Introduction

The traditional consumer theory is based on the idea that the satisfaction from consuming a good derives only from its intrinsic utility. In many circumstances, however, the pleasure of consuming a good may also be affected either by the consumption choice of other consumers, or by the social status attainable through that choice. Social interactions among consumers may generate consumption externalities.

Since the seminal contribution of Veblen (1899), many authors have discussed the many dimensions along which externalities are important in social decisions. Focussing on consumption, Leibenstein (1950) suggested that the choices of other agents may generate either negative or positive externalities on individual utility. Moreover, these spill-over effects may induce different patterns of consumers' behavior: with the term *bandwagon effect*, Leibenstein described the effect by which the demand for a good increases because others are buying it; with the term *snob effect*, he denoted situations in which the demand for a good decreases because others are purchasing the same good. In the same stream, Becker (1991) discusses a provocative example on the economic power of the original Veblen idea: in the presence of (positive) consumption externalities, it is possible that the popular restaurants face an upward sloping demand function. In this sense, the same existence of consumption externalities could be a main factor in explaining the attractiveness of firms (Karni and Levin 1994). More recently, Akerlof (1997) operates a broad distinction between the so-called *status-seeking-models* - which formalize the attempt of agents to differentiate their behavior - and the *conformist-models* - which describe situations in which agents are willing to follow common patterns. Clearly, these notions are reminiscences of those of strategic substitutability and strategic complementarity, as discussed by Cooper and John (1988).

The above contributions are examples of a rich literature which focussed on the consumers' behavior under consumption externalities. But the existence of the latter, and its implications in terms of optimal consumers' choices, have also a bearing on firms' behavior in a strategic framework. This is indeed a relatively new issue and the literature has not achieved conclusive results in this perspective. The aim of this paper is to contribute to this line of research, namely at studying the firms' strategic choices when consumer preferences embody both imitation (or conformity) and congestion (or vanity) effects.

The starting point of our analysis is the set of results achieved in two papers, both devoted to the analysis of market implications of consumption externalities in a context of spatial competition. Navon, Shy and Thisse (1995) study a standard duopoly location model with linear transportation costs, in order to investigate price competition and the divergence from optimal prod-

uct differentiation when consumer preferences are influenced by the number of consumers shopping at the same store. In the same line, Grilo, Shy and Thisse (2001) introduce a consumption externality in a spatial competition model with quadratic transportation costs. While in the former paper the externality considered in the (indirect) utility function can be alternatively positive or negative (individual utility depending linearly on the number of consumer patronizing a firm), in the latter both positive and negative spill-over effects are allowed for, through a quadratic formulation of the externality function.

Both papers suggest the same taxonomy of optimal consumers' behavior. If a negative externality prevails, consumer's preferences induce a vanity effect. When a positive externality prevails, but the externality is not too large, consumer's preferences induce what is called 'weak conformity effect'. Finally, when the prevailing externality is positive and large enough, the effect is that of 'strong conformity'. Which of the three different configurations arises depends on the comparison between two elements: the measure of the incentive to price competition in the absence of the externality on the one side, and the value of the externality function evaluated at the total population size on the other side. Specifically, Navon et al. compare the transportation cost per unit distance (transportation cost effect) with the externality value evaluated at the size of the total population; Grilo et al. compare the distance between the locations of the stores (product differentiation effect) with the externality evaluated at the total number of consumers in the market. Indeed, it is not surprising that the market equilibrium configuration depend on the balancing of these factors. The size of the unit transportation cost or the distance between firms are obviously the key factors determining the strength of price competition in location models; but also externalities may play the same role. A negative externality clearly relaxes price competition because of possible congestion effects; conversely, a positive externality makes competition fiercer.

The different hypotheses of the two papers about the transportation costs and the shape of the externality function show up when the location stage of the game is dealt with. The Navon et al. paper faces the same difficulty of the standard Hotelling model with linear transportation costs. However, a key result is that for any initial couple of locations, if strong conformity (bandwagon) prevails, both firms perceive an incentive to move inward, but only one firm supplies a positive quantity at a positive price. On the contrary, Grilo et al. confirm the general principle of maximum differentiation which holds in the Hotelling model with quadratic costs (d'Aspremont, Gabszewicz, Thisse, (1979)): if a location equilibrium in pure strategies exists, it must be such that firms are sufficiently far apart. This applies trivially to the negative externality case; but even in the case of a positive externality, firms perceive an incentive to differentiate their products. Therefore, in the absence of binding constraints on the choice of locations, this optimal location's choice induces

weak conformity in equilibrium, with both firms serving the market.

In this paper the linear transportation cost hypothesis is adopted, but it is combined with a quadratic formulation of the externality function. The choice of exploring the behavior of the market within this set-up turns out to be particularly useful in a double perspective. First, though both negative and positive externalities are jointly allowed for, the *régime* prevailing at equilibrium can be identified through a simple (a priory) comparison between the transportation cost size and the sign of the externality evaluated at the total population size. Second, and more important, it turns out that in this framework the location stage of the Hotelling game can be meaningfully solved even in the presence of linear transportation costs. The principle of minimum differentiation is confirmed, in a situation in which agglomeration coexists with firms earning positive profits. In particular, we show that firms endogenously choose to locate in the center of the interval, sharing the market with positive prices. If both imitation and congestion effects influence consumers' behavior, market power can be consistent with full market coverage, price competition and homogeneous products. The intuition behind this result is that at equilibrium, the consumers of both firms enjoy a *positive* but *decreasing* externality. At the margin congestion is perceived, and this allows firms to push up their prices.

The discussion is organized as follows. In section 1, we deal with the main characteristics of the consumption externality and study the strategic choices of firms with respect to prices and locations. Some conclusions are gathered in the last section.

1 The model

Consider the Hotelling (1929) model, where two stores 1 and 2 are respectively located at $x_1 \epsilon R$ and $x_2 \epsilon R$ on the real line, with $x_1 \leq x_2$. There is a continuum of consumers of mass N uniformly distributed over the interval $[0, 1]$. A consumer located at $x \epsilon [0, 1]$ bears a transportation cost of $t |x - x_i|$ for buying from the store located at x_i $(i = 1, 2)$, where $t \geq 0$ is the transportation rate per unit distance. Let N_i denote the number of consumers patronizing store i. The consumer patronizing the store i is affected by the following consumption externality (Grilo et al., 2001):

$$C_i^{ext}(N_i) = \alpha N_i - \beta N_i^2 \tag{1}$$

in which $\alpha > 0$ expresses the incidence of the positive imitation (or conformity) effect, while $\beta > 0$ - which affects the degree of concavity of the externality function - is a measure of the incidence of the negative congestion (or vanity)