Localism and Welfare*

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Abstract

We analyze competition between a mass media producer and providers of local content. The business model is that of a two-sided market: advertising finances programming. Broadcasters compete by choosing ad levels and program quality. The local market decision (advertising level) is tailored to each market, while the quality decision is one-size fits all. This means there are externalities between local producers even though they do not directly interact. The large producer can spread quality costs over all the local markets, and chooses higher quality than the local producers. Each local producer's quality and audience share is an increasing function of the local market size. In each market, the mass producer advertises more and has a larger market share, so the disparity is largest in the smallest markets. For a given number of markets served by local producers, the equilibrium quality may be too low, suggesting that inducements to improve quality may be beneficial. However, there is not a clear-cut case that the global producer makes it too difficult for local producers to compete; indeed, the converse may be the case because the global producer is too soft in competing in local markets. The argument for intervention may therefore have to be made on the grounds of positive externalities created by provision of local broadcasting.

Abstract

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1 Introduction

Localism in media markets refers to concerns about local aspects of broadcasting (Shiman, 2004). These include provision of local news, public affairs, and the like. The concern is also expressed about encouraging local culture, etc. In France, the "exception culturelle" encourages local production, and local programming is provided by Government backed TV and radio stations.

In the US radio market, Clear Channel owns hundreds of stations across the country, and one concern is that this suppresses diversity by not tailoring content to local markets. Rather similarly, Europeans sometimes express worries that Hollywood movies are driving out local cinema, and have erected various protective counter-measures.

Clearly, one social benefit to boosting local protection arises if there are positive spill-overs from having people more informed about local events and local culture. Likewise, a regional culture may be sustained with a thriving media in the local language and fostering local values. The argument for regulation or monetary inducement fostering local content is quite obvious when the positive externalities are large enough. However, what is much less apparent is whether there are causes for concern when externalities are weak. That is, are there fundamental market failures in a system where a multi-market producer faces local producers specific to individual markets. This paper is about the economics of that market model.

2 The model

Following Anderson and Coate (2005), let there be 2 channels operating in each market. Channel 0 is the same in each market, and constitutes the channel that is produced for mass consumption. Loosely, this is the "Hollywood" or the "Clear Channel" production. At the same time, each market is idiosyncratic and provides a competing channel that is idiosyncratic to that market. For example, the channel could provide local news, or it could provide special cultural content. It could use local language (Welsh, French) or be locally produced and reflect local cultural values (France, Australia).

One obvious argument why local channels can be under-provided in the marketplace is that there are positive externalities associated to their being broadcast, and these externalities are not captured in revenues earned by stations. Such externalities can readily be added to the model (by including such spill-overs in the welfare analysis), but for the moment we concentrate on a different and more subtle aspect of performance shortcomings. This has to do explicitly with the size advantage of the global producer, and the consequences for competition in individual markets.

We label markets (alphabetically) by increasing size. Market $m = A, ..., M$ has size N_m and has a local channel broadcasting at location 1. This is the basic Hotelling spatial framework that generates a simple linear demand function.[1]

[1] Other tractable specifications perhaps more sutiable for empirical work include the logit

We suppose that stations are commercial, or "free-to-air": this means that they are financed by advertising. We follow the recent two-sided market paradigm whereby agents on one side of the market communicate with those on the other through the intermediary of the broadcast station (see the review articles by Armstrong, 2005, and Rochet and Tirole, 2005, for more details on two-sided markets generally, and Anderson and Gabszewicz, 2005, for application to media markets in particular).

Since the advertiser surplus is not the prime aim of this paper, we assume that the advertiser demand is perfectly elastic. This means that each advertiser has the same benefit from reaching the television watchers or radio listeners on the other side of the market. Otherwise, the model follows Anderson and Coate (2005), with the important addition that there are simultaneously multiple markets. One producer is "one-size fits all", the other one is idiosyncratic and specific. Thus the linear market specification should not be thought of as representing the same preferences in each market for the second channel. Rather, the second channel in each market is not substitutable into other markets, but is specific to market m.

The performance aspects of interest are those of quality competition with the two-sided markets business model running competitive interaction. The large producer has the advantage of large viewer/listener base over which it can spread the costs of raising quality.

In this model, quality should be thought of as a demand shifter. It is not something that necessarily coincides with one's paternalistic idea of what people "ought" to be watching: that is better captured using an externality approach. Quality here intrinsically raises welfare, and raises demand. Considering viewership figures, this could well be the lowest-common denominator situation comedy rather than the opera on the BBC.

Programs are "located" at the extreme points of the unit interval and viewers are distributed uniformly by ideal point in this interval. An individual at location x gets utility from watching channel 0 of

$$U_0 = q_0 - \gamma a_0 - tx, \tag{1}$$

where q_0 is the quality level of channel 0, and quality is measured so that a unit increase raises utility by one. The term γa_0 measures the advertising nuisance on Channel 0, and a_0 is the number of ads broadcast by that channel. The nuisance cost of advertisements is thus γ per ad. Watching Channel 1 yields a utility of

$$U_{m1} = q_{m1} - \gamma a_{m1} - t(1 - x). \tag{2}$$

where the subscripts denote provision by Channel 1 in market m. In these equations, the constant t measures the "distance" disutility from not getting one's preferred product. Thus viewers with low x are typically in producer 0's market, and competition revolves at the margin around intermediate viewers for whom (1) and (2) are close in value.

model.

Advertisers get a benefit from reaching viewers that is normalized to one. This benefit is accrued on a per viewer basis, so that the benefit from reaching k viewers is \$$k$. In a competitive advertising market, this is also the price of an advertisement that reaches k consumers. Notice that each broadcaster has a monopoly bottleneck in delivering its viewers: the same viewer cannot be reached by the other channel.

The cost of providing quality is $K(q)$, which is therefore assumed to be the same function for all producers. It is assumed to be sufficiently convex that all relevant second order conditions and profit quasi-concavity conditions hold for equilibrium existence, uniqueness, and stability.

The indifferent viewer determines the market for each broadcaster. Hence the number of viewers watching channel 0 in market m is $N_m \hat{x}_m$ where $\hat{x}_m$ is given by:

$$\hat{x}_m = \frac{1}{2} + \frac{\Delta_m - \gamma\left(a_{m0} - a_{m1}\right)}{2t} \tag{3}$$

where $\Delta_m = q_0 - q_{m1}$ is 0's quality advantage. Unless otherwise noted, we take it that $\hat{x}_m \in (0,1)$; corner solutions will arise in equilibrium advertising levels if quality differences are extreme enough.

For the beginning, suppose that the advertising levels are fixed and equal in both markets. This allows a first view of how market size affects quality determination. Then we show how endogenous advertising levels intervene.

3 Fixed advertising levels

It is useful for what follows to first describe the outcome when advertising levels are exogenously set at $\bar{a}$ in each market. This would be the case if there are binding advertising caps for example (as is arguably the case in Europe and Australia). Several of the insights from this case carry over to the analysis of endogenous advertising levels.

3.1 Equilibrium

The profit of the local channel in market m is

$$\pi_{m1} = \bar{a} N_m \left(1 - \hat{x}_m\right) - K\left(q_{m1}\right) \tag{4}$$

Hence the (interior) first order condition is

$$\frac{\bar{a} N_m}{2t} = K'\left(q_{m1}\right). \tag{5}$$

The second order condition is necessarily satisfied for $K(.)$ strictly convex. At the same time, the profit earned by the large firm is

$$\pi_{m0} = \sum_{m=A}^{M} \bar{a} N_m \left(\hat{x}_m\right) - K\left(q_0\right) \tag{6}$$

The crucial feature here is that the investment in quality aids the large producer in all markets it serves. There is thus significant efficiency in investment in the large firm. Then, the (interior) first order condition is

$$\sum_{m=A}^{M} \frac{\bar{a}N_m}{2t} = K'(q_{m0}) \tag{7}$$

The marginal benefit is the same to all local firms since the marginal viewer captured always brings in the same extra revenue (the LHS of (5), and viewers are captured at a linear rate. However, the mass producer brings in viewers from all markets at this rate. Summing the first order conditions (5) and inserting in (7) gives the aggregate relation

$$\sum_{m=A}^{M} K'(q_{m1}) = K'(q_0).$$

The LHS is the vertical sum of the marginal costs of the local producers: this relation will hold below in more elaborate versions of the model. Clearly, the mass producer has a higher quality than any of the local firms. From the market-division relation (3), this translates into higher market shares in each local market too. Here, though, markets are apparently independent in that a qualities are independent of expected choices of rivals and "colleagues" (other local producers). In this sense, markets are isolated (there is *strategic independence*). This observation belies an important source of linkage in the multi-market system. Specifically, suppose that an extra market were served. An extra market enables more quality to be provided for all markets by the large channel. However, notice too what happens in the local markets. Equilibrium quality choice in each local market is unchanged by a higher quality of the global provider. But there is a change in market divisions, $\hat{x}_m$: from (3), *all local audiences are reduced by the additional market base of the large channel.*

3.2 Optimum

We can now compare the market provision with the optimal one. Since the advertising footprint is constant, it can be neglected in the welfare expression. Thus the welfare derives purely from quality provision, and is given by

$$W = \sum_{m=A}^{M} \left\{ N_m \left[\left(q_0 - \frac{t\hat{x}_m}{2} \right) \hat{x}_m + \left(q_{m1} - \frac{t(1-\hat{x}_m)}{2} \right) (1-\hat{x}_m) \right] - K(q_{m1}) \right\} - K(q_0).$$

The first term in parentheses, $\left(q_0 - \frac{t\hat{x}_m}{2}\right)\hat{x}_m$, describes the average utility of the consumers watching Channel 0 in market m: the average "distance" for these viewers is $\frac{t\hat{x}_m}{2}$. The second term in parentheses describes the average utility of the consumers watching Channel 1 in market m.

The choice of q_{m1} entails (since $d\hat{x}/dq_{m1} = -1/2t$):

$$N_m \left[(q_0 - t\hat{x}_m) \left(\frac{-1}{2t} \right) + (q_1 - t(1 - \hat{x}_m)) \left(\frac{1}{2t} \right) + 1 - \hat{x}_m \right] = K'(q_{m1}),$$

which, since $q_0 - t\hat{x}_m = q_1 - t(1 - \hat{x}_m)$ defines $\hat{x}_m$, reduces to

$$N_m [1 - \hat{x}_m] = K'(q_{m1}). \tag{8}$$

The LHS is the benefit over the market segment of an incremental quality rise. It is simply the Samuelson condition for optimal provision of a public good (quality choice): the LHS is the sum over all beneficiaries of marginal benefits, and the RHS is the marginal rate of transformation in production from the numeraire commodity. By a similar token, the choice of q_0 stipulates that the gain over all affected market segments should equal the marginal cost of quality provision, so that

$$\sum_{m=A}^{M} N_m \hat{x}_m = K'(q_0). \tag{9}$$

Note that adding a further market for the large firm increases its program quality (which, by its nature as a fixed cost, means it applies to all markets). This causes a reduction in the local market shares, ceteris paribus, and a reduction in local qualities. Combining (8) and (9) yields

$$\sum_{m=A}^{M} K'(q_{m1}) \frac{\hat{x}_m}{[1 - \hat{x}_m]} = K'(q_0); \tag{10}$$

This says that the sum of (ratio) demand-weighted marginal costs should equal the marginal cost of the large group. The same relation will be shown below to hold for endogenous advertising. As we show below, the mass producer has a higher quality and so the ratio $\frac{\hat{x}_m}{[1-\hat{x}_m]}$ exceeds unity. This means that the marginal cost of the mass producer exceeds the sum of the marginal costs of the smaller local ones.

Another (parallel) combination version from (8) and (9) is:

$$\sum_{m=A}^{M} N_m = \sum_{m=A}^{M} K'(q_{m1}) + K'(q_0). \tag{11}$$

This is again a Samuelson condition for quality choice: the RHS is the cost of increasing all qualities marginally (and so benefiting all viewers); the LHS is the sum of the marginal benefits.

We now compare optimal qualities implied by (8) and (9). To do so, first suppose that there were only one market, say market A (the largest one), and we build up from there to indicate the solution. The second order condition corresponding to (8) is $N_A/2t - K"(q_{A1}) < 0$, which we assume to hold. Furthermore, (8) gives an implicit equation in q_{A1} and q_0: the slope of this is

$$\frac{dq_{A1}}{dq_0} = \frac{N_A/2t}{N_A/2t - K"(q_{A1})} < 0$$

and this slope exceeds -1 as $N_A/t < K''(q_{A1})$, which we also assume to hold (it implies the second order condition). Indeed, this condition, and the stronger ones required below, can be guaranteed by choosing $K(.)$ to be convex enough. Parallel logic applies to the analysis of (9). Thus, the two equations resemble classic Cournot reaction functions in q_{A1} - q_0 space. They slope down, and each responds mildly (less than one to one) to the other. Their intersection is the optimum. With just one market, the solution is symmetric; $q_{A1} = q_0 = q^*$.

From this benchmark, now consider opening up market B, and initially set $q_{B1} = q^*$ too. The curve representing the optimal q_0 now rises (see (9)) and so the q_1's both fall. This elicits a further rise in q_0, and further falls in the q_1's, etc. under the stability condition, the upshot is a higher optimal q_0 and a lower optimal q_{A1} than in the one market benchmark. Further markets can be added in a similar manner, to give the full optimal solution. In line with (8) and (9), the *local markets have qualities that increase with their sizes, and the mass producer has the greatest quality of all*. Furthermore, *the fraction of the market served by the mass producer is greatest in the smallest market and falls monotonically with market size*. This is because competition is tougher in the larger markets because the incentive to provide quality is greatest there. Similarly, since the mass producer has the greatest total market of all, its own incentive to provide quality is the greatest of all, and it has the highest quality. This large quality might be thought to provide a social disincentive to entry of local producers into markets. We address this issue below in a more elaborate version of the model with endogenous advertising.

3.3 Comparison

The optimum balances marginal costs to marginal quality benefits to the groups served. The equilibrium pits firms against each other rather than addressing the global optimum. The equilibrium trades off marginal increments to demand that are induced from quality improvements: the equilibrium, recall, is given by:

$$\sum_{m=A}^{M} K'(q_{m1}) = K'(q_0)$$

where $\sum_{m=A}^{M} \frac{\bar{a}N_m}{2t} = K'(q_{m0})$. These look very different from the optimum expressions (8) and (9). The one above bears an interesting comparison to the ratio form optimum expression, (10). If it so happens that the mass producer's quality were the same in equilibrium and optimum, then qualities for local producers are *higher* at the equilibrium than at the optimum.

The analysis above, while suggestive, eliminates an important market intersection in the choice of ad levels. These are an important source of market discipline. We now allow for that competition.

4 Advertising competition

As for competition with exogenous advertising, we show that with endogenous advertising levels the mass market producer has higher quality and higher viewership. It also uses its quality advantage to sell more advertising, and so earns more in local markets on both counts of more viewers and more advertising levels,

The profit of the local channel in market m is

$$\pi_{m1} = a_{m1} N_m (1 - \hat{x}_m) - K(q_{m1}), \tag{12}$$

while, the profit earned by the large firm is

$$\pi_0 = \sum_{m=A}^{M} a_{m1} N_m (\hat{x}_m) - K(q_0). \tag{13}$$

The equilibrium choice of ad levels by the small local producers satisfies:

$$1 - \hat{x}_{m1} = \frac{\gamma a_{m1}}{2t},\ m = A, ..., M, \tag{14}$$

while the large producer's choice satisfies

$$\hat{x}_{m0} = \frac{\gamma a_{m0}}{2t},\ m = A, ..., M. \tag{15}$$

The interesting market structure here is that the large producer is free to discriminate by markets in terms of the advertising level, so local tailoring is possible. On the other hand, it cannot use a discriminatory policy with its quality level, and is instead stuck with a one-size fits all policy there. This indicates the fundamental property that the producer with the higher market share is also the one that sets the higher advertising level. It also means it gets the greater revenues from the local market. As we shall shortly see, we can identify this one with the larger producer since it has the greater incentive to provide quality.[2]

The advertising equations can be then solved out explicitly, for given qualities, and recalling from (3) that $\hat{x}_m = \frac{1}{2} + \frac{\Delta_m - \gamma(a_{m0} - a_{m1})}{2t}$ to give:

$$\hat{x}_m = \frac{1}{2} + \frac{\Delta_m}{2t} + 1 - 2\hat{x}$$

or

$$\hat{x}_m = \frac{1}{2} + \frac{\Delta_m}{6t}. \tag{16}$$

We now determine equilibrium quality levels. For given ad levels, quality choices are determined by the following relations. For the local producers,

$$\frac{\partial \pi_{m1}}{\partial q_{m1}} = a_{m1} \frac{N_m}{2t} - K'(q_{m1}), \tag{17}$$

[2] This result is not specific to the Hotelling linear demand framework, but holds for any discrete choice model with two alternatives and no outside option. See Anderson and de Palma (2001) for related results.

and for the large firm,

$$\frac{\partial \pi_0}{\partial q_{m1}} = \sum_{m=A}^{M} a_{m0} \frac{N_m}{2t} - K'(q_0). \tag{18}$$

We can now use the advertising choice equations (14) and (15) to rewrite (17) and (18) as:

$$(1 - \hat{x}_m) \frac{N_m}{\gamma} = K'(q_{m1}) \tag{19}$$

and

$$\sum_{m=A}^{M} \hat{x}_m \frac{N_m}{\gamma} = K'(q_0). \tag{20}$$

These can be summed, as with the analysis of the fixed ads model, to give the same equilibrium relations as there, except with now $\frac{N_m}{\gamma}$ replacing N_m. For future reference, we can also use (16) to write (19) and (20) as:

$$\left(\frac{1}{2} - \frac{\Delta_m}{6t}\right) \frac{N_m}{\gamma} = K'(q_{m1}), \quad m = A, ..., M, \tag{21}$$

and

$$\sum_{m=A}^{M} \left(\frac{1}{2} + \frac{\Delta_m}{6t}\right) \frac{N_m}{\gamma} = K'(q_0). \tag{22}$$

Note that these equations define a system solely in terms of qualities. Clearly, the first of these indicates (since the value of q_0 is the same in each Δ_m) that smaller markets have smaller qualities. They correspondingly sell less advertising, and they also have fewer viewers, and make less profit.

4.1 Second best optimum

Optimal quality choice may be evaluated using several different benchmarks (such as the first-best, when both advertising and qualities are determined optimally, etc.). We take as given that firms choose ad levels and so consider now the second best optimum allocation of qualities. This choice reflects the idea of not regulating all market aspects, and aims to shed light on whether the quality levels are intrinsically sub-optimal. The issue is then the optimal quality choice given that advertising levels are to be set given the qualities. The welfare maximand is the sum of consumer surplus and advertising revenues, and costs of providing quality are to be subtracted.

Recall from the producer analysis that ad levels are $2t/\gamma$ times market shares, and these market shares are $\hat{x}_m = \frac{1}{2} + \frac{\Delta_m}{6t}$ (see (16)).

The choice of q_{m1} then entails:

$N_m\{(1-\hat{x}_m)(1-\gamma\frac{da_{m1}}{dq_{m1}}+\gamma\frac{da_{m0}}{dq_{m1}})+\hat{x}_m\left(\gamma\frac{da_{m1}}{dq_{m1}}-\gamma\frac{da_{m0}}{dq_{m1}}\right)+\hat{x}_m\frac{da_{m0}}{dq_{m1}}+a_{m0}\frac{d\hat{x}_m}{dq_{m1}}+ (1-\hat{x}_m)\frac{da_{m1}}{dq_{m1}} - a_{m1}\frac{d\hat{x}_m}{dq_{m1}}\} - K'(q_{m1}) = 0.$

The first term in parentheses is the change in consumer surplus for the viewers of channel 1 in market m, the second term is the change in consumer surplus for the viewers of channel 0, and the other terms are the changes in advertising benefits.

Substituting the relations $\frac{d\hat{x}_m}{dq_{m1}} = -1/6t$, $\frac{da_{m0}}{dq_{m1}} = \frac{da_{m0}}{d\hat{x}}\frac{d\hat{x}_m}{dq_{m1}} = \frac{-1}{3\gamma}$, and $\frac{da_{m1}}{dq_{m1}} = \frac{1}{3\gamma}$ yields:

$N_m\{(1-\hat{x}_m)(1-\frac{2}{3}) + \hat{x}_m\left(\frac{2}{3}\right) + \hat{x}_m\frac{-1}{3\gamma} - a_{m0}\frac{1}{6t} + (1-\hat{x}_m)\frac{1}{3\gamma} + a_{m1}\frac{1}{6t}\} - K'(q_{m1}) = 0$. Since ads are $2t/\gamma$ times market shares, we have

$N_m\{(1-\hat{x}_m)(1-\frac{2}{3}) + \hat{x}_m\left(\frac{2}{3}\right) + \hat{x}_m\frac{-2}{3\gamma} + (1-\hat{x}_m)\frac{2}{3\gamma}\} - K'(q_{m1}) = 0$,

or:

$N_m\{(1-\hat{x}_m)(1-\frac{2}{3}+\frac{2}{3\gamma}) + \hat{x}_m\left(\frac{2}{3}-\frac{2}{3\gamma}\right)\} - K'(q_{m1})$

$= N_m\{(1-\frac{2}{3}+\frac{2}{3\gamma}) + \hat{x}_m\left(\frac{1}{3}-\frac{4}{3\gamma}\right)\} - K'(q_{m1}) = 0.$

Inserting $\hat{x}_m = \frac{1}{2} + \frac{\Delta_m}{6t}$ indicates this is just a linear equation in quality differences, namely

$$N_m\left(\frac{1}{2} - \frac{\Delta_m}{6t}\left(\frac{-1}{3} + \frac{4}{3\gamma}\right)\right) = K'(q_{m1}). \tag{23}$$

By a similar token, the mass producer's quality should (second-best) optimally be:

$\sum_{m=A}^{M} N_m\{(\hat{x}_m)(1-\frac{2}{3}+\frac{2}{3\gamma}) + (1-\hat{x})\left(\frac{2}{3}-\frac{2}{3\gamma}\right)\} - K'(q_0)$.

Solving out in a similar manner to that above yields:

$$\sum_{m=A}^{M} N_m\left(\frac{1}{2} + \frac{\Delta_m}{6t}\left(\frac{-1}{3} + \frac{4}{3\gamma}\right)\right) = K'(q_0). \tag{24}$$

We can now compare the optimal solution from (23) and (**??**) to the equilibrium one from (21) and (22). To do so, it is first instructive to consider the case $\gamma = 1$.

4.2 The "pricing" solution

When $\gamma = 1$, the nuisance cost to viewers from advertising is exactly equal to the social benefit to advertisers (recall that the social benefit has been set to 1). Hence, in this case, the solution is just as if there was a direct price, for instance a subscription price to the services offered. To see this, it suffices to set $\gamma = 1$ in the above equations, and read the a variables as direct prices face by consumers and set by firms. The important insight from this is the benchmark that the optimum and equilibrium conditions are exactly the same. Namely, the equations (21) and (22) and (23) and (**??**) reduce to the same thing. This means that optimum and equilibrium quality provision exactly coincide.

The intuition is as follows. When a producer sets quality and prices together, any incremental quality can be immediately monetized and leave shares in each market unchanged. For example, raising quality by one unit and raising price by one unit will change no consumer's utility and therefore not change the producer's market. Therefore, quality provision is optimal.[3]

This is a useful benchmark case because we can now see how the market equilibrium and optimum solutions are affected by raising γ above one. This will correspond to a case where advertising is a nuisance relative to its social value (at the margin).

4.3 Comparing optimum and equilibrium

For the general case, it is more transparent to analyze the equilibrium and optimum for symmetric local markets. Therefore, set them all equal with size 1, and let there be M of them. The qualities in all local markets are then the same. Let Δ denote the quality difference, $q_0 - q_1$.

Consider first the equilibrium. The conditions for the local firms are

$$\frac{1}{2} - \frac{\Delta}{6t} = \gamma K'(q_1) \tag{25}$$

while the mass-producer firm faces

$$M\left(\frac{1}{2} + \frac{\Delta}{6t}\right) = \gamma K'(q_0). \tag{26}$$

The case of an exponential cost function is a useful benchmark. Then we have that the ratio of the two equations above (which determines the equilibrium Δ) is independent of γ. Hence the equilibrium Δ is independent of γ. Looking at the equations and taking Δ as a constant, a higher γ now clearly reduces qualities of both types of producer, and by exactly the same amount. Hence higher γ reduces qualities. The reason is that a higher advertising nuisance causes a higher rate of turn-over: competition for viewers is more intense because of the nuisance, and leads to lower equilibrium advertising and advertising revenues. This means that the incentive to provide quality is now lower for both types of producer.

Next consider the optimum analysis. Under symmetry, the equations (25) and (26)boil down to:

$$\left(\frac{1}{2} - \frac{\Delta}{6t}\left(\frac{-1}{3} + \frac{4}{3\gamma}\right)\right) = K'(q_1). \tag{27}$$

[3] It is important for this equivalence that the utility specification is additive in quality for all consumers. In particular, the marginal benefit is the same as the average benefit. This condition was identified by Spence (1976) for a monopolist's quality choice to be optimal. If, for example, quality appreciation declined with distance from preferred product type, the competition for the marginal consumer would imply sub-optimal quality since producers would not capture the full surplus gain from the inframarginal consumers, the average benefit then exceeding the marginal one.

and

$$M\left(\frac{1}{2}+\frac{\Delta}{6t}\left(\frac{-1}{3}+\frac{4}{3\gamma}\right)\right)=K'\left(q_0\right). \tag{28}$$

Taking the ratio of these equations and again using an exponential cost, leads to a relation of the form

$$\frac{M(1+\Delta f\left(\gamma\right))}{(1-\Delta f\left(\gamma\right))}=e^{\Delta},$$

where $f\left(\gamma\right)$ is decreasing in γ. Then, the optimal gap, Δ, is decreasing in γ. Hence, from the quality equations, (27) and (28), q_0 decreases with γ, while q_1 increases. In comparison with the analysis for the equilibrium the local quality is too low. This, in part, is because raising the quality of the local producers shifts down the advertising level of the high-quality producer. Since ads are a nuisance relative to their social contribution, welfare is higher. This suggests that encouraging local production may raise welfare.

4.3.1 Entry blockading?

One might wonder whether the large firm, by dint of its ability to spread out fixed costs over many markets, might effectively dampen entry incentives and so inefficiently foreclose local producers from entering markets.

Suppose then that the last local producer was just indifferent between entering market M and not entering it. Then the equilibrium could just as well be $M-1$ markets entered as M. We wish to see whether social surplus is higher with M markets with local firms present, or $M-1$. If the total surplus is higher with M markets we shall be able to say that there is insufficient entry (since the market incentives are then lower than the social incentives), and if the converse is true, we can say there is excessive entry.

Suppose then that there were no local producer in market M. However, the mass producer can still serve it, and serve it as a monopolist. Whether or not the mass producer serves the whole market or only part of it as a monopolist, its market length served (under its optimal advertising choice and holding q_0 fixed at the M-market equilibrium level) will exceed the market length it serves under competition. Since its incentive to provide quality (marginal profit from quality provision in the market) is proportional to the market it serves, this means that its willingness to pay for more quality will be higher as a monopolist in that market. So adding a local producer in market M thus reduces the incentive for producer 0 to provide quality. From this insight, we can now determine what happens in other markets. Indeed, since rival qualities decrease with q_0 (the *strategic substitutes* property), the local producers in other markets see their qualities rise as a response. In turn, this causes the mass producer's quality to fall, inducing a further rise in the q_1's, etc., so the new equilibrium has higher local qualities and a lower global one.

Now consider the welfare effects of these quality changes in the other markets. Suppose that the induced quality changes are small enough that we need only consider first-order effects. For simplicity too in the following, set $\gamma = 1$. Then the change in firm m's profit is simply (applying the envelope theorem)

$$-\left(\Delta q_0\right) N_m a_{m1}/2t,$$

where (Δq_0) is the change in quality q_0. But, by m's advertising first-order condition, this is just equal to

$$-\left(\Delta q_0\right) N_m \left(1 - \hat{x}_m\right).$$

Consumer welfare changes by the quality changes over the affected population, so that in market m the value of the changes in qualities is measured as $(\Delta q_0)\,\hat{x}_m + (\Delta q_{1m})\,(1 - \hat{x}_m)$ times market size, N_m. Notice that we can safely ignore the consumers who switch from one producer to the other, since they are broadly indifferent in allegiance to producers both before and after the change. Lastly, consider firm 0. It is hurt directly by the new entrant, and then indirectly by the higher qualities of the competitors that its own action in reducing its quality induces. Suppose that its quality choice is close enough to the original one (for example, if the marginal market M is small enough). Then we can also apply the envelope theorem to its profit function to derive the expression for its marginal loss. Indeed, this yields a loss in market m of $-\left(\Delta q_{m1}\right) N_m a_{m0}/2t$, where (Δq_{m1}) is the change in quality q_{m1}. Again, by 0's advertising first-order condition in market m, this is just equal to $-\left(\Delta q_{m1}\right) N_m \left(\hat{x}_m\right)$.

We can now pull together all this to yield an expression for the welfare change in market m as

$$\Delta W_m = -\left(\Delta q_0\right) N_m \left(1 - 2\hat{x}_m\right) + \left(\Delta q_{m1}\right) N_m \left(1 - 2\hat{x}_m\right).$$

Now, together this implies that the welfare change is

$$\Delta W_m = N_m \left(2\hat{x}_m - 1\right) \tilde{\Delta},$$

where we just defined $\tilde{\Delta}_m = \Delta q_0 - \Delta q_{m1}$ as the change in Δ_m. Since we argued above that $\Delta q_0 < 0$ while $\Delta q_{m1} > 0$, then $\tilde{\Delta}_m < 0$. Furthermore, since $(2\hat{x}_m - 1) > 0$ (the higher quality producer has the higher market length in each market) then we can conclude that the effect on each individual market, taking profits and consumer surplus jointly, are negative. (Of course, this does obscure the fact that local producers' profits have risen from the reduction in the mass producer's quality – and their own viewers' benefits have risen from their own quality improvement.)

There remains the effects in market M. Here, the profits of producer 0 have fallen because it now faces a rival. But consumer surplus has risen for those consumers who now patronize the new entrant (although the quality reduction of the mass producer does cut against this effect).[4] Finally, the entrant makes zero profit either in or out, and so is excluded from the calculation.

[4] More precisely, welfare rises for those consumers (with ideal points near 1) who would prefer the new entrant even if the incumbent mass producer had left its quality unchanged.

Thus this indicates that a necessary condition for welfare to rise is that the consumer surplus improvement in market m exceeds the damage to firm 0 there plus the net loss in all the other markets.

To get some feeling for whether the consumer surplus creation effect can dominate the profit-stealing one, it is instructive to consider a very simplified version of the model. Consider a single market, let $\gamma = 1$, and suppose qualities are fixed exogenously at $\beta \in \left(\frac{3t}{2}, 2t\right)$ (which therefore constitutes the reservation price for all consumers).[5] Let the fixed cost of entering the market be F. In the presence of duopoly, each firm sets an advertising level of $a = t$ (this is a standard "Hotelling" result). This solution is valid as long as the nuisance to the marginal individual at $\hat{x} = 1/2$ is below β, i.e., $3t/2 < \beta$, as assumed. Profit is then $t/4$ per firm, so set this equal to F and we want to see at that value whether monopoly gives higher welfare than duopoly (if so, we will claim there is over-entry in the sense that a second entrant will come in even when this causes welfare to fall). The consumer benefits under duopoly are $\beta - t/4 - t$ where the $t/4$ is the aggregate transport cost paid (recall the average distance travelled is 1/4) and the last t is the (advertising nuisance) price paid. The total welfare is then this consumer benefit plus firm profits, $t - 2F$. The gross surplus is then

$$S^{duop} = \beta - t/4 - 2F.$$

We wish to compare this to the surplus under monopoly. For β not too large that the firm wants to serve the whole market, the firm (located at zero) will set an advertising level such that the market is only partially served. Its market length will be $\tilde{x} = \frac{(\beta - a)}{t}$ since this is the location of the indifferent viewer. Maximizing profits, $a\tilde{x}$ gives the optimized value for advertising as $a^*_{mon} = \beta/2$: the market is unserved as long as the corresponding market length, $\tilde{x}^*_{mon} = \frac{\beta}{2t}$ is less than one (the potential market size) and hence the stipulation that $\beta < 2t$ above.

The surplus under monopoly is given as $\beta\tilde{x}^*_{mon} - t\left(\tilde{x}^*_{mon}\right)^2/2 - F$; substituting for $\tilde{x}^*_{mon}$, this is written as

$$S^{monop} = \frac{3\beta^2}{8t} - F.$$

We therefore wish to see whether $S^{monop} > S^{duop}$ when evaluated at $F = t/2$. Substituting, this condition is

$$\frac{3\beta^2}{8t} - \beta + \frac{3t}{4} > 0,$$

for $\beta \in \left(\frac{3t}{2}, 2t\right)$. Equivalently, setting $x = \beta/t$, the condition is

$$3x^2 - 8x + 6 > 0 \quad \text{for } x \in \left(\frac{3}{2}, 2\right).$$

[5] This is a special case of a quality-cost function that is zero up to quality β and is infinite thereafter.

The function is convex with a minimum at $x = 4/3$, so that it is always increasing over the range in question. At $x = 3/2$, it is already positive, and so the inequality does indeed hold over the relevant range. The implication is that there can be excessive entry: instead of excessive deference, the monopoly is too likely to attract entry.

Finally, consider what happens for $\beta > 2t$. The monopolist then chooses to sell to the whole market at price $\beta - t$, and $S^{monop} = \beta - t/2 - F$. As above, duopoly surplus is $S^{duop} = \beta - t/4 - 2F$. Then $S^{monop} > S^{duop}$ as $F > t/4$. Evaluation as above at $F = t/2$ (the entrant just earns zero profits) shows that this is certainly true.

5 Conclusions

The argument for regulations to favor local producers can rely on externalities and/or market inefficiencies. This paper has considered the market failure side. One argument for promoting the local firm stemmed from the (second-best) analysis of the market system with a marginal advertising nuisance greater than its social worth. However, what may be driving the result that local producers should be helped against mass-producing rivals is that quality balancing reduces advertising by weakening the large producer in markets.

Another concern that has been investigated is that the large firm may overshadow the smaller local ones through its high quality, thus preventing socially beneficial entry. However, this seemed rather unlikely, since the weight of the welfare costs ran against further entry. The latter result is consonant with some existing results in the literature on entry into markets. The typical result for symmetric models of product differentiation is over-entry (see for example Anderson, de Palma, and Nesterov, 1995). For an asymmetric logit model (with exogenous quality differences across firms and a single market), Anderson and de Palma (2001) find excessive entry because high quality firms overprice and so render entry easy for low quality rivals. The model here is quite different because of the central position of the mass producer. However, the intuition that it will use its market power and high quality advantage to set a high advertising level seems to apply here. This "soft" behavior actually encourages entry. That said, some caveats should be drawn around such conclusions. The model ignores many factors a large producer might use to actively and aggressively keep out rivals (if it could commit to a high quantity, or low advertising level say, it would strategically deter entry). It also ignores many factors in contracts.

It should be stressed that there are remarkably few models in the theoretical literature with firm asymmetries. This is presumably not because these are uninteresting or empirically irrelevant – quite the contrary – but, instead, they are intrinsically difficult and it is difficult to make much analytical headway.[6] There are also very few models of multi-product firms, and for the same reason. The mass producer in the current model is a multi-market producer facing rivals

[6] An exception is Cournot models with homogeneous products and different marginal costs. These are quite straightforward analytically.

in each market. These local firms are strategically linked (though not directly so) through the quality of the large producer. Although progress with the model is a little laborious, it is still quite tractable relative to alternatives.

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6 APPENDIX

The main text considers a simultaneous choice game. This corresponds to a situation in which producers choose qualities and advertising levels together. In television markets, advertising is often determined in advance for the following year. An alternative game theoretic structure is to consider a two-stage game whereby qualities are set before advertising. This would correspond to advance programming choices, with advertising set on spot markets. The analysis is as follows.

To address the quality choice game that precedes advertising choice in a sub-game perfect equilibrium, consider the relationships in (14) and (15). These indicate that advertising levels are a factor $(2t/\gamma)$ times market shares given sub-game equilibrium advertising levels. Hence, since firm revenues in any market are just the product of advertising level and market size, the profit of a local producer is

$$\pi_{m1} = \frac{2tN_m}{\gamma}\left(1-\hat{x}_m\right)^2 - K\left(q_{m1}\right)$$

where market share, $1-\hat{x}_m$, is given as $\frac{1}{2}-\frac{\Delta_m}{6t}$.

Similarly, the large producer earns

$$\pi_{m0} = \sum_{m=A}^{M} \frac{2tN_m}{\gamma}\left(\hat{x}_m\right)^2 - K\left(q_0\right)$$

where $\hat{x}_m = \frac{1}{2}+\frac{\Delta_m}{6t}$. This game has some interest in its own right because each local producer is linked to the other local producers, even though they do not directly interact, through the intermediary of the mass producer. This link creates some interesting externality effects.

The local producer in market m chooses a quality level that solves

$$\frac{2N_m}{3\gamma}\left(1-\hat{x}_m\right) = K'\left(q_{m1}\right).$$

or

$$\frac{2N_m}{3\gamma}\left(\frac{1}{2}-\frac{\Delta_m}{6t}\right) = K'\left(q_{m1}\right).$$

(Note that both sides are increasing in own quality: the second order condition requires that the RHS rises faster, i.e., at a rate faster than $\frac{N_m}{9t\gamma}$, which we assume to hold for all markets). The mass producer chooses

$$\sum_{m=A}^{M} \frac{2N_m}{3\gamma}\left(\frac{1}{2}+\frac{\Delta_{q_m}}{6t}\right) = K'\left(q_0\right).$$

It is interesting to insert the first of these, rewritten as $\frac{2N_m}{3\gamma}\left(\frac{1}{2}\right) - K'\left(q_{m1}\right) = \frac{2N_m}{3\gamma}\frac{\Delta_m}{6t}$, in the second to get an equilibrium relation of the form:

$$\sum_{m=A}^{M}\left[\frac{2N_m}{3\gamma} - K'\left(q_{m1}\right)\right] = K'\left(q_0\right).$$

A higher local producer quality in market m causes the mass market producer to decrease its quality, and this decrease applies to all markets, and leads other local producers to raise their qualities. In turn, this evens out ad levels and market shares.