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Customer Ownership and Quality Provision in Public Services under Asymmetric Information†

Laura Abrardi*, Luca Colombo**, Pier Angelo Mori***

Abstract

The implementation of projects producing external effects is often a source of disagreement and conflict between hosting and non-hosting communities. The paper focuses on the impact of participatory ownership on conflict resolution and social welfare in the presence of asymmetric information and imperfect quality monitoring. We show that in such situations the participatory solution may help solve "Not-in-my-backyard" (Nimby) crises and similar deadlocks that money transfers to a for-profit operator cannot solve. The analysis highlights two main factors behind this fact. First, a customer-owned cooperative internalizes, at least partially, the external effects generated by the project. Second, the alignment of cooperative members' preferences with those of the social planner reduces (in some cases eliminates) the distortions caused by information asymmetries.

Keywords

Citizen participation, customer-ownership, cooperative firm, public goods, privatization, Nimby syndrome.

JEL codes

H23, L33, P13

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1 Introduction

The realization of projects affecting more communities often arouses conflict between them. A common situation is one where a community–the 'hosting' community–holds the power to unilaterally implement or block a project with a public-good component, while the other communities concerned ('non-hosting') do not. The field of possible applications of this scheme is very broad, including as diverse examples as the implementation of immigration agreements among sovereign states (the Schengen agreement among the European Union's member-states is one such example), inter- and intra-state pollution control and Nimby (Not-in-my-backyard) crises. The Nimby field is especially rich. The typical case is when a service is to be produced in a territory– the territorial dimension is key here–and the community dwelling in it is adversely affected by its production, whereas the non-hosting communities enjoy positive effects. Nuclear plants, thermal power stations, dams, waste disposal sites are all of this kind and often trigger the opposition of nearby inhabitants, sometimes with violent outbreaks. The specific issue is whether the community selected as host will actually accept the project or rather oppose its implementation, as occurs when open conflict breaks out. In this paper, we enquire into the role of ownership as a factor of conflict resolution. In particular, we ask: can appropriate ownership modes of the service to be produced, and participatory ones in particular, help solve or mitigate latent or open conflict between communities over common projects?

To motivate the question, consider the following two stories taken from the Nimby field. In 2008 the city of Naples, Italy, suffered a severe garbage crisis with the piling up of trash at street corners and headlines in newspapers around the world (see e.g. the New York Times articles in winter 2008). The cause was the exhaustion of a few landfills and projects for new ones triggered the violent opposition of the concerned populations. The second story is that of Peccioli (Tuscany, Italy), which tells an opposite experience to Naples'. In 1997 at Peccioli the local government promoted the establishment of a company whose shareholders were the municipality itself and individual residents (Delai, 2009). The aim was to turn an obsolete dump scheduled for closure into a state-of-the-art landfill for storing trash mainly from other towns. The process was smooth and a steady flow of investments was made in the subsequent years by this citizen-owned enterprise on the new disposal site. In Naples and Peccioli the problem was essentially the same but the outcomes were opposite. It is of course possible that compensations to the affected populations, the decision-making process, the local and national politics made a difference, which may explain the different course of history in the two cases, but one difference between them is certain and regards citizen participation. While in Naples the proposed (and opposed) solutions did not directly involve citizens in the decision-making process and the subsequent operation of the sites, at Peccioli

the whole initiative was conducted in a participatory way from start to operation. Economics has devoted considerable effort to understanding the causes of Nimby phenomena in order to find adequate solutions. Positive and normative analyses have emphasized the roles of, respectively, property rights (Kunreuther and Kleindorfer, 1986), compensating mechanisms (Mitchell and Carson, 1986; O' Sullivan, 1993; Easterling and Kunreuther, 1996; Frey and Oberholzer-Gee, 1997; Minehart and Neeman, 2002; Lescop, 2007), the political process (Feinerman, Finkelshtain and Kan, 2004). These factors are certainly relevant but there is a further one, so far disregarded in the literature, that may be as relevant, as the two stories just seen suggest: the institutional nature of the service operator, and in particular citizen participation. Note that the point is relevant not only to Nimby phenomena but more generally to the whole class of 'hosting/non-hosting' problems.

The perspective of citizen participation is especially interesting when quality issues, and specifically information asymmetries about quality, are significant. Citizens are today increasingly suspicious about government monitoring of service quality and more generally about public authorities' ability to regulate privately-owned public services/goods. Our main claim is that ownership by customer-citizens can alleviate these problems. This perspective is of course meaningful only when the concerned service/good can be provided by non-government entities (a negative example is for instance national security). Public utilities are a relevant case in point and we will occasionally refer to them for illustrative purposes, but our analysis is not confined to that context. So far, the participatory solution has not received adequate consideration in the literature and this paper is a first attempt to fill the gap. To develop a full theory of the ownership of public services or public goods one ought to make an efficiency comparison between all relevant ownership types–government, investor-ownership, customer-ownership, and non-profit. Here, we restrict ourselves to the comparison of the customer-owned cooperative with the most relevant privately-owned alternative to it, i.e. the for-profit firm, and disregard provision by both government and non-profit entities (i.e. essentially those subject to the profit non-distribution constraint). In other words, we address the efficiency issue with reference to two ownership modes of privatized services–by investors and by customers–once the choice to privatize has been taken.

Firms controlled by neither government nor investors have been ignored in the theoretical literature on privatization but for a few exceptions (see the literature review below). However, there exists a policy-oriented literature that debates alternatives to investor-ownership with a view to practical applications. Towards the end of the 90's, spurred by a growing opposition to privatization in many countries, a policy debate developed around the option of employing cooperative or non-profit organizations for running privatized public utilities (Kay, 1996; Holtham, 1997; Pollitt, Birchall and Putnam, 1998; Leadbeater and Christie, 1999; Mayo and Moore, 2001; Maltby, 2003). That debate eventually ebbed away almost

ineffective. Nonetheless, even though actual realizations still remain quite few (see Mori, 2013, for more details), a fresh interest in the issue is raised by the present doldrums of both the government and the for-profit model of service provision, due respectively to the public finance crisis hitting many countries today–especially in Europe–and widespread citizen opposition to privatization. These difficulties motivate the consideration of alternatives to classical privatization in policy design but this requires a deeper knowledge of them than is presently available.

The paper's focus is on services that affect the welfare of more communities simultaneously and whose quality is imperfectly contractible. Whenever monitoring is imperfect, profit-seeking firms are likely to choose an inefficiently low quality with a view to saving on costs. In order to ensure that a satisfactory quality be chosen, the for-profit operator must be granted larger incentive payments, the lower the monitoring efficiency. Beyond a certain point the monitoring inefficiency makes the required incentive payments unbearable to the community, with the consequence that a deadlock occurs and the project is given up (no service provided). Conversely, customer-ownership avoids the negative impact of information asymmetries, which vanish under it, and can thus solve implementation issues. How this is accomplished depends on the degree of consonance between the preferences of the hosting community and of the social planner, who represents the non-hosting communities too.

If local (hosting) customers and the social planner have fully concordant preferences about the project specification ("quality"), the cooperative always implements the socially preferred quality when the project is realized. However, this is not always the case because of the cooperative's productive inefficiency. The trade-off between the latter type of cost and the informational rents accruing to the for-profit firm turns out to be the only driver of the organizational choice in the absence of conflicting interests about the project quality within and without the hosting community. When both types of cost are high, a deadlock sets in and the project cannot be implemented unless external resources are funneled into the hosting community as compensation. This is essentially what occurs in Nimby crises. Our model shows that the ownership mode does matter in the resolution of these cases, and in particular that customer-ownership allows in some circumstances to minimize the social cost.

A more complicated situation arises when the local community and the social planner have divergent preferences about the project quality. The relevant case is when some (or all) members of the cooperative prefer a low rather than a high quality due to cost considerations, while the social planner–being concerned with the welfare of society at large, including people outside the community hosting the facility–prefers a high quality because low quality generates negative externalities. In such a case, cooperatives require incentive transfers too, though generally of lower magnitude than those required for investor-owned

firms. Differently from for-profit firms, the cooperative internalizes (at least partially) the externality created by the quality level of the project, so that even if all cooperative members prefer a low quality, inducing high quality requires weaker incentives than for the for-profit twin, because the surplus produced by high quality is in itself a partial compensation for customer-owners. This fact has several implications. The most basic one is that the organizational choice comes to depend also on the concerned parties' preferences, and particularly on the divergence between the value the local community attaches to the socially preferred choice and its own preferred one. The larger the divergence, the higher the cost of employing a cooperative in place of a for-profit operator.

Conflict between the social planner and the cooperative then generally entails a social cost but not all kinds of conflict do. Communities are not monolithic. When citizens within the hosting community differ in the willingness to pay for the service, an internal conflict adds to the conflict between hosting and non-hosting communities. This, however, is not a disadvantage from a social standpoint. By relying on action by the members more similar to herself, the social planner can reduce the cost of the cooperative solution relative to the case of unanimous local communities, since the presence of members averse to low quality reduces (or even eliminates, depending on the aversion strength) the information asymmetries, as these members play the role of watchdogs within the cooperative on behalf of the social planner. Therefore, if conflict is within the group of local customers, internal divisions may turn to the social planner's advantage but only under customer-ownership. In other words, more conflict of the right type implies less social cost, but only if customers are also owners.

The paper is organized as follows. We briefly review the relevant literature in Section 2. Section 3 illustrates the model. In section 4 we analyze the benchmark case in which no disagreement exists on service quality between the local (hosting) community and the social planner who represents also the other communities concerned. Section 5 extends the basic framework to allow for conflicts about the project nature ('quality') between the hosting and non-hosting communities. Section 6 examines the impact on project implementation of preference heterogeneity among local citizens.

2 Related Literature

There are several literature strands that bear on the themes of the present paper. In this review we focus on the two most relevant ones. The first relation we want to emphasize is to the theoretical literature on privatization. The baseline question addressed in this literature is whether certain economic activities, notably public services, should be run by government or private entrepreneurs (Schmidt, 1996; Boycko, Shleifer and Vishny, 1996; Hart, Shleifer and Vishny, 1997; Bennedsen, 2000; Hart, 2003; King and Pitchford, 2008, just to quote a

few). That is, as the dominant property rights approach puts it, the question is whether the government and the service-providing firm(s) should integrate or not, and in which circumstances. Most of these papers restrict themselves to classical privatization, where the private provider is an investor-owned firm. A notable exception, and closer contribution to ours, is Besley and Ghatak (2001) that also considers not-for-profit ownership of privatized services (in the same line Schmitz, 2013). In that paper, the alternative organizations compared are government provision and provision by institutions whose welfare is directly affected by the service provided. This means that their controllers use the service in a way or other, which makes the underlying firm similar to our customer-owned cooperative. There are, however, a few substantial differences. Here, we do not directly allow for the preliminary decision whether to privatize or not–i.e. do not allow for government ownership explicitly–and position ourselves one step further down the decision-making process, by asking if, once the choice of non-integration has been made, investor-ownership is the best solution or instead others–specifically customer-ownership–can perform better. In other words, the problem we study here is the choice between alternative ownership modes–specifically, profit-seeking and cooperative–once the decision to privatize has been taken. A second major difference regards the function of ownership. In the property rights theory, firm ownership is relevant in that it affects the ex post division of the surplus, thus indirectly affecting the ex ante investment (quality) choice. In this paper, it is instead relevant because it affects the distribution of information about quality among the concerned parties, and particularly customer-ownership allows customers' direct access to quality information that investor-ownership does not. If information asymmetries about quality are crucial, and for certain services they are indeed, this role of ownership may prevail over that highlighted by the property rights theory. What we develop here is a model of the ownership of privatized services different but complementary to that provided by the property rights approach.

Another group of theoretical contributions relevant to our paper are those dealing with the emergence of customer-controlled organizations. Indeed, our model of the choice between customer and investor ownership addresses the same general question as in this literature–why customer-ownership?–applied to the specific context of public services. Economic theories of customer-controlled organizations fall into two main categories: those emphasizing sellers' monopoly power and those emphasizing information asymmetries as their cause. The first attempts to explain the rise of such organizations had a focus on retail and wholesale cooperatives and essentially belonged to the former category (Sexton, 1986; Sexton and Sexton, 1987; Hansmann, 1988, 1996; Mikami, 2003). The focus of our paper is instead on public services that differ from generic consumer goods in many respects, in particular they often have a public-good dimension and may entail substantial health hazards (waste management and water services are good examples), which calls for regulation or monitoring by govern-

ment. As a consequence, these services are especially sensitive to information asymmetries, which makes the second avenue of research on customer-controlled organizations especially relevant in this case. The literature on customer-control and asymmetric information includes work about mutual non-profits too. This is closely related to our paper, since such organizations are in all equal to consumer cooperatives except that they are subject to the profit non-distribution constraint. Hansmann (1980) is the first to provide an explanation of mutual non-profits based on asymmetric information on product quality. His idea is that the non-profit organization has the main function of preventing the management from reducing service quality for their own benefit thanks to asymmetric information about it. The claim that service quality may be enhanced by recourse to a non-profit organization is also made by Bennett, Iossa and Legrenzi (2003) with specific reference to public utilities. In these contributions, though, there is no theory of customer control, which actually plays no role in them. An explanation of customer control in the provision of a public service is attempted by Ben-Ner (1986), where it is viewed as an instrument for eliminating information asymmetries on product quality, an idea close to that on which this paper is based. The idea is discussed with explicit reference to mutual non-profits but, being the non-distribution constraint irrelevant to Ben-Ner's argument, in fact it applies to customer-owned cooperatives too (Ben-Ner, 1986, p. 97). This contribution, however, provides only an informal discussion of the role of customer-ownership.[1] In the present paper, we move one step forward and explore the intuition that customer-control may help attain a better quality level through a formal analysis. Our context is more general than Ben-Ner's in that we do not assume a priori the profit non-distribution constraint towards customers. A paper that has a similar aim to ours is Mikami (2007), which however focuses on exogenous hazards affecting both the provider's and customers' welfare.[2]

3 The Model

We consider a project for the provision of a service of fixed quantity but variable quality. There are three possible options: the service is provided through a for-profit firm, through a customer-owned cooperative, or is not provided at all. The term "cooperative" is used

[1] A further problem, underlined by Hansmann (1987) is that it does not fit the most common non-profits like hospitals, social clubs, etc.

[2] For completeness, we note that in political science and sociology concepts like co-production and active citizenship, which are akin to customer-ownership, have been debated for a long time (see Brudney and England, 1983, for an early survey). Customer-ownership can indeed be seen as a specific form of co-production (see e.g. Bovaird, 2007). Differences with that literature mainly regard the analytical approach and the nature of services that are analyzed, mostly welfare and social services in that literature, whereas the kind of phenomena we study here is of greater relevance to public utilities.

in many different meanings but a few aspects are common to most: here we simply mean a firm that is owned and controlled in a democratic way by its members. In a customer-owned cooperative–henceforth simply cooperative–members are its customers. In the present analysis we focus on the case where all customers of the service produced by a cooperative are members too (the issue of non-member customers is not crucial for our problem and we prefer to lay it aside in a first treatment of the problem). The main difference between the for-profit firm and the cooperative is here informational. With the for-profit service operator all information concerning operations–especially service quality–is held by people other than customers, while with a cooperative operator it becomes accessible to customers.

The service is valuable to its customers but of no value to private investors, who are assumed not to be customers. The service quality e can be either high, e_H, or low, e_L. The overall gross surplus generated by the project (a proxy of social welfare) is $S^w(e)$ and the gross surplus for customers by $S^c(e)$. The gross surplus $S^i(e)$ is strictly increasing in quality both for customers ($i = c$) and the social planner ($i = w$), i.e. $S^i(e_H) > S^i(e_L)$. We also assume without loss of generality that the failure to realize the project does not affect the surplus of the actors involved. Formally, this implies that inaction does not generate any surplus for both the social planner and the customers, i.e. we normalize the surplus at the outside option to zero, $S_0^i = 0$, $i = \{c, w\}$, whereby in equilibrium there cannot be realized a negative surplus.

The effort cost for obtaining quality e is $\psi(e)$, with $\psi(e_H) > \psi(e_L)$. A large literature suggests that cooperatives are characterized by lower internal efficiency than their profit-maximizing counterparts for a variety of reasons.[3] As a matter of fact, the reverse may occur but this case is not interesting from a theoretical standpoint, since in it the cooperative would be always dominant. Then, we focus on the case where the for-profit firm is internally more efficient than the cooperative. To allow for this, we assume that costs other than the effort costs for the cooperative and the for-profit firm, respectively denoted c_H and c_L, are such that $c_H > c_L$. Furthermore, we assume that the net social surplus of a high quality service provided by an investor-owned firm is positive, i.e.

$$S^w(e_H) - c_L - \psi(e_H) \geq 0. \tag{1}$$

[3]The stock of cooperatives is often not tradable, with negative consequences on efficiency–as noted e.g. by Berry (1994) and Hollas and Stansell (1988) with regard to electric cooperatives. Furthermore, the dispersed ownership and democratic decision making processes that are typical of cooperatives are often claimed to reduce the effectiveness of managers' monitoring. Cooperatives may also face larger costs than for-profit firms in raising external capital (see e.g. Meade, 1972; Drèze, 1989; Gintis, 1989a, 1989b; Bowles and Gintis, 1994; Mikami and Tanaka, 2010), which has been related to their lower responsibilities towards contractual obligations (see e.g. Schlicht and Von Weizsäcker, 1977; Drèze, 1976; Gui, 1985). See also Hansmann's (1987, p. 38) considerations on the cost inefficiency of non-profits, which are largely applicable to cooperatives too.

In our setup, the social planner (a) decides whether to provide the service or not and, in the affirmative case, contracts out the service to an external operator (by e.g. the awarding of a service franchise), (b) finances the service, when required, (c) monitors the service quality and sanctions misbehavior when detected. Service quality is assessed through an imperfect quality signal $\hat{e}$ generated as follows. While high quality is always recognized as such, i.e. $\Pr(\hat{e} = e_L | e = e_H) = 0$, low quality may be mistaken for high quality with probability $\Pr(\hat{e} = e_H | e = e_L) = 1 - p(e_L) < 1$.

All agents (including the social planner) are assumed to be risk neutral. We also assume that the firm's reservation profits are equal to zero and that the for-profit's shareholders do not belong to the community responsible for the payment of the subsidy. The planner plays a crucial role in dealing with externalities. Public utilities often have an impact on communities other than those served by them. If the Coasian conditions for solving a potential externality through bargaining among the concerned parties (communities) do not hold, a third agent endowed with the power to impose a solution is needed. In our context, the social planner takes care of the externalities and attempts to solve them in the public interest through transfers.

Facilities like incinerators, nuclear power plants or waste disposal sites may entail unacceptable health hazards, if not properly designed and run. This is why public concerns about them are usually high, though parts of the population–those less affected–may be less concerned than others. A benevolent planner should take care of the overall welfare and the interesting case to analyze is when a conflict arises between different parts of citizenry and between some of them and the planner. To simplify, we focus on the case where the planner has an absolute preference for high quality, i.e.

$$S^w(e_L) = -\infty, \tag{2}$$

which conversely means that the low quality is disastrous for her and to be avoided by any means. A consequence of this is that only one of two choices can be implemented in this context, either the high quality or inaction, never the low quality. A further implication of this assumption–which is maintained throughout the paper–is that the objectives of cost minimization and welfare maximization are here equivalent.[4] Indeed, given the social planner's aversion to low quality, the implemented welfare is always equal to the gross surplus at the high quality net of total cost, that is the operating and effort costs plus any incentive costs needed to guarantee the desired quality level. In fact, the only relevant welfare indicator is cost, in which we include external funds (transfers) too. Through the minimization of the

[4]The social welfare is defined as the gross surplus $S(e)$ provided by a project of quality e minus the total costs associated to the project, namely the operating and effort costs plus any cost needed to induce the firm to guarantee the desired quality level.

total cost we are also able to take into account the interests of external citizens, as we will see better later on.[5] The last point to be noted is that in the absence of monitoring the for-profit solution can never be optimal, since a profit-maximizing firm would always choose the low quality in these circumstances. Indeed, the investor-ownership solution is only possible thanks to the social planner's monitoring quality and sanctioning misbehavior.[6]

4 Universal Consensus

The starting point of our analysis is the case where customer preferences coincide with those of the social planner, i.e. $S^c(e) = S^w(e) = S(e)$. This essentially means that there is consensus among all parties concerned about the specification of the project, if implemented. As we will see in due course, even in this basic set-up Nimby-like crises (what we call 'stalemates') are possible and the analysis we develop in this section allows to draw a few policy suggestions for dealing with Nimby issues.

The previous condition and (2) imply that for both customers and the social planner high quality has a higher net value than low quality, i.e.

$$S(e_H) - \psi(e_H) > S(e_L) - \psi(e_L).$$

As the cooperative's (citizens') preferred choice is always high quality, whose net value is positive by assumption (1), the 'production' cost when the service is provided by the cooperative amounts to $c_H + \psi(e_H)$. Conversely, since investors are not customers (by assumption), they do not obtain any surplus from the realization of a high quality project and therefore, in the absence of incentives, they will choose the less costly solution, e_L. Hence, for the investor-owned firm, a differential transfer is needed in case high quality is realized. For this purpose, the social planner promises a transfer $t(\hat{e})$ conditional on the signal $\hat{e}$, $\hat{e} \in \{e_L, e_H\}$, such that $t(e_L) = 0$ and $t(e_H) = t_I$.[7] Finally, recall that the planner's objective is to maximize the social welfare net of total cost (see Section 3).

Note that, to induce participation, the transfer t_I must compensate the for-profit firm for the cost of service too, i.e. $t_I \geq c_L + \psi(e_H)$. The source of the transfer t_I instead does not matter for the problem at hand. It may be either internal to the community of reference (e.g. paid by customers through rates), or external (e.g. funded at the national level through taxes).[8] The results of this section apply to either case, provided that different organizations

[5] For a full treatment, a (national) welfare function aggregating the welfare functions of all communities needs to be considered.

[6] The fact that severe information asymmetries cause an investor-ownership deadlock will emerge in Proposition 2 below.

[7] This is a dichotomous contract, and it represents the foundation of the literature on moral hazard (see also Becker, 1968, and Stigler, 1970)

[8] The cost of the service provided by a for-profit firm is t_I regardless of the transfer source.

are treated in a non-discriminatory way, and particularly that any external funds granted to the service may reach the cooperative too. To ease the exposition, here we refer just to the case of internally originated transfers to the for-profit firm and disregard transfers to the cooperative. [9]

The timing of the game is as follows.

1. the social planner contracts out the provision of the service either to a cooperative or to a for-profit firm and she announces the value of the transfer t_I;
2. the appointed provider decides on a quality level e;
3. conditional on e, an imperfect signal $\hat{e}$ is released;
4. the social planner observes $\hat{e}$ and, if $\hat{e} = e_H$, pays t_I to the appointed agent.

In order for a for-profit firm to choose high quality, the following incentive compatibility constraint must be met

$$t_I - c_L - \psi(e_H) \geq (1 - p(e_L))t_I - c_L - \psi(e_L), \tag{IC}$$

which can be rewritten as

$$t_I \geq \frac{\psi(e_H) - \psi(e_L)}{p(e_L)}. \tag{3}$$

The lower the detection probability $p(e_L)$, the higher the rent obtained by the firm when the good signal is observed and the higher the punishment $-t_I$ when low effort is detected[10].

The individual rationality constraint for the for-profit firm is

$$t_I - c_L - \psi(e_H) \geq 0, \tag{IR}$$

that is,

$$t_I \geq c_L + \psi(e_H). \tag{4}$$

If the individual rationality constraint is binding, the transfer simply follows a cost-reimbursement rule. Using (3) and (4), the minimum transfer such that the for-profit firm accepts the contract (IR) and chooses a high level of effort (IC) is given by

$$t_I^* = \max\left\{\frac{\psi(e_H) - \psi(e_L)}{p(e_L)}, c_L + \psi(e_H)\right\}. \tag{5}$$

[9] If the service is paid by local citizens, it is irrelevant to assign a transfer to the cooperative of which they are members, since it would have no net effect on welfare (transfer to the cooperative/citizens paid by citizens themselves is obviously just a formal complication of no consequence at all).

[10] The inverse relationship between punishment and detection probability is the fundamental result on which the implementation of dichotomous contracts is based (see, e.g., Becker, 1968, and Stigler, 1970).

Therefore, t_I^* denotes the lowest cost at which the service can be provided by a for-profit firm.

The following Proposition characterizes the choice between the for-profit firm and the customer-owned cooperative in terms of the detection probability $p(e_L)$.

Proposition 1 *The investor-owned firm is the cost-minimizing choice if and only if*

$$p(e_L) \geq \frac{\psi(e_H) - \psi(e_L)}{c_H + \psi(e_H)}. \tag{6}$$

In all other cases, the customer-owned cooperative minimizes costs.

Proof. See the Appendix. ■

As the Proposition makes clear, there are two factors to the organizational choice: productive efficiency and monitoring efficiency. When government is highly efficient in monitoring quality, i.e.

$$p(e_L) \geq \frac{\psi(e_H) - \psi(e_L)}{c_L + \psi(e_H)},$$

the chance of not discovering malpractice is so low that a flat cost reimbursement, $t_I^* = c_L + \psi(e_H)$, is enough to make the for-profit firm behave correctly. Below this threshold, an incentive payment to the for-profit firm–i.e. a transfer in excess of production cost–is instead needed to elicit a correct behavior from it, and the productivity gap between the two forms comes into play as well. In particular, when

$$\frac{\psi(e_H) - \psi(e_L)}{c_H + \psi(e_H)} \leq p(e_L) < \frac{\psi(e_H) - \psi(e_L)}{c_L + \psi(e_H)},$$

the detection probability is not so large as to avoid an incentive compensation to be paid to the for-profit firm, but it is still large enough to keep it below the extra production costs incurred by the cooperative, whereby the most advantageous option remains the for-profit firm. Instead, when

$$p(e_L) < \frac{\psi(e_H) - \psi(e_L)}{c_H + \psi(e_H)},$$

the detection probability is so low that the required incentive transfer outbalances the cooperative's productivity gap, and the cooperative thus becomes the cost-minimizing choice.

Note that a low confidence in government monitoring would imply a low estimate of the detection probability by the public[11] and high estimated costs of the for-profit solution (either

[11] Citizens' lack of confidence in the monitoring and regulating abilities of governments seems to be growing in many countries, a phenomenon that is attracting interest both in political science and economics (see e.g. Algan, Cahuc and Sangnier, 2011; Oh and Hong, 2012).

in terms of subsidies paid to avoid misbehaviour or of the implicit costs of misbehaviour itself, if this is not avoided). This is consistent with the view that the lack of confidence in government is a major factor of the opposition of citizens to the hand-over of public services to for-profit operators, especially when hazardous productions are involved. For instance, a survey released in 2003 by the National Cooperative Business Association (NCBA) and the Consumer Federation of America (CFA) finds significantly greater public trust in businesses that provide more consumer control and board accountability[12].

The inequality in Proposition 1 is necessary for the emergence of the for-profit solution, and the reverse inequality for the cooperative one. The final outcome, however, need not be either, since service provision may turn out too costly overall–that is total cost may outweigh social surplus under both organizational options–and therefore the service is not provided at all. This occurs when the conditions specified in the following proposition hold.

Proposition 2 *If*

$$S(e_H) < \frac{\psi(e_H) - \psi(e_L)}{p(e_L)} \tag{7}$$

and

$$S(e_H) < c_H + \psi(e_H), \tag{8}$$

a stalemate situation occurs in which the project is not realized by either a customer-owned cooperative or a for-profit firm.

Proof. See the Appendix. ■

The meaning of Proposition 2 is simple. A stalemate is a situation where the cost-minimizing organization has a total cost that exceeds the social surplus. This is the combined result of a particularly low ability of government to monitor quality and a particularly high productive inefficiency of the cooperative. More precisely, though there is a price for everything, and the service operator's compliance with quality standards is no exception, the price to be paid may be too high, if the government's monitoring ability is too low. When condition (7) holds, to pay the for-profit operator into behaving correctly is too costly for the community, i.e. there are no effective incentive compensations sustainable by it. Nonetheless, it is still possible to avoid a deadlock by acting on the institutional plane. If inequality (8) does not hold, switching to the cooperative organization indeed solves the problem. We thus get a first interesting result from our model: the participatory ownership of a public service is

[12]The trust enhancement brought about by customer-ownership is also underlined by advocates as a major argument in favour of this solution, see e.g. Maltby (2003).

capable to solve deadlocks of the Nimby type that are not solvable by mere money transfers within the community of reference.

However, when inequality (8) holds too, i.e. the cooperative's productive inefficiency is too high, the participatory option is not enough either and the deadlock solution calls for action *from outside* the concerned community (e.g. through external transfers). Formally, the two inequalities imply that the planner/community's participation constraint (surplus minus total cost in equilibrium) is violated in both organizational solutions, since the necessary condition

$$S(e_H) \geq \min \left\{ \frac{\psi(e_H) - \psi(e_L)}{p(e_L)}, c_H + \psi(e_H) \right\}$$

does not hold by inequalities (7) and (8)[13]. As a result, the outcome is inaction and the service will not be provided in this case. In sum, organizational change can take care of deadlocks that cannot be solved by money transfers among the concerned parties within the community hosting the facility, but only up to a point. Beyond that point the solution requires more resources coming from outside, which is possible if there are upper levels of government–e.g. the central government–that have an interest in the project.

To illustrate the point, consider the following example. A landfill is to be realized to take in trash from both the hosting community and an external one. The intake of external trash is 'sold' and thus $S(\cdot)$ includes the corresponding revenue (strictly, no externalities are involved here) but, when this is insufficient (because e.g. the external community cannot afford high rates), there hold conditions (7)-(8) and the project meets with a stalemate. However, suppose that the central government has reputational and political costs from the failure to implement the project, and therefore its realization is a primary aim for it. It may thus try to realize it by the use of force, but this is likely to trigger the reaction of the concerned populations in an attempt to block it by whatever means available (this is essentially what occurred in the Naples' case discussed in the Introduction). The alternative is to funnel in money to solve the stalemate but the policy package cannot limit itself to this and will also have to include an organizational choice. One organizational solution is the for-profit firm plus incentive compensations capable to induce the implementation of high quality. Another is to induce the population to start and run its own community enterprise, without incentive compensations, as in the Peccioli case (see again the Introduction). Since the cost-minimizing solution is also the one that minimizes transfers–here the only variable capable to affect the central government's choice–the outcome will ultimately depend on the condition of Proposition 1. In conclusion, ownership does matter for the solution of Nimby and similar deadlocks.

[13]The cost of getting high quality through both the investor-owned and the customer-owned firm is too large relative to the gross value $S(e_H)$.

A possible obstacle to the cooperative solution is that a citizen cooperative devoted to the project cannot exist before the latter materializes and will have to be established from scratch, whereas for-profit firms willing to bid for the service may already be available in the market. Then, once the choice has fallen on the cooperative solution, an intervention may be required to facilitate their establishment. Tax exemptions and government loans are the natural instruments for this purpose, as the history of US electric cooperatives suggests. In the 1930's, when the rural areas of the USA were mostly not served by electric power, customer-owned cooperatives very similar to those we have investigated in this paper started to be established thanks to tax exemptions and federal loans under the Rural Electrification Act of 1935. Indeed, when the public interest is at play, it is not unjustified that government steps in to facilitate the establishment of non-government enterprises–especially of the participatory type–and the previous analysis provides theoretical support to it.

5 Conflict between Communities

When there is agreement within the hosting community and between it and the social planner on the objectives to be pursued, the only factors of the organizational choice are of technical nature (provided that the service is activated). As a matter of fact, we have seen that this depends on productive efficiency and monitoring efficiency, that is two instances of technical efficiency. Preferences come into play only with regard to the decision whether to activate the service, but do not impact on the organizational structure. By contrast, when there are no common objectives and conflicting interests arise among different groups of a community or different communities concerned with the service, the organizational choice will also be affected by their preferences, more specifically their willingness to pay. Here and in the following sections we focus on this issue and extend the basic model of the previous section in several directions to study its impact on the institutional choice.

In the previous section, by assuming $S^c(e) = S^w(e) = S(e)$ we in fact assumed the existence of one undifferentiated community, just consisting of those who both use the service and host the facilities employed for producing it, and the absence of externalities. We now depart from this case by allowing for more communities–communities of present or future generations–affected by the service and bearing different and possibly conflicting interests. The basic distinction to be made is between the hosting community–i.e. the community of reference–that, besides hosting the facility, avails itself of the service, and non-hosting communities concerned with the service in some way (essentially because its members use the service or are affected by externalities).

To model this, we choose a simple framework, allowing for just two actors, the reference community and the social planner, each endowed with its own preferences. The interest-

ing case is of course when these differ (otherwise we fall back to the previous case), i.e. $S^c(e) \neq S^w(e)$. This is possible if the external community has a greater weight in the social welfare function or has a significantly stronger preference for high quality than the hosting community. Of course, it is also necessary that there be at least one actor who does not rate low quality as disastrous. Here we focus on the case $S^c(e_L) > -\infty$. From (2) there follows $S^w(e_L) - \psi(e_L) < S^w(e_H) - \psi(e_H)$. Furthermore, to keep matters simple, we assume that customers prefer low quality ($S^c(e_L) - \psi(e_L) > S^c(e_H) - \psi(e_H)$). Recall that all community members are also members of the cooperative (cf. Section 3).[14]

Note that in this model non-hosting communities are not explicitly represented as such but they are implicitly accounted for in the following way. Since a benevolent planner represents all by aggregating everybody's preferences, differences between the planner's preferences and those of the hosting community reflect the preferences of the non-hosting ones. In the specific case we study here such differences arise because of *negative externalities* that affect people not belonging to the hosting community, and do so in a severe ("disastrous") way. To illustrate the point consider the following example. If a community discharges wastewater without treatment into a river that flows through another community's territory and pollutes it, the two have conflicting interests owing to the externality suffered by the non-hosting community. When low quality has disastrous effects, the concerned community's aversion to it is unconditioned and cost considerations cannot mitigate it in any way. By contrast, in the case we analyze here the reference community is in a position to trade off quality for costs, while the planner's (non-hosting communities') aversion to low quality is absolute. This is the ultimate reason for the conflict. In our model, the conflict between communities will appear as a conflict between the hosting community and the social planner.

In a conflict situation transfers will normally have to be paid both to the investor-owned firm and the cooperative. The basic difference between them is that, while an investor-owned firm derives no utility from providing high quality, the cooperative internalizes the surplus stemming from the choice of high quality. Therefore, a customer-owned cooperative will generally require lower incentives to choose high quality than a for-profit firm.

In the previous section, we assumed that transfers (in that context going just to the non-profit firm) come from within the community. This can no longer be so. Citizens external to the local community who prefer a high service quality in the face of the local citizens' preference for a low quality must be prepared to pay insiders. If t_C is the transfer received by the cooperative and $t_C - c_H - \psi(e_L)$ comes from inside, high quality would never be chosen by the cooperative, since the quality premium would be paid by the same people who get it (and hence it would not be a real premium). To play on a level ground, we have to assume that, if the chosen organization is the investor-owned firm, $t_I - c_L - \psi(e_L)$ comes from outside

[14] However, we show below that the assumption has no substantial effect on the results.

the community too. In both cases, instead, the residual cost may come from inside or outside indifferently, as in the case of universal consensus (see the previous section). However, for our analysis the source of transfers is immaterial, since the social planner seeks to maximize the social surplus net of total cost, irrespective of how this is generated.

The transfer t_C needed to induce a cooperative to choose high quality is given by

$$S^c(e_H) + t_C - c_H - \psi(e_H) \geq S^c(e_L) + (1 - p(e_L))t_C - c_H - \psi(e_L),$$

whence

$$t_C \geq \frac{\psi(e_H) - \psi(e_L)}{p(e_L)} - \frac{S^c(e_H) - S^c(e_L)}{p(e_L)}, \tag{9}$$

with $t_C \geq 0$. Note that, if low quality were perceived by user-citizens as "disastrous", t_C in (9) would be zero.

In the context of the previous section–i.e. alignment of the social planner's and customers' preferences–the advantage of the cooperative essentially consists in making it possible for the planner to implement her preferred choice at no informational cost, since citizens enjoy full information through the cooperative. The divergence of preferences now makes it necessary to pay an informational rent to the cooperative too. Despite this, the two organizational solutions are not equivalent from the incentive standpoint, namely the cooperative retains an advantage over the for-profit firm. The reason is that, here, members–differently from shareholders–are customers too and therefore get a surplus from high quality. In other words, though there are differences between (local) customers and the planner's preferences, these differences are smaller than between the latter and the shareholders of the for-profit firm. As a consequence, the transfer t_C is lower than the transfer t_I–given by Inequality (3)–required for an investor-owned firm, as is immediately clear. Moreover, in condition (9) the amount of the required incentive transfer to the cooperative negatively depends on the differential value of high quality to customers, $S^c(e_H) - S^c(e_L)$: the higher this, the lower the transfer needed for "buying" the cooperative into meeting the planner's will.

If the service is provided by a customer-owned cooperative, the total cost is $t_C + c_H + \psi(e_H)$, while if it is provided by a for-profit firm is t_I^* (see Equation (5)). The following proposition establishes the conditions under which the assignment of the service provision to a for-profit firm is the cost-minimizing choice.

Proposition 3 *If customers prefer low quality, the investor-owned firm is the cost-minimizing choice if and only if*

$$p(e_L) > \frac{S^c(e_H) - S^c(e_L)}{c_H + \psi(e_H)}.$$

Proof. See the Appendix. ■

From the above condition and $S^c(e_L) - \psi(e_L) > S^c(e_H) - \psi(e_H)$ there follows

$$\frac{S^c(e_H) - S^c(e_L)}{c_H + \psi(e_H)} < \frac{\psi(e_H) - \psi(e_L)}{c_L + \psi(e_H)}$$

that implies a lower threshold of $p(e_L)$ for the choice of the for-profit firm. In other words, the cooperative's advantage is reduced with respect to the case discussed in the previous section and its emergence requires more severe information asymmetries than before (all else equal). A further fact to be stressed is that, differently from the previous section's case, here the organizational choice depends on preferences too, not only on the production and monitoring technologies, as is made clear by the above inequality, from which there follows that the emergence of the cooperative is positively related to the utility that local customers obtain from high quality, i.e. $S^c(e_H) - S^c(e_L)$.

The need to provide incentives to the cooperative too increases the social costs of the project with respect to the situation in which no conflict exists between the different communities affected, directly or indirectly, by the service. The costs of the cooperative solution not only include functioning and effort costs, but also an incentive rent. This suggests not only that deadlocks are still a possibility in the present circumstances but that their scope is even enlarged, as the following proposition makes clear.

Proposition 4 *If*

$$S^w(e_H) < \frac{\psi(e_H) - \psi(e_L)}{p(e_L)} \tag{10}$$

and

$$S^w(e_H) < c_H + \psi(e_H) + t_C, \tag{11}$$

a stalemate situation occurs in which the service is neither provided by a customer-owned cooperative, nor by a for-profit firm.

Proof. See the Appendix. ■

On the one hand, under Condition (10) investor-ownership is not an optimal choice because of the excessive costs of inducing high quality, since the detection probability is so low as to make an informational rent necessary, that is

$$S^w(e_H) - \frac{\psi(e_H) - \psi(e_L)}{p(e_L)} < 0,$$

and $S^w(e_H) - c_H - \psi(e_H) > 0$. On the other hand, if $S^c(e_L) - \psi(e_L) > S^c(e_H) - \psi(e_H)$, the cooperative must receive an informational rent too. Under condition (11) the cooperative turns out excessively costly because of high production costs and incentive transfers. An interesting fact to note is that, differently from the unanimity case of the previous section, the cooperative may not be a viable solution even when the social surplus brought about by high quality is enough to compensate for production costs, i.e. $S^w(e_H) - c_H - \psi(e_H) > 0$, but incentive costs are so high as to imply condition (11). This confirms the intuition that the scope for the phenomenon gets larger as a conflict between the local community and the planner (and ultimately other communities) arises.

The previous analysis is made under the simplifying assumption that the entire community participates in the cooperative. Let us now have a quick glance at the situation in which only a part of the community's members belong to the cooperative as well. Customers belonging to the cooperative prefer the low quality ($S^c(e)$) owing to cost considerations, while the social planner prefers high quality. Note that customers who are not members of the cooperative have a preference for high quality since the differential quality costs are borne by the firm realizing the project and by the external community through the transfer. Denote the number of customer-members of the cooperative by N^c, and their individual gross surplus by $s^c(e)$, so that the gross surplus of a project of quality e for the cooperative is $S^c(e) = N^c s^c(e)$. In this case, the only customers who need an incentive to choose high quality are the members of the cooperative. Therefore, the incentive compatibility constraint becomes

$$N^c s^c(e_H) + t_C - c_H - \psi(e_H) \geq N^c s^c(e_L) + (1 - p(e_L))t_C - c_H - \psi(e_L), \tag{12}$$

which can be rewritten as

$$t_C \geq \frac{\psi(e_H) - \psi(e_L)}{p(e_L)} - \frac{N^c s^c(e_H) - N^c s^c(e_L)}{p(e_L)}, \tag{13}$$

with $t_C \geq 0$. Hence, when all customers prefer low quality, the transfer paid to the cooperative is reduced by the benefit of high quality internalized by the members of the cooperative. From the comparison between (9) and (13) there follows that the transfer paid to the cooperative does not depend on the percent share of the community members who are cooperative members too, nor on the community size, but simply on the absolute number of cooperative members. As the decision about quality is taken by the cooperative members and the costs are borne by the firm and the external community, the preferences or number of customers who are not members of the cooperative are inconsequential in this framework.

6 Heterogeneous Memberships

In the previous sections, we represented the hosting community as consisting of homogenous people. Of course, this is only a first approximation that does not conform to observation.

All users of a service find it valuable–otherwise they would not use it–but they may value it differently. In particular, the willingness to pay for a service may vary across users. When this is the case, not all local citizens will favour the same choice and different quality levels may be preferred by different groups. If the service operator is a cooperative, this heterogeneity sparks democratic contests within it, which are solved by the majority rule. A conflict within a community (hosting) then sets in besides the conflicts between communities and new phenomena arise. In this section, we extend our setup to allow for local customer heterogeneity.

We assume that customers belong to one of two groups, $i \in \{1, 2\}$. A project of quality e, with $e \in \{e_L, e_H\}$, generates individual gross surpluses $s_1(e)$ and $s_2(e)$ to members of groups 1 and 2, respectively. Let $S_i^c(e) = N^c s_i(e)$, where N^c denotes the number of the cooperative's members. This is exogenously given and represents the share of individuals in the population who are willing to take the 'entrepreneurial' risk of joining the cooperative. As pointed out in the previous section, customers who are not members of the cooperative do not play an active role in our analysis. The direct implication of this is that the community composition between high and low quality supporters is of no consequence here. The only significant variable is the gross surplus attached to the project by cooperative members, which in turn depends on the weight of each of the two groups within the cooperative. Group i accounts for a share γ_i of the cooperative members receiving a net surplus of $\gamma_i[S_i^c(e) - \psi(e) - c_H]$[15].

We focus on the case in which the two groups have conflicting interests. In particular, we assume group 1 to be less affected than group 2 by the negative effects induced by the service, i.e. $S_1^c(e_H) - \psi(e_H) < S_1^c(e_L) - \psi(e_L)$ and $S_2^c(e_H) - \psi(e_H) > S_2^c(e_L) - \psi(e_L)$. Asymmetric information is again limited to the observation of the quality level by the social planner: we assume that any decision concerning quality is perfectly known to all members of the cooperative, but outsiders can only observe it imperfectly after the project is realized.

If the social planner wants high effort to be exerted, the investor-owned firm must be granted the transfer t_I^*, defined by (5). In the case of the cooperative, the quality level is decided by the majority but the minority plays a role too. In a customer-owned cooperative, it is reasonable to assume that all members have identical observation capabilities, so that, if the majority perfectly observes the quality level, the minority does too. Whenever quality is not chosen unanimously, members opposing the decision can take action. For example, if low quality is decided and the minority's utility becomes lower than her reservation level, the minority members can disclose the information and at the same time organize demonstrations,

[15] In our definition, $S_i^c(e)$ denotes the gross surplus as if the entire cooperative shares the preferences of group i. The net surplus of group i can thus be expressed as $\gamma_i(S_i^c(e) - \psi(e) - c_H)$. This particular definition of $S_i^c(e)$ is convenient because it allows the simplification of the term γ_i in the analysis. A slightly different definition, such as $S_i^c(e) = \gamma_i N^c s_i(e)$, would lead to the alternative but less convenient expression $S_i^c(e) - \gamma_i \psi(e) - \gamma_i c_H$.

protest marches, or sabotage, eventually blocking the project. In case of high quality preferred only by a minority of the cooperative's members, the whistle-blowing threat can in practice be seen as equivalent to holding a 'veto' power against the majority's decision to choose low quality.

We need to distinguish two cases: (i) the social planner and the majority M in the cooperative prefer high effort, while the minority m prefers low effort; (ii) the social planner and the minority m prefer high effort, while the majority M prefers low effort. In the first case, the minority considers the majority's decision excessively costly, but it cannot influence it, and its veto power is useless as the social planner approves the decision of the majority.[16] We thus restrict our attention to the second case, in which

$$S^w(e_H) - \psi(e_H) > S^w(e_L) - \psi(e_L), \tag{14}$$

$$S^c_M(e_L) - \psi(e_L) > S^c_M(e_H) - \psi(e_H), \tag{15}$$

$$S^c_m(e_H) - \psi(e_H) > S^c_m(e_L) - \psi(e_L). \tag{16}$$

In order for the cooperative to exert high effort, the social planner must guarantee a transfer t_C, with $t_C \geq 0$. We denote with γ_i the share of t_C appropriated by group i.

When the social planner appoints the provision of the service to a customer-owned cooperative, the timing is as follows:

1. the social planner announces the value of the transfer t_C;
2. the cooperative's members vote on the quality level by majority rule;
3. the minority members decide whether to disclose the majority's decision; in case they publicly report that low quality has been chosen, the project is not implemented; else,
4. the quality level is implemented and a quality signal is generated;
5. if the signal reported is that of high quality, the social planner pays the transfer t_C (announced in step 1) to the cooperative; otherwise, the transfer is zero.

Note that, given this timing, the majority may want to bribe the minority not to disclose that a low quality level has been chosen. Note also that the minority's report of low quality is always credible. Indeed, if high quality is chosen, the minority would never use its 'veto'

[16] Under the assumption that production and effort costs are equally shared by all customers (paid directly by the cooperative's members or indirectly by the non-members through the taxes), the minority members are indifferent between leaving or remaining in the cooperative. As a matter of fact, entry/exit decisions are not affected in this context by the amount of taxes/rates to be paid by the various categories of citizens. They depend just on the economic advantage of the financial investment in the cooperative.

power to block a project with its preferred quality level. Moreover, we can rule out that the minority blackmails the majority into falsely stating that low quality is produced. Such a threat would not be credible, as it would simply block the project, leading to a dominated outcome for the minority (that prefers high quality). Then, if the minority reports low quality, the report is true.

This fact has an impact on the subsidy amount t_C to be paid by the social planner. Recall that low quality is detected with probability $p(e_L)$ and that on its occurrence the transfer t_c is lost. Therefore, the choice of low quality has two negative implications for the minority. First, it is not its preferred quality level; second, it determines the loss of its share of t_c with positive probability. As a consequence, as we show formally below, the possibility of bribing decreases the cost the social planner has to face to induce high effort.

Now, assume that the majority can bribe the minority through a transfer T_m into not revealing information. However, note that low quality is never chosen even in the presence of bribing, provided the social planner's transfer t_C is in the correct amount: the internal transfer T_m just allows to reduce the amount that the social planner needs to grant to the cooperative. Taking into account both t_C and T_m, the minority's incentive compatibility constraint can be written as

$$\gamma_m S_m^c(e_L)+(1-p(e_L))\,\gamma_m t_C+T_m-\gamma_m\psi(e_L)-\gamma_m c_H \geq \gamma_m S_m^c(e_H)+\gamma_m t_C-\gamma_m\psi(e_H)-\gamma_m c_H$$

that is

$$T_m \geq \gamma_m \left[S_m^c(e_H) - S_m^c(e_L) - (\psi(e_H) - \psi(e_L)) + p(e_L)t_C\right]. \tag{17}$$

By (17) it is immediate to see that T_m must be increasing in the transfer t_C paid by the social planner to the cooperative. In particular, the transfer $\gamma_m t_C$–that the social planner pays to the minority (even if the minority's preferences are aligned with those of the social planner)–increases the cost for the majority to make the minority agree on low quality, since the minority looses the transfer $\gamma_m t_C$ with probability $p(e_L)$ if low quality is chosen.

The minority's participation constraint thus becomes

$$\gamma_m S_m^c(e_L) + (1-p(e_L))\,\gamma_m t_C + T_m - \gamma_m\psi(e_L) - \gamma_m c_H \geq 0, \tag{18}$$

whence

$$T_m \geq \gamma_m \left[\psi(e_L) + c_H - S_m^c(e_L) - (1-p(e_L))\,t_C\right]. \tag{19}$$

By combining (17) and (19), we can write

$$\begin{aligned} T_m \quad \geq \quad & \gamma_m \max\left\{S_m^c(e_H) - S_m^c(e_L) - (\psi(e_H) - \psi(e_L)) + p(e_L)t_C, \psi(e_L)+\right. \\ & \left. + c_H - S_m^c(e_L) - (1-p(e_L))\,t_C\right\}, \end{aligned} \tag{20}$$

where T_m in (19) denotes the amount that the minority needs to receive for accepting low quality (such an amount must both be incentive compatible if high quality is chosen and satisfy the minority's participation constraint if low quality is chosen).

The transfer t_C paid by the social planner induces the majority to choose high quality only if

$$\gamma_M S_M^c(e_H)+\gamma_M t_C-\gamma_M \psi(e_H)-\gamma_M c_H \geq \gamma_M S_M^c(e_L)+(1-p(e_L))\,\gamma_M t_C-\gamma_M \psi(e_L)-\gamma_M c_H-T_m$$

that, by rearranging terms, can be rewritten as

$$t_C \geq \frac{\psi(e_H)-\psi(e_L)}{p(e_L)} - \frac{S_M^c(e_H)-S_M^c(e_L)}{p(e_L)} - \frac{T_m}{\gamma_M p(e_L)}, \tag{21}$$

with $t_C \geq 0$.

It is to be noted that, if T_m in (20) is such that

$$T_m = \gamma_m S_m^c(e_H) - S_m^c(e_L) - (\psi(e_H)-\psi(e_L)) + p(e_L)t_C,$$

inequality (21) can be written as

$$t_C \geq \frac{\psi(e_H)-\psi(e_L)}{p(e_L)} - \frac{ES^c(e_H)-ES^c(e_L)}{p(e_L)}, \tag{22}$$

where $ES^c(e) = \gamma_M S_M^c(e) + \gamma_m S_m^c(e)$ is the average gross surplus of the cooperative when quality is e.

An implication of inequality (22) is that the presence of a minority reduces the rent t_C needed to induce the cooperative to exert high effort. When choosing low effort, the majority has to compensate the minority for the disutility it suffers because of low quality. The larger the minority and the disutility it suffers, the higher the transfer T_m, and hence the lower the rent t_c that the social planner has to pay to the cooperative for inducing the majority to choose high quality. Note that if the minority (in the limit even a single individual) rates low quality as disastrous, any transfer T_m that would compensate the minority for the choice of low quality would increase the costs for the majority so much that the choice of low quality would never be optimal. In this case, no transfers would be needed in the first place and the majority spontaneously yields to the social planner's preferences, so that no incentive contract is needed. Conversely, the larger the size of the majority in the cooperative, the larger is t_C. Note that the value of t_C also increases as the detection probability decreases and the net value of high quality decreases with respect to low quality.

The cooperative organization here shows a further advantage over the for-profit: it allows to exploit internal divisions within the community in the public interest, which is instead precluded in the for-profit firm. It is the old principle of "*divide et impera*". Communities are not monolithic. When citizens within the hosting community are differentiated as to their

willingness to pay for the service, an internal conflict adds to the conflict between hosting and non-hosting communities. This, however, is no disadvantage from a social standpoint. Internal conflict actually reduces the average divergence of the local community's preferences from the social planner's, which can be exploited through the cooperative organization, but not through the for-profit one. By forming a coalition with the group that has more similar preferences to herself, the social planner can exert her power more effectively and reduce incentive costs, which in turn reduces the overall cost of the cooperative solution relative to the case of unanimous local communities. In conclusion, more conflict of the right type implies less social cost if customers are also owners.

The following proposition states under which conditions it is optimal to assign the service provision to a for-profit firm.

Proposition 5 *Under Conditions (15) and (16), if $T_m > 0$, an investor-owned firm is the cost-minimizing choice if and only if*

$$p(e_L) > \frac{\psi(e_H) - \psi(e_L)}{c_H + \psi(e_H) + t_C},$$

where t_C is given by (21).

Proof. See the Appendix ■

By comparing Propositions 1 and 5, it is immediate to see that in the presence of heterogeneous preferences the for-profit firm is the cost-minimizing choice for a larger interval of detection probabilities than in the case of homogeneous preferences, i.e. the threshold of $p(e_L)$ above which it is preferred to the cooperative becomes lower. This is due to the fact that also the cooperative requires a rent when the majority is averse to high effort. As a matter of fact, the larger t_C is, the lower the advantage of choosing the cooperative, which remains the optimal choice for a low detection probability only. Note that the threshold of $p(e_L)$ above which the for-profit firm is preferred to the cooperative depends not only on costs but also on the preferences and on the relative weight of the two groups. The rent to be paid to the cooperative increases as the share γ_M of the cooperative's members who prefer low quality increases, their surplus differential $S_M^c(e_L) - \psi(e_L) - (S_M^c(e_H) - \psi(e_H))$ increases, or the group preferring high quality becomes less averse to low quality.

When some customers within the cooperative prefer low quality, there still exists a threshold of the detection probability above which the for-profit firm is the optimal choice (i.e., when asymmetric information is not a serious concern). However, this threshold is lower than when all customers prefer high quality. Indeed, here the trade-off between the cooperative and the investor-owned firm is no longer decided by the comparison between detection probability and (production and effort) costs: both the surplus obtained and the weights of the

different groups in the cooperative are now relevant. As a matter of fact, preference heterogeneity about the quality level is an additional factor beside costs in the choice of the firm's ownership structure. That is, the cooperative may be less advantageous from a social welfare standpoint than the for-profit firm not only because of a greater productive inefficiency but also because a part of its members need to be paid a rent for the choice of high quality. Quite naturally, the magnitude of this rent gets smaller the lower the share of the cooperative's members who prefer low quality.

There are circumstances in which the provision of high quality through an investor-owned firm is impossible since the largest compensation the community can afford is not enough to induce a for-profit firm to choose it. In this case, the customer-owned cooperative is a possible alternative given that the preference of customer-owners for high quality reduces the incentives that the social planner needs to provide to the cooperative's members. In the extreme case in which low quality is disastrous, no compensation is needed for the cooperative to choose high quality. In general, if the cooperative's control is in the hands of the stakeholders who get the largest disutility from low quality, the cost of incentives is reduced. However, the choice of high quality may be impossible given the cooperative's cost-inefficiency. In this stalemate situation, either a low quality service is provided by an investor-owned firm, or the service is not provided at all, which is the case when low quality is perceived as disastrous.

The following proposition characterizes the conditions for a stalemate situation to emerge in the presence of heterogeneous customers.

Proposition 6 *If*

$$S^w(e_H) < \frac{\psi(e_H) - \psi(e_L)}{p(e_L)}$$

and

$$S^w(e_H) < c_H + \psi(e_H) + t_C,$$

a stalemate situation occurs in which the project cannot be realized either by a for-profit firm, or by a customer-owned cooperative.

Proof. See the Appendix. ■

These conditions are closely related to those of Proposition 4 for the case of homogeneous customers with a preference for low quality. The difference between the two cases concerns the transfer to be paid to the cooperative. With heterogeneous customers the costs of the cooperative are lower, since only a share of its members require an incentive for choosing high quality, while in the case of homogeneous customers with a preference for low quality all

cooperative members need to receive an incentive for high quality to be chosen. As a result, when the cooperative's members have heterogeneous preferences, the incentive-compatible transfer is smaller than that paid when all customers prefer low quality. It follows that, when preferences are heterogeneous, the stalemate situation occurs for higher levels of c_H.

The discussion above assumes that in the cooperative case the majority can bribe the minority. We now consider the situation in which internal transfers between the members of the cooperative are not feasible (i.e. $T_m = 0$). This may be because transfers can be detected by the social planner, or because of a different timing like the following:

1. the social planner announces the value of the transfer t_C;
2. the cooperative's members choose the quality level;
3. the chosen level is implemented;
4. the minority members report a quality level;
5. nature generates a signal on the unobservable implemented quality. If the signal is high and the minority reports high quality as well, then the social planner pays the transfer t_C to the firm. Otherwise, the transfer is zero.

This timing implies $T_m = 0$, since quality is implemented before the minority is able to report it, or possibly organize blocking actions. Note that when low quality is implemented, the minority has no interest in revealing it, since by doing so it would cause $t_C = 0$, with no effects on the quality level. The transfer t_C necessary for the cooperative to choose high quality is

$$S_M^c(e_H) + t_C - \psi(e_H) - c_H \geq S_M^c(e_L) + (1 - p(e_L))\, t_C - \psi(e_L) - c_H,$$

which can immediately be rewritten as

$$t_C \geq \frac{\psi(e_H) - \psi(e_L)}{p(e_L)} - \frac{S_M^c(e_H) - S_M^c(e_L)}{p(e_L)}. \tag{23}$$

By comparing (21) and (23), it is easy to see that, for any $T_m > 0$, the possibility of an internal bribe reduces the transfer that the social planner needs to pay to the cooperative. Note moreover that

$$S_M^c(e_H) - S_M^c(e_L) < \psi(e_H) - \psi(e_L) < S_m^c(e_H) - S_m^c(e_L)$$

by (15) and (16). Since

$$ES^c(e_H) - ES^c(e_L) > S_M^c(e_H) - S_M^c(e_L),$$

we can conclude that the subsidy t_C in (22) allowing for an internal bribe is lower than the subsidy in (23) for the case in which there are no internal transfers.

The intuition is quite straightforward: under low quality, the minority looses its share $\gamma_m t_C$ of the subsidy with probability $p(e_L)$. As a consequence, it needs to be compensated not only because low quality is not its preferred outcome, but also for the expected loss $p(e_L)\gamma_m t_C$. This additional compensation raises the cost of bribing for the majority, which in turn decreases the transfer t_C. Hence, not allowing for internal transfers is a suboptimal strategy for the social planner, as the subsidy t_C can, at least partly, be used by the majority for inducing the minority not to reveal quality-related information.

7 Concluding Remarks

The realization of projects with a public-good component affecting more social groups or communities is a frequent cause of conflict. Here, we have focused on a class of problems that has its fulcrum in the opposition between hosting and non-hosting groups/communities and, within this class, on services/goods that are amenable to production outside the public sector. We have shown that the ownership mode is a relevant factor for the implementation of such projects when information asymmetries about the project quality are significant, as is the case e.g. when infrastructures are involved whose location and operation are controversial for the public bads they produce, like health hazards, environmental degradation, etc.

Information asymmetries about product quality are viewed in the literature as one cause of the emergence of consumer cooperatives in the market for consumer goods. Something similar occurs in the context we have analyzed. Customer-ownership of a public service or public good has the power to overcome information asymmetries and this causes in certain circumstances its dominance over investor-ownership even when customer-ownership entails lower productive efficiency. Moreover, the resolution of conflicts over the realization of such projects turns out less costly from a social standpoint if the service provider is directly owned by the citizens of the hosting community. Customer-ownership then appears a sensible alternative to classical privatization, capable of taking care efficiently of critical quality issues, as the results we have presented indicate.

This paper, however, is only a first step in the enquiry into this organizational form and there is still a long way to go on the theoretical plane. In the simple model we have analyzed, there is just one possible location of the project to be realized, the composition of each community is given and service users also need to be members when the service provider is the cooperative. These are indeed major restrictions that will have to be lifted if one wants a fuller account of the phenomena. Further developments of the model will have to treat as endogenous the location choice, the composition of communities and the membership choice.

A further issue that needs to be addressed concerns governments. Here, we have focused on the comparison between customer and investor-ownership but the same questions can be asked about government-ownership too, and particularly how it performs in comparison with customer-ownership. The two organization structures are both characterized by a democratic governance but face different issues and are likely to perform differently. The question is ultimately about the role of government in public services provision. Is it more efficient that it acts as a direct provider or that it hands over production to a democratic citizen enterprise? Does a 'private' democratic governance work better or worse than the 'public' governance of local governments? These questions are far-reaching and indeed touch on the most fundamental mechanisms of democratic societies. Then, to gain a full comprehension of the organization of public services, one must look at a wider horizon, a task that is left to future research.

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Appendix

Proof of Proposition 1. Proof of the 'necessary' part. Suppose that $p(e_L) < \frac{\psi(e_H)-\psi(e_L)}{c_H+\psi(e_H)}$, which can immediately be rewritten as $c_H + \psi(e_H) < \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$, implying also that $c_L + \psi(e_H) < \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$. It follows that $t_I^* = \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$. Therefore, we have that the total costs TC associated to the two organizational forms are $TC_{for-prof} = \frac{\psi(e_H)-\psi(e_L)}{p(e_L)} > TC_{coop} = c_H + \psi(e_H)$, thus making the cooperative always preferred to the for-profit solution.

Proof of the 'sufficient' part. Consider the two opposite cases (i) $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} > c_L+\psi(e_H)$, and (ii) $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < c_L+\psi(e_H)$. Given that $TC_{for-prof} = \max\left\{\frac{\psi(e_H)-\psi(e_L)}{p(e_L)}, c_L + \psi(e_H)\right\}$, in case (i) we have that $TC_{for-prof} = \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$, while in case (ii) we have that $TC_{for-prof} = c_L+\psi(e_H)$. The for-profit firm is preferred to the cooperative when $TC_{for-prof} = \frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < TC_{coop} = c_H + \psi(e_H)$ in (i), and $TC_{for-prof} = c_L + \psi(e_H) < TC_{coop} = c_H + \psi(e_H)$ in (ii). Case (i) implies that $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < c_H + \psi(e_H)$, namely $p(e_L) > \frac{\psi(e_H)-\psi(e_L)}{c_H+\psi(e_H)}$. Case (ii), by definition, occurs when $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < c_L + \psi(e_H)$. Given that $c_L + \psi(e_H) < c_H + \psi(e_H)$, if condition $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < c_L+\psi(e_H)$ holds and hence the for-profit firm is the cost-minimizing solution (i.e. we fall in case (ii)), then condition $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < c_H + \psi(e_H)$ holds as well, namely the for-profit firm is the cost-minimizing solution also in case (i). Q.E.D.

Proof of Proposition 2. If $S(e_H) < \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$, then $p(e_L) < \frac{\psi(e_H)-\psi(e_L)}{S(e_H)}$. Since $S(e_H) - c_L - \psi(e_H) \geq 0$ by assumption, it must also be $p(e_L) < \frac{\psi(e_H)-\psi(e_L)}{c_L+\psi(e_H)}$, which implies that $t_I^* = \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$. The welfare in case the service is provided by the for-profit firm is thus $W_{for-prof} = S(e_H) - \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$, which is negative if $S(e_H) < \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$. Moreover, if $S(e_H) < c_H + \psi(e_H)$, welfare when the service is provided by the cooperative is negative as well. Hence, neither the cooperative nor the for-profit firm achieve a non-negative welfare level. Q.E.D.

Proof of Proposition 3. Proof of the 'necessary' part. Suppose that $p(e_L) < \frac{S^c(e_H)-S^c(e_L)}{c_H+\psi(e_H)}$, or analogously $c_H + \psi(e_H) < \frac{S^c(e_H)-S^c(e_L)}{p(e_L)}$, which also implies $c_L + \psi(e_H) < \frac{S^c(e_H)-S^c(e_L)}{p(e_L)}$. Moreover, since $S^c(e_L) - \psi(e_L) > S^c(e_H) - \psi(e_H)$ by assumption, then $\frac{S^c(e_H)-S^c(e_L)}{p(e_L)} < \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$. It follows that $c_L + \psi(e_H) < \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$, which implies $t_I^* = \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$. Therefore, we have that the total costs TC associated to the two organizational forms are $TC_{for-prof} = \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$ and $TC_{coop} = c_H + \psi(e_H) + t_C = c_H + \psi(e_H) + \frac{\psi(e_H)-\psi(e_L)}{p(e_L)} - \frac{S^c(e_H)-S^c(e_L)}{p(e_L)}$. Given that $\frac{S^c(e_H)-S^c(e_L)}{p(e_L)} > c_H + \psi(e_H)$ by assumption, it must be that $TC_{coop} < TC_{for-prof}$, so that the cooperative solution is always preferred to the for-profit one.

Proof of the 'sufficient' part. Consider the two opposite cases (i) $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} > c_L+\psi(e_H)$,

and (ii) $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < c_L+\psi(e_H)$. Given that $TC_{for-prof} = \max\left\{\frac{\psi(e_H)-\psi(e_L)}{p(e_L)}, c_L+\psi(e_H)\right\}$, in case (i) we have that $TC_{for-prof} = \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$, while in case (ii) we have that $TC_{for-prof} = c_L + \psi(e_H)$. If the for-profit firm is preferred to the cooperative, then it must be that in (i) $TC_{for-prof} = \frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < TC_{coop} = c_H + \psi(e_H) + t_C$, and in (ii) $TC_{for-prof} = c_L + \psi(e_H) < TC_{coop} = c_H + \psi(e_H) + t_C$, where $t_C = \frac{\psi(e_H)-\psi(e_L)}{p(e_L)} - \frac{S^c(e_H)-S^c(e_L)}{p(e_L)}$. Case (i) implies that $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < c_H + \psi(e_H) + \frac{\psi(e_H)-\psi(e_L)}{p(e_L)} - \frac{S^c(e_H)-S^c(e_L)}{p(e_L)}$, namely $p(e_L) > \frac{S^c(e_H)-S^c(e_L)}{c_H+\psi(e_H)}$. Case (ii), by definition, occurs when $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < c_L + \psi(e_H)$, from which it follows that $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < c_H + \psi(e_H) + t_C$, namely $p(e_L) > \frac{S^c(e_H)-S^c(e_L)}{c_H+\psi(e_H)}$. Q.E.D.

Proof of Proposition 4. If $S^w(e_H) < \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$, then $p(e_L) < \frac{\psi(e_H)-\psi(e_L)}{S^w(e_H)}$. Since, by assumption, $S^w(e_H) - c_L - \psi(e_H) \geq 0$, it must also be $p(e_L) < \frac{\psi(e_H)-\psi(e_L)}{c_L+\psi(e_H)}$, which implies that $t_I^* = \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$. The welfare in case the provision of the service is contracted to the for-profit firm is thus $W_{for-prof} = S^w(e_H) - \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$, which is negative if the inequality $S^w(e_H) < \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$ holds. Moreover, if $S^w(e_H) < c_H + \psi(e_H) + t_C$, the welfare in case the service is provided by the cooperative is negative as well. Hence, neither the cooperative nor the for-profit solution achieve a non-negative welfare level. Q.E.D.

Proof of Proposition 5. Proof of the 'necessary' part. When (15) and (16) hold, the cooperative receives the transfer t_C in (21). Two cases can occur: i) $p(e_L) > \frac{\psi(e_H)-\psi(e_L)}{c_L+\psi(e_H)}$, or equivalently $c_L + \psi(e_H) > \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$, meaning that $t_I^* = c_L + \psi(e_H)$ and thus that $TC_{for-prof} = c_L + \psi(e_H) < TC_{coop} = c_H + \psi(e_H) + t_C$ for any $t_C \geq 0$; ii) $p(e_L) < \frac{\psi(e_H)-\psi(e_L)}{c_L+\psi(e_H)}$, or equivalently $c_L + \psi(e_H) < \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$, meaning that $t_I^* = \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$, so that $TC_{for-prof} = \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$ and $TC_{coop} = c_H + \psi(e_H) + t_C$. In the latter case, $TC_{for-prof} < TC_{coop}$ if $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < c_H + \psi(e_H) + t_C$, that is if $p(e_L) > \frac{\psi(e_H)-\psi(e_L)}{c_H+\psi(e_H)+t_C}$. Conversely, if $p(e_L) < \frac{\psi(e_H)-\psi(e_L)}{c_H+\psi(e_H)+t_C}$, the cooperative solution is the optimal one. Since $t_C \geq 0$ by assumption, then it must be $\frac{\psi(e_H)-\psi(e_L)}{c_H+\psi(e_H)+t_C} < \frac{\psi(e_H)-\psi(e_L)}{c_L+\psi(e_H)}$, so that the cooperative is the cost minimizing solution if $p(e_L) < \frac{\psi(e_H)-\psi(e_L)}{c_H+\psi(e_H)+t_C}$.

Proof of the 'sufficient' part. Consider the two opposite cases (i) $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} > c_L+\psi(e_H)$, and (ii) $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < c_L+\psi(e_H)$. Given that $TC_{for-prof} = \max\left\{\frac{\psi(e_H)-\psi(e_L)}{p(e_L)}, c_L+\psi(e_H)\right\}$, in case (i) we have that $TC_{for-prof} = \frac{\psi(e_H)-\psi(e_L)}{p(e_L)}$, while in case (ii) we have that $TC_{for-prof} = c_L + \psi(e_H)$. If the for-profit firm is preferred to the cooperative, then in (i) $TC_{for-prof} = \frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < TC_{coop} = c_H + \psi(e_H) + t_C$ and in (ii) $TC_{for-prof} = c_L + \psi(e_H) < TC_{coop} = c_H + \psi(e_H) + t_C$, where $t_C = \frac{\psi(e_H)-\psi(e_L)}{p(e_L)} - \frac{ES^c(e_H)-ES^c(e_L)}{p(e_L)}$ from (22).Case (i) implies that $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < c_H + \psi(e_H) + \frac{\psi(e_H)-\psi(e_L)}{p(e_L)} - \frac{ES^c(e_H)-ES^c(e_L)}{p(e_L)}$, namely $p(e_L) > \frac{ES^c(e_H)-ES^c(e_L)}{c_H+\psi(e_H)}$. Case (ii) by definition occurs when $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < c_L + \psi(e_H)$; then $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < c_H +$

$\psi(e_H) + t_C$, namely $\frac{\psi(e_H)-\psi(e_L)}{p(e_L)} < c_H + \psi(e_H) + \frac{\psi(e_H)-\psi(e_L)}{p(e_L)} - \frac{ES^c(e_H)-ES^c(e_L)}{p(e_L)}$, from which it follows that $p(e_L) > \frac{ES^c(e_H)-ES^c(e_L)}{c_H+\psi(e_H)}$. Q.E.D.

Proof of Proposition 6. Immediate from the proof of Proposition 5. Q.E.D.