\max \pi(p)$, and by considering an interior solution, $\pi'(p_m) = 0$ holds. Moreover, $\pi'(p) > 0$ holds for $0 \leq p < p_m$. Figure 1 illustrates that the firm initially chooses p_m by equating its marginal revenue to its marginal cost at point G. The area OBCG corresponds to the maximized profit $\pi(p_m)$.

(Figure 1 about here)

The regulator can divest a certain portion of the firm's manufacturing plants. This portion is predetermined politically (for example, five percent) based on some political or legal constraints. More formally, suppose that the firm initially has i identical manufacturing plants. The regulator can separate the predetermined j plants from the firm. As a result, the dominant firm will operate the remaining $i-j$ plants after divestiture and the marginal cost curve of the firm will shift leftward as illustrated in Figure 1.[3] The divested j plants are then assumed to form a competitive fringe. This newly created fringe firm is assumed to be a price-taker as it is supposed to remain small. Then, the dominant firm's residual demand curve is the horizontal difference between the market demand curve and the competitive fringe's marginal cost curve, i.e., supply curve. Consequently, the demand curve for the dominant firm will shift leftward as depicted in Figure 1

Let $\pi_d(p)$ denote the profit of the dominant firm when divestiture is actually carried out. We assume that $\pi_d(p)$ is strictly concave, that is, $\pi_d''(p) < 0$. The dominant firm chooses p_d that maximizes $\pi_d(p)$ when divestiture is undertaken. The maximized profit after divestiture is denoted by $\bar{\pi}_d = \pi_d(p_d)$. Note that $\bar{\pi}_d$ can be regarded as a constant value since the divestiture portion is assumed to be politically predetermined. Figure 1 illustrates that the dominant firm chooses p_d by equating its residual marginal revenue to its marginal cost after divestiture at point H. The area OADH corresponds to the maximized profit $\bar{\pi}_d$.

It should be noted that the maximized profit after divestiture is less than that without divestiture: that is, $\bar{\pi}_d < \pi(p_m)$ holds with $p_d < p_m$, as depicted in Figure 1.[4] As $\pi(p_m)$ is the maximum, $\pi(p_d) < \pi(p_m)$ holds when the

is concave and the cost function is convex. See, for example, Tirole (1988).

[3]Even if we do not assume identical manufacturing plants, the regulator would be able to undertake the divestiture in such a way that the marginal cost curve of the firm shifts leftward.

[4]Some readers might wonder whether $p_d < p_m$ always holds. McElroy (1985) examines a dominant firm-competitive fringe framework and proves that $p_d < p_m$ holds true (Theorem A.1).

divestiture plan is not in place. Note that $\pi(p_d)$ corresponds to the area OAEF without divestiture. Furthermore, as both the marginal cost curve and the demand curve shift leftward after divestiture, $\bar{\pi}_d$, namely the area OADH, is smaller than $\pi(p_d)$ ($< \pi(p_m)$). Of course, the regulator would want to divest the dominant firm in an effort to reduce the firm's monopoly profit.

Let p_l denote the price such that $\pi(p_l) = \bar{\pi}_d$. Lowering the price below p_m decreases the profit without divestiture, $\pi(p)$. There is a lower bound p_l that equates $\pi(p_l)$ to $\bar{\pi}_d$. Moreover, if the firm lowers the price even below p_l, $\pi(p)$ is then less than $\bar{\pi}_d$, that is, $\pi(p) < \bar{\pi}_d$ for $p < p_l$. Note that p_l is indeed less than p_m since $\pi(p_l) = \bar{\pi}_d < \pi(p_m)$.

Lastly, we introduce a functional relationship between the probability of divestiture and the price set by the dominant firm. Glazer and McMillan (1992) define the probability of regulatory intervention as an increasing function of the price.[5] Following Glazer and McMillan, we express the probability of divestiture as $\theta(p)$ in the interval $[0, p_m]$. We assume that $\theta(p)$ is increasing, i.e., $\theta'(p) > 0$, considering that the higher the firm sets the price, the higher the probability of divestiture. Furthermore, we assume the strict convexity of $\theta(p)$, i.e., $\theta''(p) > 0$, considering that the probability of divestiture steeply increases as the price becomes closer to the initial monopoly price p_m. Note that $0 \leq \theta(p) \leq 1$ with $\theta(0) = 0$ and $\theta(p_m) = 1$.

2.3 Expected profit and penalty

When the firm chooses some price level $p \in [0, p_m]$, it will earn $\pi(p)$ with probability $1 - \theta(p)$, still remaining undivested. On the other hand, the firm will be actually divested with probability $\theta(p)$. Once the divestiture is realized, the firm will earn $\bar{\pi}_d$, which is a predetermined constant, by switching to p_d.[6] Considering a risk neutral firm, we can express its expected profit as:

[5] See Stigler (1971) and Peltzman (1976) for detailed discussion of the political and legislative problems.

[6] We assume that the firm can quickly react to the divestiture and change its price instantaneously. We also assume that the firm knows the portion of its plants likely to be divested and the probability of divestiture.

$$\Pi_e(p) = \theta(p)\bar{\pi}_d + (1 - \theta(p))\,\pi(p)$$
$$= \pi(p) - \theta(p)\,(\pi(p) - \bar{\pi}_d)\,. \quad (1)$$

The second term in the second line of (1) can be interpreted as a form of expected penalty. When the firm chooses some price level, its profit $\pi(p)$ will be reduced by $\pi(p) - \bar{\pi}_d$ with probability $\theta(p)$ from divestiture. We here express the expected penalty as $\phi(p)$:

$$\phi(p) = \theta(p)\,(\pi(p) - \bar{\pi}_d)\,. \quad (2)$$

Moreover, the marginal expected penalty is expressed as:

$$\phi'(p) = \theta'(p)\,(\pi(p) - \bar{\pi}_d) + \theta(p)\pi'(p). \quad (3)$$

Using $\phi(p)$, which is regarded as a cost by the firm, we can rewrite the expected profit simply as:

$$\Pi_e(p) = \pi(p) - \phi(p). \quad (4)$$

3 Effects of Regulatory Threat

We now examine the effects of regulatory threat on prices. Under regulatory threat, the firm maximizes its expected profit $\Pi_e(p)$. Let p^* denote the maximizer of $\Pi_e(p)$. The following proposition demonstrates that the firm is induced to lower the price from the initial monopoly price, when faced with regulatory threat.

Proposition 1 *Under regulatory threat, the firm chooses p^* such that $p_l < p^* < p_m$, where p^* is unique.*

Proof. It follows from the setup in Subsection 2.2 that:

$$\Pi_e'(p_m) = \theta'(p_m)\,(\bar{\pi}_d - \pi(p_m)) + (1 - \theta(p_m))\,\pi'(p_m)$$
$$< 0.$$

The first term on the right-hand side of the first equation is strictly negative since $\theta'(p_m) > 0$ and $\bar{\pi}_d < \pi(p_m)$. The second term is zero from the first-order condition, $\pi'(p_m) = 0$, for the profit maximization problem without divestiture. $\Pi_e'(p_m) < 0$ implies that the firm can increase its expected profit by lowering the price below p_m. Thus, $p^* < p_m$. The following also holds for $p \leq p_l$ from the setup in Subsection 2.2:

$$\begin{aligned}\Pi_e'(p) &= \theta'(p)\left(\bar{\pi}_d - \pi(p)\right) + \left(1 - \theta(p)\right)\pi'(p) \\ &> 0.\end{aligned}$$

The first term on the right-hand side of the first equation is nonnegative since $\theta'(p) > 0$ and $\pi(p) \leq \bar{\pi}_d$ for $p \leq p_l$. The second term is strictly positive since $1 - \theta(p) > 0$ and $\pi'(p) > 0$ for $p \leq p_l$ ($< p_m$). $\Pi_e'(p) > 0$ for $p \leq p_l$ implies that the firm can increase its expected profit by increasing the price above p_l. Thus, $p_l < p^*$. Furthermore, the second-order derivative of $\Pi_e(p)$ yields:

$$\begin{aligned}\Pi_e''(p) &= \theta''(p)\left(\bar{\pi}_d - \pi(p)\right) - 2\theta'(p)\pi'(p) + \left(1 - \theta(p)\right)\pi''(p) \\ &< 0.\end{aligned}$$

All terms on the right-hand side of the first equation are strictly negative for $p_l < p < p_m$. Therefore, $\Pi_e(p)$ is strictly concave, and hence has a unique maximum p^* for $p_l < p < p_m$. ■

This proposition coincides with the result in Glazer and McMillan (1992), which shows that the threat of regulation induces a monopolist to charge a price lower than the monopoly price.

We next compare regulatory threat, which is uncertain (stochastic) regulatory intervention, with one hundred percent certain (deterministic) intervention. Suppose that the regulator had already decided upon divestiture, and indeed divested the firm with one hundred percent certainty at the beginning. This case can be regarded as deterministic regulatory intervention, where the firm chooses the maximizer of $\pi_d(p)$, i.e., p_d.[7]

An important question is the extent to which the firm lowers its price under uncertain regulatory intervention. One may conjecture that the firm would not lower the price as low as that under deterministic intervention, i.e., p_d. However, it is shown that this is not always the case. We now show the following proposition:

Proposition 2 *The price under regulatory threat is lower than that under deterministic intervention if and only if the marginal expected penalty is*

[7] It can also be interpreted that deterministic intervention is a special case of uncertain intervention in which the probability of divestiture is one for any price, that is, $\theta(p) = 1$. In this special case, $\Pi_e(p) = \pi_d(p)$ indeed holds.

greater than the marginal profit without divestiture when evaluated at the price under deterministic intervention. That is, $p^* < p_d$ *if and only if* $\pi'(p_d) < \phi'(p_d)$.

Proof. We first prove that $p^* < p_d$ if $\pi'(p_d) < \phi'(p_d)$. If $\pi'(p_d) < \phi'(p_d)$, $\Pi_e'(p_d) = \pi'(p_d) - \phi'(p_d) < 0$. This implies that the firm can increase its expected profit by lowering the price below p_d. Thus, $p^* < p_d$. Next, we prove that $\pi'(p_d) < \phi'(p_d)$ if $p^* < p_d$. Suppose by way of contradiction that $\pi'(p_d) \geq \phi'(p_d)$. Then, $\Pi_e'(p_d) = \pi'(p_d) - \phi'(p_d) \geq 0$. This implies that $p^* \geq p_d$, which contradicts $p^* < p_d$. Thus, $\pi'(p_d) < \phi'(p_d)$ if $p^* < p_d$. ■

When the marginal expected penalty is greater than the marginal profit without divestiture, it is profitable for the firm to reduce the price. Proposition 2 implies that when $\pi'(p_d) < \phi'(p_d)$, the firm can increase its expected profit $\Pi_e(p)$ by reducing the price below p_d until $\pi'(p^*) = \phi'(p^*)$ holds. In other words, under regulatory threat, the firm chooses p^*, such that the marginal profit without divestiture is equalized with the marginal expected penalty.

The regulator may wish to decrease the price by undertaking deterministic regulatory intervention. However, uncertain regulatory intervention, i.e., regulatory threat may outperform deterministic intervention in terms of a price reduction in some cases. It would be surprising that regulatory threat may induce the firm to decrease the price even more than deterministic intervention.

4 Numerical Examples

4.1 Setup

We consider numerical examples to illustrate the effects of divestiture as regulatory threat. Our focus here is on the effects of regulatory threat on prices. The inverse demand function is given by $p = -q + 100$. The marginal cost of the original monopoly firm is given by $0.25q$.

Two cases of divestiture with different scales are considered. As discussed earlier, the divestiture portion is predetermined under some political or legal constraints. We assume that these constraints allow relatively small-scale divestiture in Case 1, and relatively large-scale divestiture in Case 2. In Case 1, the marginal cost of the competitive fringe that is separated from the original firm is assumed to be $5q$. Then, the marginal cost of the dominant firm after divestiture can be derived as $\frac{5}{5-0.25}0.25q$ (the marginal cost curve shifts leftward). Moreover, the residual inverse demand function can be derived as $\frac{5}{5+1}(-q+100)$ (the demand curve also shifts leftward). In Case 2, the marginal cost of the competitive fringe is assumed to be $2q$. Then, the marginal cost of the dominant firm after divestiture can be derived as $\frac{2}{2-0.25}0.25q$. Moreover, the residual inverse demand function can be derived as $\frac{2}{2+1}(-q+100)$.

Here p_m is calculated as 55.56, which is the monopoly price when any divestiture plan is not in place. Furthermore, p_d, which denotes the price after divestiture, is obtained as 47.35 and 39.22 in Case 1 and Case 2, respectively. Note that p_d in Case 2 is lower than that in Case 1 since the portion of divestiture is larger in Case 2.

Lastly, we assume that the probability of divestiture is expressed as $\theta(p) = \left(\frac{p}{p_m}\right)^\alpha$ in the interval $[0, p_m]$, where $\alpha \geq 1$. Note that $\theta(p)$ is increasing and convex. As shown in Figure 2, the curvature of $\theta(p)$ becomes larger as α increases. α can be regarded as a given proxy parameter for the regulator's attitude (tendency) toward regulatory intervention. When α is relatively small, the firm would still face a non-negligible probability of divestiture, even if it chooses relatively low prices. In contrast, when α is relatively large, the probability of divestiture becomes significantly low and negligible if the firm chooses relatively low prices. Thus, roughly speaking, a small α would correspond to a relatively severe attitude of the regulator toward intervention, whereas a large α would correspond to a relatively mild attitude. This would be determined by political conditions.

(Figure 2 about here)

4.2 Case 1: Relatively small-scale divestiture

We first examine the case of relatively small-scale divestiture, in which p_d is relatively high. Figure 3 illustrates the results for $\alpha = 3$ in Case 1. The price under regulatory threat is shown to be lower than that under deterministic intervention; that is, $p^* = 45.18$ is lower than $p_d = 47.35$. Indeed, the marginal expected penalty is greater than the marginal profit without divestiture when evaluated at the price under deterministic intervention; that is, the condition $\pi'(p_d) < \phi'(p_d)$ holds for $p_d = 47.35$.

(Figure 3 about here)

Note that a larger p_d yields a smaller $\pi'(p_d)$ given $\pi(p_d)$ is concave, while the effect of a larger p_d on $\phi'(p_d)$ is ambiguous. As shown in Figure 4, $\pi'(p_d) < \phi'(p_d)$ holds when α is less than about 10, given a relatively small value of $\pi'(p_d) = 18.47$ in Case 1. The marginal expected penalty $\phi'(p)$ becomes small when α is sufficiently large, which coincides with the fact that the attitude of the regulator becomes less severe with a larger α. Thus, the condition $\pi'(p_d) < \phi'(p_d)$ is not likely to hold when α becomes sufficiently large.

(Figure 4 about here)

Figure 5 illustrates the prices p^* that the dominant firm chooses under different levels of α. $\pi'(p_d) < \phi'(p_d)$, and hence $p^* < p_d$ hold when α is less than about 10 in Case 1. It should be emphasized that in the case of relatively small-scale divestiture, the price under regulatory threat may be lower than that under deterministic intervention, within a relatively broad range of α, i.e., a broad range of regulator's attitudes toward regulatory intervention.

(Figure 5 about here)

4.3 Case 2: Relatively large-scale divestiture

We next examine the case of relatively large-scale divestiture, in which p_d becomes relatively low. Figure 6 illustrates the results for $\alpha = 3$ in Case 2. Contrary to Case 1, the price under regulatory threat is higher than that under deterministic intervention; that is, $p^* = 41.39$ is higher than $p_d = 39.22$, since $\pi'(p_d) < \phi'(p_d)$ does not hold for $p_d = 39.22$.

(Figure 6 about here)

Note that a smaller p_d yields a larger $\pi'(p_d)$ given $\pi(p_d)$ is concave. Indeed, $\pi'(p_d)$ is 36.76 in Case 2, which is almost doubled compared to that in Case 1. As shown in Figure 7, the condition $\pi'(p_d) < \phi'(p_d)$ does not hold in Case 2, even if α takes a low value.

(Figure 7 about here)

Figure 8 illustrates the prices p^* that the dominant firm chooses under different levels of α in Case 2. In this case, the condition $\pi'(p_d) < \phi'(p_d)$, and hence $p^* < p_d$ do not hold even if α has a low value. This result suggests that, in the case of relatively large-scale divestiture, the price under regulatory threat may be higher than that under deterministic intervention for a relatively broad range of α.

(Figure 8 about here)

4.4 Policy implications

The examples above illustrate that in the case of relatively small-scale divestiture, the price under regulatory threat may be even lower than that under deterministic intervention within a relatively broad range of regulator's attitudes toward regulatory intervention. When p_d under deterministic intervention is relatively high, the likelihood increases that it is profitable for the firm to choose $p^* < p_d$ under regulatory threat.

In some industries, such as the electric power industry, the regulator often attempts to divest a certain portion of the dominant firm's plants to mitigate market power. It is often the case that this portion determined through a political process is very limited because of some political or legal constraints. The regulator may want to rely on deterministic regulatory intervention in order to decrease the price. However, when the scale of divestiture is limited, uncertain regulatory intervention, i.e., regulatory threat may outperform deterministic intervention in terms of a price reduction.

5 Concluding Remarks

This paper has investigated the pricing decision of the dominant firm under regulatory threat, considering the probability of intervention as a function of the price. Our focus is particularly on the case where the potential divestiture of the firm serves as a threat of regulatory intervention. We have compared regulatory threat, which can be viewed as uncertain (stochastic) intervention, with one hundred percent certain (deterministic) intervention. The regulator may wish to decrease the price by undertaking deterministic regulatory intervention. However, regulatory threat outperforms deterministic intervention in terms of a price reduction under certain conditions associated with the marginal expected penalty. Numerical examples illustrate that in the case of relatively small-scale divestiture, the price under regulatory threat may indeed be lower than that under deterministic intervention, within a relatively broad range of regulator's attitudes toward intervention.

Finally, we mention some possible directions for future research. We have considered uncertain divestiture of the firm as regulatory threat. A fruitful avenue of research would be to investigate the different types of regulatory intervention possible in real markets. In this paper, we have examined regulatory threat based on a dominant firm-competitive fringe model. Further work should aim to extend the model to oligopolistic cases, such as Cournot competition. Although we have focused on a static model, investigating dynamic regulatory intervention under changing political environment would be another interesting direction for future research.

References

[1] Brunekreeft, G. (2004) "Regulatory Threat in Vertically Related Markets: The Case of German Electricity," *European Journal of Law and Economics* 17: 285-305.

[2] Driffield, N. and C. Ioannidis (2000) "Effectiveness and Effects of Attempts to Regulate the UK Petrol Industry," *Energy Economics* 22: 369-381.

[3] Ellison, S. F., and C. Wolfram (2006) "Coordinating on Lower Prices: Pharmaceutical Pricing Under Political Pressure," *RAND Journal of Economics* 37(2): 324-340.

[4] Erfle, S., and H. McMillan (1990) "Media, Political Pressure, and the Firm: The Case of Petroleum Pricing in the Late 1970s," *Quarterly Journal of Economics* 105(1): 115-134.

[5] Glazer, A., and H. McMillan (1992) "Pricing by the Firm Under Regulatory Threat," *Quarterly Journal of Economics* 107(3): 1089-1099.

[6] McElroy, F. W. (1985) "The Welfare Economics of Dominant-Firm Acquisitions," *Journal of Economics*, 45(2): 115-140.

[7] Olmstead, A. L., and P. Rhode (1985) "Rationing without Government: The West Coast Gas Famine of 1920," *American Economic Review* 75(5): 1044-1055.

[8] Peltzman, S. (1976) "Toward a More General Theory of Regulation," *Journal of Law and Economics* 19(2): 211-240.

[9] Stigler, G.. J. (1971) "The Theory of Economic Regulation," *Bell Journal of Economics* 2(2): 3-21.

[10] Tirole, J. (1988) *The Theory of Industrial Organization*. Cambridge, Mass.: MIT Press.

[11] Wolfram, C. (1999) "Measuring Duopoly Power in the British Electricity Spot Market," *American Economic Review* 89(4): 805-826.

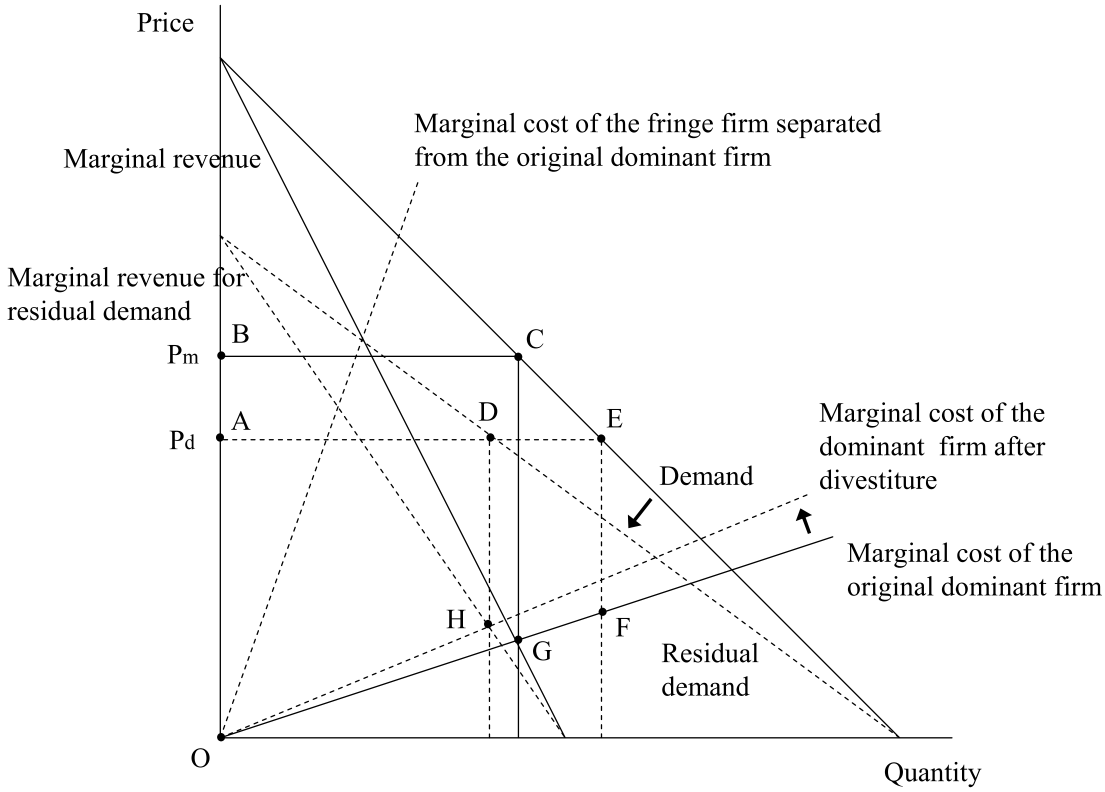

Figure 1: Pricing with and without divestiture

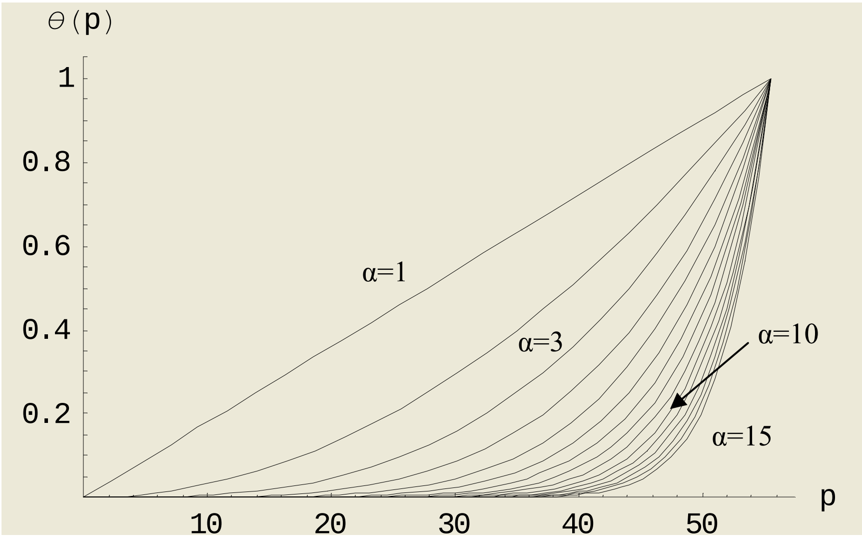

Figure 2: Probability of divestiture under various values of α

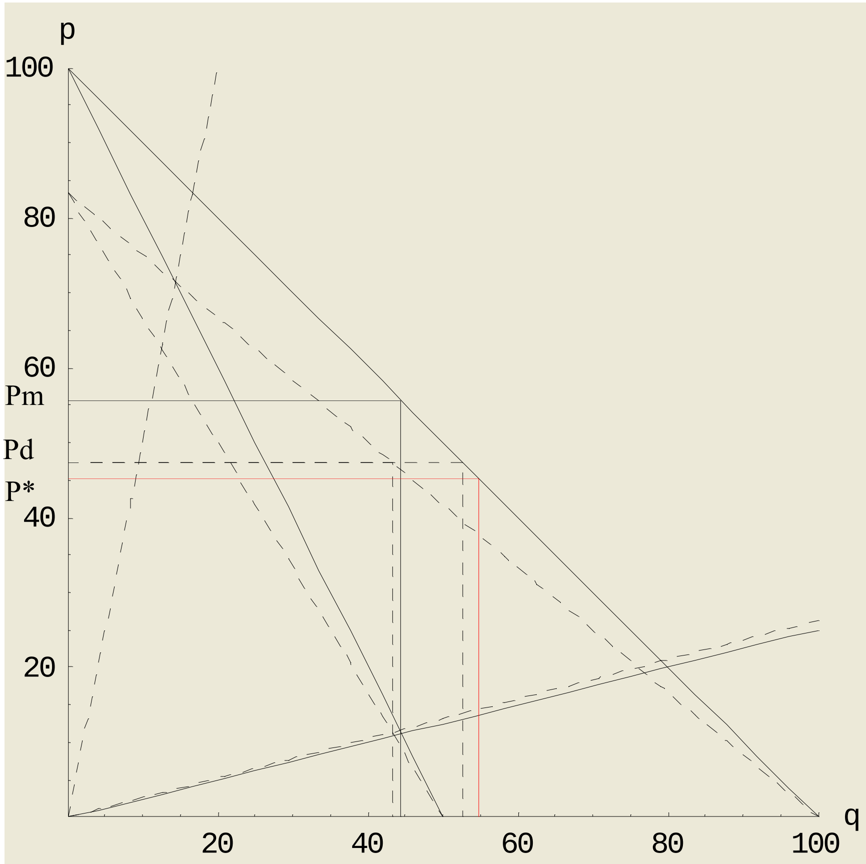

Figure 3: Results for $\alpha = 3$ in Case 1

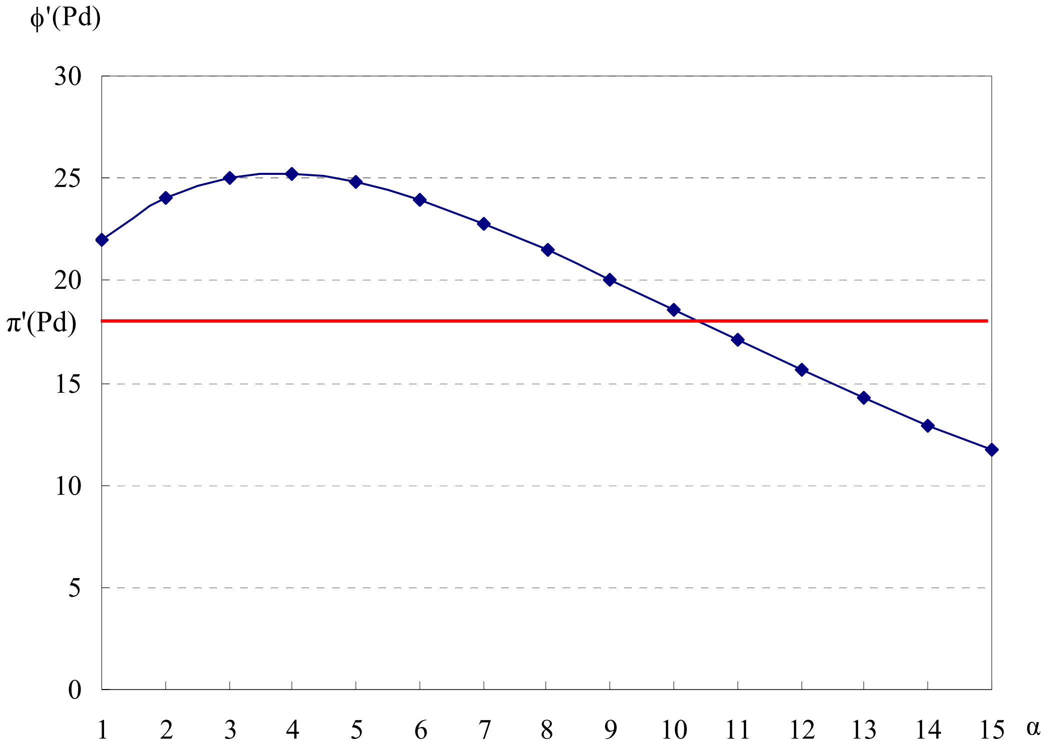

Figure 4: Marginal expected penalties under various values of α in Case 1

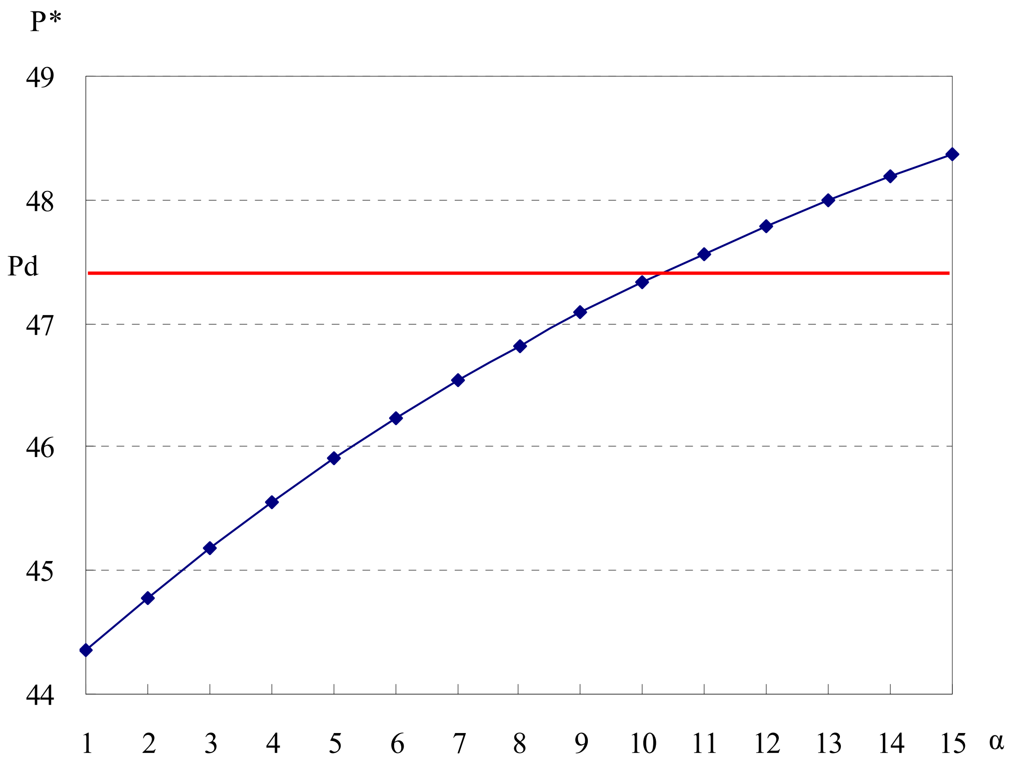

Figure 5: Prices under various values of α in Case 1

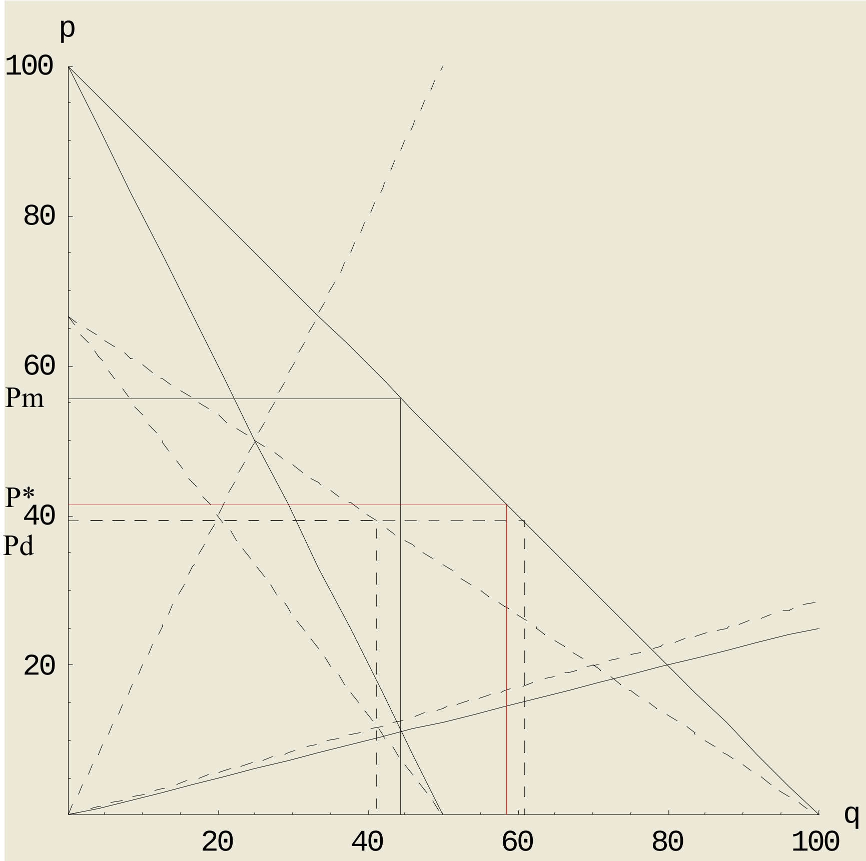

Figure 6: Results for $\alpha = 3$ in Case 2

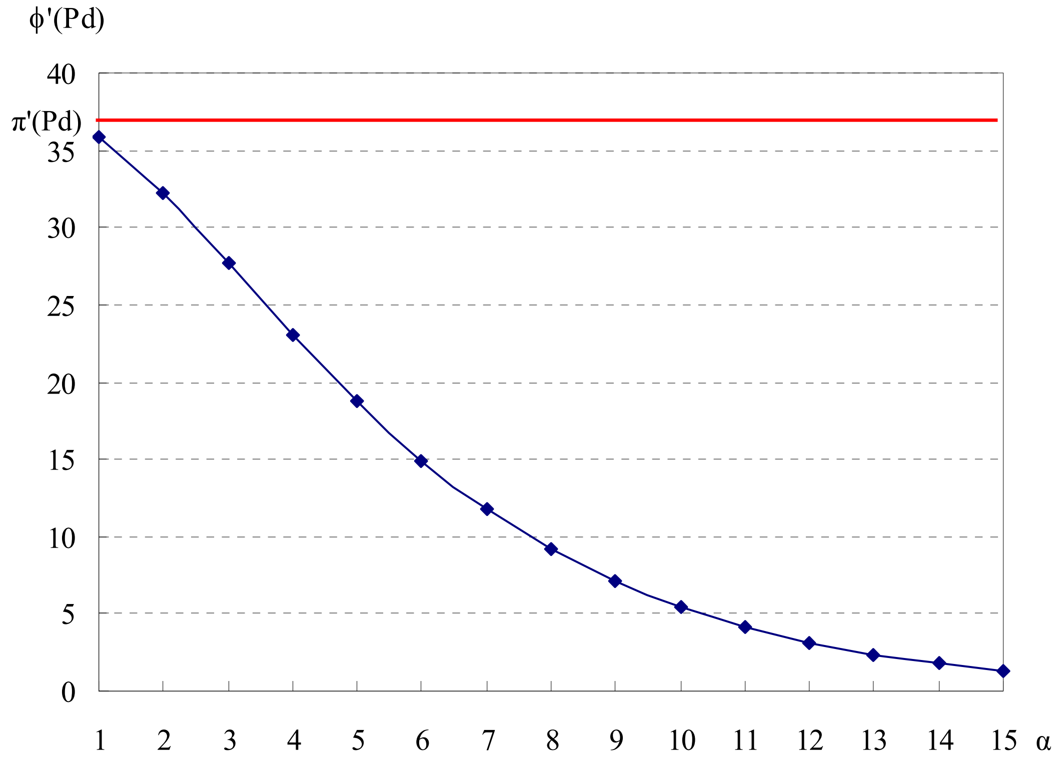

Figure 7: Marginal expected penalties under various values of α in Case 2

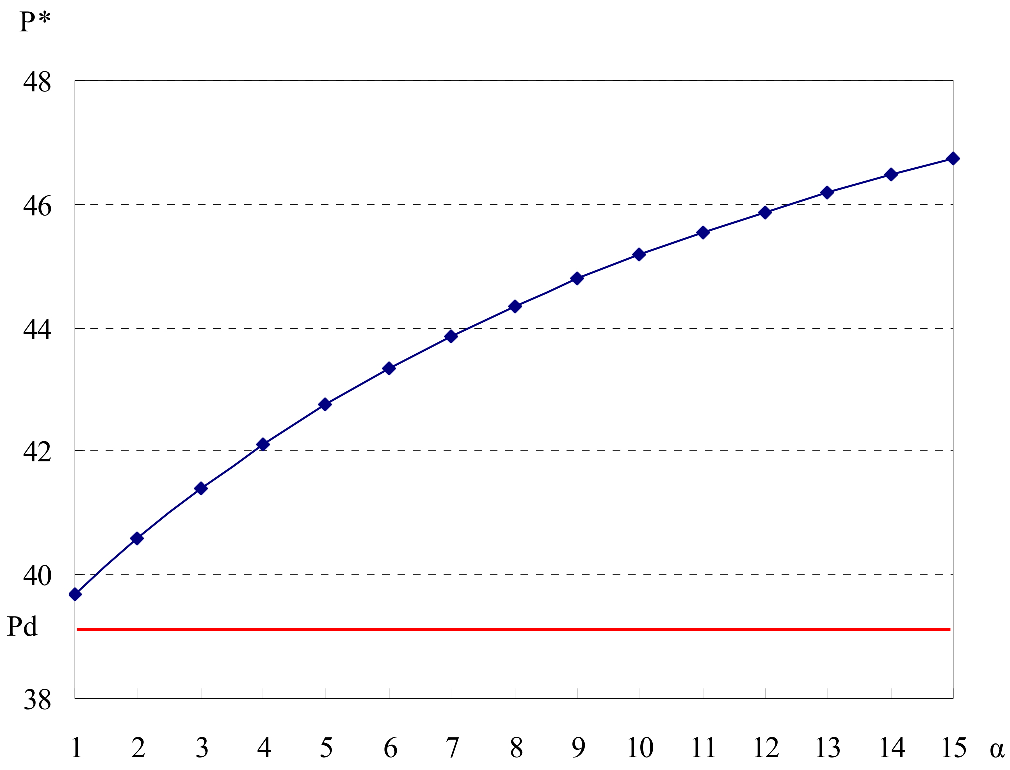

Figure 8: Prices under various values of α in Case 2