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Welfare Effects of the Failing Firm Defence

Analysis in the Cournot Model

by

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Abstract

The failing firm defence is a tool that an antitrust authority can use to approve a merger that usually would have been blocked if one of the merging firms is failing. The defence has during the last years been used a number of times on EU level as well as in Sweden. This thesis explains how the Cournot model can be used to analyse the failing firm defence. It also presents and discuss' literature that analyse how the failing firm defence affects welfare. The primary conclusion is that allowing an acquisition of a failing firm increases welfare when the acquirer reduces its marginal cost as a result of the merger. For welfare to be maximised, antitrust authorities should compare the market structures that emerge when different firms acquires the failing firm and let the firm that maximises welfare as the acquirer be the firm that acquires the failing firm. It is also important that the antitrust authority investigates if the failure of the failing firm is the result of predatory conduct by the acquiring firm, and blocks the merger if that is the case.

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1 Introduction

In this section, background information, purpose, and method for the thesis are presented. The outline of the thesis is also provided.

1.1 Background

A merger is a transaction where the ownership of one or more firms is changed, and usually takes one of two forms. Either one firm acquires one or more firms, or two or more firms combine into a new firm. If a merger between firms in the same industry is announced and the combined and firm specific revenues are above certain threshold values, the merging firms are obliged to report the merger to the antitrust authority (AA) in the country/area affected by the merger¹. The AA thereafter examines how the proposed merger is expected to affect the competitive structure of the industry that the firms are active in, and decides if the merger should be either blocked, unconditionally allowed, or conditionally allowed.² When examining how the competitive structure of an industry changes following a merger, the AA is concerned with how consumers are affected by the change (Lyons 2002).

In April 2015, the Swedish Competition Authority (SCA) published an updated version of its Guidance from the Swedish Competition Authority for the notification and examination of concentrations between undertakings³ (Guidance), which provides information about how the SCA examines notified mergers. Included in the updated version of the Guidance is a new section about the importance of considering the right counterfactual scenario when examining mergers. A counterfactual scenario is what happens if a merger is blocked, and when a merger is examined, the industry structure that emerges *ex-post* a merger is compared to the one following the counterfactual scenario. Although the counterfactual scenario for most merger cases is that the industry structure remains the same as *ex-ante* the merger announcement, alternative counterfactual scenarios exist. One type of mergers for which the counterfactual scenario differs from the usual is when a failing firm is being acquired.

A failing firm is a firm that is on the verge of bankruptcy, and a merger involving such a firm may be allowed with application of the failing firm defence (FFD). During a roundtable discussion about the FFD held by the OECD in 2009, four different counterfactual scenarios to approving a merger involving a failing firm were recognised: 1) all

¹Although it has no effect on the continuation of this paper, it should be noted that some mergers need to be reported to more than one AA.

²E.g. divestment of assets

³File ref. 581/2014, Available Online:<http://www.konkurrensverket.se/globalassets/english/competition/guidance-from-the-swedish-competition-authority-for-the-notification-and-examination-of-concentrations-between-undertakings.pdf> [Accessed 6 April 2016]

assets of the failing firm will exit the market, 2) the assets will be purchased by another incumbent firm, 3) the assets will be purchased by a new entrant to the market, or 4) the failing firm will restructure and retrench/sell some of its assets to incumbents/entrant (OECD, 2009, pp.33-34). Depending on which of these counterfactual scenarios that the AA considers most likely and the competitive structure of the industry following the counterfactual scenario, the AA may choose to approve a merger that would have normally been blocked by applying the FFD. When considering approving a merger by applying the FFD, an AA usually considers three different criteria that are similar in most of the world's developed countries' jurisdictions:

- “Absent the merger, the failing firm will exit the market in the near future as a result of its financial difficulties;
- There is no feasible alternative transaction or reorganisation that is less anti-competitive than the proposed merger; and
- Absent the merger, the assets of the failing firm would inevitably exit the market.” (OECD, 2009, p. 11)

The second and third criteria emphasises the importance of the counterfactual scenario when examining a merger in which a failing firm is being acquired, and the first criterium states that the failing firm actually has to be failing for there to be a possibility that a merger is approved by applying a FFD. These criteria are not included in the Guidance but the SCA has, when assessing mergers with a potentially failing firm, referred to the criteria in the European Commission's Guidelines on the assessment of horizontal mergers (Guidelines).⁴

The addition of information regarding how to examine mergers involving failing firms to the Guidance reflects an increase in attention that the FFD has gotten during the last years, although the defence has existed for a long time. The first time it was used was in 1932, when the US Supreme Court ruled that the acquisition of the McElwain Company by competitor International Shoe Company would not substantially lessen competition because the former was a “corporation with resources so depleted and the prospect of rehabilitation so remote that it faced the grave probability of a business failure”.⁵ The defence has been used a number of times since, and especially during the last few years.⁶ In 2011, the Swedish Competition Authority conditionally allowed a merger between the

⁴2004 OJ C 31/03. Available Online: [http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52004XC0205\(02\)&from=EN](http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52004XC0205(02)&from=EN) [Retrieved 6 April 2016]

⁵International Shoe Co. v. FTC, 280 U.S. 291 (1930)

⁶For extended discussion about FFD-legislation and more examples of merger cases where the FFD has been applied than the ones mentioned in the text, see Persson (2005) and Ouachi (2015).

dairy-product producers Arla and Milko because Milko was at the risk of bankruptcy.⁷ In 2013, the European Commission approved of similar reasons a merger where oil company Nynas acquired assets from Shell Deutschland⁸ as well as a merger where Aegan Airlines AS acquired rival Olympic Airs.⁹ The decisions by the SCA and EC in these cases has nurtured some debate about the FFD. Following the Arla/Milko case, the SCA's approval was in one of Sweden's largest newspapers criticised for being based on "judicial quibble"¹⁰ (Lindstedt 2011), to which the SCA's Director General responded that "a bankruptcy for Milko would not have benefitted consumers nor competition" (Sjöblom 2011). And in a column on the website of Competition Policy International Journal, Fountoukakos and Geary (2013) discussed whether the three FFD-criteria should be abolished and mergers involving a failing firm instead should be examined as any other counterfactual, which is similar to the way that the addition of section on counterfactuals to the Guidance is formulated.

1.2 Objective

The objective of the thesis is partly to explain how the Cournot model can be used to model the welfare effects of the failing firm defence and partly to explain what those welfare effects are.

1.3 Method

To reach the objective, I start out by explaining what the set-up of a simple model of an industry looks like and how the competition in that industry is analysed with the Cournot model. I then go on to reviewing literature that analyses the failing firm defence and I explain different models that are used in the literature.

1.4 Limitations

The conclusion drawn from the models are heavily dependant on the set-up of the models and should be regarded as hints of how the FFD affects welfare rather than facts. Also, the result derived are dependant on that the industry being analysed can be modelled with the Cournot model.

The articles reviewed below are the only ones, to my knowledge, with the focus on analysing the FFD in a homogenous good industry with the Cournot Model. There exist

⁷Dnr. 445/2011

⁸Nynas/Shell/Harburg Case M.6360

⁹Aegan/Olympic II Case M.6796

¹⁰"Juridiska spetsfundigheter" in Swedish

other papers that discuss the FFD but they either do not mainly analyse the FFD or they do not analyse the FFD in a homogenous good industry with the Cournot Model.

1.5 Outline of the Thesis

In the second section, a Base Model that is similar to the models presented in the third section is explained. By understanding how the Base Model works, the models and results presented in the third section are easier to grasp. In the third section, literature that covers the subject of the failing firm defence is reviewed and some of the models presented in the literature are explained. The literature is discussed in the fourth section, and the fifth section is a summary of the thesis.

2 Base Model

Economists use models to analyse different situations and effects that different actions have. This section presents a simple model of an oligopoly industry that can be used to analyse the effect that a merger has on welfare. By understanding how the model presented below works, the results that follow from the literature in the third section will be easier to grasp.

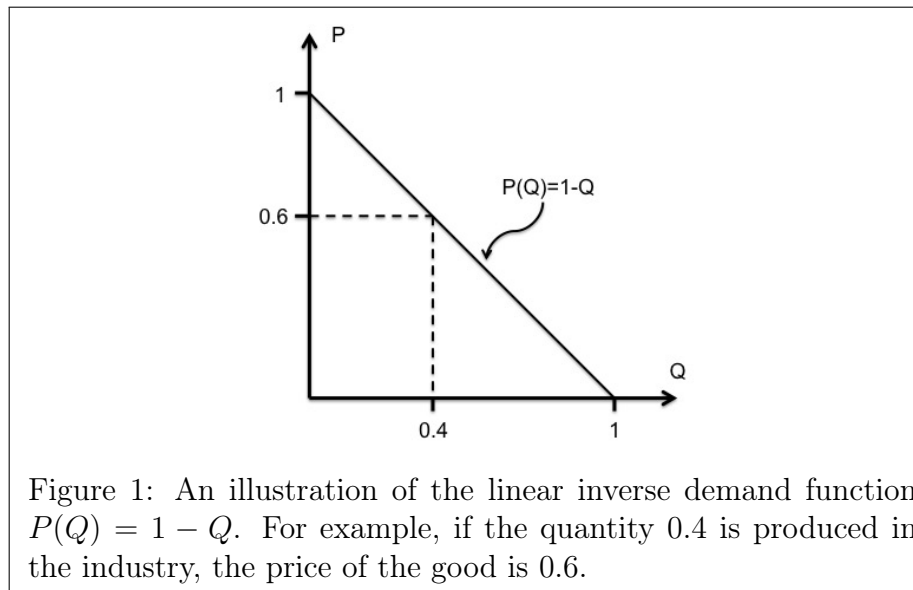
2.1 Industry Characteristics

The Base Model is a model of an industry with $n \geq 2$ number of firms that produce a homogenous good and compete with each other by simultaneously determining how many goods they will produce. The quantity that each firm produces is denoted by q_i , where the subscript i denotes which firm's quantity it is and can take any value between 1 and n : $i \in \{1, \dots, n\}$. For example, q_2 should be read as the quantity produced by Firm 2. By adding together all firms' quantities we get the quantity produced in the industry as a whole. Industry quantity is denoted by Q and is mathematically written as $Q \equiv \sum_{i=1}^n q_i$.

2.2 Demand

To capture the effect that the quantity produced by each firm has on the price of the good produced in the industry, the linear inverse demand function $P(Q) = 1 - Q$ is used. This function is illustrated in Figure 1 and shows that the larger industry quantity is, the lower is price. Since neither price nor quantity may be negative, both variables are limited to values between 0 and 1 inclusive, mathematically: $P \in [0, 1]$ and $Q \in [0, 1]$. This limited range is obviously not realistic for an industry, but works well in our models when we want to compare quantity and price in different situations rather than finding

exact values. For example, when analysing the effect of a merger we are more interested in finding if it has a negative or positive effect on price than finding a specific value for the change in price.



2.3 Consumer Surplus

To determine the effect of a merger on consumers, it is sufficient to look at changes in industry quantity.¹¹ An increase in industry quantity implies both a reduction in price (given the linear inverse demand function above) and an increase in the text-book definition of consumer surplus. The latter is defined as follows:

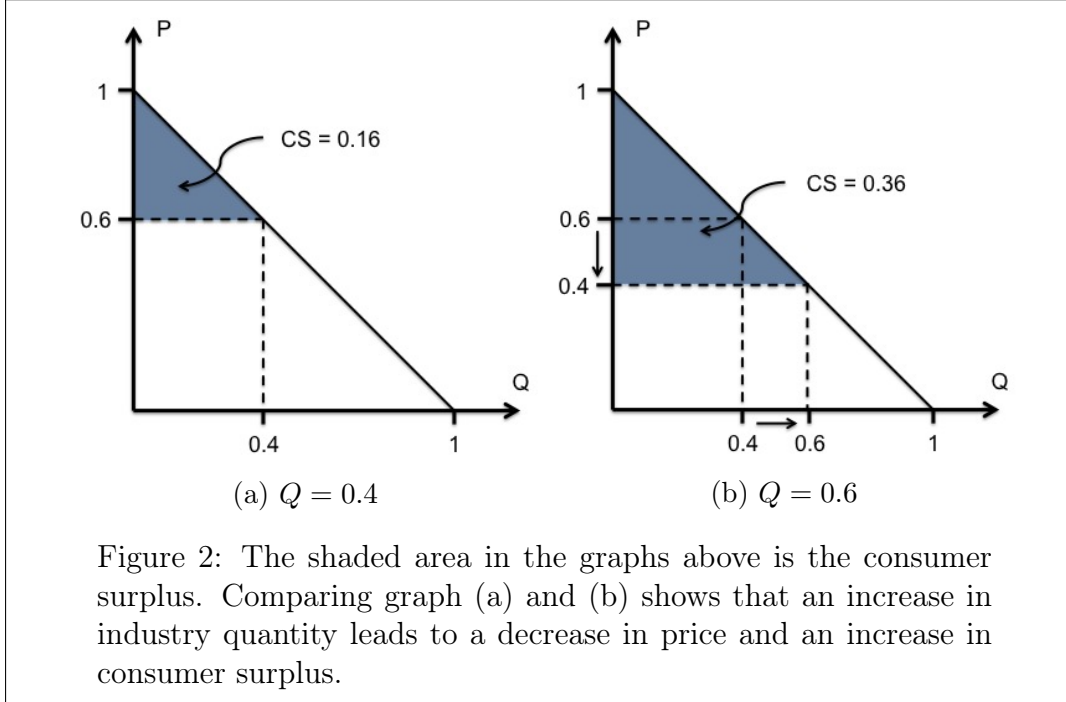
$$CS \equiv \underbrace{\int_0^Q p(Q)dQ}_{WP} - \underbrace{p(Q)Q}_{TC} = \left[Q - \frac{Q^2}{2} \right]_0^Q - Q + Q^2 = \frac{Q^2}{2}$$

The definition shows that consumer surplus is measured as the sum of the willingness' to pay (WP) of the consumers who buy the product less the total cost (TC) they pay for the products. Figure 2 provides a graphical illustration of consumer surplus (CS).

2.4 Cournot Model

All firms active in the industries analysed are assumed to be profit-maximising, which means that they will choose to produce the quantity that yields the largest profit for the firm. Given this assumption together with the assumptions that the industries consist of firms that produce a homogenous good and that firms compete by determining the

¹¹Remember from the introduction that AAs measure welfare as the effect on consumers.



quantity they produce,¹² the industry can be modelled with the Cournot model, one of the most well known models of competition in an oligopoly industry. To find the quantity that each firm choose to produce in equilibrium, we start out from the profit function for each firm. Profit for firm i is denoted by π_i and is calculated as follows:

$$\pi_i = \underbrace{P(Q)q_i}_{\text{Revenues}} - \underbrace{C_i(q_i)}_{\text{Costs}} \quad (1)$$

$C_i(q_i)$ denotes firm i 's cost function, and is a function of the quantity produced by the firm. As will be made clear throughout this paper, cost functions may take many different shapes. In this model, one with constant marginal cost c_i and no fixed cost is used: $C_i(q_i) = c_i q_i$. This cost function states that firm i 's total cost increases with c_i for each additional good it chooses to produce. Using this cost function and the linear inverse demand function from above, the profit function in Equation (1) may be written as

$$\pi_i = (1 - (q_i + Q_{-i}) - c_i)q_i, \quad (2)$$

where Q_{-i} is the quantity produced by firm i 's rivals: $Q_{-i} = Q - q_i$. To find what quantity firm i should produce to maximise its quantity, its profit function in Equation

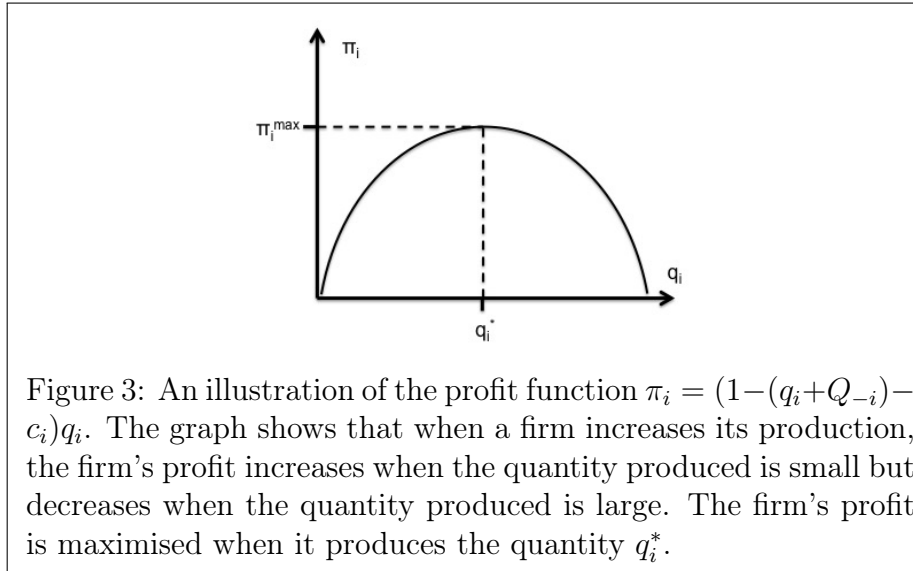
¹²Note that the firms do not set the price of the good that they sell. The price is a function of the industry quantity as given by the linear inverse demand function.

(2) is derived with respect to q_i and the derivative is set equal to zero.

$$\frac{\delta\pi_i}{\delta q_i} = 1 - 2q_i - Q_{-i} - c_i = 0. \quad (3)$$

The derivative in Equation (3) gives the change in profit for a firm when it changes its quantity produced by a small amount. The profit function is illustrated in Figure 3 and the quantity for which the derivative is zero is the quantity when the profit goes from increasing to decreasing for every additional unit of quantity.¹³ That quantity is the equilibrium quantity and solving Equation (3) for q_i yields an expression for it:

$$q_i^* = \frac{1 - Q_{-i} - c_i}{2} \quad (4)$$



Equation (4) shows that the choice of quantity produced by a firm depends on the sum of quantities produced by its rivals. Since it is assumed that all firms are profit maximising, all firms in the industry will set their quantity as in Equation (4) and their equilibrium quantities can be added together to find equilibrium industry quantity:

$$\sum_{i=1}^n q_i^* = Q^* = n - nQ^* - \sum_{i=1}^n c_i \quad (5)$$

¹³That the derivative is zero at a maximum can also be proved by deriving Equation (3) with respect to q_i : $\frac{\delta^2\pi_i}{\delta q_i^2} = -2 < 0$. The second derivative of π_i with respect to q_i being negative, it must be that the q_i^* given by Equation (4) maximises firm i 's profit.

Solving equation (5) for Q^* yields

$$Q^* = \frac{n - \sum_{i=1}^n c_i}{n + 1}. \quad (6)$$

Equation (6) shows that equilibrium industry quantity in the Cournot model is determined by the number of firms in the industry and the marginal cost of each firm in the industry. The dependance on only these two variables is important to remember because it highlights the effect that the marginal cost function being used has on industry quantity, and because the marginal cost function will vary between the models presented in this paper.

Plugging Equation (6) into Equation (4) yields a function for each firm's equilibrium quantity that is dependant on the number of firms in the industry and the marginal cost for each firm in the industry:

$$q_i^* = \frac{1 - nc_i + \sum_{j \neq i} c_j}{n + 1} \quad (7)$$

The sum $\sum_{j \neq i} c_j$ denotes the sum of all firms' marginal cost except the marginal cost for the firm which quantity is being determined.

Finally, the profit for firm i in equilibrium may, using the expression for Q^* in Equation (6), be calculated as the square of the equilibrium quantity produced by the firm:

$$\pi_i^* = (1 - Q^* - c_i)q_i^* = \frac{n + 1 - n + \sum_{j=1}^n c_j - nc_i - c_i}{n + 1} q_i^* = (q_i^*)^2 \quad (8)$$

2.5 Marginal cost reduction

A central part of the papers presented below is analyses of the effects that a marginal change in one variable has on industry output. Such a change is calculated by deriving the partial derivative of industry quantity with respect to the variable. To give an example of how this is done, I show how a marginal change in one firm j 's marginal cost will affect industry output given the same set-up as above. To denote that a partial derivative is calculated, the greek letter δ is used. To make the notation more simple, I follow Friedman (1986) and substitute the sum in Equation (6) with S , which yields the following expression for industry quantity:

$$Q^* = \frac{n - S}{n + 1}, \quad (9)$$

where $S = \sum_{i=1}^n c_i$. When calculating the partial derivative, it can be divided into two parts to simplify the calculation:

$$\frac{\delta Q^*}{\delta c_j} = \frac{\delta Q^*}{\delta S} \frac{\delta S}{\delta c_j} = \frac{-1}{n-1} \quad (10)$$

The result stems from that the derivative of Q^* with respect to S is equal to $\frac{-1}{n-1}$ and that the derivative of S with respect to c_j is equal to 1. Since n by definition is larger than 1 will the partial derivative of industry quantity with respect to the c_j always be negative. This implies that a reduction in one firm's marginal cost increases industry output, and thereby reduces price and increases consumer surplus.

3 Review of literature and models

In this section, four models that evaluate the welfare effect of the FFD are reviewed, compared and commented. The models are similar to the Base model but they have different cost functions, and not all models are of industries with n firms.

As mentioned in Section 1, there exist literature that do not focus on analysing the FFD in a Cournot model. Saloner (1987) analyses incentives for predatory conduct in a Cournot industry and part of his conclusion is that the failing firm may increase a dominant firm's incentive to prey on a rival in an industry with two firms. When predation increases, the likeliness of the industry becoming monopolised increases and welfare is thereby reduced. Mason and Weeds (2002) suggest that a more lenient version of the first FFD-criterium may stimulate entry in an industry by increasing the expected profit for owners of the firms since they can sell the firm if it faces bankruptcy. By stimulating entry, existence of the FFD lead to increased competition and welfare in Mason and Weeds model. Bouckaert and Kort (2014) analyses the effect that the FFD has on a three-firm industry with differentiated goods when one of the firms fail. Part of their analysis takes place in a Cournot industry but the set up is very different from ones in the papers below and I have therefor choose to not include it below. The conclusion that Bouckaert and Kort (2014) reach is that the FFD is welfare increasing but that firms does not find it profitable to use the defence and that there exist situations where the government should bail-out failing firms since it has a welfare increasing effect.

Of the papers reviewed below, Friedman (1986) looks at FFD-mergers that reduce marginal cost for the merging firm and thereby increases welfare, Persson (2005) looks at if the second FFD-criteria is formulated in a way that maximises welfare, Fedele and Tognoni (2010) looks at if FFD-mergers may deter future entrance into the industry and thereby decrease welfare, and Vasconcelos (2012) looks at if existence of the FFD may

induce firms to embark on mergers that lead to failure of their rivals and thereby decrease welfare.

3.1 Marginal Cost Reduction

Friedman (1986) was first to publish an article where the FFD is analysed in the Cournot model. The paper is published in a law journal and the analysis of the FFD in a Cournot industry makes up only a small part of the paper. The analysis is however worth bringing up here because it provides an understanding of the basic intuition behind the existence of the FFD.

3.1.1 Set-up

The model that Friedman (1986) uses consist of an industry with one failing firm and n healthy firms. Each firm has the following marginal cost function:

$$MC_i = \underbrace{c_i}_{\text{constant part}} + \underbrace{d_i q_i}_{\text{variable part}} \quad (11)$$

The subscripted i 's indicate that the marginal cost might vary between different firms. The marginal cost function has one constant part and one variable part. The latter causes a firm's marginal cost to increase when it increases its quantity produced. As shown in Section 2, marginal cost is one of the variables that a firm's produced quantity is a function of, and the function for a firm's optimal quantity will therefor be different from the one given in Section 2. Deriving the function for firm i 's optimal quantity the same way as in Section 2 but using the marginal cost in equation (11) instead of constant marginal cost c_i yields the following function:

$$q_i^* = \frac{1 - Q^* - d_i}{1 + c_i}$$

3.1.2 Scenario Analysed

Friedman (1986) assumes that the failing firm's assets will exit the industry in the near future unless they are acquired by one of the other incumbent firms. He further assumes that an incumbent firm that acquires the assets of the failing firm will reduce its marginal cost through the additional capacity that it gains from the acquisition. The cost reduction is analysed in three different scenarios:

1. The c -term is zero for all firms, and the d -term is reduced for the acquiring firm.

2. The c -term and the d -term are both positive for all firms, and the c -term is reduced for the acquiring firm.
3. The c -term and the d -term are both positive for all firms, and the d -term is reduced for the acquiring firm.

3.1.3 Results

For all of the cost reduction scenarios, Friedman (1986) shows that the industry quantity will increase when an incumbent firm acquires the failing firm's assets.

3.1.4 Probability of Failure

Friedman (1986) also discusses if the approval of a FFD-merger should be a function of the probability of failure of the failing firm and the increase in industry output that a FFD-merger yields compared to if the failing firm's assets exit the industry. He does so by calculating a ratio R between the difference in industry output when the failing firm survives (Q_S) and when a proposed merger is allowed (Q_A) and the difference between industry output when a proposed merger is allowed and when a proposed merger is blocked and the failing firm's assets exit the industry (Q_B). The ratio is defined as following:

$$R = \frac{Q_S - Q_A}{Q_A - Q_B}$$

Friedman (1986) describes this ratio as “the key ratio that the odds of failure must exceed to justify the conclusion that the market will be more competitive if the acquisition is allowed than if it is [blocked]” (1424-1425) and concludes “that (on most cases and under our simplifying assumptions) only when the odds of failure are substantially greater than even will the expected competitive value of a market be greater if the acquisition is allowed than if it is [blocked]” (1426). That is, for a merger to be allowed, the state of a failing firm should be such that it will go into bankruptcy much more than half the times in the event that the merger is blocked.

3.1.5 Comments

The analysis by Friedman (1986) gives a good idea of the intuition behind the FFD. If a firm and its assets inevitably will leave a market, then it is better for consumers if one of the healthy firms acquire the failing firm, given that the only effect that the merger has is that the acquiring firm may produce at a lower marginal cost. Also, by showing that the probability that a firm will fail must be high for the expected welfare to be higher when a merger is allowed rather than blocked provides support for the first FFD criterium.

3.2 Determination of Buyer of a Failing Firm

Persson (2005) focuses on the second FFD-criteria by analysing if it is formulated in a way that maximises welfare. To do so, he sets up an auction where a failing firm's assets are sold.

3.2.1 Set-up

The model that Persson (2005) uses is of an industry with one failing firm and two healthy firms: Firm 1 and Firm 2. Included in the model is also a potential buyer of the failing firm's assets active outside the industry, named Firm e . Selling the failing firm's assets to Firm e is equivalent to liquidating the assets. The marginal cost function that Persson (2005) uses for Firm 1 and Firm 2 is the following:

$$MC_i = k_i^{-\alpha_i} \quad (12)$$

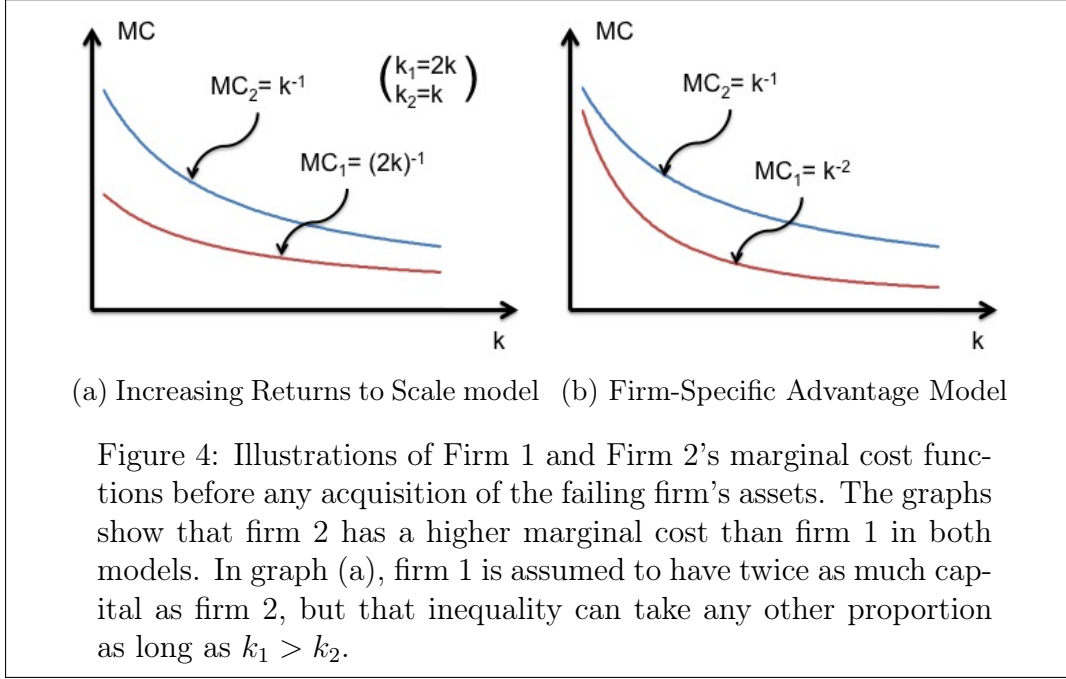
Since Equation (12) is the marginal cost function for Firm 1 and Firm 2, i is either 1 or 2: $i \in \{1, 2\}$. k_i is the amount of capital owned by firm i and α_i captures the magnitude of Firm i 's economies of scale.¹⁴ The market share s_i for Firm i is calculated as the fraction of the industry quantity that is produced by the firm ($s_i = \frac{q_i}{Q}$) and Firm 1 has a larger market share than Firm 2 ($s_1 > s_2$). The difference in market shares stems from that Firm 1 is able to produce a larger quantity than Firm 2 because the former has a lower marginal cost than the latter. Persson (2005) analyses two possible reasons for why Firm 1 has a lower marginal cost than Firm 2. The first reason is that the firms possess different amounts of capital (*Increasing Returns to Scale Model*) and the second one is because the efficiency that they are able to use their capital at differs (*Firm-Specific Advantage Model*). In the *Increasing Returns to Scale Model*, $k_1 > k_2$ and $\alpha_1 = \alpha_2 = 1$, and in the *Firm-Specific Advantage Model*, $k_1 = k_2 = k$ and $\alpha_1 = 2 > \alpha_2 = 1$. The marginal cost functions are illustrated in figure 4. Although difficult to see by eye, MC_2 is always decreasing by more than MC_1 when k increases in the *Increasing Returns to Scale Model*. When k increases in the *Firm-Specific Advantage Model*, MC_1 decreases faster than MC_2 for low values of k while the opposite holds for high values of k .

3.2.2 Scenario Analysed

The second FFD-criteria states that for a proposed merger to be allowed there needs to be “no less anti-competitive alternative purchase than the notified merger”¹⁵, which Persson

¹⁴The benefits that a firm realises from a larger production

¹⁵Paragraph 90, 2004 OJ C 31/03. Available Online:
[http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52004XC0205\(02\)&from=EN](http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52004XC0205(02)&from=EN) [Re-



(2005) interprets as that for the merger to be allowed with application of the FFD, there must be no firm that has a smaller market share than the merger-proposing firm and that is willing to pay a price for the failing firm's assets that is higher than the liquidation value of the assets. Using that interpretation, he creates an auction where the failing firm's assets are sold and where the winner is decided as a function of the bidding firm's market shares and their bids.

The market shares are defined as above and $s_1 > s_2$ because of the difference in marginal costs. The bid that each firm makes for the failing firm's assets is the price that it is willing to pay them. The price that each of Firm 1 and Firm 2 is willing to pay for the failing firm's assets is equal to or smaller than its valuation of acquiring the assets. A firm's valuation depends on 1) its profit when acquiring the failing firm's assets and 2) its profit when one of the other two firm's acquires the failing firm's assets. For example, Firm 2's valuation of acquiring the failing firm's assets when Firm 1 acquires them in the counterfactual scenario is denoted:

$$v_2^{21} = \pi_2(\mathbf{K}^2) - \pi_2(\mathbf{K}^1) \quad (13)$$

where $\mathbf{K} = (k_1; k_2; k_e; k_f)$ is a vector that show how much capital each firm owns and the superscript denotes which firm has acquired the failing firm's assets. For example, $\mathbf{K}^1 = (k_1 + k_f; k_2; k_e; 0)$ denotes the capital allocations after firm 1 acquires the failing firm's assets. In total, there are five different valuations: v_1^{12} , v_1^{1e} , v_2^{21} , v_2^{2e} , and v_e^e . Firm e 's valuation is unaffected by what the counterfactual scenario is since its profit will be

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unchanged unless it is the acquirer.

It is important to understand that Firm 1 and Firm 2's valuations of acquiring the failing firm's assets depend as much on the profit that the firm will make if it acquires the assets itself as on the profit it will make under the counterfactual scenario where its rival or firm e acquires the assets. To understand why this is, recall from Section 2 Equation (8) that shows that a firm's profit in equilibrium is the square of the quantity that the firm produces and Equation (7) that shows that a firm's equilibrium quantity is a function of both its own marginal cost and its rival(s) marginal cost(s). If Firm 1 or Firm 2 acquires the failing firm's assets, that firm's capital will increase and lead to a decrease in its marginal cost. The decrease in marginal cost leads to an increase in profit for the acquiring firm and a decrease in profit for its rival. If Firm e acquires the assets, Firm 1 and Firm 2's marginal cost will be unchanged.

Persson (2005) assumes that the outside Firm e will always be the acquirer of the failing firm's assets in the absence of the FFD. However, with the FFD, the acquirer can be Firm 1 or Firm 2 given that their bid is larger than the bid of Firm e . If both Firm 1 and Firm 2's bids are higher than Firm e 's bid, Firm 2 will be the acquirer of the failing firm's assets since Firm 2 has a smaller market share than Firm 1. Using these rules, Persson (2005) calculates what firm will be the one acquiring the failing firm depending on the ordering of the five different valuations. To evaluate the effect that the FFD has on welfare, he 1) compares the change in industry quantity when the winner of the auction acquires the failing firm's assets to the change in industry quantity when firm e acquires the assets, and 2) compares the change in industry quantity when the winner of the auction acquires the failing firm's assets to the change in industry quantity when the firm that as the acquirer of the assets maximises the change in industry quantity is the firm that acquires the assets.

3.2.3 Results

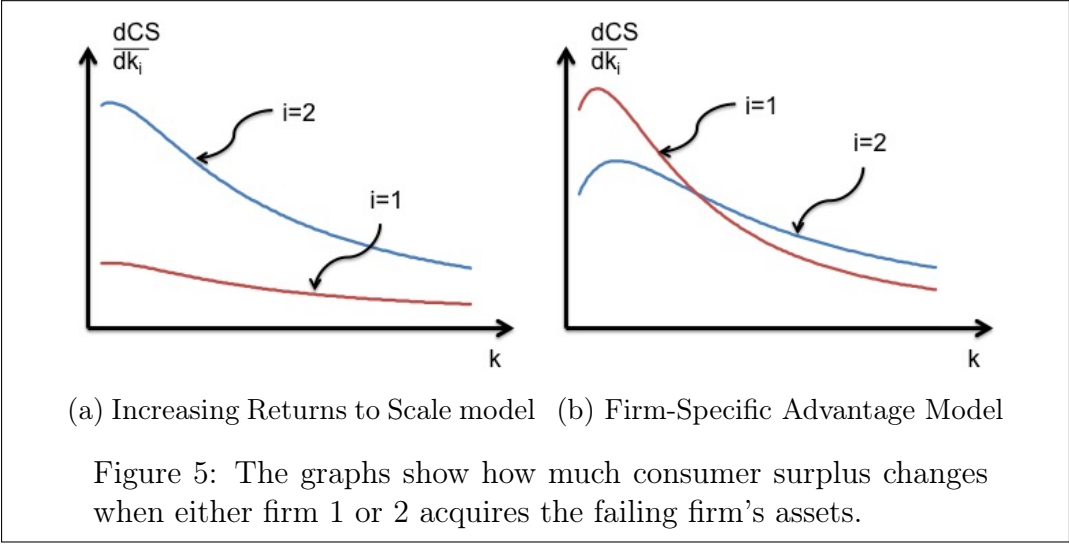
Just as in Friedman's (1986) model is the industry quantity in Persson's (2005) model always higher when a failing firm's assets are kept in the industry rather than when they exit the industry. Persson's analysis does however primarily regard the optimality of the FFD, and the result varies depending on the cost structure being used.

In the *Increasing Returns to Scale Model*, Persson (2005) shows that consumer surplus is always maximised when Firm 2 acquires the failing firm's assets. This is shown in Graph (a) in Figure 5. Persson (2005) finds that Firm 2 may however not acquire the failing firm's assets if its valuation of doing so, and thereby price it is willing to pay, is lower than the price paid by Firm e . He shows that this is the case if firm 2 is small.

In the *Firm-Specific Advantage Model*, Persson (2005) shows that consumer surplus is

maximised when Firm 2 acquires the failing firm’s assets unless both Firm 1 and Firm 2 are relatively small, then Firm 1 is the preferred acquirer of the assets from a consumer perspective. This is shown in Graph (b) in Figure 5. Persson (2005) shows that Firm 2 will acquire the failing firm’s assets when it is optimal acquirer unless Firm 2 is small enough to have a valuation that is lower than the liquidation value of the assets (Firm e ’s valuation), and that Firm 1 will acquire the assets when it is optimal unless the liquidation value of the assets is very low.

To sum up the effects on welfare under the two different cost-function models, Persson (2005) concludes that “the FFD rule works reasonable well when size differences between firms are not too large and the small firm is not very small in absolute terms” (190). Persson suggests that FFD-mergers can be approved if the above is true and that a more elaborate analysis is needed if not.



3.2.4 Extension - Potential Entrant

In addition to the analyses presented above, Persson (2005) looks at how the welfare effect of the FFD changes when a potential entrant is included in the same model as above. When there is a potential entrant to the industry, Persson (2005) finds that the FFD yields a higher welfare than if it does not exist but that welfare is not always maximised since an entrant will acquire the failing firm’s assets instead of one of the incumbent firms if the entrants bid for the assets is smaller than the price that firm e is willing to pay.

3.2.5 Extension - Predation

Persson (2005) also looks at what effect the FFD has on the incentives for predatory conduct in the same model as above. He finds that the incentive for two strong firms to predate on a weak firm depends on the the price that firm e , which is determined by

v_e^e , is willing to pay for the assets of the weak firm if it fails. The difference in incentives to predate between when the FFD exist and when it does not is that an incumbent firm that is unable to acquire the failing firm’s assets with application of the FFD gains less from predating if another incumbent firm acquires the failing firm’s assets instead of the assets exiting the industry. This is the case if v_e^e is high. If v_e^e is low on the other hand, the FFD increases the incentive for a firm to predate on a weak firm even if the other firm do not contribute to the predation since the price that the preying firm has to pay for the assets of its prey will be low.

3.2.6 Comments

Persson’s (2005) analysis is based on the assumption that AAs prefers a buyer of a failing firm that has a smaller market share to another potential buyer is based on the ruling from the FFD-merger case from 1969 between Citizen Publishing Co. v. United States,¹⁶ which Hovenkamp (2011) partly summarises as stating that “no less anticompetitive acquisition (i.e. by a smaller competitor or a noncompetitor) is available as an alternative” (p.602). This interpretation of “no less anticompetitive acquisition” seems outdated and new tests, for example the Upwards Pricing Pressure test, for predicting effects of mergers have emerged since 1969 (Baltzopoulos & Kim & Mandorf 2015). If it can accurately be measured how consumer prices will develop following the AA’s decision, market shares do not have to be used as a measurement of industry competitiveness and the AA will more often maximise welfare by letting the firm that as the purchaser of the failing firm’s assets maximises welfare be the firm that acquires the assets. The fact that Persson (2005) uses this interpretation of the second FFD-criteria makes his conclusions weaker.

Also, Persson (2005) uses the size of Firm 1 and Firm 2 to evaluate if the FFD maximises welfare but the valuation of firm e to acquire the failing firm’s assets (v_e^e), and thereby price that firm e is willing to pay, has just as big an impact on if the FFD maximises welfare. If the assets of the failing firm are very industry-specific, v_e^e will be low and the probability that welfare is maximised increases in the *Increasing Returns to Scale Model* as well as in the *Firm-Specific Advantage Model* unless k is low. If both v_e^e and k are low in the *Increasing Returns to Scale Model*, welfare is not maximised (Given Persson’s [2005] interpretation of the second FFD-criteria).

Persson’s (2005) analysis of when there is a potential entrant in the model and regarding predation provides support for the existence of the FFD. The finding that the FFD usually reduces the incentive for predation in an industry with more than two stands in opposition to Saloner’s (1987) conclusion that the FFD increases the incentive for predation

¹⁶Citizen Publishing Co. v. United States, 394 U.S. 131 (1969), Available Online: <https://supreme.justia.com/cases/federal/us/394/131/> [Accessed 6 April 2016]

in an industry with two firms.

3.3 Entry Deterrence

Fedele and Tognoni (2010) analyses if the FFD may lead to a sub-optimal industry structure welfare wise by letting an incumbent firm acquire a failing firm's assets instead of letting the assets exit the market, and thereby making room for an entrant firm.

3.3.1 Set-up

Fedele and Tognoni (2010) uses a model of an industry with n healthy firms and one failing firm, where the firms have constant marginal cost c and capacity k_i . Fedele and Tognoni (2010) assume that a firm needs one unit of capacity to produce one unit of quantity and cannot produce more than its capacity, which is expressed as $q_i \leq k_i$. Further, they assumes that if a firm wants to increase its production to a level above capacity it has to expand its capacity at a marginal cost of r per capacity unit and that it will take one time period from when a firm decides to expand it capacity to when capacity is ready. Given the expansion cost r , the marginal cost for a firm will vary depending on if it produces above its capacity or not. The marginal cost can be written as follows:

$$mc_i = \begin{cases} c & \text{if } q_i \leq k_i \\ c + r & \text{if } q_i > k_i \end{cases} \quad (14)$$

It should be pointed out that $c + r$ will be the marginal cost only for the number of goods produced above capacity. The marginal cost given by Equation (14) is however the marginal cost used when a firm determines its profit-maximising quantity under Cournot competition. The marginal cost function is illustrated in Figure 6 Graph (a). One way to make the marginal cost function comprehensible is to use that the area under Graph (a) up to a q_i is the total cost associated with producing the quantity q_i . Fedele and Tognoni (2010) assumes that all firms have the same capacity $k_i = K$ and therefor produce the same quantity in Cournot equilibrium since they have symmetric marginal cost functions.

3.3.2 Scenario Analysed

Fedele and Tognoni (2010) evaluates the FFD by calculating industry output at two times: at $t = 0$ and at $t = 1$. Time $t = 0$ occurs after a healthy firm has reported a merger with the failing firm to the AA, and the AA has either approved the merger with application of the FFD or blocked the merger. If the merger is approved, Fedele and Tognoni (2010) assume that the merged firm will have capacity $2K$ while the other $n - 1$ firms have

unchanged capacity K . On the contrary, there will be no merged firm and n incumbents with capacity K if the merger is blocked.

Time $t = 1$ occurs at a sufficiently long time after the first time for giving a potential entrant the chance to enter the industry by building capacity and for giving incumbents the chance to expand theirs. If the entrant enters the industry, it has to pay a fixed cost that Fedele and Tognoni (2010) puts a constraint on so that it is profitable for the entrant to enter the industry only when the merger is blocked by the AA. Further they assume that the potential entrant was not ready to enter the market when the merger was reported and could therefore not have been the firm to acquire the failing firm's assets.

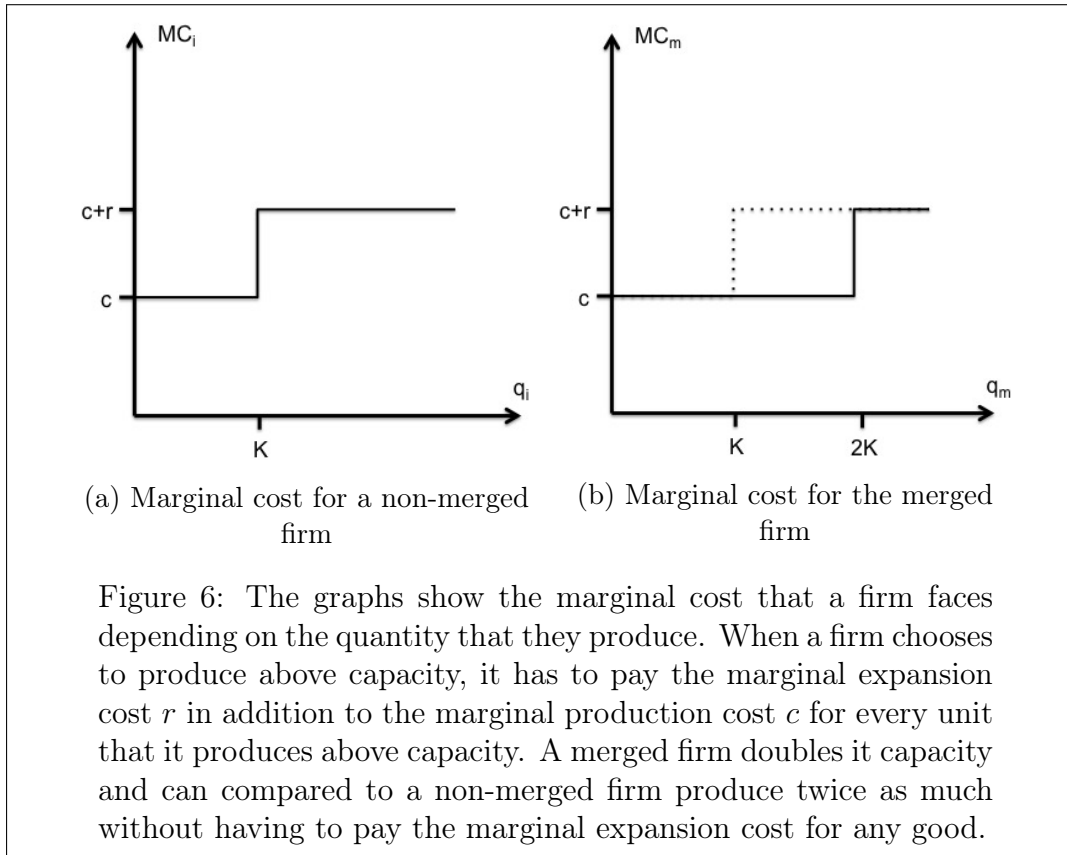
3.3.3 Results

Consumer surplus at the two different times depends on the size of K and on if the AA approves or blocks the proposed merger. At $t = 0$, Fedele and Tognoni (2010) find that unless capacity is high, consumer surplus is the highest when the merger is approved. If capacity is high, consumer surplus will be the same regardless of the AA's decision. For consumer surplus at $t = 1$, Fedele and Tognoni (2010) find that it will be the highest when the merger is blocked since an entrant will then enter the market and the number of firms in the industry will be higher compared to when the merger is approved and the potential entrant is deterred from entering the industry.

By calculating firm and industry quantities at $t = 0$ and $t = 1$ given different values for capacity and comparing these values, Fedele and Tognoni (2010) find that blocking a merger where an incumbent firm proposes to acquire the failing firm will yield a higher welfare compared to approving the merger if the industry only has two firms in it and the merging firm would become a monopolist, or if the capacity is low and there are three or four firms in the industry.

3.3.4 Comments

Fedele and Tognoni's (2010) result is similar to Friedman's (1986) and Persson's (2005) results that a merger that reduces the acquiring firm's marginal cost increases consumer surplus. The acquisition of the failing firm's assets in the model of Fedele and Tognoni (2010) leads to an increase in capacity for the acquiring firm similar to a reduction of marginal cost since the acquiring firm can increase output without paying the marginal expansion cost r . This effect is illustrated in figure 6 graph (b). The underlying question for Fedele and Tognoni's (2010) analysis (does the FFD decrease welfare by deterring future entry to the industry?) is interesting but some doubts and uncertainties arise concerning their model and the usefulness of their findings arise.



One doubt concerns Fedele and Tognoni’s (2010) limitation of the value the marginal expansion cost r to be between 0 and a maximum value that is $(1 - \frac{3}{8}\sqrt{7})(1 - c)$ if $n \leq 11$ and $\frac{1-c}{n^2+1}$ if $n > 11$. The case where the number of firms in the industry is more than 11 is however irrelevant because an AA is unlikely to even investigate a reported merger in such a competitive market. In the European Commission’s Guidelines it is in paragraph 10 stated that “[t]he Commission is unlikely to identify horizontal competition concerns in a market with a post-merger HHI below 1 000” and the HHI for an industry with 11 firms with market share S and 1 firm with market share $2S$ falls under that limit.¹⁷ The inclusion of such high numbers of n makes one wonder how well the authors know the legislation surrounding the subject that they are writing about. Also, they write that “increasing the upper bound on r complicates computations without adding generality to our analysis” (Fedele & Tognoni 2010, p.372). I would rather argue that they limit the results of their analysis to be applicable on FFD-mergers in industries where the relation between the marginal expansion cost r and marginal production cost c falls within their limit.

Another thing that makes Fedele and Tognoni’s (2010) analysis difficult to grasp is

¹⁷HHI is calculated as the sum of the squared percentage market shares of the firms in an industry: $HHI = \sum_{i=1}^n (100 * s_i)^2$. For an industry with 11 firms where one firm is a merged firm that took over the market shares for both firms that merged and the industry pre-merger included 12 symmetric firms, the HHI is: $10(\frac{100}{12})^2 + (\frac{100}{6})^2 = 972 < 1000$

their use of different values of capacity. One way of making the analysis and thereby conclusions more straight-forward could be to assume that all firms produce at capacity before $t = 0$. The only two reasons that I can see for why the firms would produce below capacity are that the firms are colluding and because demand for the good that the firms produce has gone down. Concerning the first reason, Williamson (1977) finds that excess capacity is only held in “dominant firm and collusive oligopoly industries” (p.292) and I believe it can be assumed that the industry being analysed is not collusive.¹⁸ Regarding the second reason I think that it is a reasonable assumption to make that demand has not gone down. It could however be that demand has fallen (Persson [2005] uses demand fall as a possible reason why the failing firm in his model is failing [p.178]) but that it has not is an assumption that makes more sense than assuming that r and K are within the strict limits that Fedele and Tognoni (2010) sets. If the assumption that firms produce at capacity, we have that $K = \frac{1-c-r}{n+1}$ since the firms have in previous periods set equilibrium quantity given the marginal costs c and r .

A welcome addition to their paper would also be that Fedele and Tognoni (2010) to a greater extent discussed the time that it takes to build capacity. In the paper they write that the consumer surplus at $t = 1$ does not need to be discounted because doing so does not change their result “unless one assumes a very high discount factor” (p.376). They do not mention how high this discount factor would have to be but if the assets that would exit the market if the failing firm is not acquired takes many years to rebuild, the discount factor can possibly become very high.

Lastly, another uncertainty that arises is what effect the results can have on the way that AAs handle merger cases where one of the firms are failing. Fedele and Tognoni’s (2010) analysis is based on the assumption that there is a firm that will enter the industry if the merger is blocked. That such a potential entrant exist can never be taken for granted in the real world and a merger cannot be blocked on the ground that an entrant may enter the industry in the future. The results from their analysis is however support for AAs practice to ensure that there are no other potential buyers of a failing firm than the firm that is proposing a merger.

3.4 Increase in Incentive to Merge

Vasconcelos (2013) looks at if existence of the FFD may have a welfare reducing effect by incentivising firms to do mergers that lead to failure of the industry’s non-merged firms since the merged firm can acquire the non-merged firm with application of the FFD. He

¹⁸One reason why this can be assumed is that firms in a collusive agreement should not want to propose a merger to the AA since that will lead to the AA investigating the industry’s market structure and the chances that the AA finds out that the firms are colluding increases

does so by setting up a three-period extensive form game where one merging incumbent firm and the AA are the players.

3.4.1 Set-up

Vasconcelos' (2013) model is of an industry with four firms with the cost function $C_i = \alpha \frac{4}{k_i} q_i + f k_i$ where k_i is the industry-specific capital owned by firm i , and α and f are constants. From the cost function, the following marginal cost function is derived:

$$MC_i = \frac{\delta C_i}{\delta q_i} = \alpha \frac{4}{k_i} \quad (15)$$

The cost function captures a two-folded effect on a firm when its capital increases following a merger: a decrease in constant marginal costs and an increase in fixed costs. The values of α and f determine the magnitude of these changes. The marginal cost function is similar to the one used by Persson in the *Increasing Returns to Scale Model* since a firm with more capital will have a lower marginal cost and therefore produce more than a firm with less capital, given that α is the same for both firms.

3.4.2 Scenario Analysed

In the first period of the game, one of the four firms announces a merger. This firm is named firm m . The firm decides if it is announcing a merger with one, two, or all three of its rivals and thereafter reports the merger to the AA. A game theoretic notation for the set of strategy choices for firm m in period 1 is $S_m^1 \in \{1; 2; 3\}$.

In the second period, the AA responds to firm m 's reported merger. As stated in the introduction of this paper, the AA has three choices to choose between when faced with a merger proposal; they can block the merger (B), or allow (A) it with or without some obligation(s). In Vasconcelos' (2013) model, an obligation takes the form of the merging firm having to divest assets. One unit of capital k cannot be divided into smaller parts and is therefore the smallest divestment that can be made as an obligation. If a divestment is possible, and in that case what kind of divestment is possible, depends on the number of firms that firm m wants to merge with. If firm m proposes a merger with one of its rivals divestment is not possible since it would have the same effect as blocking the merger. If firm m proposes a merger with two of its rivals, divestment of one unit is possible. The unit of capital can be divested either to an entrant firm (D^e) or to the incumbent firm that is an outsider to the proposed merger (D^e). Finally, in case firm m proposes a merger with all three of its rivals, the AA has three different divestments among its choices: divestment of one unit to one entrant (D^e), divestment of one unit to each of two entrants (D^{ee}), or divestment of two units to one entrant (D^{2e}). The strategy

set for the AA is $S_{AA}(S_m^1) \in \{A; B; D^I|2; D^e|2, 3; D^{ee}|3; D^{2e}|3\}$

In the last period of the game, any firm with only one unit of capital will fail as long as the merger was not blocked. Firm m can then choose to merge with the failing firm(s) with application of the FFD. When a merger has been approved and resulted in firm m having two units of capital, Vasconcelos (2013) consider only the possibilities to not merge with any and to merge with all failing firms, and not the possibility to merge with only one of the failing firm. Therefore, firm m has to choice to merge no firm (N) or with all failing firms (F). The strategy set for Firm m in period 3 is $S_m^3 \in \{N; F\}$.

To facilitate the understanding of the game, it is in Figure 7 illustrated as an extensive form game-tree. Wherever there is a dot, one player has a choice to make and the strategy choices are written on or next to the nodes going down from the circle. The numbers at the end of nodes that are not connected to a circle show the capital allocation following the strategy choices on the nodes following to the number. The first digit represents the capital held by Firm m and any following digits represents the capital held by other firms in the industry. The illustration shows that Firm m (denoted by f_m) is the first player to act and chooses among a strategy from his strategy set S_m^1 . Thereafter the AA chooses between the choices in strategy set S_{AA} . Depending on the choice of the AA, Firm m might have another choice and gets then to choose from strategy set S_m^3 .

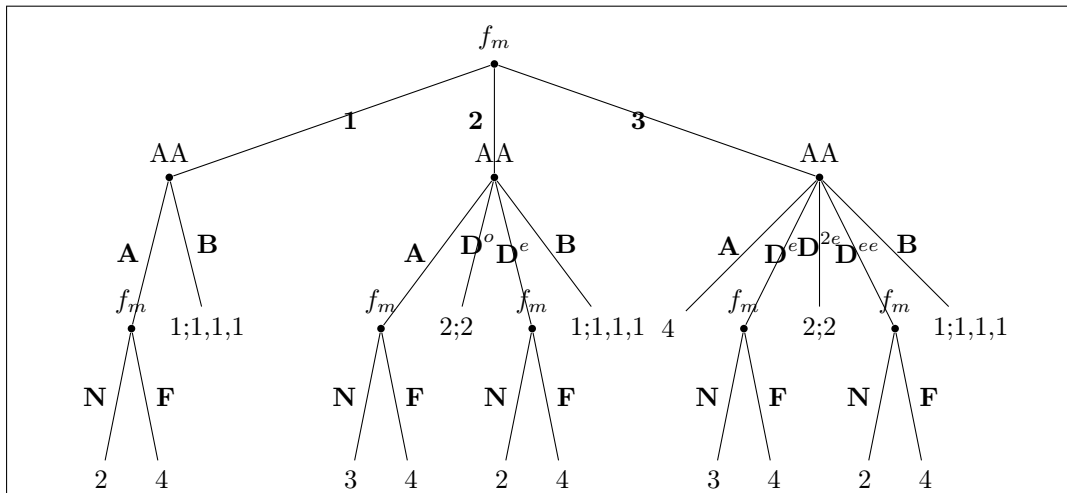


Figure 7: Vasconcelos model illustrated as an extensive form game between a merging firm and the AA. f_m and AA denotes which player it is that has a choice to make at the dot above which the player's name stands. The letters and digits on or next to the nodes that go down from a dot stands for the strategy choices that a player has at the dot. The digit(s) at the end of nodes that do not lead to a dot stands for the market outcome that emerges when the strategies on the nodes that lead to the digit(s) are chosen. A single digit stands for the capital owned by a monopolist, 2; 2 stands for a duopoly in which both firms own two units of capital, and 1; 1, 1, 1 stand for that the market structure is unchanged compared to before the game started.

3.4.3 Results

Using the different capital allocations at the end of the game (\mathbf{a} denotes a vector of the capital allocation at the end of the game), the AA can calculate what consumer surplus will be and firm m can calculate their profit (π_m) given different strategy choices. To get a result of the game, a technique called backwards induction is used. Without going into further detail of how it works and leaving it at that each player (f_m and AA) will in each period choose the strategy that maximises their pay-off ($\pi_m(\mathbf{a})$ respectively $CS(\mathbf{a})$) depending on the capital allocation that the strategy leads to. After solving the game for its Nash Equilibrium (which is an outcome where no player has an incentive to change its strategy choice given the other player's strategy choice), Vasconcelos finds that depending on the size of the marginal cost constant α the FFD may either increase or decrease welfare, but that the overall effect given a uniformly distributed α is positive. Vasconcelos shows that the existence of the FFD makes it more likely that an industry will be monopolised.

3.4.4 Comments

Vasconcelos' (2013) model is quite technical and it is questionable how useful the results of his analysis are. Compared to previous models, his analysis is most similar to Saloner's (1987) and Persson's (2005) work concerning predatory conduct. AAs should investigate if a firm may have merged with other firms with the intention that non-merged firms fail. If so is the case, the AA should block the merger to deter such behaviour in the future. Apart from that conclusion, I do not see many application of Vasconcelos' (2013) analysis.

4 Discussion of Literature

One thing that I miss from all the models is more of a discussion about how the merger is carried out. In the models by Friedman (1986), Persson (2005), and Vasconcelos (2012), it is assumed that a healthy incumbent firm acquires the assets of the failing firm. The definition of assets is however vague and it must be that the healthy firm acquires either the whole failing firm or a whole business unit of the failing firm since the merger is being reported to an AA. If just the assets of the failing firm were sold, the buyer with the highest willingness to pay for the assets would be the one to purchase the assets.

I also miss a discussion about what happens to a failing firm if it is not acquired. Usually when a firm goes bankrupt, it will continue to be run by a bankruptcy trustee. Unless the trustee is able to sell the firm, it will eventually be shut down and the trustee will try to sell the assets of the firm in order to get money to the different stakeholders in

the firm. At that point, an incumbent firm can purchase the assets and the AA cannot stop the purchase of the assets. If that is the outcome following a blocked merger, the effect that the FFD has is that it transfer assets from the failing firm to the healthy firm at an earlier point in time. It would presumably be better for welfare if the merger is allowed right away since the trustee will start closing the firm and the acquiring firm will face costs when putting the firm back to business. This scenario should be analysed further and can be a subject for future literature.

It is further not in all papers clear how the transaction of the ownership of the failing firm is carried out. If the healthy firm pays the failing firm's owners with stock in the new company, the owners from the two different companies should not have equal ownership of the merged firm. This is the case in Bouckaert and Kort (2014) where the conclusion that no healthy firm will propose a merger with a failing firm is drawn since the profits that a merged firm makes will be split equally among the healthy and the failing firm's owners, and half of the profit that a merged firm makes is smaller than the profit that a non-merged firm makes. If the acquiring firm purchases the failing firm with cash this should have an effect on the merged firm's future investment possibilities. In Fedele and Tognoni's (2010) model, the merged firm should have less ability to increase capacity compared to non-merged incumbent firms since they were all identical pre-merger and the merged firm has used up some of its financial possibilities to make investments when acquiring the failing firm. This does however command that the firms are completely symmetric pre-merger, which is not realistic outside of models.

5 Conclusion

The main conclusion of this thesis is that the primary welfare increasing effect that the FFD has is that it lets healthy firms decrease their marginal cost by acquiring a failing firm. A decrease in marginal cost leads to increased production in the industry and consumer surplus increases. This effect is best modelled as an increase in a firm's capital holding, which the firm's marginal cost is a function of. By using the Cournot model, the effect that a change in a firm's marginal cost has on the produced quantity by that firm and other firms in the industry can be analysed. Apart from the positive effect on welfare that marginal cost reductions have, the biggest take away from the literature that has been studied is that it is difficult to make generalisations regarding how an acquisition of a failing firm will affect the structure of the industry and it is therefore important that AAs find the correct counterfactual scenario for each individual merger case.

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Appendix

	Friedman (1986)	Persson (2005)	Fedele and Tognoni (2010)	Vasconcelos (2012)
Number of firms	n	$1, 2, f, e$	n	4
MC-function	$c_i + d_i q_i$	$\frac{1}{k^\alpha}$	$\begin{cases} c & \text{if } q_i \leq k_i \\ c+r & \text{if } q_i > k_i \end{cases}$	$\alpha \frac{4}{k_i}$
Scenario	Acquisition of a failing firm reduces marginal cost	Market shares and bid sizes determine which firm acquires the failing firm	Acquisition of a failing firm deters entrance to the industry	FFD incentives firms to do mergers that lead to the failure of rival firms
Result	FFD increases welfare	FFD increases but not always maximises welfare	FFD decreases welfare if the industry consists of few firms and they have low capacity	FFD usually increases welfare and also increases likelihood that industry becomes monopolised

Summary and side-by-side comparison of the four papers analysed