Global vs. Local Competition*

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Abstract

We analyze the impact of an increase in the value of purchasing from a global market on local market performance and consumer surplus. If consumers choose once where to buy, we show that increased competition from the global market will locally crowd out variety, independently of whether the local market is a monopoly or an oligopoly with free entry. The effect on prices is much less clear. While increased global competition yields a price reduction under monopoly, prices may increase under oligopoly. When global competition is severe, an oligopoly behaves like a zero profit monopoly and overprovides varieties. It follows that with severe global competition a monopoly leads to a greater consumer surplus than a free entry oligopoly.

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What is the effect of additional competition in a market? Usually, that effect is modelled by looking at the impact of entry of new competitors in that very market. The additional competition induced by entry disciplines profit maximizing firms and eventually leads to an equilibrium in which the consumers patronizing this market are better off. For instance, if one considers a Hotelling line with two competitors located at its extreme points, the entry of a new firm on the segment tends to increase competition between neighboring firms. This leads to positive welfare effects for all consumers, due both to a decrease in equilibrium prices, and a decrease in the expected (or average) “transportation cost”. The effect of entry has been to intensify competition for consumers within the market, with the mass of consumers in the market unchanged before and after entry.

However, in the reality of markets, additional competition may be brought about not only by firms that become active in the local market, thus soaking off demand from its immediate neighbors - we dub this increasing local competition - but also by firms selling substitutes that enter outside of that, thus soaking off demand from all, and not only neighboring local firms. We dub this increasing global competition. It tends to reduce the mass of consumers participating in the local market; to decrease the profits realizable locally; to induce firms to exit from the local market; and therefore to reduce local offers to consumers.

Examples of increased global competition in this sense are the following:

- Catalogue sales, or e-commerce: it attracts demand side agents who are less sensitive to supply assurance, seller reputation, inspection, etc., but hurts local (specialized) stores, and with it agents who continue to buy locally.

- Entry in a geographical market of a large discount store: it attracts agents who value low prices but less so high quality of service, but hurts firms offering high quality service, and with it demand side agents sensitive to the latter.

- International labor mobility: high skilled agents leaving the country to benefit from higher outside options elsewhere could make low skill
agents remaining in the country better or worse off, depending on the nature of the local production process. For instance, if skilled and unskilled labor are substitutable inputs into production, we should observe, after the emigration of skilled agents, an increase in demand for unskilled labor and therefore an increase in the wage of the workers who continue to stay in the country. By contrast, if there are complementarities in production, the decreased marginal productivity of the unskilled should lead to a decrease in their wage after the emigration of skilled labor.

- A particular example is the recent EU services directive that will facilitate the entry of service providers from other EU states. If these providers are of a similar quality as the local providers, there will be an increase in local competition. However if the providers are of a different quality than that of local providers, the directive will increase global competition, in our terminology. The effect on the surplus of the demanders of service may be quite different under each scenario: local competition will lead to a uniform increase in the surplus for demand side agents, whence global competition may lead to a decrease in surplus for agents who continue to patronize the local market.

The primary effect of increased global competition is therefore a decrease in demand available to the entire local industry, whilst that of increased local competition is a decrease in demand available to local firms producing close substitutes to the entrant’s products. Contrary to an increase in local competition, it is no longer true that all demand side agents necessarily benefit from an increase in global competition. In particular we will show that agents who continue to purchase locally may be strictly hurt by an increase in global competition. The effect of new competition on agent welfare on the demand side is therefore influenced in a non trivial way by the nature of entry: agents staying in the initial market will benefit from additional competition from firms in that market, but may suffer if new competition is brought from outside the market.

We obtain these results in a differentiated oligopoly model. If an industry
has reached its free entry equilibrium, an increase in global competition, modelled as an increase in the value of an outside option to agents, will lead to a decrease in the total demand available to all firms in the local market, and thus the exit of firms from the market. Fewer firms fight for a smaller pie; and it is not a foregone conclusion that agents will get a lower surplus in this situation than in the initial situation. We show that when global competition increases, the local oligopoly will react by providing less surplus to local consumers as long as the demand absorbed by the global market remains relatively low, but more surplus to local consumers as long as demand absorbed globally is relatively high.

In the latter case, we show that each firm in the oligopoly behaves like a monopolist on its market segment. Since oligopolists operate at zero profits under free entry, there is more variety in the market than the monopolist would choose. However, since in this case the benefit of lower variety is a lower price, consumers may prefer to have a local monopoly. In section 4, we show that this is the case when global competition is severe. In Section 5, we sketch extensions of our model. They by and large strengthen our main results. We conclude with Section 6.

Contributions relevant to our analysis are the following: Anderson and de Palma (2000) look at oligopolistic competition taking different forms, namely competition between neighbors versus competition between non-neighboring firms such as in CES type models. They dub "global" the latter type of competition. Their emphasis is on integrating the two forms of competition within one unifying model, whilst the novelty of our results rests on the strict separation of the two. Our approach to model the demand side is taken from Stahl (1982). Gehrig (1998) models local markets in a similar way. Competition between local markets exercises an effect similar to the one dubbed global in our model. Yet the emphasis in his paper drastically differs from ours. Inspection and trading technologies are identical across his markets. His focus is on the agglomeration externalities of markets and on conditions under which new markets do (not) form. Finally, he does not compare allocations involving different market forms.

Michael (1994), Balasubramanian (1998) or Bouckaert (1999) model com-
petition between mail order and conventional retailing. Most closely related to our approach is Bouckaert. In his model, the mail order retailer absorbs demand between oligopolists located along the Salop circle. This way the mail order retailer becomes a local, rather than a global competitor who also absorbs demand from the local retailers’ core market. As we already pointed out, consumers should always become better off with an increase in this type of competition.

1 The Model

We consider a generalized version of Salop’s (1979) model of product differentiation on the circle. The outside good in his model plays the role of the global market. The most important generalizations are that agents differ in relative access costs to the global versus the local market; that before purchasing they have to learn about the varieties available, and that the two markets differ in the mode they offer utility to agents.

More specifically, agents value the consumption of one unit of a good, but are horizontally differentiated in their preferences over different varieties. Agents can discover the variety they want to purchase only after having committed to a market place. For instance, in retailing, it is often through sampling and physical contact only that agents decide which variety fits them best; in the labor market, workers who emigrate will discover the exact working and living conditions in the foreign country only after having spent some time there; finally, as people who have hired a contractor know, the quality of service provided by him is often discovered ex-post, as is his ability to deal with unforeseen contingencies that are an intrinsic part of the contractual relationship.

Obviously, agents who shop on the internet, workers who emigrate, or customers who hire a foreign plumber do not do so blindly: reputation, past experience, and possibly advertising, already shape their beliefs about the likelihood of finding a variety that they like at a given price. Also, agents who decide to patronize the local market, e.g., by going to the shopping mall instead of shopping on the internet, by finding a job in their region rather
than emigrating, or by hiring a local plumber rather than a foreign one, also face some uncertainty about the likelihood to find a good variety for them at a given price. Yet there remain profound differences in the informational qualities of the two market channels.

At any rate, we will say that global competition increases when the expected value of an agent shopping outside his local market increases. In this paper we are not interested in analyzing how the global market may offer a greater expected utility to agents, but simply in the response of the local firms to this competitive pressure.

We now formally describe our model. There is a measure 1 of agents on a circle of circumference 1. An agent is identified by a pair \((y, \theta)\), where \(y \in [0,1]\) is the agent’s ideal variety and \(\theta\) is her cost difference between accessing the local and the global market. In the e-commerce example, agents living in rural areas far away from local retailers, but literate in the use of computers are characterized by large values of \(\theta\) for shopping on the internet; in the labor market example, workers who are well versed in language skills, or do not have strong family ties, suffer small costs of going globally and thus again have large \(\theta\).

Viewed as random variables, \(y\) and \(\theta\) are i.i.d.; we assume \(y\) to be uniformly distributed, and \(\theta\) having distribution \(G\), where \(G\) is log-concave and has a strictly positive density \(g\) on \((-\infty, +\infty)\). Independence is justified by the fact that there is no natural correlation between access costs and preferences. Having a uniform distribution for \(y\) is a common assumption in horizontal product differentiation models that helps focusing on interesting outcomes.

Agents wish to consume at most one unit of the commodity. If an agent with ideal variety \(y\) consumes variety \(\hat{y}\) she incurs a variety loss \(x = |y - \hat{y}|\). An agent having a variety loss \(x\) has a utility of \(h(x) - p\), where \(p\) is the price paid and \(h\) is a strictly decreasing and strictly concave function with \(h'(0) = 0\).

Firms entering the local market are specialized in producing one of \(m\) different varieties, and compete in prices. There is a fixed entry cost \(F \geq 0\).
and a marginal cost \( c \geq 0 \) per unit sold.\(^1\) We make the standard assumption that varieties are always symmetrically located on the circumference of the circle.

The \textit{ex-ante} utility of an agent who goes to the global market is exogenously given by \( u \). As we assume that there is no strategic response of the global market to changes in the local market, the precise specification of the global market is not crucial.\(^2\)

The timing of events is as follows:

- There is entry in the local market and the number of varieties \( m \) becomes known to agents. For convenience \( m \) is treated as a continuous variable.
- Agents learn their relative cost \( \theta \) and their \textit{ex-ante} utility \( u \) of going to the global market.
- Agents decide whether to go to the local or to the global market.
- Local firms set their prices \( p_i \).
- Nature draws \( y \) for each agent.
- Agents make purchasing decisions.

Some of the assumptions merit discussion. The assumption that global markets affect local ones while the converse is not the case has merits when the number of local firms is small relative to the number of global firms. The assumption that agents once and for all decide about the market channel is made for convenience only. In Section 5 we will discuss the consequences of modifying it. The assumption that firms determine their prices only after

\(^1\)We later relax this assumption to consider the case where one monopolist produces all varieties with the same cost structure per variety.

\(^2\)One interpretation for the global market is that a large number of varieties \( M \) is offered that sell at price \( q \). Because of cultural differences or difficulty to sample, the agent will identify her best variety with probability \( \mu \in (0, 1) \) and with probability \( 1 - \mu \) will not be active in the market \textit{ex post}, (or will choose at random among the existing varieties). As long as \( \mu \) is small enough, even a high number of varieties \( M \) and a low price \( q \) can lead to a low expected utility.
agents have decided about the market brings agents into a hold-up situation. It is made to strengthen the clarity of the exposition. We discuss later that our main results are reinforced when firms (are able to) commit to prices before agents take their choice of marketplace.

Finally, the assumption that agents learn about their best variety only after they have committed to buy from one market place captures the idea that agents can discriminate among varieties only by inspection. Towards concrete examples, consider an agent who wants to buy herself a pair of "nice" shoes, but can decide about which type of shoes is "nice" only when trying them onto her feet. Alternatively, consider a car producer procuring a complex component, but can decide about which technical specifications are most appropriate only after having inspected the available alternatives. Returning to our labor market example, the laborer often learns about which job is appropriate to her and in which she performs efficiently only after she has started working in that job.

2 Surplus and Prices in the Local Market

When choosing whether to go to the global or local market, agents compare the surplus they obtain in the global market gross of the benefit of not going to the local market, \( u + \theta \), and the surplus \( v(m) \) they expect to obtain on the local market with \( m \) firms. The surplus \( v \) is endogenously determined by the price strategy of the \( m \) firms. There exists a cutoff value \( \theta^*(m) = v(m) - u \) such that all agents with cost less than \( \theta^*(m) \) go to the local market and the others go to the global market. Hence the mass of agents going locally is \( G(v(m) - u) \). At the time local firms set their prices, the mass \( G(v(m) - u) \) of agents present in the local market is fixed.

Because \( \theta \) and \( y \) are i.i.d., the distribution of \( y \) is still uniform among those agents present in the local market, and since the marginal cost is constant, the pricing behavior of the \( m \) firms will be in fact independent of the mass of consumer agents. In particular, for a given \( m \), the price equilibrium is the same for all values of \( u \); this will be convenient for analyzing how the number of firms \( m \) changes with \( u \) in a free entry equilibrium.
In line with the literature on horizontal product differentiation, we focus on symmetric equilibria: all \( m \) firms set price \( p(m) \). We say that the market is covered if \( p(m) \leq h\left(\frac{1}{2m}\right) \), i.e., if the price is consistent with all agents willing to be active in the market; in this case, each firm obtains a market share \( \frac{1}{m} \). If the market is not covered, then \( p(m) > h\left(\frac{1}{2m}\right) \), and agents with a variety loss in the interval \([h^{-1}(p(m)), 1/2m]\), while present, do not participate in the market; a firm then sells to agents having a variety loss in the interval \([0, h^{-1}(p(m))]\). The proportion of agents served by a firm on one of its two segments is then,

\[
x(m) = \begin{cases} 
  \frac{1}{2m} & \text{if } p(m) \leq h\left(\frac{1}{2m}\right) \\
  h^{-1}(p(m)) & \text{if } p(m) > h\left(\frac{1}{2m}\right),
\end{cases}
\]

and the expected surplus of a consumer is

\[
v(m) = 2m \int_0^{x(m)} h(x) \, dx - p(m), \tag{1}\]

while the equilibrium profit of a single firm in the local oligopoly considered here is

\[
\pi^o(m, u) = G(v(m) - u) 2x(m) (p(m) - c) - F. \tag{2}
\]

A free entry equilibrium \( m^* \) requires both that existing firms make zero profit, and additional firms have no incentive to enter.

\[
\pi^o(m^*, u) = 0 \tag{3}
\]

\[
\pi^o(m, u) < 0 \text{ for all } m > m^*. \tag{4}
\]

We now derive the equilibrium price \( p(m) \) for a given \( m \) and we later show

\(^3\)Note that if this condition would be specified so that only the marginal entrant’s profits are negative, then, as we have found in numerical examples of the model, there could be multiple equilibria that can be reached under various forms of firms’ expectation, or by coordination between the firms. By contrast, our condition admits a unique equilibrium.
that in a free entry equilibrium the market is necessarily covered.

Consider a potential equilibrium price \( p(m) \) and a single firm potential deviation \( p \).

Assume first that the market is not covered: \( p(m) > h(1/2m) \), hence, \( x(m) := h^{-1}(p(m)) < 1/2m \). Clearly, since a single firm does not face competition for consumers with a variety loss less than \( 1/2m \), it must be true that \( x(m) \) maximizes \( x(h(x) - c) \). Let

\[
\bar{x} = \arg \max x(h(x) - c) \tag{5}
\]

\[
m = \frac{1}{2\bar{x}}.
\]

Then since \( x(h(x) - c) \) is concave in \( x \), the market is not covered only if \( m < \bar{m} \). Note that if \( m < \bar{m} \), it is indeed a dominant strategy for all firms to set price \( p(m) = h\left(\frac{1}{2m}\right) \).

When \( m \geq \bar{m} \) the market must be covered and firms will potentially fight for the marginal agent with variety loss \( h(1/2m) \). Consider a single firm deviating to \( p < p(m) \). This firm will serve all consumers with variety loss less than \( x \) where \( x \) solves \( h(x) - p = h\left(\frac{1}{m} - x\right) - p(m) \), as long as \( p \leq h(x) \). Therefore the firm solves

\[
\max_x \left( h(x) - h\left(\frac{1}{m} - x\right) + p(m) - c \right)
\]

\[
h\left(\frac{1}{m} - x\right) - p(m) \geq 0. \tag{6}
\]

When the constraint does not bind the first order condition together with \( x = 1/2m \) yields

\[
p(m) = c - \frac{h'(\frac{1}{2m})}{m}. \tag{7}
\]

Let \( m^* \) solve

\[
h\left(\frac{1}{2m^*}\right) = c - \frac{h'(\frac{1}{2m^*})}{m^*}. \tag{8}
\]

For \( p(m) \) as in \( (7) \), the participation constraint in \( (6) \) does not bind only if \( m \geq m^* \). Otherwise the constraint binds and we have \( p(m) = h(1/2m) \). We
summarize this discussion in the following.\footnote{All proofs not appearing in the text are in the Appendix.}

**Proposition 1** Consider a local oligopoly with \(m\) firms. Consider \(m^*, \underline{m}\) defined in (8) and (5). Then \(m^* > \underline{m}\) and

(i) if \(m \leq \underline{m}\) the equilibrium price is \(h\left(\frac{1}{2m}\right)\) and \(x(m) = \frac{1}{2m}\).

(ii) if \(m \in [\underline{m}, m^*]\), the equilibrium price is \(h\left(\frac{1}{2m}\right)\) and \(x(m) = \frac{1}{2m}\).

(iii) if \(m \geq m^*\), the equilibrium price is \(p(m) = c - \frac{\eta(\frac{1}{2m})}{m}\) and \(x(m) = \frac{1}{2m}\).

Note that the equilibrium price is

\[
p(m) = \begin{cases} 
  h\left(\frac{1}{2m}\right) & \text{if } m \in [\underline{m}, m^*] \\
  c - \frac{\eta(\frac{1}{2m})}{m} & \text{if } m \geq m^*.
\end{cases}
\]  

(9)

Observe that the equilibrium price increases in \(m\) for \(m \in [\underline{m}, m^*]\), and decreases thereafter. The reasons are considered in the sequel. Observe also that if instead of an oligopoly we had a monopolist offering the \(m\) varieties, the optimal price would still be \(h(1/2m)\) for \(m < \underline{m}\) but would be \(h(1/2m)\) for \(m \geq \underline{m}\). Figure 1 illustrates the equilibrium price as a function of \(m\).

As an immediate consequence of proposition 1, the number of varieties is never lower than \(\underline{m}\) in a free entry equilibrium.

**Corollary 2** In a free entry equilibrium the market is covered, that is the number of firms is at least equal to \(\underline{m}\).

Existence of a free entry equilibrium is insured under a mild condition.

**Proposition 3** An equilibrium with free entry exists if and only if \(\max_m \pi^o (m; u) \geq F\).
From now on we can assume that $m \geq m^\ast$. Consider the two functions

$$H(m) = 2m \int_0^{\frac{1}{2m}} h(x) \, dx - h \left( \frac{1}{2m} \right)$$ \hspace{1cm} (10)

$$\hat{H}(m) = 2m \int_0^{\frac{1}{m}} h(x) \, dx + \frac{h'(\frac{1}{2m})}{m} - c.$$ \hspace{1cm} (11)

It is then immediate from (1) and Proposition 1 that in an oligopoly equilibrium, the expected utility of an agent going to the local market is $v(m) = H(m)$ when $m \in [m, m^\ast]$, and $v(m) = \hat{H}(m)$ when $m \geq m^\ast$. The properties of $H$ and $\hat{H}$ are key for our comparative statics. They are summarized in the following Lemma:

**Lemma 4** (i) $H(m)$ is a strictly decreasing and convex function of $m$.
(ii) $\hat{H}(m)$ is a strictly increasing function of $m$.

By definition of $m^\ast$, $H(m)$ and $\hat{H}(m)$ intersect at $m^\ast$ and from Lemma 4 the expected surplus of an agent going to the local market in an oligopolistic
price equilibrium with \( m \) specialized firms is given by

\[
v^O(m) = \begin{cases} 
H(m) & \text{if } m \in [\underline{m}, m^*] \\
\hat{H}(m) & \text{if } m \geq m^*,
\end{cases}
\]  

(12)

that is \( v^O(m) = \max\{H(m), \hat{H}(m)\} \) as represented in Figure 2.

\[ \text{Figure 2: Surplus functions} \]

Hence in line with the equilibrium price changes discussed above, the local oligopoly offers expected surplus that decreases in \( m \) up to \( m^* \) and increases thereafter. We should emphasize that it is not immediate that surplus decreases for \( m \in [\underline{m}, m^*] \) since increasing \( m \) contributes to better matches between offered and preferred varieties.

3 Local Response to Global Competition

Figure 2 exhibits the key result of the previous section. It will enable us to derive quite simply the response of the local industry to an increase in \( u \), as well as other results.
Note that starting from the surplus at \( m \), as \( m \) increases, the oligopoly extracts all the surplus from the marginal agents. In this “monopoly regime” region \([m, m^*]\), the price increases in \( m \) since the surplus of the marginal agent is increasing in the number of varieties. The fact that oligopolistic firms mimic monopoly behavior is due to the strict concavity of \( h \). Indeed, to serve a proportion of agents greater than \( \frac{1}{m} \) would require lowering the price in a portion of its residual demand function that is less price elastic than the monopolistic portion of its demand function, due to the competition with the neighboring firms. It therefore sets a price just high enough to cover its now reduced territory along the Salop circle from which it monopolistically extracts its demand and therefore faces a relatively price elastic demand function.

When \( m \) exceeds \( m^* \), competition for the marginal agent becomes effective. With an increasing number, locate more narrowly to each other. The concavity of \( h \) leads to an increase in the price elasticity of the typical firm’s residual demand, which induces the firm to aggressively lower its price, in the attempt to intrude its neighbors markets. While firms in equilibrium still serve an equal proportion of agents, the price has to decrease, while the surplus increases in \( m \).

In all, we have opposite “dynamics” in surplus and prices between the two regions: surplus is U shaped as in Figure 1 while the price dynamic is an inverted U.\(^5\)

Given a level of global competition \( u \), there will be entry on the local market up to the point where \( \pi^O (m, u) = 0 \), where by (2) and Corollary 2

\[
\pi^O (m, u) = \frac{G(v(m) - u)}{m} (p(m) - c) - F, \quad (13)
\]

with \( p(m) \) and \( v(m) \) given by (9) and (12). Let \( u_0 \) the initial level of expected utility given by the global market to local consumers and let \( m_0 \) be the free entry equilibrium number of firms.

\(^5\)Such a change of regime has been noticed by Beckmann (1972). Its welfare effect as analyzed here is far from obvious, and there has been no (welfare) comparison with monopolistic outcomes as discussed in the next section. For a case of price-increasing competition see also Chen and Riordan (2006).
Suppose that global competition increases in the sense that \( u_1 > u_0 \). By definition of a free entry equilibrium,

\[
\pi^O(m, u_0) < 0, \text{ for all } m > m_0.
\]  

(14)

It must be the case then that at the new free entry equilibrium the number of firms is \( m_1 < m_0 \). Indeed, from (13), we have \( \pi^O(m_1, u_0) > \pi^O(m_1, u_1) \) since the mass \( G(v(m_0) - u) \) of agents in the local market decreases when \( u \) increases. Hence, if \( m_1 \geq m_0 \), we would have \( \pi^O(m_1, u_0) \leq 0 \) by (14) and therefore \( \pi^O(m_1, u_1) < 0 \). It follows that the number of firms will have to decrease following an increase in global competition, independently of its level and of whether the oligopoly is in a monopoly regime. Hence, the welfare of local agents follows a pattern opposite to that of prices in Figure 1: it first decreases and then increases as \( u \) increases.

**Proposition 5** Let \( v^O(u) \) be the surplus and let \( m^O(u) \) be the number of varieties in a free entry equilibrium number of firms when the outside option is \( u \).

(i) \( m^O(u) \) is a decreasing function of \( u \),

(ii) \( v^O(u) \) is increasing in \( u \) if \( m^O(u) > m^* \) and is decreasing in \( u \) if \( m^O(u) < m^* \).

4 Can Concentration Benefit Consumers?

If consumers are charged the monopoly price in the local market, a larger number of varieties decreases the surplus \( H(m) \) of local consumers. Indeed, while they benefit from having more varieties to choose from, they have to pay a higher price; by concavity of \( h \), the price variation is larger than the average benefit variation. Providing more surplus to consumers therefore requires a decrease in the number of varieties. A multi-variety monopoly can internalize the effect of more varieties on consumers that is negative because of the concomitant exploitative price increase, a free entry oligopoly cannot. And indeed, by definition of a free entry equilibrium, it is clear that for any given \( u \) a monopoly will choose fewer varieties than an oligopoly. Hence,
when the oligopoly is in the “monopoly regime”, typically for large values of $u$, we have excessive variety from the point of view of local consumers and they would prefer to have a local monopoly rather than an oligopoly.

By contrast, an oligopoly has the advantage, from the point of view of consumers, to impose price competition. Hence, for smaller values of $u$, in the "competition regime", consumers will prefer to face an oligopoly since they can have a lower variety loss while also facing lower prices. This suggests that there is a cutoff value for $u$ such that consumers are better off under oligopoly only if $u$ is above this cutoff.

To establish this result, it is necessary to understand the response of a monopoly to an increase in global competition. The dynamics under oligopoly was a direct consequence of free entry: as global competition increases, the demand facing the local oligopolistic industry decreases and therefore the number of firms must decrease. By contrast, since a monopoly can choose the number of varieties, it can effectively choose to provide more or less surplus to consumers in response to an increase in global competition.

It is therefore not obvious whether increased global competition will crowd out variety when there is a monopoly structure. However, as long as $G$ is log-concave we can show that a monopoly will, like an oligopoly, reduce the number of varieties it offers. The intuition is the following. Let $u$ be the level of global competition and consider a level of surplus $v$ that the monopoly wants to provide to the local consumers. The demand facing the local market is then $G(v - u)$. By log-concavity of $G$, the elasticity of demand is increasing in $u$, and therefore, as $u$ increases, the monopoly will concede a higher surplus to consumers. Since $v = H(m)$, and since $H$ is decreasing in $m$, the monopoly will choose to decrease the number of varieties. This intuition is incomplete however because the monopoly will trade-off this demand benefit and the loss in profit per consumer from smaller values of $m$. We show that under log-concavity the demand effect dominates the per-consumer profit effect. The next proposition states this result as well as relevant results for the monopoly case, in particular that the market is covered at an optimum.

**Proposition 6** Let $m^M(u)$ be the profit maximizing choice of a monopoly
when outside competition is \( u \). As long as the monopoly makes nonnegative profits at the optimum,

(i) \( m^M(u) \geq m \),

(ii) \( m^M(u) \) is decreasing in \( u \).

This and Proposition 5 imply the following relationship between the expected surpluses \( v^M(u) \) and \( v^O(u) \) of local consumers under monopoly and oligopoly, respectively.

**Corollary 7** There exists \( \overline{\pi} \) and \( \underline{u} \) with \( \pi > u^* > \underline{u} \) such that

(i) \( v^M(\overline{\pi}) = v^O(\overline{\pi}) \),

(ii) \( v^M(u) > v^O(u) \) when \( u \in (\underline{u}, \overline{\pi}) \),

(iii) \( v^M(u) < v^O(u) \) when \( u < \underline{u} \).

Indeed, consider Figure 3 below. A monopoly chooses \( m^M(u) \) in order to maximize its profit, and the resulting surplus to local consumers is

\[
v^M(u) = H(m^M(u)) \, .
\]

For the oligopoly the free entry equilibrium value \( m^O(u) \) decreases continuously with increasing \( u \), and there exists a unique \( u^* \) such that \( m^O(u^*) = m^* \) and a unique \( \overline{\pi} \) such that \( m^O(\overline{\pi}) = m \). For \( u < u^* \), the free entry equilibrium oligopoly will change regime and \( v^O(u) = H(m^O(u)) \) for \( u \leq u^* \) and \( v^O(u) = \hat{H}(m^O(u)) \) for \( u \geq u^* \).

At \( \overline{\pi} \), the oligopoly behaves like a zero profit monopoly and chooses the number of varieties \( m \), which is the number of varieties at which the local market is covered under monopoly pricing. Hence, from Proposition 6(i), we also have \( m^M(\overline{\pi}) = m \): for a high level of global competition, the monopoly and the oligopoly lead to the same outcome. When \( u \) decreases from \( \overline{\pi} \), a monopoly necessarily chooses \( m^M(u) < m^O(u) \) since by definition of a free entry equilibrium profit is nonpositive for \( m > m^O(u) \). In particular, \( m^M(u^*) < m^O(u^*) \) and therefore \( v^M(u^*) = H(m^M(u^*)) > H(m^*) = v^O(u^*) \).

Since \( v^M(u) \) is increasing in \( u \) while \( v^O(u) \) is decreasing in \( u \) for \( u \leq u^* \), there exists \( \underline{u} < u^* \) such that local consumer surplus is larger under monopoly if and only if \( u > \underline{u} \).

As we show in the Appendix, the same results hold if we consider also the surplus of agents going to the global market. Indeed, the low surplus offered
in the local oligopoly will induce some agents with a low $\theta$ to leave the local market, while they would stay in it under local monopoly and gain surplus greater than $\theta$. Furthermore, since at $\underline{u}$ monopoly and oligopoly yield the same consumer surplus but monopoly profits are positive, total surplus is greater with a monopoly at $\underline{u}$. It follows that total surplus is greater with monopoly when $u$ exceeds a value $\hat{u}$ strictly smaller than $\underline{u}$.

**Proposition 8**  
(i) A monopoly generates a larger consumer surplus than the oligopoly if and only if $u > \underline{u}$.  
(ii) There exists $\hat{u} < \underline{u}$ such that a monopoly generates a larger total surplus than the oligopoly if and only if $u > \hat{u}$.

Hence if competition from global markets is weak, an increase in that competition will be buffered better by local oligopoly. However, if it becomes strong, concentration in the local market will unequivocally lead to larger total surplus. We should emphasize that under the second condition specified in the proposition, both local consumers and local industry will be better
off with more concentration, and this independently of the welfare concept adopted.

Observe finally that once $u$ increases further towards $h(0)$, both the oligopolists and the monopolist are forced to eventually exit the local market. However, owing to the fact that monopoly profits are strictly positive, the monopolist exits only at a higher expected utility level than the oligopolists do.

5 Extensions

In this section we briefly comment on modifications of two key assumptions, namely that agents once and for all decide about the market channel patronized, and that firms determine their prices only after agents are locked into their market channel decision. Relaxations of both are considered in our earlier working paper (Legros and Stahl, 2002). Turning to the first assumption, we consider, for the monopoly case, the possibility that agents inspect in the local market but decide to buy in the global market. With this we account for the possibility of *ex-post* price competition from the global market, in addition to *ex-ante* competition in utility. We now must explicitly distinguish between two different sources for the increase in $u$, namely improvements in search and inspection possibilities in the global market, and decreases in prices in (or access costs to) that. We show that decreasing prices or access costs reinforce the crowding out effect derived earlier. Matters are more complex in the former case. Here we find subcases in which the monopolist’s reaction in providing variety follows an inverted U-shaped pattern: if the global market offers low inspection value to agents, the monopolist reacts by increasing variety, whilst if the global market offers high inspection value, the monopolist reacts by offering less variety. For the oligopolistically structured local market the logic is as before: allowing agents to inspect varieties in the local market before arbitraging between the two market channels will create even more *ex-post* competition, decrease oligopoly profits, and pressure for firms to exit the local market.

As to committing to prices before agents take decisions about the market
channel, we analyze the case for the monopolist. The analysis reveals that there is no value to preannouncing prices if \( u \) is small so that the above analysis continues to hold; but there is value to it if \( u \) is large, i.e. if \( u \to h(0) \). Valuable pre-commitment to prices necessarily implies that the quoted prices are lower than the prices charged by the non-committing monopolist. Clearly the incentive to commit \textit{ex-ante} to lower prices is vastly reduced under oligopoly, as the individual firm can internalize the increase in local market demand generated from setting a lower price only at the order of magnitude of \( 1/m \). Hence our welfare result tends to be upheld, that local monopoly welfare dominates local oligopoly under high \( u \).

6 Concluding Remarks

While globalization opponents are often drawn from the supply side of a market, i.e. from firms or workers, it may seem puzzling for economists to see that demand side agents oppose globalization. Our model provides one potential answer in illustrating how an increase in global competition may result in a lower surplus for those agents who continue to shop locally. Our analysis suggests that in addition to benefiting industry, concentration may be beneficial to consumers. This result may be relevant for some policy debates about the optimal response to the challenges of globalization.

For instance, during the recent years, the discussion about merger policy was very much influenced by considerations about globalization. A central question was whether local concentration could help the survival of local industry or the preservation of local employment, possibly at the expense of local consumer surplus. In this paper, we have shown that local monopoly may not only be beneficial to local industry, but also to local consumers. The reason is that local monopoly brings benefits to consumers by internalizing local externalities, and at the same time, the negative impact of monopoly is weakened by strong enough global competition.
References


7 Appendix

7.1 Proof of Proposition 1
It is enough to show \( m^* > m \). (i)-(iii) have been established in the text. Note that for each \( x \), since \( h \) is a decreasing function,

\[
h(x) - c + (x/2)h'(x) > h(x) - c + xh'(x).
\]

Therefore at \( x = \frac{1}{2m^*} \), (5) and (8) we have

\[
h\left(\frac{1}{2m^*}\right) - c + \frac{1}{2m^*}h'\left(\frac{1}{2m^*}\right) > 0
= h\left(\frac{1}{2m}\right) - c + \frac{1}{2m}h'\left(\frac{1}{2m}\right).
\]

Using the fact that \( h \) is decreasing and concave yields \( m^* > m \).

## 7.2 Proof of Corollary 2

Suppose to the contrary that there exists a free entry equilibrium with \( m < m \). Existing firms serve \( m/m < 1 \) agents and therefore if \( \pi^O(m) = 0 \) it is also true that \( \pi^O(m + \delta) = 0 \) when \( \delta < m - m \), therefore (4) is violated.

## 7.3 Proof of Proposition 3

Clearly, if the condition fails, then no firm enters the local market. Suppose now that \( \max_m \pi^O(m;u) \geq F \). Since \( \lim_{m \to \infty} \pi^O(m;u) = -F \), and since by Proposition 1 \( \pi^O(m,u) \) is continuous in \( m \), there exists \( m \) such that \( \pi^O(m;u) = F \) and \( \pi^O(m;u) < 0 \).
7.4 Proof of Lemma 4

Simple computations lead to

\[ H(m) > 0, 
\lim_{m \to \infty} H(m) = 0, \]

(15)

\[ H'(m) = 2 \int_0^{\frac{1}{2m}} h(x) \, dx - \frac{1}{m} h \left( \frac{1}{2m} \right) + \frac{1}{2m^2} h' \left( \frac{1}{2m} \right), \]

(17)

\[ H''(m) = -\frac{1}{2m^3} \left( h' \left( \frac{1}{2m} \right) \right) + \frac{1}{2m} h'' \left( \frac{1}{2m} \right). \]

(18)

Since \( h \) is decreasing, \( h(x) > h \left( \frac{1}{2m} \right) \) when \( x \in \left( 0, \frac{1}{2m} \right) \), hence (15) follows. Since \( h \) is decreasing and concave, \( H'' > 0 \) in (18) and \( H \) is strictly convex. Since \( H > 0 \), (16) and (17) are compatible with \( H \) convex only if \( H'(m) < 0 \).

Differentiating (11), we have

\[ \pi_m = \tilde{\theta}_m(m,p) \, g \left( \tilde{\theta}(m,p) \right) (p - c) \, 2mh^{-1}(p) - mF, \]

where \( 2mh^{-1}(p) < 1 \) since \( p > h \left( \frac{1}{2m} \right) \). Differentiating with respect to \( m \) yields

\[ \pi_m = \tilde{\theta}_m(m,p) \, g \left( \tilde{\theta}(m,p) \right) (p - c) \, 2mh^{-1}(p) + 2G \left( \tilde{\theta}(m,p) \right) (p - c)h^{-1}(p) - F \]

\[ = \tilde{\theta}_m(m,p) \, g \left( \tilde{\theta}(m,p) \right) (p - c) \, 2mh^{-1}(p) + \frac{\pi}{m}. \]
Since $\tilde{\theta}_m > 0$, as long as $\pi \geq 0$, $\pi_m > 0$ (indeed $\pi \geq 0$ implies that $p > c$ when $F > 0$).

(ii) Since the market is covered, the monopoly chooses $m$ to solve

$$\max_m G(H(m) - u) \left( h \left( \frac{1}{2m} \right) - c \right) - mF,$$

and by (i), the solution must be greater than $m$ if the monopoly makes nonnegative profits.

We are interested by the comparative statics of a solution $m^M(u)$ with respect to $u$. Consider two levels of outside options $u > \hat{u}$ and assume that the optimal solution for $u$ is $m$ and the optimal solution for $\hat{u}$ is $\hat{m}$. Assume by way of contradiction that $m > \hat{m}$. Let $v = H(m), \hat{v} = H(\hat{m}), h = h \left( \frac{1}{2m} \right)$ and $\hat{h} = h \left( \frac{1}{2\hat{m}} \right)$. By Lemma 4, $v < \hat{v}$ and since $h$ is a decreasing function $h > \hat{h}$.

Since $v < \hat{v}$ and $u > \hat{u}$, log-concavity of $G$ implies

$$\log G(v - u) - \log G(v - \hat{u}) > \log G(\hat{v} - u) - \log G(\hat{v} - \hat{u}),$$

adding $\log h - \log \hat{h}$ to the left hand side and adding $\log \hat{h} - \log \hat{h}$ to the right hand side we preserve the inequality and obtain

$$\log G(v - u) h - \log G(v - u) \hat{h} > \log G(\hat{v} - u) \hat{h} - \log G(\hat{v} - \hat{u}) \hat{h}. \quad (19)$$

Revealed preferences imply

$$G(v - u) h - mF \geq G(\hat{v} - u) \hat{h} - \hat{m}F \quad (20)$$

$$G(\hat{v} - \hat{u}) \hat{h} - \hat{m}F \geq G(v - \hat{u}) h - mF. \quad (21)$$

Since $m > \hat{m}$, (20) implies

$$G(v - u) h > G(\hat{v} - \hat{u}) \hat{h} \quad (22)$$

---

6 We could alternatively differentiate the first order condition with respect to $u$, however, it is necessary then to establish that the first order condition is sufficient for an optimum, something that is not immediate since the profit function is not concave. See our working paper for details.
and by adding (20) and (21) and rearranging we have

\[ 0 \leq G(v - \hat{u}) h - G(v - u) h \leq G(\hat{v} - \hat{u}) \hat{h} - G(\hat{v} - u) \hat{h}. \]  

(23)

Let \( \delta \geq 0 \) be equal to the difference between the right and left hand sides of (23). Since \( \log \) is a concave function, (22) implies

\[ \log G(v - \hat{u}) h - \log G(v - u) h < \log \left\{ G(\hat{v} - \hat{u}) \hat{h} - \delta \right\} - \log G(\hat{v} - u) \hat{h} \]

\[ \leq \log G(\hat{v} - \hat{u}) \hat{h} - \log G(\hat{v} - u) \hat{h} \]

which contradicts (19). This proves that when \( u > \hat{u} \), the optimal value of \( m \) decreases.

### 7.6 Proof of Proposition 8

(i) When the outside option is \( u \) and the local market structure is \( k \), \( k \in \{O, M\} \), the expected utility of local agents is \( v^k \) and the marginal agent going to the global market is \( \theta^k = v^k - u \). The expected agent surplus is then

\[
S^k(u) = G(v^k - u) v^k + (1 - G(v^k - u)) u + \int_{\theta_k}^{\infty} \theta dG(\theta)
= u + G(\theta^k) \theta^k + \int_{\theta^k}^{\infty} \theta dG(\theta).
\]

Suppose that \( v^M > v^O \), then \( \theta^M > \theta^O \) and,

\[
S^M(u) - S^O(u) = G(\theta^M) \theta^M - G(\theta^O) \theta^O - \int_{\theta^O}^{\theta^M} \theta dG(\theta)
= G(\theta^O)(\theta^M - \theta^O) + \int_{\theta^O}^{\theta^M} (\theta^M - \theta) dG(\theta)
> 0.
\]

25
If $v^M < v^O$, then $\theta^M < \theta^O$ and

$$
S^M(u) - S^O(u) = G(\theta^M) \theta^M - G(\theta^O) \theta^O - \int_{\theta^O}^{\theta^M} \theta dG(\theta)
$$

$$
= G(\theta^M)(\theta^M - \theta^O) + \int_{\theta^M}^{\theta^O} (\theta - \theta^O) dG(\theta)
$$

$$
< 0.
$$

Therefore a monopoly generates a larger expected total consumer surplus than an oligopoly if and only it generates a greater local surplus.

(ii) Monopoly profits are strictly positive whilst free entry oligopoly profits are zero. Since $S^M(u) - S^O(u) = 0$, the total surplus at $u$ is strictly greater under monopoly; continuity insures the existence of $\hat{u} < u$ such that total surplus is greater with monopoly when $u$ is greater than $\hat{u}$. 

26