Conflict and consensus in a theory of firm ownership with public goods

Preliminary Version

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Abstract

This paper investigates the conditions under which consumer ownership may be preferable to investor ownership in economies characterized by firms' market power. On making their choices investor-owners consider producer surplus only, while consumer-owners take into account both producer and consumer surplus, which means that the firm's objectives are naturally aligned with society's. Nonetheless, we find that pursuing consumer objectives may be socially less beneficial than pursuing those of investors when external effects of consumption are accounted for. The conflict arising between the community of consumers and the external community of citizens affected by the externality is not sufficient for the dominance of investor ownership. Then, the critical factor is not conflict but rather common interest between the external community of citizens and the investors.

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1 Introduction

If having a self-interested baker make my loaf is a good idea in a competitive setting, it may not be so good when competition is absent or limited. Indeed, the lack of competition is likely to foster what Adam Smith calls conspiracy against the public—i.e. consumers—and have a negative impact on social welfare. When this is the case, there is room for alternative production organizations, notably those where consumers own the enterprises that cater to them and, in short, produce themselves what they consume. The literature points out several disadvantages of consumer ownership relative to investor ownership. Prominent among them are dispersed ownership and limited property-rights transferability, to which there are to be added greater collective decision-making costs, as consumers typically display greater diversity among themselves than investors. On other planes, instead, consumer ownership appears to be more advantageous.

Consider the simple case of homogeneous investors and customers. On making their choices investor-owners take into account producer surplus only, while consumer-owners take into account both producer and consumer surplus, which means that in this case the firm's objectives are naturally aligned with society's. Then, if there are neither internal efficiency nor heterogeneity issues and firms have market power, it seems beyond doubt that ownership is not irrelevant and, in particular, that placing consumers in charge of pricing improves their own welfare and society's as well, or not? The argument leads to an apparently very strong, almost tautological conclusion, but it actually refers to a specific situation from which an important element is missing—external effects. If we allow for them, matters grow more complicated and it is no longer assured that pursuing consumer objectives is socially more beneficial than pursuing those of investors.

Besley and Gathak (2001) (hereafter B-G) are the first to investigate the effects of firm ownership changes on the production of public goods from the property-rights perspective. The basic question is: who among the concerned parties should own (the assets indispensable for the production of) a public good? In that literature the actions producing external effects have the nature of non-contractable specific investments and ownership is just a means for inducing satisfactory levels of them. Besley and Gathak's main insight is that ownership of a service with a public good nature should rest with the party that has the largest subjective valuation of the external effects generated by it. This insight has been probed by a number of subsequent contributions which ask the basic question within modified versions of the original B-G model, allowing for additional features such as location, unequal bargaining powers, etc. (Halonen-Akatwijuka and Pafilis, 2014; Mueller and Schmitz, 2015, 2016, 2017; Schmitz, 2013,

2014). We want to probe B-G's insight too but we develop our analysis in a different direction.

In this paper we espouse the property-rights idea of ownership as residual rights of control and, as in B-G, we apply it to public goods production, but we depart from the enquiry line initiated by Grossman and Hart (1986) in that we disregard specific investments in physical assets. Here we consider a public good that is produced not by individual specific investments but by individual consumptions of private goods. Despite their differences, however, the two situations are fundamentally the same, for both involve choices that are not contractable and not transferable with firm ownership. In our circumstances the decision powers attached to ownership may only concern the firm's market strategy through pricing, and in this we follow Hart and Moore (1996). We also focus on different determinants of ownership allocation. Since there are no specific investments, in our context ownership changes have no effects on the stakeholders' bargaining power but they still bring with them different owner objectives. This is the relevant point for our analysis and the one we concentrate on. Our stakeholders have preferences that are naturally identified by the economic function they embody—consumers, investors, etc. As a consequence, firm policies vary, as ownership switches from one group to another, irrespective of whether there is a specific investment to be made or not.

In the literature spawned by B-G the relation between externalities and the specific investments producing them is purely technological and exogenously given. In our model, instead, the feasibility of externality-generating actions is mediated by the market and is endogenous. Here, then, are at play two main factors of ownership allocation: the market nature and the external-effect type. However, of all differences the most substantial one to B-G and the ensuing literature is that in this paper the basic question above is asked within a *multilateral* context, instead of a bilateral one. In existing models there are involved two subjects or groups of subjects, while here we consider *three* groups of stakeholders/potential owners: a community of citizens who consume a private good and are affected by externalities generated by their own consumptions; citizens, belonging to an external community, who do not consume but are affected by the externalities; investors who do not consume and are not touched by external effects. Differently from previous contributions, we also consider several types of public goods, differentiated by the nature of the external effects they have on different communities of citizens. Two are the main categories of public goods, those which affect only the (internal) community of consumers who generate them by their consumptions and those which affect other (external) communities. The latter proves the more problematic and is the cause in our context of results that contradict B-G's main insight.

To pave the way for our main point, we first elaborate a few preliminary results for the case of a single community of citizens/consumers. In these circumstances the public good can be only of the common-pool type, and this, as usual, is accompanied by free riding. We analyze market equilibria with for-profit providers and find, rather unsurprisingly, that public goods provision is inefficient, independently of market conditions, and also that the welfare ranking of perfect competition and monopoly depends on the sign of external effects (Proposition 3). However, under the present conditions transferring decision powers to the affected people—i.e. citizens—is enough to solve the efficiency issue, as consumer-owners are able to fully control free riding through pricing. A strong result in this regard is that consumer ownership supports the first best (Proposition 4), and hence dominates investor ownership irrespective of the degree of market competition (the result is the companion of an analogous for the case of no externalities, Proposition 1). Then, for the class of within-community externalities we find confirmation of B-G's claim that the ownership of the firm(s) from whose activity externalities ultimately stem is to be assigned to the most caring party.

This result obtains essentially for in the given circumstances there is no conflict among consumers. This, however, is no longer the case when there are two citizen communities touched by the external effects, but only one of them takes part in the decision process that generates them. It has been known at least since the rise of the political economy school that allocative inefficiency is a likely effect of citizens' heterogeneity and attendant conflicting interests, whenever collective choices affect allocation, typically through voting (see e.g. Shepsle and Weingast, 1984, for an application of the median voter model to the analysis of public goods provision). Heterogeneity is indeed a cause of efficiency losses, when allocative choices rest with political institutions, but the phenomenon is not limited to them.

To abstract from efficiency losses due to collective decision-making, e.g. through voting, we keep assuming as before that the internal community is homogeneous. In these circumstances conflict may obviously arise between communities, but not within them. A first result is that conflict may arise only in the presence of *negative* externalities, either unilateral—affecting only one community—or bilateral—affecting both (Proposition 6). When there are conflicting interests between internal and external communities, ownership by internal citizens generally fails to achieve full efficiency for society as a whole and in such situations there is room for alternative ownership structures—in particular investor ownership—to prevail. Note, however, that, though heterogeneity and conflict between communities are necessary, they are by no means enough for the result. The reason is that for comparing inefficient ownership structures the relevant criterion is *relative*, not absolute efficiency. As a matter of fact, when conflict among consumers

causes citizen ownership to be inefficient in absolute terms, it does not necessarily cause it to be relatively inefficient too (Proposition 7) and for this there is required something else besides conflict. The main insight we gain in this regard is that there must be consensus of a specific kind between one group of consumers and investors.

More precisely, conflict between communities causes departures from full efficiency that are larger, the larger the conflict is. This, however, is not sufficient for the dominance of investor ownership until conflict grows so large that there arises a preference for it by the external community (Proposition 8). Then, the critical factor is actually not conflict but *common interest*, specifically between the external community of citizens and the investors—a sort of *de facto* alliance between the two groups. Viewed from a different angle, there is no way for ownership by investors to be dominant if they do not find an "ally" in either citizen community. Note that the condition can be extended to political firms affected by internal conflict between a majority and a minority: investor ownership dominates when investors have a common interest with the minority. In conclusion, while with just two interest groups, as in B-G, it is the stakeholders who value the good most to win ownership, with more than two interest groups stakeholders who do not value the good most may well be owners, provided that they belong to the dominant "alliance", i.e. that which values the good most. Then, ultimately the key factor here is which alliance cares most about the good.

The main point does not change if ownership is shared. We concentrate on a specific case, citizen enterprises that include both communities as owners. Ownership enlargement has two main effects. On the one hand, it widens the audience of those who (potentially) affect the collective choice. In a word, under it a larger set of preferences is aggregated. On the other hand, it increases the number of people who are called to participate financially in production by the sharing of revenues and costs. We show that shared ownership, like single-community ownership, does not warrant the attainment of the first best and may also be dominated by a for-profit organization.

The paper is organized as follows. After laying out the basic facts about the model in section 1, section 2 offers an introduction to consumer ownership and studies its behavior in the absence of externalities. A few benchmark comparative results are also presented for this case. The following sections extend the basic model by allowing for externalities of various types. Section 3 deals with externalities affecting only the community that generates them (within-community externalities). Section 4 further extends the analysis to externalities that, besides affecting the hosting community, also affect external communities. Section 5 extends the analysis to shared consumer ownership.

2 The Model

In our economy there are one consumer good of given quality (hereafter simply called the good), which is consumed by n consumers, and a numeraire good ('money'). Besides consumers, there are other individuals who do not consume and are unaffected by the external effects generated by consumption. These individuals are interested in money and, if they take on the ownership of a firm, they do for purely financial reasons; in a word, they are investors.

Every consumer i consumes an amount x_i of the good, $i = 1, \cdots, n$. Consumption produces an externality $f(x), x \equiv \sum_i x_i$, which enters into all utility functions. In our model consumers have the same preferences, represented by a quasi-linear utility function $u(x_i, f(x)) + W_i$, where W_i is her net wealth and $u(x_i, f(x))$ is the utility from the consumption of x_i and the externality $f(x)$. Both the utility and the externality production functions are assumed differentiable and the utility function is also assumed concave and increasing in x_i, $u_1 > 0$. Note that the externality is of the common-pool type and has the nature of a public good, whose effects are not touched by market and organization changes, in particular by ownership reshuffling.[1] Net wealth includes any revenues from the participation in firms' profits as shareholders or members. In the paper we allow for two main types of firms—the for-profit firm and the participatory firm, for brevity called "cooperative". As will be seen later (Section 3.2 below), this is akin to a consumer cooperative. To simplify, we assume that consumers participate in a firm only if this is a cooperative and that the initial net wealth is zero, so that W_i is always zero too, unless the market is cooperative-based.

In equilibrium total consumption equals total production, irrespective of market nature. Then, we do not have to distinguish formally between the two quantities and use symbol x for both. Since, as we will see, for our purposes there is no need to specify how production is allocated among individual firms, we do not specify individual firms' outputs and just consider total production. We assume that there is an aggregate cost function $C(x)$, twice continuously differentiable and convex, that summarizes the total cost the market bears for producing x, when its production is efficiently distributed among a given number of incumbent firms, and for a given technology. The social welfare is measured by the sum of the individual welfares. Note that the sum is extended to all individuals in the economy, consumers and investors alike.

[1] The main difference with the literature's classic examples of commons, like pastures and fisheries, is that these external effects cannot be eliminated through a reallocation of property rights, as an individual's "consumption" of an externality is not transferable to others.

3 The benchmark case: no externalities

The paper's general aim is to study how alternative production organizations, differentiated by market and ownership structure, in dealing with different kinds of external effects. Propedeutical to this analysis is the study of a benchmark economy where no external effects are present. For this purpose we consider a special case of the general environment outlined in section 2, in which private goods are produced without externalities, i.e. $f(x) = 0$ for all x. Given consumer homogeneity, there is no need to distinguish individual demands formally and we set $x_i = q$ for all consumers i. Accordingly, the individual utility function is specified as $u(q)$, $u' > 0, u'' < 0$, and the aggregate demand as $x = nq$.

The first-best individual consumption solves

$$\max_q [nu(q) - C(nq)]$$

and must meet the following first-order condition

$$u'(q) = C'(nq). \tag{1}$$

Markets for the private good may have different degrees of competition on the supply side but for this paper's purposes it is enough to analyze the polar cases of perfect competition and pure monopoly, which is done in the next subsections.

3.1 Market equilibrium with for-profit firms

In this subsection we just restate for the reader's convenience a few standard results on market equilibria with for-profit firms that will become useful later. At price p each consumer chooses q such that

$$\max_q [u(q) - pq].$$

The inverse demand function is then defined by the following equation (FOC)

$$p = u'(q) \tag{2}$$

from which we get the individual demand function

$$q = (u')^{-1}(p).$$

As is well known, under *perfect competition* the only rational firm objective is profit maximization, irrespective of the nature of the firm and its owners, in particular whether they consume the good produced or not. In other words, the objectives of firm owners are wholly irrelevant to firm behavior (see e.g. Spulber, 2009, chap. 3). The perfectly

competitive aggregate supply function is obtained as usual from the condition $p = C'(x)$ and market equilibrium is identified by the equation

$$u'(q) = C'(nq),$$

which coincides with (1) and hence equilibrium outcomes coincide, as is well known, with the first best.

At the opposite end of the market spectrum stands pure monopoly. A *monopolistic for-profit firm* chooses the individual price so as to maximize its profit $pnq - C(nq)$, which can be written as

$$\max_q \left[u'(q)nq - C(nq)\right]$$

£££Here and in the following we skip existence issues, simply by assuming that the profit function is concave.£££ The equilibrium quantity then solves

$$n\left(qu''(q) + u'(q)\right) - nC'(nq) = 0,$$

i.e.

$$qu''(q) + u'(q) = C'(nq). \tag{3}$$

Lastly, from the comparison between (3) and (1), we obtain that the individual consumption in case of a monopolistic for-profit firm is lower than that in the first best for $u''(q) < 0$.

3.2 Monopolistic cooperative

In the previous subsections we have dealt with firm ownership by investors. The other group of agents who can be firm owners in our context is consumers. Since we we want to compare all forms of ownership that can arise in the given circumstances, we now turn to consumer ownership. Differently from what we did before, we can no longer avail ourselves of existing results and develop a new model of the consumer cooperative.

The starting step is to discuss what is exactly meant by consumer cooperative in the present context. The concept of firm ownership now current in economics has its origins in legal thought. According to it owners of a firm are the persons who share a bundle of two rights—the right to control and the right to appropriate residual earnings (Hansmann, 1996; see also Grossman and Hart, 1986). Consumer ownership then characterizes those firms whose owners are consumers of the goods they produce. The most widespread and best-known species of this genus is certainly the consumer cooperative—hereafter simply called 'cooperative'—, that is a cooperative whose members are consumers. In the real world, however, we find an ample variety of forms under this name. Then we have to delimit the field more precisely.

A first quibble is if all customers need to be owners (and then their cooperative is what is usually called "fully mutual") or not (in passing, we recall that this issue was widely debated in the 19$^{\text{th}}$ century at the outset of the cooperative movement). For our purposes we can simplify matters by assuming the coincidence of consumers and owners (n in number). We need two further delimitations to get a meaningful representation of consumer-owned firms. Even a minimal model cannot avoid the issue of governance. Observed consumer cooperatives mostly display a hierarchical governance structure, where a management acts under the monitoring and directions of the body of members. Actual models of governance vary considerably in the powers that each group has and the way they are used. Some cooperatives, like large corporations, are managerial; others are more assemblarian (direct democracy). We cannot go into the details of this topic here. What we need is a stylized model of a cooperative with a minimal governance structure capable to capture the effects of consumer (citizen) participation in the running of a productive activity. To this end, following an established approach (Putterman, Journal of Comparative Economics 1980; Putterman and DiGiorgio, Oxford Ec. Papers 1985; Demarzo RES (1993); Hart and Moore, Oxford Review of Economic Policy (1996); Dow and Putterman, JEBO 2000; Renstrom and Yalcin, J. Public Ec. Theory (2003); Prinz A., van der Burg T., *European Journal of Law and Economics* (2013) , we disregard the managerial layer and assume that our cooperative is directly run by its members, who make all relevant firm choices themselves (as a matter of fact, in a context with homogeneous consumers like ours the assumption is uncontroversial; cf. Mori, 2017, for more details on this issue). The second delimitation we need to make concerns the market structure. As our analysis is essentially about pricing, the cooperative must be endowed with some market power (as a matter of fact, if it had none, a consumer cooperative would hardly be distinguishable from a profit-maximizing one, as is also claimed by the neoclassical separation theorem, cf. subsection 3.1). Then, to simplify as much as possible, we concentrate on the monopoly market, and we assume that, when cooperative-based organizations arise, there is only one cooperative—that we call 'monopolistic cooperative'—encompassing all consumers (which is a very little restrictive assumption, given member homogeneity).

Consumer ownership implies that consumers are also the final recipients of the profits earned by the firm they patronize. Then, member benefit is now the sum of net utility and profit share (note that W_i coincides in this case with the profit share and is generally not zero, differently from the standard case seen in the previous section). Profit-sharing among members creates a strategic interaction between individual consumption choices and members actually play a game under it, where they make choices about price and their individual consumption. The timing is the standard two-stage one for this kind of

problems (see e.g. Farrell, 1985; Spulber, 2009): at the first stage members vote on price; at the second one each of them decides her own demand, taking the price set at the previous stage as given. At each stage every individual's welfare is jointly determined by her own choices and the others'. At the second one, individual consumption choices, given the price set at the first stage, jointly affect individual income from profits via the profit-sharing mechanism. At the first stage consumers' ballots jointly determine the price at which exchanges will take place at the later stage. We thus have two nested games—a voting game and a demand game—played by the same individuals in different roles, the former in the role of owners and the latter in that of consumers. Note that in the present context the voting game actually reduces to a maximization problem, whose solution, however, cannot be not worked out without knowing the solutions of the demand game.

By moving backward, we start characterizing member demands for the good at price p under the uniform sharing rule. A generic member i's demand for a given price p and $x_{-i} \equiv \sum_{j \neq i} x_j$ is a solution to

$$\max_{x_i} \left[u(x_i) - px_i + \frac{p(x_i + x_{-i}) - C(x_i + x_{-i})}{n} \right], \tag{4}$$

Nash demands at price p, $\hat{x}_i(p)$, are best replies to all others' demands at that price, and are defined by the following inequalities:

$$u(\hat{x}_i(p)) - p\hat{x}_i(p) + \frac{p(\hat{x}_i(p) + \hat{x}_{-i}(p)) - C(\hat{x}_i(p) + \hat{x}_{-i}(p))}{n} \geq$$
$$u(x_i) - px_i + \frac{p(x_i + \hat{x}_{-i}(p)) - C(x_i + \hat{x}_{-i}(p))}{n}, \forall x_i, \forall i.$$

(Note that demand functions $\hat{x}_i(\cdot)$ also depend on the number of members n but, since it is a parameter here, we avoid to make it explicit formally.)

Let us now calculate the price that would be chosen by a generic member i if she were given the power to choose it (or were to cast a ballot). Under member homogeneity the Nash demands are unique and equal across them, $\hat{x}_i(p) = \hat{q}(p)$, $\forall i, \forall p$, as is immediate to see. Assume to the contrary that $\hat{x}_i(p) \neq \hat{x}_j(p)$ for some i, j. Then, owing to strict concavity, the FOC

$$u'(\hat{x}_h(p)) - \frac{n-1}{n}p - \frac{C'(\hat{x}(p))}{n} = 0 \tag{5}$$

cannot hold for $h = i, j$ simultaneously, which contradicts the assumption that $\hat{x}_i(p)$ and $\hat{x}_j(p)$ are Nash demands at p. The strict monotonicity of $u(x_i), C(x)$ also rules out multiple Nash demand functions, $\hat{q}^a(p), \hat{q}^b(p), \ldots$ Since the equality of preferences is common knowledge, everyone knows that, once the price is set, each member will express the same individual demand $\hat{q}(p) = \hat{x}(p)/n$, where $\hat{x}(p) = \sum_{i=1}^{n} \hat{x}_i(p)$ is the

aggregate demand. Then, the indirect utility function can be written as

$$U(p) \equiv u(\hat{q}(p)) - p\hat{q}(p) + \frac{pn\hat{q}(p) - C(n\hat{q}(p))}{n}. \tag{6}$$

The individual voter's choice is a solution to the maximization problem $\max_p U(p)$ and all voters will cast the same ballot, owing to preference homogeneity. The preferred price by everybody is then that meeting the first-order condition

$$u'(\hat{q}(p))\hat{q}'(p) = \frac{C'(n\hat{q}(p))\hat{q}'(p)}{n}n, \tag{7}$$

which coincides with the first best condition (1). Lastly, by a comparison of (7) with (1), we obtain the result stated in the following proposition.

Proposition 1. In the absence of externalities the monopolistic cooperative supports the first best in equilibrium.

The proposition is related to a number of similar results on monopolistic pricing, the first of which is due to Farrell (1985), followed by Hart and Moore (1998) and several others. The difference between these contributions and ours is that they do not account for the free-riding effects induced by profit-sharing and fail to notice that in the cooperative set-up consumer demands generally differ from standard ones, as individual consumption choices affect the size of the profits distributed to consumers and generate a sharing effect. Even though in the special case under consideration such phenomena do not show up in equilibrium, this is not generally true and taking due account of the sharing effect is important not only for a full understanding of the mechanics of cooperatives' pricing choices in the present set-up, but also for the identification of equilibria in more general contexts (Section 4).

For our purposes, it is convenient to rewrite the first order condition (5) as

$$u'(\hat{x}_h(p)) - p + \frac{1}{n}(p - C'(\hat{x}(p))) = 0. \tag{8}$$

The *sharing effect* is given by the third addendum of (8), which distorts demand upward when it is positive and downward in the reverse case. By increasing her consumption by one unit, a consumer-owner earns the marginal net surplus $[u'(\hat{x}_h(p)) - p]$ plus an additional income from its participation in profits, which is equal to $\frac{1}{n}[p - C'(\hat{x}(p))]$. If the income variation is positive, demand is raised beyond the level that would obtain without profit-sharing, while it is pushed below for negative values.[2] There is, however, one price where no distortion occurs—the first-best price—and this is just the reason

[2]This is the point ignored by Farrell (1985) and the literature on not-for-profit monopolistic firms spawned by it.

why it is unanimously preferred by members. With homogenous preferences, in the Nash equilibria of the demand game individual welfare at any price is the same for all consumer-owners and is just $1/n$ of the social welfare. More precisely, it is the sum of the (individual) gross surplus at $\hat{q}(p)$ minus the price for this quantity plus the profit share, and each addendum is exactly $1/n$ of the corresponding aggregate one, i.e. the standard social surplus at $\hat{q}(p)$. In other words, there is no divergence between individual and social interests, which means that the same price optimizes both and no free riding occurs in equilibrium, as Proposition 1 states.

An immediate implication of the proposition is the following corollary.

Corollary 1. The monopolistic cooperative equilibrium is equivalent in welfare terms to the perfectly competitive one.

In the circumstances under consideration cooperative equilibria are characterized by the absence of demand distortions (the sharing effect is null) and thus the monopolistic cooperative exactly replicates a perfectly competitive market with investor-owned suppliers. Note that this is made possible by the cooperative's different ownership structure, and particularly the consumption motivations guiding its choices that have the effect to fully annihilate the impact of monopoly power. In conclusion, under the present conditions we have a clear ranking of the different market organizations, with the monopolistic cooperative equivalent to a perfectly competitive market and the standard for-profit monopoly dominated by both. This is the benchmark we refer to in evaluating the results of the next section, where we analyze situations in which free riding is not limited to the cooperative but, owing to the presence of externalities, arises also in markets where suppliers are for-profit firms.

4 Externalities

In the previous section we focused on the baseline case where no externalities are present. Now we address the general case outlined in Section 2 where consumption of the private good generates externalities. In particular, we assume that there is an externality jointly produced by consumption of the private good according to the production function $f(x)$, $f'(x) > 0$ for all $x, x \equiv \sum_i x_i$. The externality may be positive ($u_2 = \partial u/\partial f > 0$) or negative ($u_2 < 0$). We are interested here in the differences between alternative organizations in dealing with external effects. Of course, if Pigouvian taxes/subsidies were feasible, all ownership issues would be wiped out, as the first best would be attained irrespective of firm ownership and all ownership structures would be in fact equivalent (no firm theory is indeed possible if ownership has no impact on efficiency). Then,

we assume away taxes and subsidies of any kind, in order to concentrate ourselves on the effects of ownership on the production of external effects. As before, we have to distinguish between for-profit and cooperative organizations.

4.1 Demand for goods supplied by investor-owned firms

In the case where the private good is provided by a for-profit firm, for any price p and x_{-i}, each consumer maximizes

$$u(x_i, f(x_i + x_{-i})) - px_i \tag{9}$$

under the usual consumer budget constraint. Here, to keep the analysis simple we focus on interior solutions only, hence disregarding the impact of the budget constraint.[3]

Individual i's demand at price p is a maximizer of (9) with respect to x_i, given p and x_{-i}. The demand function $x_i(p, x_{-i})$ is then a solution to the following FOC:

$$p = u_1(x_i, f(x_i + x_{-i})) + u_2(x_i, f(x_i + x_{-i}))f'(x_i + x_{-i}) \tag{10}$$

where $u_1(x_i, f(x_i + x_{-i})) = \partial u/\partial x_i$ and $u_2(x_i, f(x_i + x_{-i})) = \partial u/\partial f$.

In Nash equilibrium with homogeneous preferences there hold $x_i = x_j = q$ and $x_{-i} = (n-1)q$ for all i, j, whereby equation (10) becomes

$$p = \tilde{p}(q), \tag{11}$$

where $\tilde{p}(q) = u_1(q, f(nq)) + u_2(q, f(nq))f'(nq)$. Correspondingly, we use the symbol $\tilde{q}(p)$ to denote Nash demands without sharing effects, as opposed to Nash demand $\hat{q}(p)$ with sharing effects of the cooperative case (with a small abuse of notation, we use the same symbol as without externalities).

The aggregate demand at p is then

$$x = nq = n\tilde{q}(p)$$

i.e.

$$\frac{x}{n} = \tilde{q}(p)$$

from which we obtain the inverse aggregate demand function

$$p = \tilde{p}\left(\frac{x}{n}\right). \tag{12}$$

To ensure the existence of an interior solution we assume a downward-sloping, invertible demand function for the private good:

[3] Allowing for corner solutions would somewhat complicate the analysis without gaining new insights.

$$\frac{\partial \tilde{p}(q)}{\partial q} < 0. \tag{13}$$

The socially optimal individual quantity is

$$q^* = \text{argmax}_q \left[nu(q, f(nq)) - C(nq) \right],$$

which satisfies

$$u_1 + nu_2 f' = C'. \tag{14}$$

The socially optimal aggregate quantity is then $x^* = nq^*$. Note that a positive (negative) externality increases (decreases) the level of production relative to the situation where no external effects are present.

4.2 Perfect competition

We assume that in case of perfect competition, firms are for-profits. Since the perfectly competitive equilibrium price is such that $p = C'(x)$, from (12) we have

$$\tilde{p}\left(\frac{x}{n}\right) = C'(x). \tag{15}$$

Hence the equilibrium aggregate quantity in perfect competition x^{PC} solves[4]

$$u_1 + u_2 f' = C'. \tag{16}$$

From the comparison of (16) and (14) there immediately follows

Proposition 2. In a perfectly competitive equilibrium with positive (negative) consumption externalities the aggregate consumption x^{PC} is lower (larger) than the first best level.

This result is standard (cf. e.g. Mas-Colell, Whinston and Green, 1995, p. 353). The cause of overconsumption in the presence of negative externalities lies in a *free-riding* effect created by joint production. On working out their demands, individuals take into account the marginal impact of the externality on their own welfare but they disregard the effects on others and consume more of the private good than would be socially desirable. Analogous considerations apply to the case of underconsumption with positive externalities. Note that the distortion is higher the larger is the size of the market n. When the number of customers is high, the aggregate effect of the externality is higher and this widens the gap between the first best and the competitive outcome.

[4]Note that under our assumptions, the problem at hands is globally concave.

4.3 Monopolistic for-profit firm

A monopolistic for-profit firm chooses the price so as to maximize its profit, i.e.

$$\max_p \left[pn\tilde{q}(p) - C(n\tilde{q}(p)) \right].$$

The FOC of the above expression is

$$n\tilde{q}(p) + np\tilde{q}'(p) = nC'(n\tilde{q}(p))\tilde{q}'(p),$$

i.e.,

$$\frac{\tilde{q}}{\tilde{q}'} + p = C'.$$

Since $p = u_1 + u_2 f'$, the previous condition becomes

$$\frac{\tilde{q}}{\tilde{q}'} + u_1 + u_2 f' = C', \tag{17}$$

the solution of which allows to find x^M. Given assumption (13), the term $\frac{\tilde{q}}{\tilde{q}'}$ is negative, implying that $x^M < x^{PC}$.

Unsurprisingly, the comparison of equilibrium conditions for monopoly (17) and perfect competition (16) with the equation defining the first best (14) immediately yields the following proposition.

Proposition 3.

1. In the presence of positive externalities ($u_2 > 0$) there holds $x^* > x^{PC} > x^M$, i.e. the competitive solution always dominates the for-profit monopolistic one.

2. Conversely, under negative externalities ($u_2 < 0$) there holds $x^* < x^{PC}$ and $x^M < x^{PC}$, which means that a standard monopolistic market is preferable to a perfectly competitive one when the number of consumers n is sufficiently high or the demand $\tilde{q}^{-1}(q)$ is sufficiently inelastic.

A basic proposition of economics is that perfect competition outperforms monopoly in efficiency terms. This is certainly true in a wide array of situations but ceases to hold when there are externalities that induce free-riding behaviors, under which monopoly may indeed dominate perfect competition. However, this is possible only in specific circumstances.

We first focus on what occurs under positive externalities (Proposition 3.1). In this case, under for-profit provision, the aggregate consumption is larger when the good is provided by perfectly competitive firms than by a monopolistic firm. Both perfect competition and for-profit monopoly exhibit underconsumption in equilibrium,

as consumers ignore the positive effects of own consumption on the other consumers, but the distortion is not of the same size in the two markets. In standard monopoly the adverse effect of underconsumption is strengthened by the exploitation of market power through high prices, which further reduces consumption and amplifies the loss due to the externality. This is why perfect competition is preferable to for-profit monopoly when the externality is positive, as is claimed by Proposition 3.1.

When externalities are negative, a different result is possible. In this case perfectly competitive equilibria always display overconsumption, as consumers disregard the negative impact of own consumption on fellow-consumers' welfare (Proposition 3.2). As is immediate to see, the difference between conditions (14) and (16) lies in the marginal externality term—$u_2 f'$ vs. $nu_2 f'$—and a distortion arises because of this divergence, whose size is increasing in the consumers' number. In monopoly there occurs the same distortion but there is also a countervailing effect induced by monopolistic exploitation of market power, which abates consumption and the concomitant external effects, thus contributing to dampen the impact of free riding on welfare, as condition (17) tells. Since the term $\frac{\tilde{q}}{\tilde{q}'}$ is negative, consumption is lower, all else equal, i.e. an underconsumption effect is at work, which determines $x^M < x^{PC}$ (see part 2 of Proposition 3). If the underconsumption effect generated by monopolistic pricing is not too big, i.e. demand is sufficiently elastic or n sufficiently large, it mitigates the overconsumption effect due to the externality without overriding it, and the final outcome is an x^M such that $x^* \leq x^M < x^{PC}$. Then, monopoly dominates perfect competition in welfare terms, though generally not supporting the first best. Conversely, when market power effects are large relative to free-riding ones ($\frac{\tilde{q}}{\tilde{q}'}$ is large and n small), underconsumption prevails over free riding and the outcome is $x^M < x^* < x^{PC}$. In this case perfect competition may be preferable from a welfare standpoint.

An interesting point is that, while perfect competition never supports the first best, with negative externalities the standard for-profit monopoly can, i.e. there may hold $x^* = x^M$. This indeed occurs when the conditions (14) and (17) have the same solution, that is when the following condition is met

$$(n-1)u_2 f' = \frac{\tilde{q}}{\tilde{q}'}. \tag{18}$$

It is to be stressed that the possibility that the first-best is supported by a for-profit monopoly arises only if externalities are negative ($u_2 \geq 0$ is obviously inconsistent with the previous equation, since $\tilde{q}' < 0$). One case where condition (18) is met is when utility and cost functions are defined respectively as

$$u(x_i, f(x)) = x_i^{\alpha} - Ax,$$
$$C(x) = cx,$$

$A > 0$, $0 < \alpha < 1$.[5] We will not pursue this point further, since for our purposes it is enough to establish that such an outcome is possible.

4.4 Monopolistic cooperative firm

In subsections 4.2 and 4.3 we have analyzed perfectly competitive and monopoly markets along essentially standard lines. Interestingly, the dominance of perfect competition over monopoly is no longer assured when there arise externalities that generate free riding behaviors. Now we look at markets served by a monopolistic consumer cooperative and here we have an entirely novel picture. The main difference with our analysis above is that in this context consumer-owners strategically interact between themselves not only via the consumption externality $f(x)$ but also via profit-sharing. In other words, if the supplier of the private good is a cooperative, there are two external effects originating from consumption decisions—instead of one—that intertwine together: the consumption externality effect, and the sharing effect, already met in Section 3.2. Let us see how the cooperative's model changes in light of this.

The game played by consumer-members has the same two-stage structure as before. At the first stage members vote for the price p; at the second one, each of them chooses her individual consumption given the price set in the previous round. We proceed backward, as usual, and look at the individual optimal consumption at the second stage when price is set at level p. The decision problem faced by the representative consumer is the following variant of (4)

$$\max_{x_i} \left[u\left(x_i, f(x_i + x_{-i})\right) - p x_i + \frac{p(x_i + x_{-i}) - C(x_i + x_{-i})}{n} \right]. \tag{19}$$

In a Nash equilibrium of the second-stage game at price p there is defined an individual demand $\hat{q}(p)$ (the same for all consumer members)

$$p = \frac{n}{n-1} \left[u_1(q, f(nq)) + u_2(q, f(nq)) f'(nq) - \frac{C'(nq)}{n} \right], \tag{20}$$

which is obtained by replacing $(x_i + x_{-i})$ with $n\hat{q}(p)$ in the first-order condition for problem (19). Then, given the demand function, the individual indirect utility under the uniform profit sharing rule is defined at any p as[6]

$$u\left(\hat{q}(p), f(n\hat{q}(p))\right) - p\hat{q}(p) + \frac{pn\hat{q}(p) - C(n\hat{q}(p))}{n}.$$

[5] This case is fully analyzed in an annex to the paper that can be obtained from the authors upon request.

[6] Note that, to avoid encumbering the notation too much, we keep using the symbol $\hat{q}(p)$ for individual demands under profit-sharing in the presence of externalities as well.

This is the maximand at the voting stage (first stage of the cooperative's game) and the corresponding FOC is

$$u_1\hat{q}' + u_2 f' n\hat{q}' = \frac{1}{n} C' n\hat{q}'$$

that simplifies to

$$u_1 + nu_2 f' = C', \tag{21}$$

which allows to find x^C. Note that the latter is just the first-best condition (14). In other words, when they are homogeneous, the cooperative's members unanimously vote for the first-best price p^* and the amount of externality produced will be optimal. All this is summarized in the following proposition.

Proposition 4. In the presence of an externality $f(x)$, $f'(x) > 0$, the first best is always supported by the monopolistic cooperative.

In the previous subsections we saw that in the presence of an externality a perfectly competitive market never supports the first best in equilibrium, while for-profit monopoly may occasionally do. Then, an immediate implication of Proposition 4 is the following corollary.

Corollary 2. In the presence of an externality $f(x)$ the monopolistic cooperative dominates all market organizations based on for-profit firms weakly and some of them strictly, depending on the circumstances.

We have previously seen in the no-externality case the cooperative-based market organization is equivalent from a social welfare standpoint to a perfectly competitive market and the for-profit monopoly is inferior to both (Section 3.2). In the externality case there is instead no overall equivalence of the cooperative with either alternative, though in some cases monopoly happens to support the same outcome (first-best) as the cooperative (perfect competition instead never does). Then, the presence of an externality reinforces the case for the participatory enterprise. This result underscores an important difference between a competitive market and a participatory production organization integrating consumers and producers. As is well known, the externality problem we are studying can be solved through a competitive market by placing a wedge between demand and supply demand, for example by means of an appropriately designed pigovian sales tax. This solution, though, has two important limitations: first, it requires the intervention of an external agent - government - and, second, it is subject to the pitfalls of asymmetric information. Pigovian taxes indeed require full knowledge by government of critical information that is held by the agents (namely, preferences and cost functions), in the absence of which implementation is necessarily imperfect or

impossible. By contrast, in the participatory solution the first best is attained without calling in external agents and, above all, without relying on unlikely informational requirements. It is just with regard to the informational plane that the participatory solution displays one of its most appealing strengths.

Proposition 4 is the main result of the section. It bears a close resemblance to Proposition 1, and in fact it is an extension of it to a context with externalities, but the involved phenomena are rather different from those at work in the context of Section 3.2. The proposition states that, under an encompassing consumer cooperative (that is, in the absence of non-member customers) and homogeneous consumer preferences, the total free-riding effect is always null in equilibrium and the first best is attained, irrespective of whether the externality is positive or negative ($u_2 \gtrless 0$).

Individual Nash demand functions, as we have seen, are defined by (20), and it is immediate to verify that the intersection of the aggregate demand with sharing, $n\hat{q}(p)$, and that without, $n\tilde{q}(p)$, occurs, as before, at the competitive market-clearing price $p^{PC} = C'(nq(p^{PC}))$. It is important to note, however, that this is no longer the first best (cf. Condition (14)). As we already noted, consumer-owners here interact with each other through two channels, via profit-sharing and via the jointly-produced externality. Let us rewrite (20) as

$$u_1(\hat{q}(p), f(n\hat{q}(p)) + u_2(\hat{q}(p), f(n\hat{q}(p))f'(n\hat{q}(p)) - p + \frac{1}{n}\left(p - C'(n\hat{q}(p))\right) = 0,$$

This is analogous to Equation (8). The last addendum on the left-hand side is the sharing effect. For prices higher (lower) than p^{PC} there occurs a negative (positive) effect on private consumption. On the other hand, when $u_2 > (<)\ 0$, the distortion originating from the externality causes an under-(over-)consumption effect. In equilibrium the two distortions must be of opposite sign and perfectly compensating, so as to yield a zero total free-riding effect (Proposition 4). That is, for $u_2 > (<)\ 0$ we must have $p^* > (<)\ p^{PC}$. An interesting point to note is that the cooperative's advantage over for-profit organizations lies not in the absence of free riding phenomena in equilibrium—on the contrary, we have seen that there are two non-null such effects at work—but in the choice of a price that generates a zero *total* free riding effect.[7] What is the logic behind such a choice?

Consider each stage's choices. They both affect the welfare of people other than the decision-makers, i.e. they generate external effects, but in different ways. The price

[7]Note the difference with the case of no externalities, where the sharing effect is null in equilibrium (see subsection 3.2). Note also that, thanks to this fact, in that context allowing for $x(p)$ in place of $\hat{x}(p)$, as is done by Farrell (1985) and others, would bring about the same outcome. Here, instead, if we ignored the sharing effect and its role in shaping equilibria, we would come to identify a wrong outcome.

choice finally determines everybody's welfare through the Nash demand functions. As a matter of fact, setting a price means choosing a welfare level for one and all at one touch. By contrast, an individual consumption choice affects others' welfare only partially through the externality, as the final outcome depends on the fellow-consumers' choices as well. In a word, the pricing choice has a *public-good* nature (Silvestre, 1994) that is instead missing from individual consumption choices ('public-good' decision vs. 'private-good' decision). This difference is crucial. In the voting game consumers compute the effects of price changes on their own welfare through the Nash demands arising in the second-stage game and, in so doing, they are forced to take into account the effects of their choices on their fellow-consumers' welfare, which are instead ignored at the second stage where free-riding phenomena may appear. Though not subject to free riding, price-setting may cause other kinds of distortions, namely redistribution among members. For redistribution phenomena to materialize, there is required some heterogeneity among the concerned individuals. Under the conditions of this section, the cooperative organization eliminates any form of heterogeneity and, since all lose or gain from price variations in the same measure, there is no way for one member group to induce surplus transfers from another and hence no redistribution effect is actually possible (redistribution requires differentiated effects, while here external effects are symmetrical). As a consequence, it is in the interest of every consumer-owner to choose the price that annihilates free riding effects at the second stage so as to maximize social surplus, just as a benevolent planner would do (note that here, as in the case without externality, individual welfare is just one n-th of the social welfare, i.e. each component is one n-th of the corresponding total: total gross surplus, total price, total profits). In other words, there is no conflict between individual and social interests and individual and social objectives are perfectly aligned.

Let us get back one moment to the for-profit monopoly. Here the choice problem is the same as in the cooperative but the choice rests with a different group of individuals, investors. This introduces a fundamental heterogeneity between two groups of social surplus recipients, one—the decision-makers'—motivated by profit-seeking and the other by consumption motives. It is this heterogeneity that makes surplus redistribution possible in this case and explains the different behavior of the two firm types. Price hikes have the effect of tilting the distribution of social surplus from consumer surplus to profits but affect its total size as well. Then, as is well known, the monopolist's choice will generally entail an upward price distortion causing redistribution of the total surplus in favor of profits, which is instead impossible in the homogeneous cooperative. Note that here a for-profit monopoly firm can occasionally support the first best (Section 4.3), and hence may be equivalent to a homogeneous consumer-owned cooper-

ative, a fact that cannot occur without externalities. The reason is again the free riding effect. By keeping prices high, and hence consumption low relative to perfect competition, the monopolist in fact reduces the negative impact of free riding on social welfare. In particular, when external losses inflicted by free riding are strong enough relative to individual benefits from private consumption, the monopolist's choice may casually fall on the first-best price, as we have seen in Section 4.3. An unusual fact occurring in our context is that perfect competition may perform worse than monopoly. Perfectly competitive markets are effective at countering for-profit firms' attempts at redistribution in their favor through high prices but in the presence of (negative) externalities they are, as it were, *too* effective, since equilibrium prices do not allow for external effects and turn out too low. Competitive equilibria thus imply a positive amount of free riding and this is the basic reason why this market organization is always dominated by the cooperative and sometimes even by monopoly.

This result offers new insights into the effects of competition. The traditional view is that competition is generally beneficial except in a few well-delimited cases, the most important of which is undoubtedly increasing returns. When returns to scale are increasing over the whole range of production levels that can be absorbed by the market—in a word, when there is natural monopoly—it is socially preferable not to have competition in the market. For traditional theory, then, the basic factor behind "good" monopoly is essentially technological. Here we have a further point of view: monopoly - of the right kind, it must be added - may be good for non-technological reasons as well. Even in the absence of the classical natural monopoly conditions, the joint production of external effects by private consumption or production justifies the replacement of many competing investor-owned producers with one monopolistic producer under the control of the consumers of both the private good and the public good generated by consumption (production).

In conclusion, in the homogeneity case externalities can be fully taken care of by the community of users through cooperation among themselves, without the need for altruistic attitudes (i.e. by purely egoistic users) or a benevolent planner. The previous analysis in fact leads to a possibility result: in the presence of external effects business organizations other than customer-owned ones are socially desirable *only if* preferences are heterogeneous or customer ownership adversely affects internal efficiency (the subject of a wide literature which, however, is ignored here, as it falls outside the paper's scope). It has also shed light on the role of free riding as the basic factor of the dominance of customer-ownership over the other organizational forms, and, by negation, also on the role of consumer heterogeneity. There are essentially two ways by which heterogeneity may enter into the picture. One is when members are differentiated

among themselves. In that case redistribution phenomena of the same nature as in the for-profit monopoly become possible within the cooperative too, though of different intensity (the different motivations of decision-makers—consumption vs. investment—will generally play a positive role by attenuating the impact of redistribution effects, Mori, 2018). The second is what we may call external heterogeneity. In this section's circumstances the homogeneous cooperative solves the efficiency issue fully but in others it does not, as externalities may generate specific forms of heterogeneity, involving people outside the cooperative. As we discuss in the next section, when this occurs, not only is the cooperative generally unable to support the first best but it may even perform worse than for-profits in social welfare terms.

5 Two communities

By contrast, when we have to do with inter-community externalities, the basic intuition ceases to hold. More precisely, it is no longer true that the largest social surplus is obtained by assigning the most caring party the ownership of the firm(s) from whose activity externalities ultimately stem, as in Besley and Gathak (2001). We show that in plausible conditions it may be in the interest of consumers and of society as a whole to grant ownership to investors rather than to themselves, when there are external effects on non-hosting communities. The two driving factors are the specific nature of inter-community externality, in particular whether there is consensus or conflict between the concerned communities, and the market nature, in particular whether the for-profit firm(s) with which we compare the consumer cooperative operate(s) in perfect competition or not.

A community is a group of individuals who consume, directly or indirectly, the consumer good produced in the economy and an economy may comprise several such communities, differentiated by some attribute. In the previous sections all consumers were equal and hence there was only one community. Suppose now that we have two separate communities. The first is just the previous section's community and includes all individuals who consume the private good. To this there is added a second one that instead consists of individuals who do not consume the good directly but are affected by the first community's consumption via an externality. In a word, the externality produced by private consumption now affects two communities instead of one.[8] To distinguish the two communities we will then refer to them as 'internal' and 'external'

[8]The latter community's members can actually be viewed as consumers of a sort, as they indeed consume something—the public good generated by the externality—and can be said to consume the private good indirectly.

respectively, and to their members as 'internal/external consumers'. Internal consumers' preferences are represented by the utility function $u(x_i, f(x))$ of the previous section, where, we recall, $f(x)$ is the public-good effect of individual consumption on themselves. We keep assuming as before that, when a cooperative is formed, all internal consumers, and they alone, are members, as no individual from the external community is entitled to become a member (this assumption will be relaxed later). External consumers are all equal and their preferences are represented by the utility function $v(g(x))$, where $g(x)$ denotes the external effect of the private good's consumption on the members of the external community. To simplify, we also assume without loss of generality that the two communities consist of the same number of individuals, n. Lastly, we recall that there exists a non-specified group of investors, i.e. individuals who do not consume, either directly or indirectly (cf. Section 2).

In the previous section we allowed for both positive and negative externalities affecting the single community that was present there. We maintain the assumption for the internal community and also assume that that the externality can have both signs for the external community too, i.e. $v'(g(x)) \gtrless 0$. Moreover, we do not impose restrictions on the combination of signs, and in fact we allow for four possible cases, a few examples of which are reported in Table 1.

Table 1 – Examples of externalities affecting the two communities

$u_2 \leq 0$	$v' < 0$	(Waste management, $u_2 < 0$) The internal community is the group of residents in a neighborhood where a total amount of garbage x is produced. The waste treatment process—e.g. by incineration—produces a negative externality $f(x)$ affecting both communities, $u_2 < 0, v' < 0$. Garbage rates paid by the residents may or may not allow for the external effects and are the key market variables here. (Water pollution, $u_2 = 0$) To consume x, the internal community discharges an equal amount of untreated wastewater into a river, with no impact on itself but a negative impact on an external community living downstream.
$u_2 > 0$	$v' > 0$	(Air quality improvement) The internal community is made up of the users of a given total amount of a polluting kind of energy and external consumers are those who do not use it; x is the fraction of green energy over total, $f(x)$ an index of air quality improvement. The key market variable is in this case the differential between the price of green and non-green energy.
$u_2 > 0$	$v' < 0$	(Water tapping, crossed external effects) The internal community is located upstream of a river from which it taps water for civilian use. The more water it taps, the less is available to the downstream community. The private consumption of water by the residents, x, generates a public good $f(x)$ that affects both communities, but in a different way. In the internal community a larger x contributes to a cleaner and healthier environment, thus generating a positive externality ($u_2 > 0$). The effect on the external community's environment is just the opposite, a less clean and less healthy environment ($v' < 0$). The internal community's water rates are the key market variables.

An important point to note is the difference between the external effects of the previous section and the present one's. The externalities occurring within the community that consumes the private good, $f(x)$, have basically the same nature as the commons, with which they share two features—they are the result of joint production and reciprocal. When a second community, not consuming the private good, comes into the picture, a new external effect arises, $g(x)$, which is instead not of the common-pool

type. Both effects generate free riding but of a different nature and in general different organizations will react to them with unequal degrees of effectiveness. The difference is especially striking in cooperatives. While they are capable to fully annihilate free riding phenomena within communities (Section 4.4), they are not able to do so with externalities across them. The reason, as we will see in the next section, is essentially that this kind of externality introduces heterogeneity into society, that was instead absent in the single-community case.

5.1 Welfare analysis of market equilibria

In the new set-up we are considering, the external community's members are affected by an externality but do not participate in the decision-making process, which still involves the same individuals as before. Since the objective function of every individual—whether consumer or investor—is not changed by the presence of the external community (in a word, they do not allow for $v(g(x))$), equilibria do not change either, irrespective of market nature (cooperative, perfectly competitive, monopolistic). What changes here is the social optimum and, as a consequence, the ranking of the various organizational forms under consideration changes too. The socially optimal individual quantity is now defined as

$$q_E^* = \text{argmax}_q \left[nu(q, f(nq)) + nv(g(nq)) - C(nq) \right],$$

and solves the following first order condition

$$u_1 + nu_2 f' + nv'g' = C'. \tag{22}$$

To ensure the existence of an interior solution, we assume that the l.h.s. of condition (22) is decreasing in q. The first best with two communities q_E^* generally differs from the first best with a single community, q^*, as equation (22) differs from (14) by the term $nv'g'$. Which is greater then depends on the final impact of the external effects, in particular the sign of u_2, as Lemma **??** of the Appendix shows. The most relevant implication of this fact is that Proposition 4 ceases to hold. The cooperative's equilibrium quantity is x^* in the two-community case as well as in the one-community context. When the first best shifts from x^*, as is the case in the two-community context, the cooperative's equilibrium no longer supports it, differently from the case of a single community (Proposition 4). This in turn has effects on the ranking of the different organizational forms and in particular it causes the cooperative to fall behind for-profits in some cases. The chief task of the present section is to understand what is behind the divergence between the cooperative equilibrium and the social optimum.

We start our analysis by looking at how each of the three organizational types performs relative to the first best.

Perfect competition. In perfect competition there are two distortions at work. The first one is of the common-pool type and is due to the fact that a for-profit's customers do not take into account the impact of their consumption x_i on the other members of the internal community through $f(x)$, as is clear from the comparison of (22) and (16) (compare, in particular, the term $nu_2 f'$ in the former with $u_2 f'$ in the latter). The effect is overconsumption with negative externalities ($u_2' < 0$) and underconsumption in the opposite case ($u_2' > 0$). The second distortion ££is the consequence of internal consumers' disregarding the effects of their consumption x_i on the external community, that are formally captured by the term $nv'g'$ in (22)—a term that is instead absent from (16)££. This results in overconsumption in the case of a negative external effect on the other community ($v' < 0$), and underconsumption in the reverse case ($v' > 0$). The two effects obviously reinforce one another when they have the same sign and in this case the comparison yields a definite ranking, as is summarized in the following proposition.

Proposition 5. If $u_2 > (<)\ 0, v' > (<)\ 0$, $x^{PC} < (>) x_E^*$ ($x_E^* \equiv nq_E^*$).

££Note that these distortions are of the same sign as those arising with a single community (cf. Proposition 2).££ When the external effects have opposite signs ($u_2 > (<)\ 0, v' < (>)\ 0$), the final effect is instead indefinite and both $x^{PC} < x_E^*$ and $x_E^* \geq x^{PC}$ are possible.

To sum up, in the presence of externalities across communities a perfectly competitive equilibrium may entail overconsumption or underconsumption according to circumstances, and may also support the first best, which is instead always precluded under standard conditions with within-community externalities only. The case of opposite external effects is where differences with the single-community context are biggest.

Monopolistic for-profit. From the comparison of (17) and the first-best condition (22) it is immediately clear that with this organization the departure from optimality may have several causes. First of all, the for-profit monopolist disregards the externality on internal consumers (the term $nu_2 f'$ in (22)), and this brings about an overproduction effect when $u_2' < 0$ and an underproduction one when $u_2' > 0$. A second cause of welfare losses is that the monopolist restrains production to maximize profits (the term $\tilde{q}/\tilde{q}' < 0$ in (17)). However, it does not take into account the externality imposed on the external community ($nv'g'$ in (22)) either, and this produces an underproduction effect when $v' > 0$ and an overproduction provision in the opposite case, $v' < 0$.

Monopolistic cooperative. Here the main fact is that the cooperative's production choices do not take into account the externality imposed on the external community, as is clear comparison is between (21) and (22). The result is that under the cooperative organization there always arises overconsumption when $v' < 0$ and, conversely, underconsumption when $v' > 0$.

5.2 Common interests, conflict and ownership

We now compare the different organizations in terms of social welfare. It is intuitive that a critical variable affecting the ranking is the sign of external effects and the following propositions confirm the intuition. Together they provide a complete characterization of the relation between the equilibrium outputs under the different organizations.

Proposition 6. If both external effects are positive, $u_2 > 0, v' > 0$, there is a definite ranking of equilibria under the three organizations, which sees the cooperative as the dominant one, i.e. $x_E^* > x^C > x^{PC} > x^M$.

Proof. The statement follows directly from the comparison of (16), (17), (21) and (22). □

The sign of the externalities plays a key role here. When both externalities within and across communities are positive, the cooperative comes closer to the first best than the for-profit monopoly and even perfect competition, though it fails to attain it. The reason is that the cooperative's members do not take into account the positive effect of own consumption on the external community. A perfectly competitive market is inferior to the cooperative-based one as, in addition to the previous effect, prices disregard the positive externality involving the internal community either. Standard (for-profit) monopoly is inferior to both, since it is subject to the failures arising with perfectly competitive firms and moreover it also suffers from the fact that production is further reduced in order to maximize profits via higher prices.

The picture gets more complicated when external effects are negative. A necessary condition for a for-profit firm to support the first best is then that at least one negative external effect is present, $u_2 < 0$ or/and $v' < 0$, as is immediately clear from the comparison of the first-best condition (22) with the first-order condition for monopoly (17). As a matter of fact, the two hold simultaneously only if

$$(n-1)u_2 f' + nv'g' = \frac{\tilde{q}}{\tilde{q}'},$$

whereby, being the right-hand term negative, at least one of u_2 and v' must be negative too. This observation leads immediately to the following proposition.

Proposition 7. If at least one of the external effects is negative, no global ordering of the three organizations exists but there are local orderings, specified as follows:

a) if $u_2 < 0, v' < 0$, there hold $x_E^* < x^C < x^{PC}$ and $x^M < x^{PC}$;

b) if $u_2 < 0, v' > 0$, there hold $x^C < x^{PC}$, $x^M < x^{PC}$ and $x^C < x_E^*$;

c) if $u_2 > 0, v' < 0$, there hold $x^C > x^{PC} > x^M$ and $x^C > x_E^*$.

Proof. The statement follows from the comparison of (16), (17), (21) and (22). □

A few comments on the proposition are in order. In the case 7.a) there holds a seemingly paradoxical result: any organization type can be dominant with the exception of perfect competition, so that the organizational "choice" is actually restricted in the given circumstances to two market structures—for-profit monopoly and cooperative monopoly. The monopolistic cooperative's advantage in welfare terms is that it is the only organization capable to internalize the common-pool externality within internal consumers. By contrast, in perfect competition firms have no power to manipulate prices and thus fail to avoid the negative impact on welfare of this external effect and of the external effects on the outside community. This is why it performs worse than the cooperative. But it may perform worse than the for-profit monopoly too, as in the latter case the firm is led to restrain production to keep prices high, which turns out to have a better impact on the external community. In other words, there is a trade-off between internal welfare losses due to monopolistic pricing and external welfare losses due the larger consumption of the private good and larger external effects on the external community in perfect competition. There is instead no definite ranking of for-profit monopoly and cooperative and either may dominate in terms of welfare according to the circumstances. The for-profit monopolist reduces its production by the term $\tilde{q}/\tilde{q}'$ and dominates the cooperative if the size of $\tilde{q}/\tilde{q}'$ is sufficiently large compared to that of $(n-1)u_2 f'$, i.e. if $u_2 f' + \tilde{q}/\tilde{q}' < nu_2 f'$, and hence if n is sufficiently low or $\tilde{q}/\tilde{q}'$ is sufficiently high (in absolute value).

When the conditions of 7.b) hold, both the cooperative and the for-profit monopolist underproduce relative to perfect competition, in the former case because it takes into account the negative effects on the internal community (free riding) and in the latter because it restrains production to keep prices high. The final outcome is, again, uncertain but now perfect competition may be welfare improving, as higher production has larger positive effects on the external community. No definite ranking emerges in case 7.c) either. The cooperative overproduces relative to the first best, because it does not take into account the negative effects on the external community. This occurs in

perfect competition too, where the welfare loss is partially offset by the downward distortion in production caused by disregarding the positive externalities on the internal community. For example, if $(n-1)u_2 f' + nv'g' = 0$, perfect competition achieves the first best outcome.

In sum, the message of Proposition 7 is simple: when negative external effects of any kind are at play, the cooperative organization may be dominated by for-profit firms of either type, which can never occur with positive externalities (Proposition 6). This fact is not surprising in itself. If we look at the cooperative more closely, it is apparent that its nature is that of a political entity, not unlike a legislature. That externalities are not enough to warrant governamental intervention in the economy is a basic tenet of the public choice school and what we find here is just going in that direction. Some papers have already shown formally that a political firm under the democratic rule may yield a larger production of public bads than the market (Shepsle and Weingast, 1984; Roemer, 1993). Here we gain a new insight into the reasons why this may be the case. From what we have seen it is obvious that in the presence of externalities across communities cooperative equilibria do not generally coincide with the first best (differently, we recall, from the case of within-community externalities only) but this fact raises a question: what is it that makes a departure from optimality possible in this case? This is the central point which we now address. In Section 3 the cooperative dominated the for-profit monopolist essentially because redistribution effects were not possible within it under the assumed conditions (namely, the presence of a single community of homogeneous consumers). By contrast, when internal consumption affects outside communities through externalities, there may arise redistribution phenomena with cooperatives too, that are of the same basic nature as those induced by a monopolist, though they manifest themselves in a different guise. In the presence of an outside community it is no longer sure that the consumption motive behind consumer-owners' choices helps reduce redistribution effects and may even worsen them. This is why cooperatives cease to be globally dominant in the new context, as we will now see in greater detail. The groups of potential surplus recipients are now three instead of two, as to the investors and the consumers of the internal community there is added an external community of individuals who do not consume the private good but are affected by the externality caused by its consumption. Let us go back for a moment to Proposition 6. Under its conditions both for-profit organizations cause a destructive redistribution of surplus occurs within the internal community, which is exactly of the same size as in the previous section (the variables affecting internal welfare have not changed). By contrast, with the cooperative organization the internal social welfare is larger (it is actually maximized, as it was in the single-

community case, Proposition 4) and the external community also gets a larger surplus, for in the cooperative equilibrium consumption is larger than under both types of for-profit (though not optimally so) and the external effects are positive. As a consequence, the outside community is better than under any for-profit organization. Note that the ordering of the for-profit price and the cooperative price is the same for the two communities. In a word, between the two communities there is a *de facto* alliance in this case—a concept that will be made precise below.

Proposition 7 provides a different picture. When external effects are negative, the cooperative no longer supports the first best and there is no longer a definite ranking of the organizations. In particular for-profits may now be dominant. The first fact to be noted is that the behavior of the cooperative versus the external community is qualitatively the same as the for-profit monopolist's versus internal consumers. Let us focus on the case of bilateral negative effects (the following argument can be easily adapted to the mixed cases as well). When a cooperative switches from the first-best price p^* to its preferred one, p^C, the internal consumer's surplus increases, while both the total surplus and the external community's surplus decrease. In other words, there occurs a redistribution of social surplus from the external community to the internal one, just as a redistribution of surplus from consumers to investors occurs in standard monopoly via price hikes. Note that redistribution is possible with *negative* externalities but not with positive ones. Note also that the channel by which redistribution occurs is different, here being the non-pecuniary external effect $g(x)$ in place of the pecuniary external effects on expenditures and profits caused by price variations in the for-profit monopoly. Despite this and the fact that different groups of individuals are involved, there is no doubt that the two phenomena are qualitatively the same, though they may differ in size.

The different weights of the two redistribution effects are the key factor behind the indefiniteness in the welfare ranking of the three organizations affirmed in Proposition 6. More precisely, and focusing on the cooperative and for-profit monopoly, while the for-profit monopoly produces welfare losses by redistribution from internal consumers to investors, the cooperative organization brings about an increase in the internal community's welfare, larger consumption of the private good and a lower welfare of the external community relative to the for-profit equilibrium When the external welfare loss is large enough to outweigh the internal welfare loss under the for-profit organization, the latter emerges as dominant. For society as a whole what matters is the relative weight of the redistribution effects in the two situations: when the effect within the internal community, – i.e. the conflict of interests between internal consumers and investors – is stronger than the redistribution effects and the conflict across communities, the

standard for-profit monopoly turns out a better option from a social standpoint. In conclusion, it is the relative weight of the welfare produced internally vs. that produced outside that ultimately determines the ranking and only when the external welfare has a strong weight in the total welfare it is possible for a for-profit monopoly to dominate a cooperative.

It is intuitive that, when the for-profit monopoly is dominant, there must be a sort of consensus between investors and the external community and, viceversa, a conflict between internal consumers on the one side and both investors and external individuals, on the other. We now want to make this intuition precise. In collective-choice problems heterogeneous individuals generally prefer different collective actions (in the limit, every individual's preferred action differs from all others'). Nonetheless, when confronted with any couple of feasible actions, the set of individuals is partitioned into two subsets, those who prefer one and those who prefer the other option, and both subsets can be non-empty. In other words, when preferences are heterogeneous, there is not agreement between all individuals over the whole choice set, but there is always agreement within some subset of individuals over any binary choice subset or, as we can say, there is a common interest between these individuals over this choice subset. Formally, given a choice set C and a set of individuals affected by the collective choice, N, we say there is a *common interest* between individuals belonging to a subset $A \subset N$ over some subset B of the choice set if they have the same preferences over the latter.[9]

In the present context there are three groups of individuals—investors, internal consumers, external consumers—and two ownership structures, investor-ownership (for-profit monopoly) and (internal) consumer-ownership (coop), that in a normative sense form a choice set. An interesting point is that the common interests linking the different groups are the key factor behind the social ordering of the organization structures. Let us have a look into this by starting from the case of a socially dominant for-profit monopoly (M). Each organization structure implies a definite equilibrium price and definite quantities. Then, preferences on ownership structures are just equivalent to preferences on the equilibrium prices or quantities they entail and, if we keep to the utilitarian approach to social choice adopted above, the preferences of each group are represented by the sum of individual utilities within that group.

The social welfare function is then

$$W(q) = n\left[u(q, f(nq)) - pq\right] + \pi(q) + nv(g(nq))$$

If the individual consumption in the monopoly equilibrium is denoted by q^M (corre-

[9] More formally, if $x \succeq_i y, x, y \in B \subset C, i \in A \subset N$. Individuals in N are heterogeneous if $x \succ_i y$ and $x \preceq_j y$ for some $x, y \in C$ and $i, j \in N$.

sponding to the monopoly price $p^M = x^{-1}(nq^M)$), by definition of q^C there holds

$$\begin{aligned} &n\left[u(q^C, f(nq^C)) - p^C q^C\right] + \pi(q^C) \geq \\ &n\left[u(q^M, f(nq^M)) - p^M q^M\right] + \pi(q^M). \end{aligned} \tag{23}$$

Now suppose that the for-profit monopoly is socially preferred to the cooperative, i.e.

$$\begin{aligned} &n\left[u(q^M, f(nq^M)) - p^M q^M\right] + \pi(q^M) + nv(g(nq^M)) > \\ &n\left[u(q^C, f(nq^C)) - p^C q^C\right] + \pi(q^C) + nv(g(nq^C)), \end{aligned}$$

which, together with (23), implies

$$v(g(nq^C)) < v(g(nq^M)). \tag{24}$$

By definition, q^M is such that $\pi(q^C)) \leq \pi(q^M)$ ($q^M = \text{argmax}_q \pi(q)$). Then, this together with (24) implies that there is a *common interest between investors and the external community* about the (monopolistic) organization structure. What we have found can be summarized as follows.

Proposition 8. A necessary condition for the for-profit monopoly to dominate the cooperative from a social standpoint is that the external community and investors have a common interest over ownership structures.

It is to be noted that, while investors may have a common interest with the external community (and, when it occurs, this is full of consequence), having a common interest with the internal community of consumers is impossible, as the latter never prefers the for-profit monopoly to the cooperative owned by itself. To see why, consider the special case where the internal community prefers the monopoly price p^M—a case that is unlikely but not impossible. Even in this case, however, consumers will prefer to own the firm, as they can still charge the price p^M, being free in this choice, but their welfare will be larger, since they would also earn the profits that go to investors under the monopolistic organization.

It is then clear that the cooperative will never do worse from the standpoint of the internal welfare than the for-profit monopoly. The only community of consumers which can find the monopoly preferable in certain circumstances is the external one. Proposition 8 also helps clarify why with positive bilateral externalities the cooperative is dominant. In this case both internal and external communities prefer the cooperative price, which means that they always have a common interest with regard to the organizational form and hence it is ruled out that the for-profit monopoly can be dominant. It is now also clear the role of negative externalities for the result: the dominance of the for-profit

monopoly requires a common interest between investors and external consumers, which in turn requires conflict between the communities of consumers, but the latter can occur only with this kind of externality. It is to be noted that the conflict situation does not require that the effects of the externality on the two communities' welfare be of opposite sign. Indeed, even with both effects negative it is possible that members of two communities are in conflict with each other and that the external ones may find it convenient to 'ally' with investors.

We have seen that a for-profit monopoly dominates ($\succ_w$) a cooperative (internal) when the external community's suffers a strong welfare loss, i.e. the conflict (redistribution effect) between the monopolist and the internal community is less strong than the conflict between the two communities of consumers. However, the dominance of the for-profit monopoly over the internally owned cooperative is *not* sufficient for the cooperative owned by the external community to be globally dominant (i.e. over both the FP and the internal cooperative).

Summing up, the previous analysis has brought to light a few facts of general interest. A first fact is that, contrary to what is sometimes claimed in public policy analyzes and advocacy papers, the consumption motive that drives mutual organizations is not enough by itself to rule out rent-seeking on the part of consumers. A second lesson is that the fact that consumers, internal and external, are driven by consumption motives is no guarantee that they have common interests too. There are indeed possible cases where some group of consumers have closer interests to investors' than to other consumer groups'. This does not occur only in the present context but is a more general phenomenon. For instance, if there no externalities and members are heterogeneous, in a consumer cooperative there typically emerge groups with conflicting interests—namely, a majority and a minority—which take the place of the internal and external communities in the present context and some of them—typically, the minority—may find themselves naturally 'allied' to investors (**Mori, 2018**).

6 An extension: Inclusive community ownership

In this section we briefly discuss the joint ownership of a production activity that generates a public good affecting all communities.

Joint firm ownership is a complex phenomenon on which here is little agreement among scholars. The literature presents a number of local results on the welfare properties of joint ownership that are valid in specific circumstances and little robust to changes in them. This section is a preliminary effort towards a complete analysis. Its aim is to illustrate the main phenomena and factors at play through the study of a few

specific examples.

This topic has been previously analyzed by Besley and Gathak (2001) and others (Schmitz, ...). We have already pointed out the general analogies and differences between that model and ours (see the Introduction). With regard to the specific subject of joint ownership, the major differences concern the decision-making process in the jointly owned firm. In Besley and Gathak the parties (communities) reach an agreement on the decision variables (specific investments in their case) through bargaining. Here, instead, joint ownership takes the specific form of an inclusive cooperative, whose members are the citizens belonging to both communities, and the collective choice is made by the rules usual in cooperatives, namely the majority rule. Differently from a bargaining situation, then, collective choices will typically not be unanimous and there will usually be ex-post conflict (absence of agreement) among owners. As we will see in a moment, in our context there occur two facts that occur in Besley and Gathak (2001) too: joint firm ownership may occasionally, but not always dominate single ownership in the presence of public goods; secondly, it may occasionally support the first best, but generally fails to. Here we have the same two results but the forces at play are different and outcomes are also qualitatively different. In that contribution, the basic result about joint ownership is that it tends to dominate when the investment choice of the less caring party is more important (Proposition 4, p. 1356). Here we consider other factors and new perspectives open up. The main question of this section is: does the enlargement of membership in a cooperative organization always mark an improvement in social welfare terms? Since a cooperative is a democratic organization, the question is farther-reaching than might appear. As a matter of fact, it bears on the fundamentals of political democracy theory, since it touches on an important issue: is the enlargement of constituencies or a more inclusive democracy always beneficial? Is it good to call all citizens affected by a decision to participate in the democratic process? The constituent elements of the problem are the same in our context and in political ones.

There is also a second viewpoint, more specific but more closely related to our topic. The inclusion of all communities affected by the external effects into the governance structure of the firm is just another instance of multi-stakeholder governance. Then, our starting question can be specified further as follows: is multi-stakeholder governance always beneficial? At first blush, an affirmative answer to these questions seems plausible and indeed this is what some political theories suggest. By contrast, within the field of policy choices on specific matters as in direct democracy systems and also in our context, the answer is negative. Showing this is the main aim of the chapter. Of course, the extension of the organizational forms to the inclusive consumer (citizen) cooperative actually enlarges the number of cases where one form or other of coopera-

tive organization dominates for-profits. However, the first fact is that the enlargement is not always welfare-improving, in that single-community cooperatives may perform better than the inclusive one. Secondly, the enlargement of the cooperative field is not enough to fill all holes and there are indeed a few cases, that are identified below, where a for-profit monopolist dominates *all* cooperative organizations. The interesting point is not so much the negative answer to the general questions above as the reasons that in some cases make multi-stakeholder governance inferior to a non-inclusive one. The reasons why this is possible are instructive, for they bring to light aspects of the multi-stakeholder organization structure that are largely unexplored.

In this section we want to discuss a few basic qualitative facts about inclusion and, given this limited aim, we keep the formal analysis to a minimum. We focus on the case of an inclusive cooperative that encompasses all individuals belonging to the two communities as members. The extension of membership poses a new problem, as members now have different preferences and we therefore need an explicit model of the collective choice process. We assume that decisions are taken under the majority rule, that is the usual collective choice rule for cooperatives (note that our previous model of the single-community cooperative is just a special case of the present one). This means that, owing to preference homogeneity within each community, the equilibrium price is the one preferred by the more numerous community. In the previous sections, as will be recalled, the two communities were assumed equally numerous, both with n members. We slightly modify this last assumption by postulating that either community has one member more than the other but we make calculations as if the two communities had the same member number n, in consideration of the fact that the resulting error has no substantial impact on the qualitative results presented below.[10] Another issue we have to deal with is the distribution of losses. In a consumer cooperative losses are covered either by capital reductions or by one-time transfers from members to firm. Our simple model does not allow for capital (implicitly set equal to zero), and hence the only way to cover losses is loss-sharing among members. It is reasonable to assume that the firm's by-rules forbid the distribution of losses incurred in the production of the private consumption good to non-consumers,[11] but allowing for this formally would complicate calculations somewhat. Since a full-fledged analysis of the inclusive cooperative falls out of the paper's scope, we cut short by restricting ourselves to the analysis of cases where the equilibrium price entails positive profits that are shared among the two communities.

[10] Moreover, the error is decreasing in n and becomes negligible when n gets large.

[11] Without such a constraint non-consumers could easily be made to pay for others' consumption and under voluntary participation this would be a sufficient motive for the external community not to participate in the cooperative.

In an inclusive cooperative individual demands for the consumption good are defined similarly to the previous sections. Specifically, i's demand at price p, given the others' demands x_{-i}, is a solution to the following maximization problem:

$$\max_{x_i} \left[u(x_i, f(x_i + x_{-i})) - px_i + \frac{px_i + px_{-i} - C(x_i + x_{-i})}{2n} \right] \tag{25}$$

(note that the only difference with the previous sections' formulation is that profits are now divided by $2n$ instead of by n). Nash demands $\hat{q}(p)$ are derived from (25) by the same procedure that was followed in section 4.3.[12] Then, in the case it is the internal community to have a majority, the equilibrium price is found by solving

$$\max_{p} \left[u\left(\hat{q}(p), f(n\hat{q}(p))\right) - p\hat{q}(p) + \frac{np\hat{q}(p) - C(n\hat{q}(p))}{2n} \right], \tag{26}$$

and the individual demand at that price is q^{JC}. Conversely, when the inclusive cooperative is controlled by the external community, the equilibrium price is a solution to the problem

$$\max_{p} \left[v\left(g(n\hat{q}(p))\right) + \frac{np\hat{q}(p) - C(n\hat{q}(p))}{2n} \right], \tag{27}$$

to which there corresponds an individual demand q^{JE}.

Switching from a single-community cooperative to an inclusive one has two major implications. On the one hand, it increases the number of those who participate in the decision-making process and potentially affect the collective choice. On the other, it increases the number of people who are called to take part in the sharing of profits. The problem is that the two phenomena do not always act in the same direction—in some cases they reinforce one another but in others they have countervailing effects—and this is why it is not simple to characterize their net impact on social welfare.

A few interesting facts, however, can be established even in the absence of a general characterization. Intuition suggests that inclusion can improve social welfare and perhaps sometimes attain the first best. As a matter of fact, this is true, as we verify below, but it is not always so and in some cases inclusion turns out harmful, i.e. the single-community cooperative performs better. Moreover, since single-community cooperatives sometimes perform worse than for-profit monopolists (section 4.3), we expect that there are circumstances where the latter can performs better than inclusive ones, and this is indeed the case, as we will verify.

Let us look more closely at the effects of the enlargement of a cooperative's membership. As regards the former of the phenomena at play, a constituency enlargement

[12] By a slight abuse of notation, Nash demands by an inclusive cooperative's members under profit-sharing are denoted here by the same symbol used before for single-community cooperatives.

obviously produces effects in the median-voter model only if the median voter changes. Under our assumptions this is possible only if the external community comes into control, i.e. it is the more numerous. Moreover, for the change to benefit society, the new pivotal voter's preferences must be closer to the average voter's, or, in other words, the external community's interests must be closer to those of society as a whole than the internal community's. This intuitively requires that the external community's welfare to have a substantial weight in total social welfare. Space constraints prevent us from further elaborating on this theme and we stop here.

Let us now turn to the other phenomenon caused by membership extensions—the increase in the profit-recipients' number. To make comparisons, we need to formally distinguish between the Nash demands under the single-community and the inclusive cooperative, both of which were previously denoted by $\hat{q}(p)$. Then, in place of this symbol, in the following we will use $q^{JC}(p)$ for the member demand at price p in the inclusive case (JC), and $q^{C}(p)$ in the single-community one (C). Consider the FOC for problem (26) (we skip the functions' arguments for simplicity)

$$u_1 q^{JC\prime} + u_2 f' n q^{JC\prime} = \frac{q^{JC} + p q^{JC\prime}}{2} + \frac{1}{2} C' q^{JC\prime},$$

which is best to write as

$$q^{JC\prime}\left[u_1 + u_2 f' n - C'\right] - \frac{1}{2}\left[q^{JC} + p q^{JC\prime} - C' q^{JC\prime}\right] = 0, \tag{28}$$

The solution to (28) is the price chosen by the inclusive cooperative, p^{JC}. Note that, by the concavity of U^{JC}, if the LHS of (28) is negative at p^C, there holds $p^C > p^{JC}$, and the reverse in the opposite case. Note also that the sign of the first addendum on the LHS of (28) at p^C depends on the sign of u_2: it is positive (negative), if $u_2 > (<)\ 0$ (Corallary 1). But what really matters is the magnitude of the equilibrium demands under the two cooperative types, $q^C(p^C)$ and $q^{JC}(p^{JC})$. Unfortunately, there is no biunivocal correspondence between the ordering of demands and that of equilibrium prices and then it is not possible to infer the latter from the former: for example, on switching from the single-community to the inclusive cooperative, the equilibrium price may decrease but the individual demand function may simultaneously shift downward too, so that $q^C(p^C) > q^{JC}(p^{JC})$, despite $p^C > p^{JC}$.

To get an idea of the forces at work, let us focus on the case $u_2 > 0, v' > 0$, where underconsumption occurs in the single-community cooperative's equilibrium, as we know from Proposition 6. In these circumstances the shift to the inclusive cooperative improves social welfare only if it entails an increase in consumption, i.e. $q^{JC}(p^{JC}) > q^C(p^C)$. Let p° denote the price such that $q^{JC}(p^\circ) = q^C(p^C)$. At this

price the sign of the LHS of (28) is the same as that of the second addendum, since the expression in the first brackets is null. Then, by the concavity of U^{JC}, there holds $p^{JC} \leq p^{\circ}$, if the second addendum is non-positive, and the reverse in the opposite case. This means that, in order to have $q^{JC}(p^{JC}) > q^{C}(p^{C}) = q^{JC}(p^{\circ})$, the marginal profit must be positive at p°. Let us rewrite it in the standard form, i.e.

$$\pi^{JC\prime} \equiv p\left(1 - \frac{1}{\varepsilon^{JC}}\right) - C',$$

where ε^{JC} is the (absolute value of the) elasticity of demand $q^{JC}(p)$. From this it is immediately clear that for the result there are required high marginal costs or a high demand elasticity. In other words, the higher marginal costs and demand elasticity, the more likely is the inclusive cooperative to improve on the single-community one.

A general analysis of this point will not be made here, as for our purposes it is sufficient to verify that, by extending membership, it is indeed possible to obtain welfare increases and even attain the first best. We do this by studying a specific case , where the shift from the single-community to the inclusive cooperative generates an increase in total consumption that is just enough to attain the first best whereby we can state the following fact.

Fact 1. An inclusive cooperative may support the first best and dominate the single-community cooperative.

While a membership enlargement can indeed increase social welfare, this, however, is not always true.

Fact 2. An exclusive cooperative may dominate the inclusive cooperative, irrespective of which community holds the majority.

The intuition for the above result emerges clearly when the externality u_2 is positive, but v' is negative. Let us compare first an exclusive cooperative with the inclusive cooperative of consumers. Both types of cooperatives have an incentive to overproduce with respect with the first best, as they completely neglect the negative effects of consumption on the external community. However, the overproduction problem in the inclusive cooperative is further aggravated by the fact that it underweights the distribution motive and, as a consequence, it faces a lower pressure to keep the quantity low to maximize its profit. Let us compare now an exclusive cooperative with the inclusive cooperative in which the external community has the majority. An inclusive cooperative with external majority faces two opposite forces. On the one hand, the members of the external community have the incentive to underproduce with respect to the first best

because they do not take fully into account the positive externality on the internal community. On the other hand, the members of the external community have the incentive to overproduce with respect to the first best because they underweight the distribution motive. Overall, the distortion from the first best of the joint cooperative with external majority is greater than the distortion of an exclusive cooperative of consumers when the externality u_2 is relatively large with respect to v'.

We now compare the performance of a cooperative to that of a for-profit monopolist. A cooperative's decision problem differs from that of a for profit at two different levels. First, the monopolist completely neglects the direct effects of the externality on the utility of both the internal and external community (although it considers the consumers' preferences indirectly through the demand function); conversely, the cooperative always considers the direct effect of the externality on the community who owns the majority. Second, profits have a lower weight in the case of a cooperative than in case of a for-profit.

Overall, these differences imply that there are circumstances in which a for-profit monopoly dominates both an exclusive and an inclusive cooperative:

Fact 3. A for-profit monopoly may dominate both the single-community and the inclusive cooperative.

To gain a simple intuition of the above result, consider the special case in which the two externalities have opposite sign but similar magnitude, so that the welfare maximizing quantity is almost exclusively related to the utility component u_1 due to the individual consumption. Given that the decision problem of a for-profit monopolist accounts only for the effects of the externalities on the individual demands, the distortion from the first best is only due to the rent seeking motive. Conversely, a cooperative's decision is biased in that it neglects (totally or partially) the externality affecting the other community, while it fully accounts for its own externality; when the magnitude of the externalities is large, the cooperative's decision may be excessively unbalanced and a for-profit monopolist may emerge as the dominant solution.

In the previous analysis we have put in comparison three organizational structures—for-profit firm, single-community cooperative, inclusive cooperative (two communities)—the last of which comprises two sub-cases, according to which community holds the majority. Restricting the attention to these organization structures amounts to implicitly assuming that there are transaction costs that prevent bargaining between the communities until the first best is reached (the Coasian "market" solution), as is usual to assume in organization theory (no theory of organizations is indeed possible in the complete absence of transaction costs). The enlargement of a cooperative bears a resemblance

to the enlargement of property parcels by acquisition but there are a few differences that are worth pointing out. The inclusion of new communities is indeed similar to the merging of different properties into one, as in the classical theory of property rights originally developed in the seminal papers by Coase, (1960), Alchian (1965), Demsetz (1968). From the viewpoint of the decision-making process, the main difference is that the inclusion of external communities within a democratic system (cooperative) does not concentrate ownership by eliminating one or more owners. On the contrary, it enlarges the set of owners to include people that were not owners before the merging. The resulting subject is an organization where a collective-choice problem is present, as we have seen, since the individuals belonging to different communities are different between each other and hence the resulting organization's members are intrinsically heterogeneous. While in classical theory property merging produces by itself an internalization of the external effects, nothing of sort occurs in our context. For internalization to take place, it is required that the involved external effects are brought "to bear (in greater degree) on all interacting persons" (Demsetz, 1967, p. 348). However, this is not always—and not even often—the case with the inclusive cooperative. As a matter of fact, integration does not always change the choices of the concerned parties. Under the majority rule and the conditions that ensure non-strategic voting by the concerned parties (single dimension of the choice space, single-peaked preferences, etc.), the inclusion of the external community may not alter the pivotal decision-makers, as when the majority remains with the internal community. In this case each member votes for the same choice as she would make if she were the sole decision-maker. Then, strictly speaking, there is no internalization of external effects, as after merging internal members do not take into account external effects just as they do in the single-community cooperative case. There can be internalization (partial) only when external-community's members win the majority, as these indirectly take into account the effects of their decision on the other community thank to profit-sharing (this pushes the external community to consider the impact of their choices on profits and thus indirectly on the costs they entail for the internal members). Inclusion is indeed different from internalization and this is the ultimate reason why inclusion is generally not sufficient for the first best and not even for the dominance of the cooperative over the other organizational options.

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