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*THE TELEVISION INDUSTRY: The interplay between products, advertising, and programme quality**

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Summary:

The purpose of this report is to examine the rivalry within the product and the TV market, respectively, and how those two markets interact through the market for advertising on TV. After a brief introduction where we describe some characteristics for the TV industry, we elaborate on two different theoretical models; one by Motta and Polo, and one by Grossman and Shapiro. Both models are extended to capture the interaction between the TV market and the product market. Finally, we discuss briefly some of the potential market failures in the TV industry.

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1. INTRODUCTION

The television industry is apparently more complex than many other industries. It is an interplay between at least three factors: products, advertising and programming. The TV station airs *programs* for viewers, and it sells *advertising* slots to firms. Each firm decides which *products* to produce and how much advertising slots it should purchase. Then we see that firms compete on different areas. On the one hand, TV companies compete for viewers through their choice of programming. A typical revenue source is the sale of advertising slots to producers. On the other hand, producers compete for customers and use TV advertising as one measure to attract customers to buy their product. We see that TV companies and producers compete with each other, respectively, and that there are close links between those two arenas. In particular, TV companies earn revenues from setting aside space for advertising, while the producers pay for the advertising and hope to attract customers and thereby increase sales as a result of the advertising.

The purpose of this report is to investigate the rivalry within the product and the TV market, respectively, and how those two markets interact through the market for advertising.[1] We have chosen to apply a theoretical perspective, focusing on what we believe is important driving forces in this particular industry. This in turn serves as a background for understanding the need for public policy in the industry in question. Note, though, that a discussion of specific public policy measures is not an issue in this report, but only touched upon briefly at the end of the report.

As we have argued, the interaction in the industry in question is quite complex. In Section 2 we illustrate the complexity and characteristics of this industry

[1]Note that the characteristics of the radio industry are very similar to those of the TV industry, so our analysis in this report is also relevant for radio broadcasting.

by describing some facts. Therefore, it is no surprise that it turns out that models analyzing this industry can only capture some of the elements involved. Due to this, we have chosen to investigate the industry from two quite different angles. One starting point is to focus on the TV companies and their choice of programming and advertising. In Section 3 we use a model, first introduced in Motta and Polo (1997a), to investigate more in detail the TV companies' behaviour. However, in their model there is by assumption no strategic interaction between the producers in the product market. We have therefore extended their model to take into account strategic interaction in the product market, focusing on the case with a limited number of TV channels. The other starting point is the producers' strategic use of advertising to get an advantage in the product market. In Section 4, we use a model first introduced in Grossman and Shapiro (1984) to investigate the producers' choice of price and advertising outlay. We extend their model to take into account imperfect competition in the market for TV advertising by assuming that the TV firms set the slot prices of advertising. In Section 5 we summarize our results, and discuss briefly some potential market failures in the TV industry.

2. THE TELEVISION INDUSTRY

In this Section we will give a brief description of some characteristics for the TV industry. We have chosen to apply a broad definition of the TV industry, including the TV channels as well as the producers in the product markets who use TV to advertise their products. We first briefly describe the industry structure, and then the role of advertising as a link between those two markets.

2.1 THE INDUSTRY STRUCTURE[2]

The broadcasting industry is less than one hundred years old. It started out with radio broadcasting in the early twentieth century. In the 1930s, television was introduced in the US and United Kingdom. During the next two decades, television service was introduced in many countries, among them the large Western European countries. In the early 70s, one still observed that a few firms dominated the industry. In the US, the TV channels CBS, NBC and ABC had more than 90 % of the audience. In the UK, BBC was only challenged by the private channel ITV. In other large European countries, such as France, Germany, Italy and Spain, a public channel had a monopoly position. The high concentration in this industry could apparently be explained by technological constraints. Until the 70s, television was broadcasted by over-the-air networks. Since the number of frequencies available on the radio spectrum was limited, the number of TV channels in each country also had to be limited.

From the mid-70s, new technology made it possible for new TV channels to enter the industry. Cable and satellite broadcasting offered new entry opportunities,

and the introduction of digital technology made it possible to increase the number of channels broadcasted over-the-air. Despite the removal of technological constraints, in many countries the industry continued to be dominated by few firms. In Table 1, we report the market share of the four largest TV channels in the five largest Western European countries in 1991.

In the US, the three dominant channels ABC, NBC and CBS have lost market shares since the early 70s. This is due to the introduction of a fourth over-the-air network, Fox of the Murdoch group, and the success of cable TV services in the US. But the four large over-the-air networks had in the early 90s still a market share of around 70%.

Table 1. Concentration in the TV market

	France	Germany	Italy	Spain	UK	Japan	US
4 firm audience	91%	73%	69%	89%	94%	77%	70%
4 firm ad. rev.	89%	95%	65%	80%	96%	n.a.	n.a.

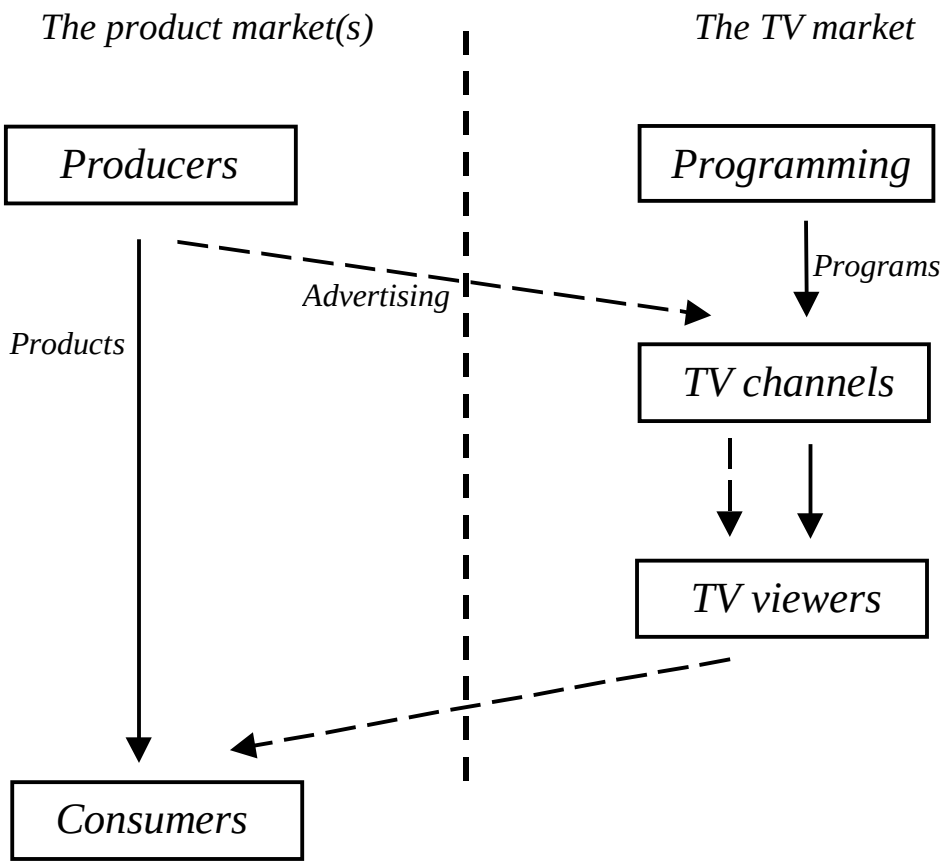
Source: Carat (1992), referred to in Table 3 in Motta and Polo (1997b), concerning 4 firm advertising revenue, and Motta and Polo (1997b) Table 1, concerning four firm audience.

We have witnessed a deregulation of the TV industry in many countries in the last two decades. In contrast to the US, television was introduced by public channels in all Western European countries. Except for the UK, where a private TV channel was established in mid 50s, the first private channel was introduced in the 80s in the largest European countries. This implies that, during the last two decades, advertising has become a major revenue source for TV channels in many countries, partly replacing the revenue from compulsory subscription for public TV channels. The

[2]Unless otherwise stated, this Section draws on information reported in Motta and Polo (1997a, 1997b) and Albaran and Chan-Olmsted (1998).

interplay between the TV market and the product market, as illustrated in Figure 1, has therefore become important in many countries.

Figure 1. The structure of the TV industry



The vertical structure of the TV industry differs in the US and Europe. In the US, several antitrust decisions have banned many kinds of vertical restraints between the programming industry and the TV channels (see Ornstein, 1998). As a result, programming in the US is dominated by large film studios, while in Europe a larger fraction of programming is integrated into the TV channels themselves. However, from the mid-90s, the antitrust authorities in the US has relaxed its restrictive policy towards vertical restraints in the TV industry, and we now observe closer vertical integration in the US TV industry through mergers and acquisitions.

As mentioned above, for many years technological constraints on transmission limited the number of over-the-air television channels. However, this is no longer any serious obstacle to entry. On the other hand, there might be barriers to entry due to the cost structure in programming. Producing a high quality program might be very costly, while it can be cheap to produce a low quality program. After the programme is made, on the other hand, the cost of serving an additional viewer is very limited. This illustrates that fixed costs associated with programming are determined by the TV channels, and might be the outcome of a game for attracting viewers. Such a rivalry between the firms will result in high fixed costs, thereby deterring outside firms from entering the industry. This is exactly the mechanism we set out to elaborate on in Section 3.

2.2 THE ROLE OF ADVERTISING

The introduction of advertiser-supported TV added a new dimension to the TV industry. TV advertising has become important as such measured in turnover, and it has also captured a large share of total advertising. In the US, television ads amounted to 41.1 billion US $ in 1998, more than 50% of total amount spent on advertising.[3] In Norway, television ads is expected to reach 4.7 billion Norwegian Kroner in year 2000, which is slightly less than half the total advertising in Norway.[4] As should be clear from the above description – see Figure 1 – there are two distinctly different arenas where TV advertising plays a role: TV viewers and consumers in the product market.

[3]From data reported by *Advertising Age* on http://adage.com/dataplace/archives/dp394.html.

2.2.1 TV viewers

A typical viewer watches TV simply because s/he likes the programs being aired. TV advertising then becomes a second, complimentary product. Empirical literature indicates that a typical viewer dislikes advertising breaks. It is documented that viewers try to escape from advertising breaks, see for example Thorson and Zhao (1997) and Danahar (1995). For example, it was observed by the water commissioner in Toledo, Ohio that each advertising break in the show 'I Love Lucy' was marked by a huge drop in water pressure as thousands of toilets flushed at once (referred in Zhou, 1999).[5]

If TV viewers could easily escape advertising breaks, the viewers' costs associated with such breaks would be limited. For example, a viewer could zap to another channel. However, the TV channels' behaviour have made such an escape difficult for the viewers. It is in the interest of a TV channel that viewers watch TV ads, because its revenue comes from selling advertising. As shown in Zhou (1999), the large US TV channels synchronise advertising breaks both concerning the length and the timing.[6] In such a way they force more viewers to watch advertising. Zhou (1999) shows that in theory it is individual rational (Nash equilibrium) for the TV channels to synchronise advertising breaks. Hence, the predicted behaviour by TV channels – a behaviour which is supported by empirical evidence – reinforces the costs for viewers associated with advertising breaks.

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[4]See the data reported by *Propaganda*, January 19, 2000 on http://www.propaganda-as.no/.

[5]However, one can argue that in this respect TV advertising is distinctly different from advertising in other media. In particular, readers may actively look for certain advertisements in newspapers or magazines, making it natural in such cases to assume that consumers like advertising. Häckner and Nyberg (2000), for example, have made such an assumption in a model of the newspaper industry. See also Rysman (2000) on the market for Yellow Pages, a product consumed strictly because of the advertising it contains.

2.2.2 Consumers in the product market

How would advertising on TV impact the rivalry between producers in the product market? The existing theoretical literature points to several possible effects in the product market of advertising in general. First, let us distinguish between the effect of advertising on (i) the number of producers in an industry and (ii) the price rivalry between existing producers in an industry.

Concerning the number of producers, existing literature indicates that advertising can limit the number of producers. Sutton (1991) compares advertising-intensive industries and other industries. He predicts from theory a distinctly different market structure in those two types of industries, and finds support for his prediction from data for the food industry in six large OECD countries. In the advertising-intensive industries, one may have large endogenous fixed advertising costs which, in turn, implies that the industry can only support a limited number of firms.[7] Hence, seller concentration may be higher in advertising-intensive industries than in other industries. Sutton's predictions are supported by the empirical findings reported in Robinson and Chiang (1996).[8]

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[6]The overlap between any of the three TV channels NBC, ABC and CBS concerning advertising breaks is 70%, while random timing would result in an overlap of only 30%. 100% overlap is in practice impossible, because breaks are inserted between different news stories and different programs.

[7]Note that the picture is more complicated than reported here. If the market is of limited size, then advertising is limited. In such a case the industry called advertising-intensive can support more producers than other industries, because such industries are characterized by differentiated products. Differentiated products will typically dampen price rivalry, which, in turn, may support a larger number of producers in the free-entry equilibrium. But this is true for low levels of advertising. As argued in the text, advertising as such tends to limit the number of producers that can exist in a free-entry equilibrium.

[8]This is apparently in contrast to the earlier empirical literature in the socalled *SCP*-paradigm (Structure-Conduct-Performance), who found only limited support for a positive relationship between advertising and concentration. But Sutton (1991) argues that the model applied in the earlier empirical literature was misspecified. One should distinguish between advertising-intensive and other industries and test them separately, which the earlier empirical literature failed to do.

Concerning the effect on the price rivalry between existing producers, we may distinguish between three different aspects: information of a product's existence/price; signal of product quality; loyalty of consumers.

First, advertising can inform consumers about the mere existence of a brand or the retail price of a brand. Typically, such advertising would result in more price competition in the product market. Consumers become aware of more products, and the producers have to compete more vigorously on prices to attract the informed consumers. This point was first analysed in Grossman and Shapiro (1984), and we will describe that model in Section 4. Although results are not clear-cut, it seems as if the empirical studies typically supports the predictions from theory that informative advertising has a pro-competitive effect.[9]

Second, advertising can signal product quality. A high quality producer can spend large amounts on advertising, because its present sales will trigger a large amount of repeat purchases from satisfied customers. A low quality producer, on the other hand, will not find it profitable to mimic the high quality producer's advertising outlay, because its profits from repeat purchases is limited. A rational consumer would then associate high advertising spending with high quality even if the advertising in question contains no information whatsoever about the product's quality. Moreover, theory predicts that, in order to signal high quality, a producer combines high advertising expenditures with high prices. Over time prices fall towards the full information price level as consumers obtain more information. This

[9]In particular, empirical studies seem to suggest that advertising of *prices* results in lower prices. A classical study in the economic literature is by Benham (1972), who found that advertisements of prices of eyeglasses resulted in more intense rivalry on prices. Kaul and Wittink (1995), in a survey of the marketing literature, conclude that 'the use of price advertising leads to lower prices'.

idea concerning advertising as a signal of product quality is formalised in Milgrom and Roberts (1986). However, there are few empirical studies testing this theory.[10]

Third, advertising can increase consumer loyalty. Increased loyalty implies that for a given price by a rival product, the price premium on our product can now be higher before a consumer decides to switch to the rival brand. No surprise, then, advertising that increases consumer loyalty is dampening the price rivalry in the product market. Products are becoming more differentiated seen from the consumers' point of view, and it is well known from theory that this may dampen price competition. Such anti-competitive effects of advertising are formally modelled in Fudenberg and Tirole (1984).

From the brief discussion above it is not at all clear whether the net effect in the product market of advertising is anti-competitive or pro-competitive. A natural next step would then be to examine more in details results from empirical studies. To simplify matters, let us focus on TV advertising rather than advertising in general. In the literature there are several empirical studies of advertising, but few of them focus on TV advertising. One notable exception is Eckard (1991). He studies the effect of the 1970 ban on TV advertising for cigarettes in the US. He concludes that the ban had an anti-competitive effect, implying that TV advertising as such would have increased price rivalry. Another notable exception is Kanetkar *et al*. (1992). They study how TV advertising affects consumers' price sensitivity for two frequently purchased consumer goods. They find that, for high levels of advertising exposure, price sensitivity drops, while the opposite is true for lower levels of advertising exposure. This implies that, at high levels of TV advertising, further advertising dampens price competition, while the opposite is true for lower levels of TV

[10]Thomas *et al*. (1998) does not test the theory as such, but they find results from the US automobile industry that is consistent with the theory.

advertising; in other words, there is a U-shaped relation between the level of advertising in an industry and the product price prevailing in the industry.

Since there are few studies of the competitive effect specifically of TV advertising, it can be useful to examine the results from empirical studies of advertising in general. In both the economic and the marketing literature, results are ambiguous: Some studies conclude that advertising is anti-competitive, others that it is pro-competitive.[11] In recent marketing literature, one have started classifying which effects promote and which dampen price competition (see Kaul and Wittink, 1995). While this is valuable for classifying the effect of advertising in a specific industry, it is not that relevant for how advertising on TV affects product market rivalry. The reason is that several industries advertise on industries, implying that the effect of TV advertising is expected to be ambiguous.

Another much debated issue in the empirical literature is how advertising affects sales. Although many empirical studies do show that TV advertising has a significant effect on own sales (see Blair and Rosenberg, 1994), some doubt this conclusion (see Tellis and Weiss, 1995). The next question is whether advertising is *predatory* or *cooperative*. The former is the case where advertising has no effect on total sales, and only affect market shares. The latter is the case where advertising expands total sale in the industry. Again, empirical results are ambiguous. Some studies find that advertising can be predatory, see for example Nelson (1999) concerning TV advertising for tobacco in the US; while other studies find the opposite result, see for example Roberts and Samuelson (1988) concerning the US cigarette industry. Still other studies find ambiguous results, see Slade (1995b).

[11]For a survey of the empirical economic literature, see Slade (1995a), and see Vakratsas and Ambler (1999) for a review of the marketing literature. Anand and Schachar (1997) test for whether TV advertising is informative or persuasive and find that both effects are significant.

3. RIVALRY IN THE TV MARKET

According to the description in Section 2, there are large fixed costs in the TV market. In particular, the TV channels compete on quality of programming. In the following we will report from a theoretical model, first presented in Motta and Polo (1997a), from now on denoted MP. The main focus in their article is the endogenous nature of that kind of fixed costs. In Section 3.1 we present their model and the main findings. We argue that it is of interest to extend their model, to focus more in detail on the interplay between the product market and the TV market and the strategic interaction in both the TV market and the product market. This is what we set out to do in Section 3.2, where we present a variant of the MP model.

3.1 MOTTA AND POLO (1997a)

In MP, the broadcasting industry consists of two different groups of firms: first, the TV market where TV channels compete for audience; second, the product market where producers compete for sale of its product. Those two markets are linked through advertising, demanded by the producers and supplied by the TV channels. So their model is very much in the spirit shown in Figure 1.

3.1.1 The model

They apply the following rules of the game:[12]

Stage 1: TV firms decide to enter or not

Stage 2: TV firms choose the quality of their programs

Stage 3: TV firms select the supply of advertising slots

Stage 4: Producers choose their demand of advertising slots

Stage 5: Viewers decide which channel to watch, if any

The model is solved by backward induction, and we therefore start with the viewers' choice.

Stage 5: Viewer's choice

What determines a viewer's choice of TV channel, and how much s/he decides to watch? To answer the question, we have to start with the utility function of a viewer. A viewer's utility from watching a programme on channel k with quality q_k and advertising time a_k is the following:

$$U_k = \theta q_k - a_k + \varepsilon_k = s_k + \varepsilon_k \qquad (1)$$

for $k = 1, .. , m$, where ε_k is a random i.i.d. term with zero mean and finite variance. The outside utility is represented by setting $k = 0$ in the above expression. We see that a viewer's utility is increasing in programme quality and decreasing in the amount of advertising. This implies that a typical viewer is attracted by TV programmes and

[12] It may looks unfamiliar that TV channels and producers sequentially choose the quantity of advertising. In equilibrium, though, the TV channels' and the producers' choices are consistent: The equilibrium price of advertising will be such that, at stage 3, TV channels choose an amount of advertising slots that is identical to the amount of advertising demanded by producers at stage 4.

dislikes advertising breaks. Such a disutility from advertising is consistent with results in the empirical literature (see Section 2.2.1). Such a utility function gives rise to the following audience function for channel *k*:

$$N_k = \delta\left[\alpha(m) + \beta(m)(\theta q_k - a_k) - \gamma(m)\sum_{j\neq k}(\theta q_j - a_j)\right] \qquad (2)$$

assuming that:

(i) $\beta(m) \geq (m-1)\gamma(m) \geq 0$

(ii) $\alpha(m) \leq 1/m$

There are three endogenous variables, *i.e.*, choice variables determined by the firms in the industry:

m = number of TV companies

q_k = quality of TV programs of channel k

a_k = amounts of advertising slots of channel k

In addition, there are five parameters influencing the size of channel *k*'s audience. δ is a pure shift parameter, scaling up or down the audience, and can be interpreted as the size of the population of viewers. The parameters α, β, and γ all depend on the number of firms, although the exact relationship is not explicitly formulated in (2). α can be interpreted as a parameter determining each viewer's demand for TV watching for a given quality of programming and for a given amount of advertising slots. The parameters β and γ capture how sensitive a viewer is to own relative quality – quality minus amount of advertising slots – and rivals' relative quality, respectively. Finally, the parameter θ measures the marginal impact of programme quality q_k.

We see from assumption (i) that TV channels are imperfect substitutes, with an effect of own quality on own audience that is larger than the effect of rivals'

quality on own audience. Finally, note that assumption (ii) sets a limit to the growth in market size caused by a new TV channel entering the industry.

Furthermore, note from (2) that an increase in advertising, all else equal, reduces the number of viewers. Due to this, there are diminishing returns to advertising. Although an increase in advertising increases the sales to each viewer (see below), it also reduces the total number of viewers.

Stage 4: Producers' choice

Producers set prices for their products and decide the numbers of advertising slots to buy. The demand for producer *i*'s product is defined as follows:

$$D^i(p,a) = d^i(p)\psi\sum_{k=1}^{m} a_{i,k}N_k \qquad (3)$$

Here, $d^i(p)$ captures how product prices for all products affect sales of product *i*, while the parameter ψ captures how advertising and the number of viewers affect the sales of product *i*. Note that products by assumption are identical, and that *p* is a vector of product prices.

In this model, product prices are not affected by the amount of advertising, while advertising, on the other hand, has a scale effect on demand. The former implies that MP, in their modelling, sidestep from the question whether advertising is anti- or pro-competitive.

Moreover, we see that there is, by assumption, no strategic interaction in the product market. However, products are imperfect substitutes (see below). Implicitly, then, there is assumed to be monopolistic competition in the product market.

Producer *i* has the following profit function:

$$\Pi^i = (p^i - c^i)d^i(p)\psi\sum_{k=1}^{m} a_{i,k}N_k - \sum_{k=1}^{m} r_k a_{i,k} \qquad (4)$$

where r_k is the unit price of advertising on TV channel k. As argued, the producer's product price is unaffected by the amount of advertising. Let us, therefore, focus on the producers' advertising decisions. From (4), we can find the first-order condition with respect to a firm's advertising in each TV channel. We assume symmetric producers (identical demand and cost conditions), so that the amount of individual advertising is identical for all producers, and so that also product prices are the same. Then we have the following inverse demand for advertising:

$$r_k = \delta \cdot \psi \cdot (p - c)d(p) \cdot N_k \qquad (5)$$

To simplify, we define:

$$S = \delta \cdot \psi \cdot (p - c)d(p).$$

S is a scale parameter, measuring the producer's profitability for a given amount of advertising. Now, $r_k = SN_k$, where N_k is given in (2): a firm's willingness to pay for advertising in channel k is proportional to the channel's number of viewers.

Comparing (2) and (5), we observe an important difference between the audience function and the willingness to pay for advertising. TV viewers look at TV channels as substitutes. An increase in advertising at TV channel j, results in an increase in the number of viewers of TV channel k. On the other hand, the producers consider the TV channels as complements concerning advertising. If the amount of advertising at TV channel j increases, this would increase the willingness to pay for advertising at TV channel k. The reason is that an increase in advertising at TV channel j will imply that some viewers shift from channel j to channel k.

Stage 1-3: TV firms' choice

As we argued in Section 2, the costs of TV firms are typically fixed. In line with this reasoning, we set marginal costs to zero. In addition, we distinguish between two

different fixed costs. First, we define σ as an *exogenous* fixed cost. We interpret this as technological and institutional costs in association with establishing a TV channel. By definition, the TV channels must incur this cost to be active in the industry. Second, we define *F* as *endogenous* sunk costs. The interpretation is costs associated with programming, and includes production costs and the purchase of transmission. These costs depend on the quality of programming; the higher the quality, the higher the endogenous fixed costs. To capture this in a simple manner, we assume the following cubic function: $F = q_k^3 / 3$.

Channel *k* has then the following profit function:

$$\underset{a_k, q_k}{Max} \ \prod_k = S \cdot N_k a_k - \sigma - \frac{q_k^3}{3} \tag{6}$$

From (6) we can find the marginal profit effect of own advertising, set it equal to zero and solve with respect to own advertising. This is stage 3 of the game. The individual advertising level is then found, and it is a function of the parameters in the model as well as the TV channel's quality level q_k. Given such a choice of advertising level, each TV channel chooses its own quality of programming. This is stage 2 of the game. From the first order condition we can find the equilibrium choice of quality. Finally, firms enter until profit equals zero. This is stage 1 of the game.

3.1.2 The main results

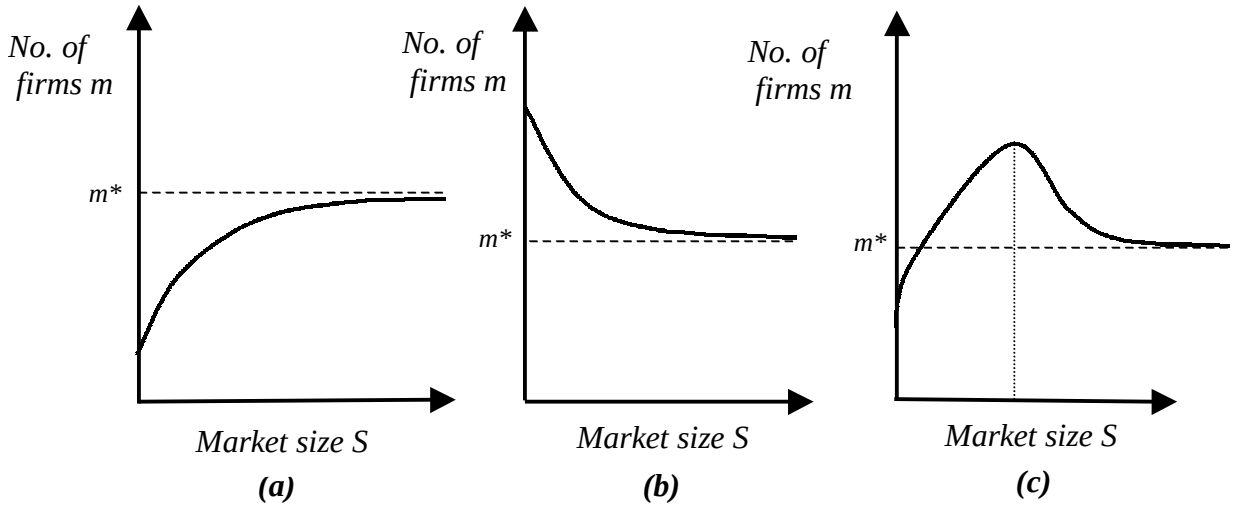
As it should be clear from the previous Section, the MP model becomes quite complicated when we solve for the equilibrium outcome. Let us therefore not report the specific equilibrium values of the choice variables a_k and q_k, but rather report the more qualitative results from the study in MP.

First, it is shown that a symmetric equilibrium exists and is unique. There is a unique advertising level and quality level for each TV channel, and the equilibrium choice of advertising and quality, respectively, are identical for all TV channels.

Second, it is shown that when the market size approaches infinity, the equilibrium number of TV channels does not depend on the market size. This result is illustrated in Figure 2, with three different cases. In all three cases the number of firms goes asymptotically towards m^* when market size approaches infinity.

To understand the results in Figure 2, let us first consider what we would expect in an industry with only exogenous fixed costs. In such an industry an increase in market size would always increase the equilibrium number of firms. Fixed costs per firm are per definition exogenously determined. A larger market size implies a larger potential for covering fixed costs. Consequently, an increase in market size attracts entrants to the industry. In such a case the number of firms in the industry depends on the market size.

Figure 2. Market size and the number of TV channels



However, in the industry in question we have both exogenously and endogenously fixed costs. Due to the latter kind of fixed cost, the market size matters for the individual firm's fixed cost. The larger the market size, the more would a firm gain from an increase in market share. Hence, an increase in market share can trigger more intense rivalry on programming. In our setting, this implies more intense rivalry on quality of programming. Then we have that an increase in market size results in a cost increase due to higher programme quality, thereby higher endogenous fixed costs for each individual firm. Due to this mechanism, a large market cannot support an infinite large number of firms. Each of them would not be able to cover their endogenous fixed costs. As the market size approaches infinity, the number of firms approaches a finite number. This is illustrated in Figure 2 with the number of firms approaching m^*.

MP show that, in their setting, the endogenous cost effect – all else equal – results in fewer firms in a large than in a small market. Put differently, the escalation of the rivalry on quality triggered by a larger market size force some firms to exit the industry. This is illustrated in Figure 2(b), with a negative relationship between market size and the number of firms.

However, the exogenous cost effect has – all else equal – the opposite effect. As explained above, the larger the market size the more firms are able to cover their exogenous fixed costs. If the exogenous fixed cost is of large importance relative to the endogenous fixed cost, then we would expect a relationship between market size and the number of firms as shown in Figure 2(a). An increase in market size attracts new firms to the industry.

Exogenous and endogenous fixed costs have opposing effects on the number of firms in the industry. While exogenous fixed costs implies that the number of

firms increases in the market size, the endogenous fixed costs implies that the number of firms decreases in the market size. The smaller the market, the larger the relative importance of the exogenous fixed costs. Due to this, we can have a relationship between the market size and the number of firms as shown in Figure 2(c). For a low market size, an increase in market size attracts newcomers. For a sufficiently large market size, an increase in market size triggers more intense rivalry on quality and forces some firms to exit.

Third, MP have shown that the industry is not necessarily highly concentrated if there exists a sufficient degree of product differentiation in the TV market.[13] A large degree of product differentiation implies that viewers are quite loyal to one particular TV channel. Then each TV channel has little to gain from improving quality. A dampening of the rivalry on quality makes it possible for more firms to enter the industry.

3.2 EXTENSIONS

As reported in the previous Section, MP focus on how the industry equilibrium evolves over time. However, their model may also be applied to other issues. In particular, it may be of interest to explore more in detail the link between the TV market and the product market and the rivalry between a limited number of TV channels. This is what we have set out to do in this Section. We have chosen not to report all technical details, nor the proofs. For more details, see Nilssen and Sørgard (2000a).

[13]This result is analogous to the result reported in Schmalensee (1992).

3.2.1 A revised model

Let us stick to the rules of the game proposed in MP. We now simplify the audience function, and add strategic interaction in the product market. Instead of monopolistic competition, we have a product market with *n* firms, either competing a lá Cournot, or colluding on prices. We let each TV channel set the price of advertising and each producer choose his amount of advertising. In contrast, in MP each TV channel as well as each producer sets quantity of advertising. Finally, we do not examine the free entry equilibrium. This implies that stage 1 in MP is not analysed in the following, and firms have profits in equilibrium in the extended model presented here. Below, we focus on a comparison of the cases of TV monopoly and TV duopoly.

Stage 5:

At stage 5, the viewers decide to watch or not a TV channel. We apply a simplified version of MP, and we have the following audience function for TV channel *k*, *i.e.*, the number of viewers for channel *k*:[14]

$$N_k^j = \left[bq_k^j - \sum_{i=1}^{n} a_{i,k}^j \right] - d\left[bq_{-k}^j - \sum_{i=1}^{n} a_{i,-k}^j \right], \text{ where } k=1,2 \text{ and } j=\text{S,C} \qquad (7)$$

Here, the superscript (*S* or *C*) keeps track of the two alternative modes of competition in the product market (see more on this below). The parameter *d* captures the differentiation between TV channels. If *d*=0, then the TV channels are independent. The rival channel's programme quality and amount of advertising have no effect on the number of viewers for our channel. If, for example, a second channel enters with identical investment in programme quality and amount of advertising as the existing

[14]Note that, compared with MP, we have set $\alpha=0$, $\beta=1$ and $\gamma=d$.

channel, then the total number of viewers is doubled. On the other hand, if $d = ½$, then a second channel has no market expansion effect. Adding a second channel to an industry with only one channel will then have no effect on the total number of viewers if the second channel has identical investment in programme quality and amount of advertising as the incumbent channel. Since we are interested in the case where the two TV channels are substitutes and we want to compare monopoly and duopoly in the TV market, we restrict ourselves to the case where $0 < d \leq ½$.

The parameter b captures the effect of programming on quality and thereby the number of viewers. As is the case in MP, the formulation where an increase in advertising reduces the number of viewers implies diminishing returns to advertising.

Stage 4:

At stage 4, the producers in the product market set the amount of advertising. To simplify, we assume that the products sold in the product market are identical. Furthermore, we assume that all consumers are identical. Let p denote the price of one unit sold in the product market for a representative consumer. For each viewer, the profit generated in the product market is

$$Z = (p - c)D, \tag{8}$$

where c is marginal cost and D is sale per viewer.

As described in Section 2, it is not at all clear whether advertising is pro- or anti-competitive. In line with MP, we sidestep from this question by assuming that advertising only affects sales, not prices.

Let $A = \sum_i \sum_k a_{i,k}$, where $a_{i,k}$ denotes the number of advertising slots by firm i in channel k. To ensure that advertising has no effect on the equilibrium price, we apply the following viewer-specific inverse demand function in the product market:

$p = 1 - Y/AT$.

(9) Here, Y is the total sale by the n producers to a viewer, while the parameter T can be interpreted as a scale parameter. It captures other factors than advertising, such as the size of the product market or the total potential sale per viewer.

We allow for two regimes of product-market competition. The first regime is collusion, where firms set prices in the product market to maximise joint profits.[15] Alternatively, they compete. If so, we assume that Cournot competition prevails.

We let superscript S denote the regime where the firms in the product market collude on prices, and superscript C denote the regime where Cournot competition prevails. If we normalise marginal costs to zero, then we have that $p^S = ¼$ and $p^C = 1/(1+n)$.

Producer i's profit per viewer in channel k is, therefore, the following in each of these two regimes:

$$Z_{ik}^S = \frac{a_{i,k}^S \cdot T}{4n} \quad \text{and} \quad Z_{ik}^C = \frac{a_{i,k}^C \cdot T}{(1+n)^2} \tag{10}$$

Total gross profits is found by multiplying profits per viewer with the number of viewers (see the discussion below).

Note from the formulation of the audience function that competition on advertising has many similarities with Cournot competition. It is well known that under Cournot competition with constant unit costs a firm would find it profitable to

[15]The firms collude on prices, but compete on advertising. In the literature, this combination of competition and collusion is labeled semicollusion [see Fershtman and Gandal (1994)]. Since prices are more flexible than most other choice variables, it follows from the theory of repeated games that it is easier to collude on prices than on other variables. Therefore, most of the literature on semicollusion assumes collusion on prices and competition along another dimension, such as for example advertising, capacity, or location. For a review of the literature on semicollusion, see Phlips (1995).

divisionalize as long as it is credible.[16] Then all firms divisionalize in equilibrium. In line with this, unless otherwise stated we assume that all producers advertise in both TV channels (if duopoly).

Let r_k denote the price per advertising slot charged by channel *k*. Producer *i* has the following maximisation problem at stage 2, given that there are two TV channels[17]:

$$\underset{a_{i1},a_{i2}}{Max} \ \prod_i^j = \sum_{k=1}^{2} Z_{ik}^j N_k^j - \sum_{k=1}^{2} r_k^j a_{ik}^j \ , \ \text{where } j=S,C \tag{11}$$

We see that total gross revenue is the potential profits from each viewer multiplied with the number of viewers.

Stages 2 and 3:

We let each TV channel's profit be determined by its revenue from advertising, deducted the costs of programming. In line with MP, we use a cubic function to model the costs of programming; this is the simplest specification that is sufficient to ensure a solution with a finite amount of programme quality. TV channel *k*'s profit function is the following:

$$\underset{r_k,q_k}{Max} \ \pi_k^j = r_k^j \sum_{i=1}^{n} a_{ik}^j - \frac{[q_k^j]^3}{3}, \ \text{where } j=S,C \tag{12}$$

Note that, in our specification, each TV channel sets the price of advertising. In contrast, MP assume that each TV channel sets the quantity of advertising.

[16]As shown in Salant *et al*. (1983), a merger between two firms is unprofitable in this simple Cournot setting. This implies that a divisionalization of the firm into two independent units is profitable. However, all firms would find it individually rational to do so. The equilibrium outcome is an example of a prisoner's dilemma, where all firms produce more than prior to the divisionalization; see Baye *et al*. (1996a, 1996b).

3.2.2 Some additional results

In this Section we report our main results from the extended model. Let us start with the effect of a transition from monopoly to duopoly.

(i) Price per advertising slot is always lower with duopoly than with monopoly in the TV market.

This is no surprise. The introduction of a second TV channel results in rivalry on prices on advertising slots.

(ii) Total investment in programme quality is always higher under duopoly than under monopoly.

This is less obvious. On the one hand, a second channel triggers competition on prices for the advertising slots and thereby reduces the incentives to invest in programme quality. On the other hand, a second channel introduces a business stealing effect. Higher own programme quality will not only increase the total number of viewers in the market, but also shift some viewers from watching the rival's program to a channel's own program. We find that the business stealing effect dominates, causing the total spending on programme quality to rise as a result of the introduction of a second TV channel. However, each duopoly channel's investment in programme

[17]The producers could in general sell a positive amount even if advertising for its own product is zero. However, we simplify by normalising this sale to zero.

quality is always lower than the monopoly channel's investment in programme quality.

(iii) The total number of viewers may drop following the introduction of a second TV channel.

If the TV channels are perfect substitutes, then a second channel's investment in programme quality just duplicates the first channel's investment seen from the TV viewers' point of view. In such a case, the total investment in programme quality in the industry must more than be doubled following the introduction of a second channel for the number of viewers to increase. However, as explained above, each duopoly channel's investment in programme quality is lower than a monopoly channel's investment in programme quality. Therefore, the total number of viewers drops when a second channel – which is perfect substitute to the first channel – enters. On the other hand, if the second channel is independent from the first channel (not a substitute), it is as if you have two monopoly channels. Obviously, then, the introduction of a second channel will increase the total number of viewers. Therefore, a transition from monopoly to duopoly will reduce the number of viewers if the TV channels are sufficiently close substitutes.

(iv) The total spending on advertising may drop when a second TV channel is introduced.

All else equal, a lower price per advertising slot will result in more advertising. On the other hand, as explained above the total number of viewers can drop as a result of

the entry of a second channel. If the TV channels are sufficiently close substitutes, then the reduction in the total number of viewers is so large that it offsets the effect of lower price on advertising. We find that the total spending on advertising drops when the second TV channel enters if the TV channels are very close substitutes. Note, though, that the scope for such an outcome is limited; the channels have to be very close substitutes.

(v) The producers may be better off with a monopoly than with a duopoly in the TV market.

The reason is that the number of viewers is lower in duopoly than in monopoly if the TV channels are sufficiently close substitutes. In duopoly, in contrast to monopoly, one TV channel's increase in the number of viewers from higher programme quality is partly offset by a reduction in the number of viewers for the competing TV channel. Each producer takes into account this indirect effect. It is concerned about the total number of viewers, not the number of viewers for each channel. The loss of profits for the producers due to the reduction in the number of viewers more than offsets the cost reduction due to lower price of advertising in duopoly than in monopoly.

Let us now focus on the nature of competition in the product market, and how it affects the equilibrium outcome in the TV market.

(vi) The nature of competition in the product market matters for the TV channels' choices of price of advertising and programme quality.

To understand this, note that there is a larger profit potential in the product market under collusive price setting than under Cournot competition. Each TV channel exploits this by setting a higher price per slot of advertising. In addition, each TV channel expands this profit potential by increasing its programme quality and thereby the number of viewers.

The link between profits in the product market and the investment in programme quality suggests that the investment in programme quality can be seen as a rent seeking activity. Each TV channel invests in programme quality to attract viewers which, in turn, allows the TV channel to capture a part of the profit potential in the product market.

(vii) Advertising is higher under price collusion than what is the case if Cournot competition prevails.

In a TV duopoly, price collusion results in higher programme quality and higher price of advertising. An increase in programme quality and an increase in the price of advertising have opposite effects on each producer's choice concerning the amount of advertising. Since we find that less rivalry on prices in the product market results in more spending on advertising, it shows that the effect of higher price on each advertising slot is not large enough to offset the effect of higher programme quality. The outcome can be explained by observing a TV channel's profit function. It earns revenues from both price per unit and the total sales of advertising. Larger profit potential is exploited by increasing total sales of advertising slots as well as the price per slot of advertising.

Let us now investigate how the equilibrium outcome is affected by a change in the number of producers in the product market.

(viii) The total spending on advertising increases as a result of a reduction in the number of firms.

This is in contrast to what the received theoretical literature typically predicts. For example, in a traditional Cournot setting a reduction in the number of firms reduces the total sales in the industry.[18] Each remaining producer has a larger market share, and each of them is therefore more concerned about how an increase in own sale affects the price and thereby the income on its existing sale.

To understand why fewer producers result in more advertising, note that this makes each of them more responsive to the programme quality's effect on the number of viewers. Due to this, each TV channel responds to a lower number of producers in the product market by investing more in programme quality and thereby trigger more viewers and more advertising. As argued above, investment in programme quality can be seen as a rent seeking activity. Note also that the price of advertising increases. The reason is that the increase in the potential for advertising is exploited partly by allowing for more advertising slots, and partly by increasing the price for each advertising slot.

So far, we have assumed that there is only one product market. Clearly, this is unrealistic. Therefore, let us now introduce a second industry at the product level. In

[18]See, for example, Salant *et al.* (1983). They find that in an industry with symmetric firms and constant marginal costs, a merger between firms will result in a reduction in sale by the merged firms and an expansion in sale by the non-merging firms. However, the former effect dominates so total sales drop following a merger.

the first product market, we have n firms, and the parameter T is a proxy for the market size. In the second product market, we assume there is only one firm. Hence, we label the first product market the oligopoly product market and the second one the monopoly product market. Moreover, we set T=1 in the monopoly product market. If T=1 in the oligopoly product market as well, then the two product markets are of identical size. The oligopoly product market is the larger one if T>1. To simplify further, we assume that there is only one TV channel. Then we have a larger number of product markets than TV channels.

As before, the TV channel chooses advertising price and program. Now it can either set a price and a programme quality so that firms in both product markets decide to advertise, or it can set price and programme quality so that only firm(s) in one product market decide(s) to advertise. Note that a uniform price is offered all producers, so if some producers decide not to advertise it is because they find the price of advertising too high.

(ix) With one TV channel and identical market size of the two product markets, only the firm in the monopoly product market advertises.

This is true even if there is collusion on prices in the oligopolistic product market. Hence, the firms in the oligopolistic market do not advertise even though the unit price in their product market is identical to the unit price in the monopoly product market and the two product markets face an identical marginal cost of advertising. The driving force behind this result is the market sharing in the oligopolistic product market. There, each firm must share its sale with all its rivals, so that the increase in individual sale by advertising is lower than in the monopoly market. The TV channel

then finds it profitable to focus on the product market where one producer can generate a large sale by advertising and thus has a high willingness to pay for advertising. It sets a high price per ad and offers all producers to advertise, but only the firm in the monopoly market decides to advertise.

(x) Both the number of firms and the nature of competition in the oligopolistic product market matter for whether firms in both product markets advertise.

The more competitive the nature of competition in the oligopoly product market, the more limited is the firm-specific revenue generated in that product market by advertising. Moreover, the larger the number of firms in the oligopolistic product market, the less sales per slot of advertising in that particular product market. Hence, there is a larger scope for the firms in the oligopolistic product market to advertise if there is collusion on prices rather than Cournot competition, and the same is true if there are few rather than many firms there. The TV channel takes this into account and is better off setting a high price per ad and serving only the monopoly product market if the number of firms is sufficiently large and the price competition sufficiently intense in the oligopolistic product market.

So far we have assumed that the TV channel allows every producer in the product market to advertise. However, it might be able to discriminate between the producers. For example, it might set a high official price per advertising slot and then give discounts to one or a few number of producers. Is it so that a TV channel would like to discriminate between the producers? Let us hold on to the assumption that there is

only one TV channel. However, we now return to the situation with only one product market. We have the following result:

(xi) *With one TV channel and one product market with identical producers, the TV channel would prefer that only one producer in the product market advertises.*

With two producers in the product market, each producer's marginal revenue from advertising would be limited, thus dampening each producer's advertising. Therefore, the product market generates more advertising if it is only one producer that advertises. Thus, if the TV channel can decide which producer is advertising, it would prefer to create an asymmetry in a product market that initially is symmetric.

However, note that the firms by assumption sell identical products. This implies that there is no market expansion effect in our model from letting a second producer advertise. Obviously, then, differentiation in the product market may overturn the driving mechanism behind our result. But by comparing *(ix)* and *(xi)* we can conjecture that a large asymmetry can exist even if products are differentiated. One interpretation of the result in *(ix)* is that we have a situation with a market with two separated niches of identical size, where there are two firms in one niche and one in the other one. We then see that if we add some asymmetry, in this case asymmetry concerning the number of firms in each niche, it can easily offset the effect of differentiation and lead to a situation where the TV channel would like to discriminate between two niches of identical size.

4. RIVALRY IN THE PRODUCT MARKET

In the basic model we presented in the previous Section, the main focus was on the rivalry between the TV channels. We extended that basic model by adding strategic interaction in the product market, thereby elaborating on the interplay between the TV market and the product market. In this Section we reverse the focus. In the basic model we will present here the product market is the starting point. In particular, our starting point in Section 4.1 is Grossman and Shapiro (1984), from now on denoted GS. GS is a model of product-market competition where producers set both price and advertising outlays. Advertising is, in this model, purely informative in the sense that it increases the number of consumers aware of a producer's product. However, there is no TV market in their model. The advertising cost is exogenously determined. In Section 4.2 we therefore extend their model, by letting the price producers have to pay for advertising be determined endogenously by the rivalry between two TV channels.

4.1 GROSSMAN AND SHAPIRO (1984)

As explained in Section 2, actual advertising is in part informative and in part persuasive: Firms advertise in order for their products to be known to the public, but they also advertise in order to persuade consumers to buy their product rather than some other product. Those two kinds of advertising have opposite effects on price competition in the product market. GS has by assumption focused on informative advertising, and let us here explain in detail their model. [19]

[19]We will not review the literature on informative advertising here. However, an early analysis of informative advertising under monopolistic competition is found in Butters (1977). Among more recent studies of informative advertising in oligopoly are McAfee (1994), Stahl (1994), and LeBlanc (1998).

The analysis in GS clarifies the basic effects of firms' informative advertising in an oligopoly: First, the more it advertises, each firm obtains an increase in the number of consumers aware of its product. Thus, effectively, advertising increases the potential market for a firm's product and therefore is a good thing for the firm. Secondly, the more the firms in the market advertise in total, the higher is the number of consumers being aware of two or more products. Such segments of informed consumers are marked by more fierce competition than other segments, since these consumers are able to pick from all the offers they are aware of. Thus, more advertising means more competition, which harms firms' profits. In equilibrium, one will see a trade-off between these two effects of advertising, and the GS model is set up to clarify this trade-off.

To be specific, consider a market with product differentiation, *i.e.*, where the consumers differ in their opinion of what is the preferred characteristic of the product. We model this by way of the Hotelling (1929) model, positing consumers uniformly distributed along a line segment, for simplicity taken to be [0, 1].[20] Thus, as a matter of normalisation, the total number of consumers is measured equal to 1. Each consumer has a unit demand for the product, with a gross surplus equal to *s*. The product differentiation is modelled by way of linear transportation costs: if there is a distance *d* in product space between a consumer's favourite and the actually consumed product, a utility loss equal to *td* entails.

On the supply side of the product market, there is a duopoly, with the two firms located at the two extreme positions 0 and 1 on this segment. A consumer is able to consume a particular firm's product if and only if he receives an ad from this firm. Denote the two firms by A and B. Let φ_i be the fraction of the consumers in the

market who receive an ad from firm *i*. Let $A(\varphi)$ denote the cost for a firm of reaching a fraction φ of the consumers in the market.

Suppose firm A's advertising reach is φ_A. This is then also the potential demand for firm A's product. This potential demand can be divided into two groups: A fraction φ_B of the φ_A consumers are those who, in addition to an ad from firm A, also receive an ad from firm B and therefore know about both firms; and the residual fraction $(1 - \varphi_B)$ are those who receive an ad from firm A only and do not know about the presence of firm B in this market. We assume that there is no targeting of the advertising, nor is there anything else present that could create a correlation between the characteristics of a firm's product and those of the consumers reached by the firm's advertising. Thus, the φ_A consumers aware of firm A's product are evenly spread on the line [0, 1]. So is also that subgroup of $\varphi_A\varphi_B$ consumers aware of both products, and so on. It is for the consumers who have received ads from both firms that competition prevails. However, as long as each firm is unable to get information on which consumers have received ads, it will have to offer the same price to all consumers.

The firms' prices interact with transportation costs to determine each firm's demand in the competitive market segment. If firms set prices p_A and p_B, then consumers on the line segment [0,1] who are below x^* choose firm A while those above x^* choose firm B. The indifferent consumer x^* is determined by the equation:

$$s - p_A - tx^* = s - p_B - t(1 - x^*), \tag{13}$$

[20]This version of the GS model, with two firms located on a line segment, is due to Tirole (1988). In the original GS model, the product space is modeled as a circle, with *n* firms evenly distributed around it.

meaning that this consumer has the same net benefit from firm A's product (on the left side of the equation) as from firm B's product (on the right side). Solving this equation, we find that

$$x^* = \frac{1}{2} + \frac{p_B - p_A}{2t} \ . \tag{14}$$

With help of this expression, we obtain each firm's demand given both firms' prices and advertising:

$$D_A = D_A(p_A, p_B, \varphi_A, \varphi_B) = \varphi_A[(1 - \varphi_B) + \varphi_B x^*], \tag{15}$$

assuming that, at the prevailing prices, all consumers with information only about firm A actually purchases from this firm, which amounts to assuming that even consumers over at 1 on the [0, 1] line find it worthwhile to "move over" to firm A at 0. Formally, since it takes transportation costs equal to t to move across all the product space (which is of unit length), we assume that, in equilibrium, $p_A \leq s - t$. Thus,

$$D_A = \varphi_A\left[(1-\varphi_B) + \varphi_B\left(\frac{1}{2} + \frac{p_B - p_A}{2t}\right)\right], \text{ and} \tag{16}$$

$$D_B = \varphi_B\left[(1-\varphi_A) + \varphi_A\left(\frac{1}{2} + \frac{p_A - p_B}{2t}\right)\right]. \tag{17}$$

An important issue in a formal discussion of the competition between the two firms is the move sequence. Actually, there are two issues here: First, what is the move sequence between pricing decisions and advertising decisions? Secondly, what is the move sequence between the two firms? Although, in many circumstances, price is rightly considered a short-term decision and therefore modelled as following after more long-term decisions, like characteristics of the products and investments in capacity or R&D, it is more doubtful whether advertising is of such a long-term nature that a sequential modelling strategy is called for. We will therefore go on with

assuming that prices and advertising are chosen simultaneously. With respect to the other modelling question, we will treat the firms symmetrically so that they take their decisions simultaneously.

With two firms each making two decisions simultaneously, the equilibrium of the game is found as the solution of a system of four first-order conditions, two for each firms: one with respect to price and one with respect to advertising. For firm A, the problem is the following:

$$\max_{\{p_A,\varphi_A\}}\left\{\varphi_A\left[(1-\varphi_B)+\varphi_B\left(\frac{1}{2}+\frac{p_B-p_A}{2t}\right)\right](p_A-c)-A(\varphi_A)\right\}, \tag{18}$$

and this results in two first-order conditions for the firm, with respect to its price and its advertising level, respectively. After some rearrangements, these first-order conditions can be expressed as:

$$p_A=\frac{p_B+c+t}{2}+\frac{t(1-\varphi_B)}{\varphi_B}, \text{ and} \tag{19}$$

$$A'(\varphi_A)=(p_A-c)\left[1-\varphi_B+\varphi_B\left(\frac{1}{2}+\frac{p_B-p_A}{2t}\right)\right]. \tag{20}$$

From the first of these expressions, we can see that a firm's optimum price is independent of its own advertising but rather depends on the other firm's price and advertising decisions. We also see how the fact that consumers are less than perfectly informed, affects the price: The first term on the right-hand side of this expression is the reaction function when consumers are fully informed. We see that firm A's price now will be higher than in the full-information case, since the second term is positive, and more so the less advertising the other firm does. In the second expression above, the marginal cost of advertising, on the left-hand side, is set equal to the marginal benefit on the right-hand side, the latter being the price-cost margin times the probability of a sale.

We now have four equations, two first-order equations for each of two firms. Solving this system is greatly simplified by the observation that the two firms are completely symmetric. Thus, also their equilibrium behaviour will be the same. We can therefore introduce the variables p and φ, denoting a firm's equilibrium price and advertising level, respectively, *i.e.*, $p = p_A = p_B$, and $\varphi = \varphi_A = \varphi_B$. Applying this symmetry to the above first-order condition with respect to price, we find:

$$p = c + t + 2t\frac{1-\varphi}{\varphi}. \tag{21}$$

If we now go on to insert this expression in the first-order condition with respect to advertising and again make use of symmetry, we obtain:

$$A'(\varphi) = t\left(1 + 2\frac{1-\varphi}{\varphi}\right)\left(1 - \frac{\varphi}{2}\right). \tag{22}$$

In order to proceed from here, we need to be specific about the advertising cost function $A(\varphi)$. We could, as done in Tirole (1988), assume the following advertising cost function:

$$A(\varphi) = \frac{a\varphi^2}{2}. \tag{23}$$

With such a quadratic advertising cost function we get some counterintuitive results. In particular, an increase in advertising costs, in the sense of an increase in a, will also *increase* firms' profits. The reason is that, in addition to the direct, negative effect of increased advertising costs on profit, there is also an indirect, positive effect through the equilibrium advertising decisions: Higher advertising costs mean reduced advertising, and thus less competition, higher prices, and increased profit.

Furthermore, Tirole (1988), in his discussion of this model, shows that, from a welfare point of view, there may be excessive advertising in equilibrium. This is apparently a paradox, given that advertising as shown above tends to lower prices in

this particular model and thus be beneficial to consumers. On the other hand, advertising as such is costly. For advertising to be beneficial for society, the reduction in dead weight loss due to lower prices must offset the costs of advertising. The socalled *business stealing effect* explains why producers may advertise more than what society would prefer. Each producer can capture consumers from rival producers by advertising. The gain for a consumer from such an advertisement is much lower than the gain for the producer from capturing this consumer. In particular, much of the gain associated with capturing one more consumer is mirrored by a loss for the rival producer by losing one consumer. Hence, in this particular model some advertising is beneficial for society, but in equilibrium we may have excessive advertising.

4.2 EXTENSIONS

A quadratic advertising cost function – as specified above – may not be the natural choice in the setting we are focusing on. Instead of applying any arbitrary advertising-cost function, we let the advertising costs be endogenously determined. Advertising is in our setting offered by TV channels, who compete on prices of advertising. Thus, the producers' cost of advertising is determined by the rivalry between TV channels. In this Section, we therefore extend the model introduced in GS by letting the producers' cost of advertising be endogenously determined by the rivalry between the TV channels. We do not report all the details concerning the model, nor any of the proofs. For a detailed analysis, see Nilssen and Sørgard (2000b).

In this extended version of GS, we address questions such as how advertising firms' demand for advertising is affected by the suppliers being TV channels. We model the advertisers as competing with each other in the product market and

demanding advertising in order to increase consumer awareness of their products. We note two features of TV advertising that we try to get a grip on. First, there are only a few relevant TV channels for the advertising firms to choose from. Second, each TV channel is able, through viewer meters, to keep track of how many viewers any ad has and can therefore, in principle, price the advertising it sells on a per-viewer basis.

We do believe it is important to take into account that there is a limited number of TV channels available to choose from.[21] We will below discuss a case where two TV channels are available. An advertising firm will have to decide not only how much to advertise, but also how to distribute its advertising efforts among the two TV channels. In order to focus on the effects of TV as a channel for advertising, we will disregard any other means for a firm to reach out to its consumers, such as newspapers and magazines.

In GS, we had a simultaneous game. The producers set product prices and advertising amounts simultaneously. In this version of the model this is stage 2 of the game. At stage 1, the TV channels set prices of advertising simultaneously.

We will allow for the two TV channels to be of different sizes in terms of their viewer bases. An obvious next step is to discuss how the advertising market interacts with the competition between the TV channels for viewers. However, for now, we assume that any such competition between the TV channels already has taken place. Thus, we let v denote the size, in terms of viewers, of the bigger channel, so that $(1 - v)$ is the size of the smaller channel, with $v \in [\frac{1}{2}, 1)$. As a matter of convention, we will let channel 1 be the bigger one.

[21]This is true for all product markets where competition is localised. For example, a firm in Norway has essentially three commercial TV channels available when choosing where to advertise: TV2, TVNorge, and TV3. Of these, TV2 and TVNorge have the same owner, who is the dominant supplier of TV advertising in Norway.

Although the two channels may not be of equal size, we do not envisage any systematic difference among the channels' viewers in terms of their preferences for the advertised product. In particular, at each point in the product space [0, 1], a fraction v of the consumers preferring this particular product variety watch the bigger channel while the rest watch the smaller one.

We assume that the only costs of advertising for the firms on the product market are related to what they have to pay the TV channels for the advertising space, or more accurately, for the viewers reached by the advertising.[22]

With two TV channels to choose from, a firm not only will have to decide how much to advertise, but also where to advertise. Thus, each firm has a total of three decisions to make: the price of its product; advertising in the big TV channel 1; and advertising in the small channel 2. Let φ_{ij} denote firm j's advertising reach among the viewers of channel i, $i \in \{1, 2\}$, $j \in \{A, B\}$. Firm j's total advertising reach is: $v\varphi_{1j} + (1 - v)\varphi_{2j}$. The price of advertising per viewer is b_1 in channel 1 and b_2 in channel 2. The advertising costs depend on how many viewers are reached by advertising on each channel: $A(\varphi_{1j}, \varphi_{2j}) = b_1\varphi_{1j}v + b_2\varphi_{2j}(1 - v)$, $j \in \{A, B\}$.

The informed consumers' choices are not affected by how they get informed. Therefore, in this market segment, the indifferent consumer is determined as in the previous section. Firms' various decisions are again taken simultaneously. Thus, we can state firm A's problem as follows:

$$\max_{\{p_A, \varphi_A^1, \varphi_A^2\}} \pi_A = \left\{ \varphi_A \left[(1 - \varphi_B) + \varphi_B \left(\frac{1}{2} + \frac{p_B - p_A}{2t} \right) \right] (p_A - c) - b_1\varphi_{1A}v - b_2\varphi_{2A}(1 - v) \right\}. \quad (24)$$

[22]It would add realism to add some costs related to the development of the advertising. However, this will make the analysis unnecessarily complicated in a way not pertinent to the questions we will try to address presently.

The first-order condition with respect to price is as before:

$$p_A = \frac{p_B + c + t}{2} + \frac{t(1-\varphi_B)}{\varphi_B}. \tag{25}$$

Each firm has now two first-order conditions with respect to advertising, one for each TV channel. Note, however, that the way advertising pricing is made by TV channels in this model creates a linear relationship between a firm's marginal costs of doing advertising on a particular TV channel and its marginal benefit from it. The marginal benefit from advertising is independent of which channel the marginal advertising is put on, since both channels' viewers are evenly distributed as consumers in product space. Denote this marginal benefit for firm A by K_A, *i.e.*:

$$K_A = (p_A - c)\left[(1-\varphi_B) + \varphi_B\left(\frac{1}{2} + \frac{p_B - p_A}{2t}\right)\right] \tag{26}$$

The net marginal profit for firm A from advertising on the big channel 1 can now be expressed as:

$$\frac{d\pi_A}{d\varphi_{1A}} = K_A v - b_1 v = [K_A - b_1]v. \tag{27}$$

The corresponding expression for advertising on channel 2 is:

$$\frac{d\pi_A}{d\varphi_{2A}} = [K_A - b_2](1-v). \tag{28}$$

The firm will spend the additional funds on advertising on the channel where the net marginal profit is the greater. Thus, it chooses channel 1 if:

$$[K_A - b_1]v > [K_A - b_2](1-v), \tag{29}$$

i.e., if:

$$b_1 < \left(2 - \frac{1}{v}\right)K_A + \left(\frac{1}{v} - 1\right)b_2. \tag{30}$$

A corresponding condition holds for firm B.

Again, we make use of symmetry, so that $p_A = p_B = p$, $\varphi_A = \varphi_B = \varphi$, and, therefore, $K_A = K_B = K$. Also, $\varphi_{iA} = \varphi_{iB} = \varphi_i$, $i \in \{1, 2\}$. A firm will choose the cheaper TV channel for the whole of its basis of viewer, if necessary, before considering making use of the other channel's services. It may have to use the latter channel, however, if the desired level of advertising cannot be covered through one channel. For example, if the big channel 1 is the cheaper one but each firm wants to obtain an advertising reach in excess of v, the number of channel 1's viewers, then they both will have to turn to the other channel. Note that, in equilibrium, the marginal benefit of advertising is set equal to marginal costs of advertising for the firms. Since the latter is equal to either b_1 or b_2, we have that, either $K = b_1$, or $K = b_2$. In both these cases, however, the condition for a firm preferring channel 1 over channel 2, which with symmetry reads:

$$b_1 < \left(2 - \frac{1}{v}\right)K + \left(\frac{1}{v} - 1\right)b_2, \tag{31}$$

reduces to $b_1 < b_2$.

Note that, using the symmetry property, we can simplify the expression for the marginal benefit of advertising:

$$K = \frac{t(2-\varphi)^2}{2\varphi}, \tag{32}$$

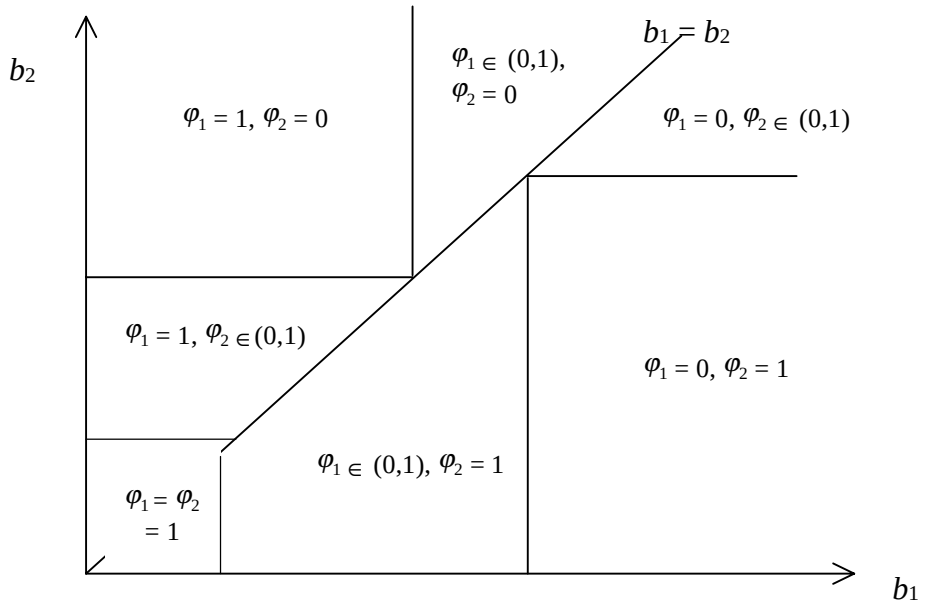
which is identical to the right-hand side of Eq. (22) above.

It is standard to assume that, when the two TV channels set equal prices, *i.e.*, when $b_1 = b_2$, each firm places the same amount of advertising in each of the two channels, or in proportion to the size of each channel. Such an assumption does, however, create a purely technical difficulty. An equilibrium in the price-setting game between the channels does not exist in a strict sense. One of the channels would prefer to set a price close to but not equal to that of the other channel. In order to get

around this problem, without distorting the economic content of our analysis, we will, when discussing the TV channel's pricing strategies, simply disregard this mathematical problem of optimisation over an open set and let one channel undercut another by some small positive price difference ε.

Before we discuss the equilibrium prices, let us examine each firm's amount of advertising for exogenously determined prices. This is illustrated in Figure 3.

Figure 3. Advertising reach and prices of advertising

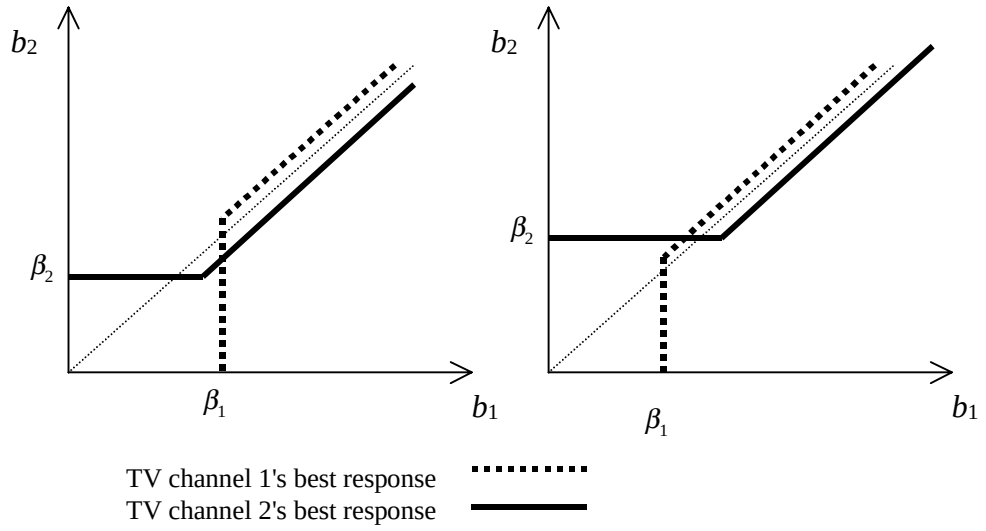


This Figure shows the outcome of the Stage-2 equilibrium, for various combinations of b_1 and b_2. Remember that b_i and φ_i are the prices of advertising and advertising reach, respectively, in channel i. Two features of the firms' advertising behaviour can be seen clearly from this Figure. First, if both TV channels raise their prices, so that we move in a Northeast direction in the Figure, then advertising goes down and therefore also competition is weakened in the product market. If one TV channel

alone raises its price, so that we move horizontally or vertically in the Figure, then that channel gets less advertising.

Now we can proceed to Stage 1 of the game. The TV channels set prices of advertising simultaneously. It is clear from Figure 3 that a channel's number of viewers works as a form of capacity: A TV channel cannot sell more advertising reach than it has viewers. Thus, even the higher-priced channel may get some of the advertising business, precisely because the lower-priced channel cannot provide the full service that the advertising firms want. However, in contrast to other models of capacity constraints, notably Kreps and Scheinkman (1983), this does not give rise to non-existence of a pure-strategy equilibrium. In the present model, each TV channel's best-response price is a continuous function of the other channel's price: If the other channel's price is low, then it pays to keep one's own price a bit higher. Otherwise, the best response is to undercut.

Figure 4. Best response curves for the TV channels



It is important to notice that the inherent capacity constraint creates a cut-off point concerning price setting. When the rival channel's price on advertising reach is sufficiently low, it is not profitable for a TV channel to undercut it. Rather, the channel's best choice would be to set a price above its rival price and serve the residual advertising demand. The cut-off point is determined by *v*, the asymmetry in market coverage, and *t*, the degree of product differentiation. Let β_i denote the cut-off point for firm *i*. In Figure 4 we have shown the two TV channel's best response curves.

Then it is straight forward to determine the equilibrium outcome. Either β_1 *or* β_2 is the binding constraint, and we have the following result:

(i) The TV channels set identical price of advertising per viewer reached

Thus, we see how the introduction of a market for TV advertising has made the price of advertising, and therefore the advertising costs of the advertisers, endogenous. While there is some competitive pressure towards low prices, this pressure is limited by the fact that the advertising reach obtained through one single channel is limited by the size of this channel's viewer base. Even if one channel prices advertising lower than the other does, it may still be necessary for advertising firms to make use of both channels in order to reach the desired fraction of consumers. This is the main mechanism by which the competition between the TV channels is softened, with the implication that advertising prices always are greater than their marginal costs.

Note that, although the two TV channels have the same advertising price, their marginal profits are not the same: The price is for advertising per viewer, and since

channel 1 has more viewers than channel 2, it also has a greater marginal profit in equilibrium.

In the remaining part, let us focus on the case where there is a lower bound on product differentiation in the product market.

(ii) The larger TV channel lets the small channel have maximum advertising, while it itself satisfies the residual demand.

For each TV channel a price cut would have ambiguous effects on its revenue. On the one hand, it can increase its sales by cutting prices. On the other hand, a price cut would reduce the revenue from its existing sales of advertising. The larger the sales of a TV channel initially, the more reluctant would it be to lower its price. Rather, it would prefer to keep high prices to continue to extract large revenues from its existing sale. Therefore, the large TV channel finds it profitable to let the small channel use all its capacity and itself only serving the residual demand it is facing.

(*iii) Advertising prices increase with an increase in the differentiation in the product market and with an increase in the size of the larger TV channel*

(iv) The amount of advertising is decreasing in the size of the larger TV channel, while product differentiation has an ambiguous effect on the amount of advertising

An increase in the product differentiation makes the products more different in the view of consumers and firms get more interested in advertising since now competition

is more relaxed. This increased demand for advertising, in turn, accounts for the increased price of advertising. But it also explains the ambiguous total effect of an increase in *t* on advertising: In addition to the positive direct effect, there is also a negative effect through the increase in advertising price.

Under the restriction we use here, that *t* is not very low, it is the smaller TV channel which has the higher incentives to set a low price. An increase in the (relative) size of the larger channel means that a larger fraction of total advertising will have to be made through the high-price large channel. Of course, in equilibrium, there is a negligible price difference between the two channels. However, as the larger channel gets even larger, it gets even less incentives to compete with the aggressive small channel, and equilibrium price of advertising increases. This feeds into less advertising being sold.

We thus find that asymmetry between TV channels dampens price competition. The more limited the small TV channel's audience, the higher are the prices on advertising. A natural question, then, is whether it can be profitable for the 'small' TV channel to deliberately act so that its audience is limited. One natural interpretation is that the 'small' TV channel is an entrant. If it invests only a limited amount in programme quality, its audience is limited. By such a strategy it both saves investment in programme quality and dampens price competition.

If we, as above, interpret our game as an entry game, our result shares some similarities with what was labelled *judo economics* in Gelman and Salop (1983). They showed that a producer might have incentives to restrict its sale in order to stop its rival from cutting its price. It then exploits the fact that a producer with a large market share would rather maintain high prices to serve all its existing consumers than to cut prices to compete with the small producer. However, in their model with sequential

price setting the small producer sets a lower price than the lower firm in equilibrium. Given that prices are typically flexible, we find it more natural to assume simultaneous price setting. Therefore, we assume simultaneous price setting in our model. We reproduce the main result in Gelman and Salop (1983), capacity limitation dampens price competition, but in equilibrium prices are now identical.

5. CONCLUDING REMARKS

The TV industry plays an important role in modern society. For example, TV is important measured in adults', as well as children's, time spent watching TV. In addition, TV plays an important role in the producers' effort to reach out to the consumers with advertisements for their products. Some studies indicate that approximately half of all spending on advertising is TV ads, and television ads amounts to more than forty billion US $ in the US and slightly less than five billion Norwegian kroner in Norway (see Section 2.2). It is surprising, then, that there are relatively few studies in the economics literature on this obviously important industry. The studies typically focus on how rivalry between TV channels affects programme diversity.[23] With a few notable exceptions, the choice of advertising on TV is not taken into consideration.[24]

The purpose of this report has been to examine the rivalry in the product market and the TV market, respectively, and in particular how these two markets interact through the market for advertising. In this Section we start by summarising our findings (Section 5.1). Then we discuss more in general potential market failures in the TV industry (Section 5.2), while we finally briefly comment on the role of public policy in this particular industry (Section 5.3).

[23]Steiner (1952), focusing on radio broadcasting, was concerned about whether competing radio stations would air identical type of programmes at the same time. For elaborations on the Steiner model, see Owen and Wildman (1992). Spence and Owen (1977) use a model of monopolistic competition to compare the programme diversity of pay TV and advertising-financed TV. In Nilssen and Sørgard (1998), we discussed a TV duopoly where TV channels choose both programmes' contents and their time-scheduling. Empirical studies of programme diversity, such as Rust and Eechambadi (1989), Rust *et al.* (1992), Goettler (1999), and Goettler and Shachar (1999), primarily focus on how to estimate the viewers' demand for TV programmes and the implications for TV stations' program choice.

5.1 A SHORT SUMMARY

As mentioned, our main focus is on the interplay between the product market and the TV market through advertising. To examine such an interplay, we have started out from two different angles. In our first setting, we have used the model introduced in Motta and Polo (1997a) [MP] as the starting point. That model focuses on the TV market, and we have extended their model by including more details concerning the product market. In our second setting, we have used the model introduced in Grossman and Shapiro (1984) [GS] as the starting point. That model is focusing on the producers' choice of advertising, and we extend their model by letting the producers' cost of advertising be determined by the rivalry between two TV channels.

5.1.1 Motta and Polo (1997a)

MP is mainly concerned with the free-entry equilibrium number of TV channels. Since technology is no longer a constraint on the number of TV channels, they ask whether there could be other forces at work that may limit the number of TV channels. Their answer is yes, and the main mechanism is *endogenous* investment in programme quality. The larger the number of potential viewers, the more profitable it would be to escalate the investment in programme quality and thereby capture a larger share of the viewers. Investment in programme quality is a fixed cost, implying that even a large market can support only a limited number of TV channels with large

[24]Zhou (1999) examines the choice of commercial breaks in a TV market. However, he is not modelling the producers' choice of advertising outlay.

fixed costs. Their finding is consistent with the observation reported in Section 2.1 that a limited number of TV channels is typically dominating in each national market.

In line with the conclusion in MP, we focus on the case where the number of TV channels is limited. We extend the model to the case where we have strategic interaction in the product market. Either the producers in the product market collude on prices, or they compete a là Cournot (a rather mild nature of competition).

First, we find that the rivalry in the TV market may be disadvantageous for both viewers and the producers in the product market. The TV channels partly duplicates each others investment in programme quality, implying that the total programme quality seen from a viewers point of view may drop even if the total investment in programme quality increases. A reduction in the number of viewers will, in turn, imply that the producers reach fewer consumers with their ads.

Second, we find that investment in programme quality can partly be regarded as a rent seeking activity. Each TV channel invests in programme quality to attract viewers and, in turn, extract profits in the product market through sales of advertising on TV. The larger the profit potential in the product market, the larger the investment in programme quality to extract a share of the potential profits generated in the product market.

Third, we find that a dominant TV channel may create asymmetries in product markets. With two product markets with identical size we may have that only the producers in the product market with the lowest number of firms choose to advertise. The reason is that in a product market with few producers, each of them can alone generate a large sale by advertising and thus have strong incentives to advertise. Moreover, a TV channel can find it profitable to discriminate between identical producers. It can be better for the TV channel to have one producer advertising on TV

than having two (or more), because one firm would generate more advertising than two (or more) producers.

5.1.2 Grossman and Shapiro (1984)

GS is focusing on how advertising as such influences the rivalry in the product market. Each producer sets price and advertising. Advertising is in their model per definition informative. The more a producer advertises, the more consumers are aware of its product. Advertising will therefore increase own sales, all else equal. On the other hand, advertising implies that more consumers are aware of more than one product. This tends to increase the price rivalry, as producers compete on attracting informed consumers. Seen from a producer's point of view there is a trade-off between these two effects of advertising – increased sales and increased rivalry on prices – and the purpose of the model introduced in GS is to clarify this trade-off.

In Tirole's (1988) version of the GS model it is shown that, seen from society's point of view, we may have excessive advertising in equilibrium. This is a first glance surprising, given that advertising has a pro-competitive effect on prices in this model. On the other hand, advertising is costly. Excessive advertising simply implies that the cost of advertising more than offsets the reduction in dead weight loss associated with lower prices. The intuition is that each producer is motivated by a *business stealing effect*, which is not a relevant effect seen from the society's point of view. Each producer has a large gain from capturing one new consumer, but a large part of the gain is mirrored by a loss of revenue for the producer who initially served the consumer in question.

In GS advertising is exogenously determined, captured by a quadratic advertising cost function. However, we argue that the advertising costs should be *endogenously* determined. Advertising is, in our setting, offered by TV channels, who compete on prices of advertising. Thus, the producers' cost of advertising is determined by the rivalry between TV channels.

In this extended model we find that price rivalry between the TV channels may be limited. The reason is that advertising reach through one TV channel is limited by the size of this channel's viewer base. Even if one channel prices advertising lower than the other does, it may still be necessary for advertising firms to make use of more than one channel to reach the desired fraction of consumers. The implication is that prices of advertising exceed marginal costs.

Moreover, it is found that asymmetries in the TV market – interpreted as asymmetries in TV channels' market shares – may have an anti-competitive effect on prices of advertising. To understand this, note that for each TV channel a price cut would have ambiguous effects on its revenue. On the one hand, it can increase its sales by cutting prices. On the other hand, a price cut would reduce the revenue from its existing sales of advertising. The larger the sales of a TV channel initially, the more reluctant would it be to lower its price. Rather, it would prefer to keep high prices to continue to extract large revenues from its existing sale. Therefore, the large TV channel finds it profitable to let the small channel use all its capacity and itself only serve the residual demand it is facing. As the larger channel gets even larger, it has even less incentive to compete with the aggressive small channel, and equilibrium price of advertising increases.

5.2 POTENTIAL MARKET FAILURES

In this report we have most of the time had a rather narrow perspective, focusing on the interplay between the TV market and the product market through advertising. Let us here briefly discuss the equilibrium of the TV industry in a broader perspective. We ask which factors in this particular industry may create market failures so that equilibrium deviates from optimum from a welfare point of view. In particular, why is there reason to believe that competition may not produce the standard results referred to in textbooks such as lower costs, lower prices and more product variety? Let us point to five factors that we think is of importance.

TV as a public good?

Broadcasted TV has public goods characteristics. If one viewer watches TV, this will not exclude others from watching the same TV channel. The marginal cost of providing one more viewer access to TV is close to zero. This is an argument for free access to TV, which is what we basically have in the case of advertiser-supported TV. But this has also implications for the number of TV channels. Although marginal costs are close to zero, fixed costs associated with investment in programming are large. Seen from a pure cost perspective, there is therefore no reason to have more than one TV channel. It would just be a duplication of fixed costs. On the other hand, competition between TV channels may put a downward pressure on TV channels' costs. The reason is that competition forces each TV channel to organise its resources in a better way to save costs. But, even if this is true, we could still have that the battle for viewers triggered by rivalry between TV channels could lead to an upward pressure on costs. TV channels attract new viewers by increasing their investments in

programming, and the battle for market shares can result in an escalation of endogenous fixed costs.[25]

Price competition irrelevant?

Low prices is the classical argument in favour of free markets. The argument is simple. Producers compete to attract consumers, and this rivalry triggers low prices and thereby passes on any potential profits to the consumers. It sounds attractive, but is this relevant for the TV industry? Which prices are we talking about? The price of watching TV? That price is, as we know, zero for advertising-supported TV. But it is also zero in a system with compulsory subscription for public TV channels, and even in a system with only one advertiser-supported TV channel. So in that respect it is neither worse nor better with rivalry between advertising-supported TV channels instead of no rivalry.

What about prices of advertising? Rivalry in the TV market is expected to result in lower prices per advertising slot. But, is lower prices as such always a good thing? Rivalry between TV channels is typically associated with not only lower prices of advertising, but also more advertising. It is not the prices as such we should be concerned about, but the resources used, in this case the amount of advertising. An increase in advertising may be disadvantageous for both TV viewers and consumers in the product market. We will return to this point.

[25]Note the fundamental difference between the market in question and a market without any public goods characteristics. For example, think about an expanding town with only one restaurant at present. The restaurant's capacity is met, and it sets high prices to ration demand. Society would prefer a capacity expansion. One option is that the existing restaurant expands its capacity. An alternative would be that a new restaurant is established. Either the existing restaurant or a new establishment must incur costs associated with capacity expansion. Obviously, society is better off with a new establishment. There is no wasteful duplication of fixed costs, it puts a downward pressure on prices, and it may even increase the product variety in the restaurant market in this particular town.

TV viewers' preferences not reflected?

On the demand side there are obviously potential gains concerning product variety from having more than one TV channel. By definition, a transition from one to several TV channels implies that the viewer suddenly has a choice. But could it be that this choice has no value whatsoever for the viewer except for the apparent freedom to choose? To illustrate, think about two competing TV channels both airing a game show at the same time. Each hires one of two twin brothers each to host the game show. A viewer has a choice concerning which show to watch, but does it really matter for the viewer which one s/he actually watches?

The example was hypothetical, but still with a flavour of reality. There is a fundamental problem associated with the information – or more precisely lack of information – about a viewer's preferences. In an advertiser-supported TV market, one viewer is one viewer. Whether you are strongly in favour of watching the program in question or indifferent between watching it or not, is irrelevant for the TV channel. Its concern is the number of viewer. Then, no surprise, each TV channel may end up with a program profile tailor-made to the average viewer's preferences. This is perfectly rational for each TV channel. From a viewer's perspective, though, the TV channels are almost identical in program profile. If a viewer belongs to the majority of viewers, s/he probably finds a program to watch. But the choice is limited, since programs are not very differentiated. If one channel hosts a game show, you may observe that the rival channel airs a similar kind of program. The question is whether any TV channel offers any program for viewers with special interests. If the market is sufficiently large, as in the US, a TV channel may find it worthwhile to serve special interest groups. In a smaller market, as the Norwegian TV market, it may not be

profitable for a TV channel to serve such groups with special interests, even if those people have strong preferences for a particular program.

Advertising good or bad?

By definition, advertising is an important part of advertising-supported TV. Advertising-supported TV may therefore be a good thing because it promotes advertising. But think about it as a viewer. Do you like programs being interrupted by commercial breaks? In fact, viewers do their best to escape from advertising breaks. So in this perspective, TV ads generate disutility rather than utility for viewers. Even worse, the TV channels try to stop you from escaping from the ads. They have almost identical time schedules for commercial breaks, so that you cannot escape ads on one TV channel by zapping to another one. Then you are forced to go to the toilet, make a cup of coffee or at last give in and simply watch the ads.

Advertising has an important role to play in the product market, though. But again, is it a good or bad thing? It depends. Ads can inform viewers about new products or prices of products, triggering more intense rivalry to capture informed consumers. But it can also create loyal consumers which, in turn, allows the producer in the product market to raise its price and exploit those loyal consumers. So we really don't know; in some markets, advertising is pro-competitive, in others anti-competitive. But even if ads are pro-competitive, we may have excessive advertising seen from society's point of view. The consumers gain from lower prices, but their gain might be more than offset by the costs of advertising. Moreover, what we know is that price advertising is typically pro-competitive. But price ads are more present in newspapers than on TV. So the kind of advertising where we have some evidence that it is pro-competitive is not that kind of advertising we typically see on TV. So you can

argue that TV ads is good for the product market, but there is no strong case in favour of that line of reasoning.

Successive rent seeking?

Even though there are potential market failures in the TV market and the product market, respectively, couldn't the link between those two markets improve things? To the contrary, it may make things even worse. For example, think about investment in programme quality. A TV channel invests in order to attract viewers, but this is not the end of the story. TV channels invest in programme quality to attract viewers so that they, in turn, can extract some of the profit potential generated in the product market. Investment in programme quality is then a kind of rent seeking activity. The larger the profit potential in the product market, the larger the investment in programme quality. This allows the TV channel to extract profits from the product market partly through higher prices per advertising slots, and partly through more advertising slots.

But if TV channels are engaged in rent seeking activities, what then about the producers? They are, too, and their rent seeking activity is advertising. As mentioned, we don't know whether advertising is pro- or anti-competitive. But even if advertising has no competitive effect, there are of course costs associated with advertising. If no competitive effects of advertising, could there be other gains from advertising or is costs associated with it? It may be that advertising expands the total market, which can be regarded as beneficial. On the other hand, in some product markets, advertising has no effect on total sales. If so, advertising is an instrument used in the battle for market shares. In such a case, there are no revenues or other gains for society generated by advertising. Then, advertising can be seen as nothing else then a

rent-seeking activity, or more precisely, an unproductive rent-seeking activity. Part of the rent seeking activity may show up as resources used by marketing agencies, who help the producers to implement their advertising strategy.

Furthermore, rent seeking activities by those two groups of firms – TV channels and producers in the product market – may reinforce each other. More programme quality increases the number of viewers which, in turn, gives the producers stronger incentives to advertise. So in that respect we could have that the fact that the TV market and the product market is linked through advertising may make things even worse seen from society's point of view.

Creating dominance in the product market?

Finally, one may argue that TV advertising allows new producers to inform consumers and thereby to challenge already established producers. No doubt, this may be true in some product markets. The problem, though, is that the price the producers have to pay for TV advertising is high for everyone, because a TV channel would not like to sell its scarce amount of advertising slots cheaper to some producers than to others. Identical slot prices for all implies that the producers with a large sale potential can afford TV ads while others may not. If so, we may have a self-enforcing mechanism: The large producers advertise and become even larger, while others cannot afford and falls behind or even exit. This is consistent with the observation that advertising-intensive industries typically have a more limited number of producers than other industries, or a few producers dominating the industry. Moreover, it may even be in a TV channel's interest that there is asymmetry in the product market. The reason is that in a product market with few producers, each of them can alone generate a large sale by advertising and thus have strong incentives to advertise.

5.3 SOME FINAL REMARKS

From the discussion of potential market failures, one might be tempted to conclude that there are very serious market failures in the TV industry. However, in the previous discussion, we intentionally biased our discussion, to convince the reader that there are several potential market failures. If you look more closely, you realise that we simply don't know whether many of those potential market failures are actual and important market failures in the real world. For example, there is ambiguity concerning both the effect of advertising and the diversity of TV programs. Moreover, there are many partly unresolved questions. For example, this report has only pointed to some possible problems in association with the complex interplay between the TV market and the product market. This suggests that we should not jump to any dramatic conclusion concerning the public policy towards this industry. Rather, the potential market failures we have pointed to should be a guidance to which areas public policy should be concerned about, and should be weighted against any other possible policy concerns.[26] Let us, in line with this, point to three areas that we think public policy, and future research, should be directed towards.

First, our analysis indicates that there may be arguments in favour of restricting the amount of advertising on TV, as is the case presently in Norway.[27] Such a restriction has an ambiguous effect on the product market, but is on the same time beneficial for TV viewers, at least as long as TV viewers, all else equal, prefer to watch TV without commercials. Moreover, any possible negative effect in the product

[26]In particular, freedom of speech could certainly be a genuine argument for having several TV channels. See for example Alger (1998), who has a strong view against media concentration in the US.
[27]In the US, on the other hand, government took the National Association of Broadcasters (NAB) to court, challenging NAB's restrictions that, *inter alia*, limited commercial time. The court subsequently ruled that these limits be removed. See Areeda and Kaplow (1997, p. 237), citing *US v. National Assn. of Broadcasters*, 536 F. Supp. 149, 156 (D.D.C. 1982), and 553 F. Supp. 621 (1982).

market could partly be offset by advertising being reshuffled to other media such as newspapers and magazines, where advertising does not have such detrimental effects on media consumers (here: readers). Although we believe a better understanding of the relationship between restrictions on TV advertising and the performance of the market for TV advertising is warranted, our limited knowledge points in the direction of a restrictive government policy on the amount of TV advertising.

Secondly, we would like to point out that care must be taken when using outright dominance, or lack of cost savings, as genuine arguments to ban mergers in the TV industry. More than in many other markets, there is a reason to question whether competition results in program diversity. So any merger or acquisition in this particular market – even if the market share of the merging parties is, say, 80% or more – could perfectly well be beneficial for society even without any cost savings. Again, this calls for an extension of our current knowledge of the issue and, in the meantime, caution on the part of industry regulators and competition authorities supervising this industry.

Third, we believe public policy should look for possible asymmetries in the product markets that are reinforced or created by TV channels. In particular, TV channels should not be allowed to discriminate between different producers in a product market. For example, they should not be allowed to set a high official price of advertising and then, in turn, offer discounts to only some of the producers.

In all, the TV industry could very well be one where the regulation of conduct, rather than of structure, has the more merit. But, again, our knowledge about the relationship between competition and welfare in this particular industry is at present quite limited.

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