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THE CO-OPERATIVE PROVISION OF PUBLIC SERVICES IN AN EVOLVING WELFARE STATE

Wim Van Opstal and Caroline Gijselinckx

Cera Centre for Co-operative Entrepreneurship, HIVA, Catholic University of Leuven, Belgium

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ABSTRACT

Co-operatives are jointly owned and democratically controlled organizations, designed to meet the socio-economic needs of their members. Originated in the mid 19th century, co-operatives were set up to improve the living conditions of their members, contributing to the development of the welfare state in the countries they operated in. This paper focuses on co-operatives as providers of public services in the context of an evolving welfare state. Co-operatives can be seen as hybrid forms, positioned in a co-operative trilemma between the exigencies of market, state and civil society. We make an economic analysis of the conditions and mechanisms that make co-operatives an interesting provider of public services. Next, we discuss the comparative institutional advantage of co-operatives, as compared to for-profit and non-profit provision, in the light of an evolving welfare state. Finally, we conclude with a discussion on remaining research questions, market niches and policy recommendations.

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INTRODUCTION

According to the definition of the International Co-operative Alliance (ICA) co-operatives are jointly owned and democratically controlled organizations, designed to meet the socio-economic needs of their members (ICA, 1995). From the beginning they formed an essential and pioneering part of the developing welfare mix. They played a prospective function in the sense that they detected societal needs and developed innovative economic mechanisms to meet them. Furthermore, co-operatives played a corrective role towards the aberrances of the market.

The term "co-operative", when used in line with the ICA definition (ICA, 1995), refers to an economic organization in which ownership, control, and beneficiary are vested directly in the hands of its members. Through democratic ownership and control co-operatives try to balance the need for profitability with the needs of their members and the wider interests of the community. In virtue of its properties, this type of co-operative claims a hybrid position between those of the firm and the non-profit institution. Its restriction on profit clearly differentiates it from a capitalist firm. The primary aim of the co-operative is to meet the needs of its members, whereas the primary aim of the for-profit firm is to maximize profit. At the same time however, the co-operative operates according to the logic of business enterprises. Its organization of democratic member participation – sometimes including economic and governance participation of civil society organizations – allows it to be informed and driven by the needs of their members and the broader society. However, its autonomous structure and member-based organization do not allow it to be categorized as a public institution. Redistribution, ideal-typically a principle of the public sector, is not the primary principle that drives the co-operative. However, solidarity is often built in and from the past and contemporary examples of co-operatives providing public services, it is clear that the model is often used as a mechanism to increase welfare and well-being of deprived categories in society. (Develtere, 1994; Develtere & Raymaekers, 2006; Gijselinckx, Develtere & Raymaekers, 2007; Gijselinckx & Develtere, 2008).

These hybrid institutions, in virtue of their properties, face what may be called a "co-operative trilemma". The trilemma that every co-operative has to deal with is to reconcile the imperatives imposed on every business undertaking by a complex and highly competitive market with the democratic and material claims of members, to reconcile the claims of the members (internal claims) with the claims of society at large and of the less priviledged in particular (external claims), and to reconcile the exigencies of a private and autonomous business undertaking with the regulations and public structures of the welfare state (Gijselinckx & Develtere, 2008). In this respect, it is particularly interesting to examine the contribution the co-operative business model can make in providing public services – thus contributing to the welfare and well-being of people in contemporary welfare states.

Indeed, since their inception, welfare states all over the world have been dealing with continuous pressures to adapt and reinvent themselves. Nowadays, welfare states are challenged by, among many other factors, an ageing population, an increase in migration flows, globalizing markets, technological change and a changing role of the government. One of the questions that arise in the light of these changes is what type of organization is most suited to provide public services in these welfare states.

In most countries, governments play a key role in providing hospitals, residential facilities for the elderly, child and family care, care and sheltered employment for disadvantaged people, etc. Next to government provision, private agents, both for-profit and not-for-profit, take up an increasing market share in this field (Pacolet, 2006). Nonprofit organizations have a long tradition in the provision of public services, often initiated by and embedded in social movements and religious congregations. They act as private institutions, but they often depend for a considerable extent on government funding or donations. In recent years, the prevalence of for-profit firms in the provision of public services has increased. For-profit provision may be a response to an excess demand for public services, and has been stimulated more recently in a context of public private finance initiatives[1]. Together public, private non-profit and private for-profit institutions contribute to society's welfare and well-being, which is described in the literature on the third sector and social economy as the "welfare mix" (Svetlik, 1991; Pestoff, 1992; Svetlik & Evers, 1993; Evers, 1995; Kramer, 2000 and Evers & Laville, 2003). Next to its normative aspects, the composition of this welfare mix also has implications in terms of efficiency and quality of public service provision.

In this paper, we assess the role co-operatives play and could play as a provider of public services within this evolving welfare state. Throughout the discussion, we focus on co-operatives in health and social care since the impact of this evolving welfare state is the most dramatic in these areas of public service delivery. Quite some scholars and practioners praise the co-operative alternative in public service provision. A first advantage for co-operatives may well come from a better access to information. Co-operatives may have a superior position in revealing needs and preferences of their members due to its democratic ownership structure (Kurimoto, 2002). This may result in a provision of services that is well tailored towards the needs of its users. When membership is broadened towards other stakeholders as well, this may broaden the scope of objectives of the co-operative, strengthening the public character of the services they deliver. Such a multistakeholder co-operative may also take a lead position in innovation, as it may fall back on a large network of its constituent partners, while being able to confront and exchange different points of view within one and the same organization.

Thomas (2004) mentions its participatory character as another advantage of co-operatives, resulting in enhanced efficiency, greater stakeholder involvement and a large potential to attract volunteers. Girard (2002) links health care co-operatives with social capital and social cohesion while Firman (1985) and MacKay (2007) praise co-operatives for the role they play in fostering empowerment. Other authors, like Levy (2001) and Pezzini (2006), stress the role of co-operative values (like equity and solidarity) and principles (like concern for community), urging them to focus at goals that go beyond the common interests of their members. Finally, results from experimental economics indicate that people are more willing to contribute to a public good (or service) when they find themselves in a co-operative framing compared with a competitive framing (Elliot et al., 1998).

[1] Note that public private partnerships and public private finance initiatives may also involve nonprofit partners. For a nice formal treatment on the comparison of nonprofit and for-profit partners under traditional government procurement and public private finance initiatives we refer to Bennett & Iossa (2005, 2006).

While, to the best of our knowledge, empirical work on co-operatives in public services provision remains scarce, it is difficult to assess these statements. Exceptions are Angus & Manga (1990) and McLean & Sutton (2008). The former report on the effectiveness of co-operative health care delivery in Canada and show that per patient costs, hospitalization rates and money spent on prescription drugs were drastically lower in health care co-ops. McLean & Sutton (2008), make an assessment of local health care co-operatives in Scotland. They report, however, that the impact of introducing these health care co-ops on clinical governance and on public and patient involvement turned out to be poor. Therefore, as long as data remain scarce or unavailable, it might be worthwhile to consider a theoretical analysis, focusing on conditions that make co-operatives an interesting alternative in public services provision as compared to other organizational forms.

This paper is structured as follows. First, we review some of the most common types of services, ownership structures and primary motivations for co-operative provision. Next, we provide a simple formal framework to assess the conditions and mechanisms that make co-operatives an interesting provider of public services. We discuss the comparative institutional advantages (and disadvantages) of co-operatives, as compared to for-profit and non-profit provision. Next, we look at the effects different aspects of an evolving welfare state may have on their relative performance. We conclude with potential market niches, policy recommendations and remaining research questions.

1. CO-OPERATIVE PROVISION IN HEALTH AND SOCIAL CARE

Originated in the mid 19th century, co-operatives are set up to improve the living conditions of their members, contributing to the development of the welfare state in the countries they operate in. Within the course of the last decades, and especially in recent years, co-operatives have been set up in areas of health and social care. In 2006, Japanese health care co-operatives comprised a membership of more than 2.5 million people, employing more than 25000 professionals[2]. According to MacKay (2007), Canada has over 100 health care co-operatives providing care to over 1 million people, especially in the provinces of Québec and Saskatchewan. In Colombia, Saludcoop provides health care services for 15.5% of the population, providing 23% of the jobs in the health care sector[3]. According to the International Health Co-operative Organization (IHCO), which has been founded in 1996 as a sectoral organization of the International Co-operative Alliance (ICA), health co-operatives currently serve at least 100 million households around the world[4].

Without making any claim to be comprehensive, we summarize some of the motivations why co-operatives are set up in these areas and highlight some of the common types of co-operative provision. Note that our focus is on co-operatives that engage themselves in an active provision of services. Many other co-operatives, however, are active in supporting existing services through partnerships, societal investment programs and donations. These products of co-operative social responsibility remain outside the focus of this paper.

[2] http://jccu.coop/eng/public/pdf/ff_2006.pdf
[3] http://www.coop.org/coop/statistics.html
[4] www.ica.coop/ihco

1.1. Motivations for co-operative provision

More than a century ago, co-operatives were established to warrant access to health and social care at an affordable cost. Co-operatives may prove to be cost reducing where joint procurement and utilization of costly medical equipment is feasible. Today, this is still an important motivation for setting up health care co-ops, especially in developing countries (Develtere et al., 2001, 2004). In industrialized countries, the role of these co-operatives evolved into a focus on reducing transaction costs as well (Kurimoto, 2002).

A second important motivation for setting up health and social care co-operatives can be summarized as the vacuum hypothesis, as formulated by Westerdahl & Westlund (1998). This means that we could expect co-operatives to become more prevalent in areas where an increase in needs is not met by the government, nor by the market. The rise in public debt and financial problems in the 1980s triggered reductions of government provision and a wave of privatizations in almost every industrialised country. According to Girard (2002), this situation was reflected in important cuts in (para)medical staff, merger trends and a decrease in the number of public health delivery facilities[5]. Especially in remote areas, this evolution caused severe problems, leaving communities without any available alternative, obliging weak groups in society, such as the elderly and chronically ill, to move to bigger cities or to move to residential long-term care facilities. As a result, social organizations and trade unions organized themselves at different places in the world to establish health care co-operatives, while in other settings workers and medical staff organized a buyout to become the owners of their own facility.

Sometimes, health care co-operatives are set up to ensure the employment of (para)medical staff. In some countries, like Benin, doctors who were laid off after a privatisation wave in the medical sector started their own health care co-operative. The opposite case exists as well: some health care co-operative were established to strengthen recruitment and retention of (para)medical staff, especially in remote areas that face the risk of a brain drain towards big cities. The same story holds for medical facilities in many developing countries, seeing their doctors moving towards industrialised countries.

In more urban areas, co-operatives provide an alternative for people who are not satisfied with the quality level of available alternatives. Co-operative hospitals and social care co-operatives may also put a supplementary focus on the needs of special groups, like migrants, the elderly, indigenous groups, etc. As Kurimoto (2002) states when describing the situation of Japanese health co-operatives in urban areas: "*users want to participate in the health promotion/medical process in collaboration with service providers and to promote transparency and democracy in the medical sector*"[6]. This way, co-operatives may introduce innovative services, reflecting the preferences and needs of the local community. In such cases, co-operatives often limit themselves to small scale care provision, complementing a larger scaled system of government provision. All these motivations may be valid as a *condition of necessity* for co-operative entrepreneurship, as pointed out by Defourny et al. (2002).

[5] MacKay (2007) describes the stressful situation in British Columbia (USA), which is due to a lack of supply of medical care. Next to long waiting lists he mentions a shortage of family physician's for more than 100000 British Columbians. Of course, in many developing countries, this situation is far more cumbersome (Develtere et al., 2004).

[6] This is also in line with what Westerdahl & Westlund (1998) call the local-identity hypothesis.

1.2. Types of services

In the field of health care, there exist co-operative versions of almost any kind of health care facility that is taken up in the international classification of health care providers (ICHA–HP), as defined by the OECD (2000). Several countries have co-operative hospitals and co-operative nursing and residential care facilities for general and mental health care. More widespread are co-operatives in ambulatory health care, including co-operative practices of physicians, dentists and other health practioners, co-operative medical and diagnostic laboratories, co-operative home health care services and co-operative ambulance services[7]. Co-operatives can also be found in retail sale of medical goods. In Belgium, 20% of retail pharmacies are co-operatives[8].

As mentioned earlier, many health co-operatives are active in health promotion, provide public health programs, often tailored to the needs of the local community, or organize health insurance. Health insurance purchasing co-operatives (HIPCs) are not only set up in developing countries (Fonteneau & Op de Beeck (2007)), but are also established in industrialized countries. As an example, in Wisconsin (US) farmers established a farmers' health co-operative[9] to help farmers and small employers gain leverage and access to the health insurance market. Finally, there exist also numerous examples of co-operative structures that have been established between health care providers to elicit collaboration in the areas of training, procurement and the introduction of electronic medical records.

Social care co-operatives include co-operative residential facilities for the elderly, for people with disabilities and for people suffering from addictions. The Netherlands and Scandinavian countries are experimenting with co-operatives that bundle home care procurement to allow elderly and people with disabilities in remote areas to stay in their homes and remain in their communities. Finally, there are also co-operatives within the fields of family care, child care (e.g. babysitting co-ops) and youth care.

1.3. Types of ownership

We can classify health and social care co-operatives along the traditional ownership structures that exist for co-operatives in general (Kurimoto (2002)):

- user-owned co-ops (consumer co-operatives)
- provider-owned co-ops (producer co-operatives / worker co-operatives)
- joint user- and provider-owned co-ops (multistakeholder co-operatives)

Provider-owned co-operatives are most common in cases where employment issues or joint procurement of expensive medical equipment have been the motivation to establish the co-operative. Examples of this are ambulance co-operatives and medical practice co-operatives (Craddock & Vayid, 2004).

Many health and social care co-operatives are owned by their users. Membership of these co-operatives may consist solely of actual users of the co-operative, which might be relevant for several types of social care co-operatives. Members of health co-operatives, however, are often healthy people who wish to contribute to the provision of health care facilities they can rely upon whenever they need to. At the same time, (medical) personnel of these facilities are often involved as members as well. Multistakeholder co-operatives have a membership that includes both users and providers, often supplemented with the membership of local

[7] See Craddock & Vayid (2004) for a review of health co-operatives in Canada, with examples from almost any of these dimensions. A more comprehensive, but older reference is a UN report on health and social co-operatives (United Nations, 1997).
[8] www.ophaco.org
[9] www.farmershealthcooperative.com

governments, social organizations, and other stakeholders. These co-operatives are also known as multipartner co-operatives or solidarity co-operatives (Girard, 2002). Throughout the last two decades, several countries including Canada, Italy, Spain and France adopted legal frameworks allowing multistakeholder co-operatives to develop within the field of health and social care[10].

In many cases, however, users outnumber providers and other stakeholders in these co-operatives[11]. As it is the membership of a co-operative that elects a board of directors, this may lead to user-dominated boards of directors. Their responsibility is to oversee the operation of the co-operation and to hire a manager to negotiate contract with health insurance companies, governments, and health care providers (MacKay, 2007). User-dominated boards of directors in health and social co-operatives often have to rely on the expertise of the staff when making decision on operations (including the level and quality of care provided) or capital investments[12]. As this may give rise to conflicts between nominal and actual power, co-operatives have been creative in finding solutions, including the promotion of member participation through intermediary bodies like community networks and user's committees (Kurimoto, 2002). In Canada, medical staff, physicians included, is paid a salary by the co-operative instead of a fee-for-service (Girard, 2002). These solutions help to align interests between users and providers.

2. ORGANIZATIONAL PERFORMANCE

In this section, we present a formal model to assess the conditions that affect the performance of alternative organizational forms in providing public services. The organizational forms considered are outside ownership (denoted as firms), nonprofit organizations and consumer co-operatives[13]. Government provision and regulation are considered as exogenous, but we will discuss its impact[14]. Within the field of formal economic theory, comparisons of the institutional comparative advantages of organizational types that include consumer co-operatives are rather scarce. Whereas most of the economic literature concerning co-operatives focuses on labor-managed firms and agricultural producer co-operatives, Hart & Moore (1998) and Herbst & Prüfer (2007) provide notable exceptions.

The model, which draws heavily on Herbst & Prüfer (2007), contains a simple static framework to discuss the performance of different types of organizations in providing public services that are rival and excludable in nature, as is often the case in health and social care. Rivalry means that the consumption of one unit of the service cannot be shared by more than one user. Excludability is ensured by the fact that a price has to be paid for the service, not to be confused with the notion of general access. Next to price, we focus on quality as a distinctive feature of the public services under consideration. We think this focus is permitted, given the dramatic impact the quality level of a public service may have on the quality of life, especially in the field of health and social care. As in Herbst & Prüfer (2007), we first formalize the differences between organizational forms and then discuss differences in quality

[10] We refer to Thomas (2004) for a review of social co-operatives in Italy, and Lindsay & Hems (2004) for a discussion on sociétés cooperatives d"Intérêt collectif (SCIC) in France.

[11] For example, in 1999, employees only accounted for 0.8% of the 2.1 million members in Japanese health care co-operatives (Kurimoto, 2002).

[12] This point has been made by Pauly and Redisch (1973), who model decision making processes in nonprofit hospitals as if these hospitals were physician's co-operatives.

[13] As we discussed in section 2, many health and social care co-operatives are consumer co-operatives or multistakeholder co-operatives in which users have a dominant position.

[14] In many cases, we could interpret government provision as nonprofit provision. This interpretation may be valid in settings where state owned public services operate relatively independent from policy makers and where government control is restricted to the appointment of a board of trustees and an annual audit of the financial statements.

and efficiency. Next, we review some possible extensions of this model. In the succeeding section, we apply this analytical framework to discuss the impact of an evolving welfare state on the relative performance of these organizational forms.

2.1. Structure of the model

We identify an organization by the identity of its ownership. Firms are owned and controlled by its outside investors who want to maximize the value of their investment. Nonprofits are owned and controlled by its members, who solely value the quality of the provision. They have no financial interests since members have no rights of residual income because of what is labeled as the non-distribution constraint. Co-operatives are a combination of both worlds: owners have a double identity, being shareholders, resulting in rights of residual income and eligibility to receive dividend payments, and users[15], focusing on quality, at the same time. Next to the baseline case where all members of the co-operative are both owner and user, we allow co-operatives to attract outside users or outside investors.

A management contract for costly quality provision

In this model, owners represent themselves in a board of directors that hires a manager who runs the daily operations of the organization. A manager of, say organization A, administers his operations to deliver a public service of quantity x_A, sets a price p and offers quality $q \in [0;1]$. Producing quality requires effort by the manager, denoted by an effort cost function $e(q)$, which has the standard convexity assumptions $e(0) = 0$, $\frac{\partial e(.)}{\partial q} > 0$ and $\frac{\partial^2 e(.)}{\partial q^2} \geq 0$. This assumption captures the idea that the cost of effort increases more than proportional with increases in quality provision, as is also the case in Glaeser & Shleifer (2001), Francois (2003), Besley & Ghatak (2005) and Herbst & Prüfer (2007).

Since the authority of decisions concerning the quality of the service rests ultimately with the owners, owners and the manager agree ex ante upon a contract in which a provision with quality q is remunerated at cost $e(q)$. As in Herbst & Prüfer (2007), this process is costless if all owners agree on the quality level to be specified. Otherwise a cost of D_j is incurred to identify the median owner. This alignment cost depends on the type of the organization $j \in \{F, N, C\}$, denoting firms, nonprofits and co-operatives respectively.

[15] As indicated before, we restrict our analysis to consumer co-operatives, allowing, however, for an extension towards multistakeholder co-operatives.

Consumer surplus

In the baseline model, we assume that quality is perfectly observable, but as in Handy (1997), Besley & Ghatak (2007) and Herbst & Prüfer (2007) the valuation of quality by users may differ[16]. We denote the willingness to pay for a quantity x of a public service[17] with quality q as $\theta^i qx$, where $\theta^i \in [0;1]$ is the valuation of user i of the quality of one unit of the service. User i will be willing to consume the service as long as $\theta^i qx - px \geq 0$. We can define consumer surplus as $CS = \int_0^1 \left((\theta^i q - p)x\right)\phi(\theta)d\theta$, where ϕ is the distribution function of θ.

Profit

Producer surplus can be considered by the accumulated profits of all providers. The profit of organization A, denoted by $\pi_A = x_A(p,q)\left(p - c(x_A)\right) - e(q) - D_j$, is equal to total revenue px_A, minus production costs cx_A[18], effort costs $e(q)$ and a potential alignment cost D_j. This alignment cost depends on the type of the organization $j \in \{F, N, C\}$, denoting firms, nonprofits and co-operatives respectively. Note that we allow marginal production costs $\frac{\partial c}{\partial x_A}$ to vary with the scale of the activity level x_A.

Market structure

We allow providers to have some degree of market power, but we do not account for strategic interaction between providers. The degree of market power depends on the market share of the provider $\frac{x_A}{x}$. Total demand, $x(p,q)$, depends on price p and on quality level q. We denote price elasticity of demand by $\varepsilon_p = -\frac{\partial x}{\partial p}\frac{p}{x} \geq 0$ and quality elasticity of demand by $\varepsilon_q = \frac{\partial x}{\partial q}\frac{q}{x} \geq 0$. Both elasticities are assumed to be identical between all types of organizations[19].

Total surplus

Finally, as a benchmark for efficiency comparisons between organizational forms, we define total surplus generated by organization A as:

$$TS = \int_0^1 \left((\theta^i q - p)x_A(p,q)\right)\phi(\theta)d\theta + x_A(p,q)\left(p - c(x_A)\right) - e(q) - D_j, \text{ with } j \in \{F, N, C\}$$

This is the sum of consumer surplus and producer surplus generated by the organization.

[16] Later on, we discuss the impact of other forms of asymmetric information concerning quality provision.
[17] Here, we differ from Herbst & Prüfer (2007), who normalize quantity to 1.
[18] Also here, we differ from Herbst & Prüfer (2007), who normalize production costs to 0.
[19] Here, we make a generalization compared with Herbst & Prüfer (2007), who define a competitive fringe, being the specification of price and quality of the closest substitute.

2.2. Organizational forms

We start with analyzing the calculus of firms, nonprofits and co-operatives. This obliges us to make a rigorous distinction between the characteristics of these types of providers and obtain a clear insight into the determinants of quality levels being chosen.

Firms

When considering the firm, we look at the calculus of individual shareholders. As the objective of an individivual shareholder is to maximize the value of his investment, his objective function can be defined as his share σ in total profits π. Owners are willing to agree upon a management contract, resulting in a price and quality level that maximizes:

$$\max_{p,q} \sigma\pi = \sigma\left(p x_A(p,q) - c(x_A(p,q)) - e(q) - D_F \right)$$

The first order condition of price for the firm is $x_A + \frac{\partial x}{\partial p} p - \frac{\partial c}{\partial x_A}\frac{\partial x}{\partial p} = 0$, which leads after rearranging to $p_F^* = \frac{\partial c / \partial x_A}{\left(1 - \frac{x_A}{X}\frac{1}{\varepsilon_p}\right)}$. This is a standard textbook result where the price, represents marginal costs and a mark-up that increases with market power. Note that this mark-up increases as the price elasticity of demand becomes more inelastic.

The first order condition for quality, $p\frac{\partial x}{\partial q} - \frac{\partial c}{\partial x_A}\frac{\partial x}{\partial q} - \frac{\partial e}{\partial q} = 0$, yields after rearranging:

$$\left(\frac{\partial e(q)}{\partial q}\right)_F^* = \left(p - \frac{\partial c}{\partial x_A}\right)\frac{\partial x}{\partial q}$$

Quality provision depends on market power, as well as on the slope of the demand function with respect to quality. Under some regularity conditions[20], quality provision will be higher when consumer sensitivity for quality increases, an effect that will be enhanced by market power. The latter effect can be explained by the fact that an increase in market power enhances firms' ability to reap the fruits of this quality induced demand.

Since profit maximization is the singular objective of all shareholders[21], any individual shareholder could act on behalf of all shareholders. Since ownership interests in a firm are perfectly aligned, no alignment costs apply, so $D_F = 0$.

[20] These conditions are discussed in part B of the proof of proposition 1 in the appendix.

[21] Outside owners are assumed not to consume the service. If they want to, they can purchase the service at market prices, but this does not imply that they take their position as a consumer into account when maximizing profit. This is also in line with Hart & Moore (1998) who assume that profit motives of outside owners swamp any consumption benefit.

Nonprofits

Members of a nonprofit organization do not have access to any residual income[22], but focus entirely on consumer surplus. Each member i, being a user of a fraction γ of the public service, will prefer a quality-price combination that satisfies:

$$\max_{p,q} \gamma\left((\theta^i q - p)x_A(p,q)\right)$$

The first order condition of price for the nonprofit is $\theta^i q \frac{\partial x}{\partial p} - x_A - \frac{\partial x}{\partial p} p = 0$. Since consumer surplus has to be positive for any member willing to join the nonprofit, the first order condition of price, which can be rewritten as $(\theta^i q - p)\frac{\partial x}{\partial p} - x_A = 0$ will not hold, as the left hand side of this expression remains negative. Lowering the price towards zero will maximize consumer surplus, so $p^*_{N,un} = 0$.

The first order condition of quality for the nonprofit is $\theta^i q \frac{\partial x}{\partial q} + \theta^i x_A - \frac{\partial x}{\partial q} p = 0$, which we can rewrite as $(\theta^i q - p)\frac{\partial x}{\partial q} + \theta^i x_A = 0$. Again, since price should not exceed the willingness to pay, the left hand side of this expression remains positive. Therefore, in equilibrium, quality provision will be as high as possible: $q^*_{N,un} = 1$.

This equilibrium, which we will denote the unconstrained equilibrium (indicated by the subscript *un*), results in nonprofits making losses[23]. This is no surprise, since the attention of members goes solely on the provision of quality, not taking into account any efficiency requirements.

However, as long as side payments by governments or donations do not occur, nonprofits have to face a break even constraint, $p_{N,con} = \frac{c(x_A) + e(q) + D_j}{x_A(p,q)}$. As lower prices always result in a bigger consumer surplus, this break even constraint will be binding. Replacing price with average costs, we rewrite our (constrained) objective function as:

$$\max_{p,q} \gamma\left(\theta^i q x_A(p,q) - c(x_A) - e(q) - D_j\right)$$

The first order condition for quality now is $\theta^i q \frac{\partial x}{\partial q} + \theta^i x_A - \frac{\partial c}{\partial x_A}\frac{\partial x}{\partial q} - \frac{\partial e}{\partial q} = 0$

Rearranging this first order condition yields

$$\left(\frac{\partial e}{\partial q}\right)^*_{N,con} = \left(\theta^i q - \frac{\partial c}{\partial x_A}\right)\frac{\partial x}{\partial q} + \theta^i x_A$$

where *con* refers to the constrained equilibrium.

[22] In most legislations, nonprofits are only allowed to divert any surpluses towards charitable goals or other nonprofits serving a similar goal.

[23] Also here we differ from Herbst & Prüfer (2007), who assume that all organizations earn positive profits.

Under some regularity conditions[24], quality provision of a nonprofit at its break-even point will increase as the valuation of quality increases, as its marginal costs decreases, as the sensitivity of demand with respect to the quality level increases, as well as when the amount produced by the organization increases.

Since quality maximization is the singular objective of all members, any individual member could act on behalf of all members in the unconstrained equilibrium. This results in a membership with perfectly aligned interests, so $D_{N,un} = 0$. In the constrained equilibrium, however, some members may find it not worthwhile to pay a price $p > \theta^i q$. The nonprofit can solve this problem by introducing a membership fee, such that quality provision remains maximal: $\theta^i q \frac{\partial x}{\partial q} + \theta^i x_A - \frac{\partial c}{\partial x_A}\frac{\partial x}{\partial q} - \frac{\partial e}{\partial q} > 0$, which results in the following condition on valuation of the marginal member: $\theta_m^i > \frac{\frac{\partial c}{\partial x_A}\frac{\partial x}{\partial q} + \frac{\partial e}{\partial q}}{x_A + \varepsilon_q x}$.

As denoted by Herbst & Prüfer (2007), this fee is a credible device, since members have no rights to residual income. So also in the constrained equilibrium, it is possible to reduce alignment costs to zero, so $D_{N,con} = 0$

Co-operatives

Unlike nonprofits, members of a co-operative are entitled to a share in residual profits and unlike outside ownership, members are users of the services provided by the co-operative as well. Individual members of the co-operative, owning a share σ of the co-operatives assets and consuming a share γ of the services provided, will vote for a price-quality combination that satisfies:

$$\max_{p,q} \gamma\big((\theta^i q - p)x_A(p,q)\big) + \sigma\big(px_A(p,q) - c(x_A(p,q)) - e(q) - D_C\big)$$

The first order condition of price for the co-operative is:

$$\gamma\left(\theta^i q \frac{\partial x}{\partial p} - x_A - \frac{\partial x}{\partial p} p\right) + \sigma\left(x_A + \frac{\partial x}{\partial p} p - \frac{\partial c}{\partial x_A}\frac{\partial x}{\partial p}\right) = 0$$

Rearranging brings us to the following equilibrium quality level:

$$p_C^* = \frac{\gamma\theta^i q - \sigma \partial c / \partial x_A}{(\gamma - \sigma)\left(1 - \frac{x_A}{X}\frac{1}{\varepsilon_p}\right)}$$

The first order condition for quality is:

$$\gamma\left(\theta^i q \frac{\partial x}{\partial q} + \theta^i x_A - p\frac{\partial x}{\partial q}\right) + \sigma\left(p\frac{\partial x}{\partial q} - \frac{\partial c}{\partial x_A}\frac{\partial x}{\partial q} - \frac{\partial e}{\partial q}\right) = 0$$

[24] These conditions are discussed in part B of the proof of proposition 1 in the appendix.

Rearranging brings us to the following equilibrium quality level:

$$\left(\frac{\partial e(q)}{\partial q}\right)_C^* = \frac{\gamma}{\sigma}\theta^i\left(x_A + \varepsilon_q x\right) + \frac{\partial x}{\partial q}\left(p(1-\frac{\gamma}{\sigma}) - \frac{\partial c}{\partial x_A}\right)$$

Under some regularity conditions[25], quality provision increases as the sensitivity of demand for quality increases (as indicated by the slope of the demand function with respect to quality, and by the quality elasticity of demand), as the valuation of quality increases, as the markup over marginal costs increases and as supply (both of the co-operative as well as in general) increases. Not surprisingly, we also notice a higher concern for quality as the ratio of consumption versus ownership increases (and vice versa)[26].

Members of a co-operative face a trade-off between consumer surplus and profit. While members' valuation of quality differs, co-operatives cannot credibility install a member fee, since this fee would enter operating profits. Because members of a co-operative have residual rights to the income of the co-operative, the fee would become eligible for dividend payments or may be returned to the members at the moment of liquidation. Therefore, a fee would not be a credible alignment device ex ante. Therefore, unlike nonprofits, co-operatives have to incur an alignment cost $D_C > 0$ to identify the median member $\tilde{\theta}$ (Herbst & Prüfer, 2007). This result is also in line with Hart & Moore (1998) who state that co-operative become less efficient as member heterogeneity increases[27].

2.3. Quality of the provision

Social optimum

In order to compare quality levels, we define a social optimum, which we will use as a benchmark. A social optimum would be accomplished when a benevolent social planner would choose a price-quality combination that satisfies:

$$\begin{aligned}\max_{p,q} TS &= \int_0^1 \left((\theta^i q - p)x(p,q)\right)\phi(\theta)d\theta + x(p,q)\left(p - c(x)\right) - e(q) - D \\ &= \int_0^1 \left((\theta^i q)x(p,q)\right)\phi(\theta)d\theta - x(p,q)c(x) - e(q) - D\end{aligned}$$

Resulting in the following first order condition for quality:

$$\frac{\partial x}{\partial q}\left(\bar{\theta}q - \frac{\partial c}{\partial x_A}\right) + \bar{\theta}x_A - \frac{\partial e}{\partial q} = 0$$

where $\bar{\theta} = \int_0^1 \theta^i \phi(\theta)d\theta$, which is the average valuation of quality.

After rearranging, this yields the following equilibrium condition for quality provision at the social optimum:

[25] These conditions are discussed in part B of the proof of proposition 1 in the appendix.

[26] For an interesting discussion concerning the possibility of membership sales, we refer to Hart & Moore (1998). Especially in the literature on agricultural producer co-operatives, this ratio of "patronage" versus ownership is a much debated topic.

[27] In their paper, Hart & Moore (1998) review some empirical work on co-operatives in a variety of activity domains that demonstrate this negative correlation between member heterogeneity and efficiency.

$$\left(\frac{\partial e(q)}{\partial q}\right)^{*}_{SO} = \bar{\theta}\left(x_A + \varepsilon_q x\right) + \frac{\partial x}{\partial q}\left(-\frac{\partial c}{\partial x_A}\right)$$

Here, we see that quality provision in the social optimum is positively related with the average valuation of quality, the output level and the quality elasticity of demand. Quality provision decreases in social optimum with an increase in marginal costs. The latter effect becomes bigger as the slope of the demand curve with respect to quality increases.

Quality comparisons

We summarize our findings on quality comparisons between organizational forms in proposition 1. For a proof, we refer to the appendix. Note that we limit our results to the case where decision making is based on an identical draw of the distribution of valuations θ.

Proposition 1: Quality comparisons

If there are no side payments nor initial endowments, and if decision making is based on an identical draw of the distribution of valuations θ, the following quality rankings apply:

A. For $\frac{\partial^2 x}{\partial q^2} > 0$,

$$q_N = q_{SO} = q_C > q_F \text{ if } \gamma = \sigma \quad (1)$$

$$q_N = q_C = q_{SO} > q_F \text{ if } \gamma > \sigma \quad (2)$$

$$q_N = q_{SO} > q_C \geq q_F \text{ if } \gamma < \sigma, \text{ with } q_C = q_F \text{ if } \gamma = 0 \quad (3)$$

B. For $\frac{\partial^2 x}{\partial q^2} < 0$,

$$q_N = q_{SO} = q_C \geq q_F = 0 \text{ if } \gamma = \sigma \quad (4)$$

$$q_N = q_C = q_{SO} \geq q_F = 0 \text{ if } \gamma > \sigma \quad (5)$$

$$q_N = q_{SO} \geq q_C \geq q_F = 0 \text{ if } \gamma < \sigma, \text{ with } q_C = q_F \text{ if } \gamma = 0 \quad (6)$$

Part A of the proposition focuses on services for which its demand increases more than proportionally with quality increases. When considering several alternatives available (not to forget including the option not to consume any of these public services), the public service that offers superior quality will often attract a more than proportional fraction of total demand. As decisions in health and social care affecting quality have a major impact quality of life for the people involved (Firman, 1985), we believe that this assumption holds for many services in this area.

In a situation where all users are owner of the co-operative, and vice versa (1), quality provision by the nonprofit and the co-operative will equal that of the social optimum, while quality provision of the firm will be lower. This can be attributed to the fact that the calculus of firm owners only takes monetary profits into account, instead of considering consumer surplus as well. Parts (2) and (3) reflect the situation where ownership and consumption are not balanced. For the ease of exposition, we will denote co-operatives with $\gamma > \sigma$ as user-

dominated co-operatives and co-operatives with $\sigma > \gamma$ as non-user dominated co-operatives. Our results on this part are in line with Hart & Moore (1998) who conclude that co-operatives start to behave like an outside owner if non-users are in the majority and like a nonprofit when users are in the majority. The extreme of that case is depicted in (3): if membership only consists of non-consumers, decision making in the co-operative is equivalent to that of a firm.

Note that the assumption of no side payments and the absence of initial endowments has an impact on the results. If budgetary restrictions would be loosened, nonprofits would increase quality provision up to its maximum. As in Herbst & Prüfer (2007), this would result in an overspending on quality, which is perfectly in line with the interests of their members, though not as efficient as the social optimum. The same holds for co-operatives in part (2): if their budgetary restriction would be loosened, quality provision would exceed that of the social optimum, but at a slower pace than that of the nonprofit as long as membership contains some owners who have residual rights of income, thus including dividend payments into their calculus.

Part B of the proposition looks at the situation when an increase in quality leads to a less than proportional increase in demand. In that case, the firm will reduce quality provision to zero, since providing quality costs more than it adds to the firms' revenue. The conditions for co-operatives, non-profits and the social optimum to reduce quality provision to zero are (weakly) stricter, since decision-making in these organizational forms adds a positive valuation of quality through its consumer surplus to the calculus. When comparing cases (4) up to (6), the same reasoning as in part A of the proposition applies.

2.4. Efficiency of the provision

As in Herbst & Prüfer (2007), we evaluate efficiency of the provision by comparing total surplus that is generated by the different organizational forms. The quality level alone is insufficient as a criterion to determine which organizational form is the most efficient. In proposition 2, we summarize our results for the case where the quantity of output is the same under each organizational form, so $x_A = x_F = x_C = x_N$. For a proof, we refer to the appendix.

Proposition 2: Efficiency comparisons

If $x_A = x_F = x_C = x_N$:

1. Total surplus under nonprofit provision is higher than under firm provision if:

$$\bar{\theta}\, x_A > \frac{e(q_N) - e(q_F)}{q_N - q_F}$$

2. Total surplus under co-operative provision is higher than under firm provision if:

$$D_C \in \left(0; \bar{\theta}\, x_A - \frac{e(q_C) - e(q_F)}{q_C - q_F} \right)$$

3. Total surplus under co-operative provision is higher than under nonprofit provision if:

$$D_C \in \left(0; -\bar{\theta}\, x_A + \frac{e(q_N) - e(q_C)}{q_N - q_C} \right)$$

Comparing firm provision with nonprofit provision, we know from proposition 1 that firms deliver lower quality, resulting in lower managerial effort costs, allowing for higher profits. For nonprofits the opposite story holds. The interpretation of the right hand side of the condition in part 1 of the proposition is equivalent to Herbst & Prüfer (2007) and can be interpreted likewise. It describes the additional costs incurred from increasing the quality level of the firm to nonprofit level relative to the quality change. Therefore, if the excess quality provision by the nonprofit is less costly, high quality production by the manager is affordable and nonprofit provision dominates firm provision. On the other hand, if high quality becomes excessively costly, it is more efficient to let a firm deliver the service. The left hand side of the condition can be interpreted as follows: if the valuation of quality increases, nonprofit provision becomes ceteris paribus more interesting. Also, if the quantity provided by the organization increases, effort cost per unit of quantity becomes cheaper, enlarging the basin of attraction for nonprofits.

Comparing co-operative provision with other organizational forms incurs taking into account the alignment cost D_C. Again, as in Herbst & Prüfer (2007), co-operatives dominate firms as long as the costs of collective decision making are sufficiently low. This is no surprise, since co-operatives, by combining the calculus of both users and owners in its decision making processes, come close to the maximization of the social optimum. Similarly with nonprofits, the basin of attraction for co-operatives increases the quantity of the service, or its valuation, increases. We also find that the critical value of D_C, being the borderline between the basins of attraction of firms and co-operatives, lowers as the additional effort cost for providing extra quality increases.

Finally, comparing nonprofit provision and co-operative provision reflects the same reasoning. Especially in cases where budgetary restrictions do not apply, nonprofits will want to increase their quality level excessively high, which is only efficient when the cost of providing this extra quality is not too high. At the same time, an increase in the valuation for quality, as an increase in the quantity of the service, will enlarge the basin of attraction for the nonprofit vis-à-vis the co-operative.

In any case, the institutional comparative advantage of a co-operative depends strongly on the extent to which it is able to keep costs of decision making low. Mechanisms that lower member heterogeneity and that align member interests within the co-operative will strengthen the institutional position of the co-operative. On the other hand, the curvature (or convexity, as denoted in Herbst & Prüfer (2007)) of the effort cost function is also defining for the relative success of alternative organizational forms. This analytical framework allows us to explore some basic mechanisms behind the creation of co-operatives, as well as behind processes of demutualization.

2.5. Extensions

As this paper is still work in progress, we discuss some extensions that may be worthwhile to consider. While the literature that compares for-profit provision with nonprofit provision grows day by day, we will try to translate some of these insights to the co-operative provision of public services as well, albeit, for now, in a narrative way.

Side payments and government regulations

One of the first things to add to this model is making side payments explicit. Side payments can be provided by governments granting subsidies or by philanthropists and social organizations giving donations. They are likely to have different effects for firms, co-operatives and non-profit institutions.

Side payments per unit of quantity will result in an increase of quality by the nonprofit, as budget restrictions become softer[28]. However, Glaeser & Shleifer (2001) warn for a side effect: as side payments become available, nonprofits will put themselves in a situation where donations have a real effect on their incentives, like overcommiting resources to become cash poor or introducing internal rules like the requirement for every project within the organization to find its own financing. This may lead to the repeatedly observed finding that nonprofits strategically hold large endowments[29], while working hard to stay poor on the cash flow basis (Glaeser & Shleifer, 2001). It may be worthwhile to investigate the conditions under which the same holds for co-operatives.

In the case of firms, side payments will give them incentives to reduce quality, as this – given the current set-up of the model - would lower the mark-up of the firm above marginal costs. As co-operatives combine aspects of both worlds, the effect of side payments on the quality of co-operative public service provision remains undecided. Alternatively, we could also consider government subsidies that are directly linked to the level (or to the mere achievement) of quality standards. Also this is left for future research.

Government regulations that condition subsidies on a restriction of dividend payments would in any case incur a greater inclination of the co-operative to translate these side payments into an increased quality provision. In the same spirit, providing tax advantages will incline nonprofits to spur quality provision. For co-operatives, the same result holds true as long as dividend payments are restricted or prohibited. As the effects of subsidies or tax advantages on quality provision may be clear, the effects on total surplus are still in doubt, as the government may stimulate an overly costly provision of quality. Of course, attention to specific disadvantaged groups in society, as well as other normative prerogatives may justify such a policy focus.

Positive externalities

The latter argument may be connected with the fact that the provision of public services often generates positive externalities. Whereas we focused on the rival aspects of the public service, high quality public services may have a positive impact on society as well. For example, a healthier and better educated population improves accumulation of human and social capital, enhancing economic growth and social welfare. Including these considerations into our total surplus story may make a case for quality enhancing government regulation.

Next to these potential *merit good* aspects of public services, another extension needs to be considered. In our model, we restricted attention to the individual valuation of quality, whereas public services may have an impact that goes far beyond the valuation of its current users. Introducing aspects like altruism and solidarity (non-users prefer users to be well treated in public services) or expected utility calculus (someday, non-users may become users) enhanced by some degree of risk aversion (non-users really want to be treated well in the contingency they become users), will definitely expand the basin of attraction for non-profit and co-operative provision. Note, however, that the provision of public services with non-rival and non-excludable side-products becomes prone to free riding behavior[30].

[28] This observation is equivalent with that of Glaeser & Shleifer (2001), who establish that donations to non-profits lead to an increase in quality, whereas this is not the case with for-profit organizations.

[29] See Hansmann (1990) for an extensive discussion on the endowments of universities, Wedig et al. (1996) and Gentry (2002) for the case of hospitals and Van Opstal & Pacolet (2007) for the case of sheltered workshops.

[30] Besley & Ghatak (2007) establish that in such cases, the same result holds as in the standard literature on the voluntary provision of public goods.

Multistakeholder co-operatives

During the exposition of the model, we implicitly allowed for non-users to vote in the co-operative, which may be the case when $\gamma/\sigma < 1$. Widening the scope of those who valuate service quality would allow for a more explicit identification of the conditions in which multistakeholder co-operatives become an interesting alternative. This extension of the set of evaluators does not need to be restricted to the set of potential users. In board of directors, social organizations and movements may have a strong moral voice in co-operative decision making, reflecting the needs and expectations from their part of civil society[31]. Also the staff of the public service may valuate quality of the provision.

As an alternative, we could compare traditional consumer co-operatives where each member has a double identity, being both consumer and user, with co-operatives that allow for outside-users (without voting rights) or outside investors. In the case outside-users are allowed, these non-members would be charged a higher price[32]. This rent, earned from outsiders, subsidizes consumption by its members, attracting members with relatively low valuations for the public service to consume anyway. This results in what Hart & Moore (1998) denote as an inefficient inclusion of co-operatives. In the case of outside-owners, these non-users would pay a negative price, being the dividend (Hart & Moore, 1998).

Worker co-operatives

It would be interesting as well to compare the performance of worker co-operatives, i.e. co-operatives where membership consists of service providers, with the outcome for consumer co-operatives. Their calculus, however, is fundamentally different. While members of a consumer co-operative face a trade-off between maximizing consumer surplus and maximizing profit, members of a worker co-operative basically maximize income per member[33]. Of course, as noted before, workers may valuate quality of the provision as well.

Francois (2003) compares the for-profit and nonprofit provision of public services where concerned employees may donate extra effort if they believe in the organization's mission. This labor donation hypothesis, however, is subject to a free rider problem since workers do not care about their own effort, but about its impact on total output. Francois compares available alternatives for for-profits and nonprofits to overcome this problem and finds that in equilibrium for-profits install a supervision technology to monitor effort, while nonprofits engage themselves in relational contracting, paying a wage premium. The optimal choice for a co-operative in this setting, however, remains unclear, and is open for further research.

Motivated agents

A similar argument has been made by Besley & Ghatak (2005), who compare incentives of intrinsically motivated agents working in mission-driven organizations (producing public goods and services or merit goods) with profit maximizing firms. They focus on the non-

[31] In Belgium for instance, early co-operatives were firmly embedded within other social movements, such as the Christian and socialist workers movement and the Christian farmers' movement. In more recent times co-operatives also arose in the wake of the Third World movement and the ecological movement. Many of the contemporary co-operatives maintain more or less close institutional ties to their respective social movement (Develtere & Raymaekers, 2006; Gijselinckx, Develtere & Raymaekers, 2007; Gijselinckx & Develtere, 2008).

[32] Providing a discount to members is a widespread practice among co-operatives to ensure ongoing economic interactions between members and their co-operative.

[33] Bolton & Xu (2001) provide an interesting framework to compare customer co-operatives, worker co-operatives and firms in a setting of internal and external competition on the labor market. Ohnishi (2008) provides a comparison between a worker co-operative and a profit-maximizing firm in a quantity-setting model with a strategic commitment to providing capacity, which may be relevant framework to study worker co-operatives in health and social care.

pecuniary aspects of motivation, the sorting process of agents between organizations and the productivity that results from this matching process. Translated to our model, intrinsically motivated managers may characterize their effort cost function less concave (i.e. lowering their effort cost scheme in bargaining their management contract) when they are matched with organizations that put an intrinsic focus on quality. For both nonprofits and co-operatives that succeed to attract such mission-driven managers, this may result in an expansion of their basin of attraction, i.e. making these organizational forms the most attractive alternative.

Asymmetric information

Glaeser & Shleifer (2001) also put their focus on lower management salaries in the nonprofit sector. However, they do not model this outcome as a result of entrepreneurial altruism of non-profit managers, but focus on the strategic aspect of this choice. They observe that the non-distribution constraint of a non-profit softens incentives of not-for-profit managers, allowing them to put greater and credible focus on quality provision. Consequently, stakeholders feel themselves protected by the non-profit status, resulting in higher employee commitment, customers willing to pay higher prices and donors willing to give more, providing the entrepreneur a competitive advantage. As long as the benefits of this competitive advantage outweigh the costs of having to take their net revenues in the form of perquisites rather than cash, this result is incentive compatible.

At the heart of this observation lies asymmetric information. Especially in the field of quality provision, there exists a rich variety of sources for asymmetric information. The source described in Glaeser & Shleifer (2001) is a risk of ex-post expropriation, i.e. managers can shirk on a contracted quality level, because quality cannot be enforced properly for a court. In the literature, this phenomenon is also referred to as the hold up problem. This result holds particularly for public services like health care, child care, long term care for the elderly and schools.

Translating these insights into our model may result in implementing costly monitoring technologies or in paying efficiency wages, thereby increasing the convexity of the effort function. As noted before, a trade off between these technologies has been modeled by Francois (2003) for firms and nonprofits, but this still has to be done in the context of a co-operative provision of public goods. Hart & Moore (1998) indicate that co-operatives have a disadvantage in solving agency problems like these. Because of the fact that most co-operatives naturally have many shareholders, each with equal, hence little, voting power, it is difficult for an individual shareholder to exert pressure on the management. Furthermore, enhanced by the fact that many shareholders only have a small financial stake in the co-operative, there is an internal free rider problem of exerting control of the management. According to Ben-Ner (2000), stakeholders of nonprofits demonstrate a similar lack of interest in controlling the nonprofits management. Nevertheless, as pointed out by Bolton & Xu (2001), consumer co-operatives may have a comparative advantage to reduce hold up problems, as users obtain power from their ownership of assets.

Another source of asymmetric information comes, as in our model, from the fact that the valuation of public services is private information. As noted by Handy (1997), this form of asymmetric information may become subject of exploitation when those who decide about the purchase are different from those who consume the service. This is typically the case for public services like child care, care for people with mental disabilities, schools, but also in pharmacies (prescriptions are written by medical staff) and hospitals (whose services are often largely paid by public or private health care insurance). The same problem holds when there is a time lag between the production of the service and the comprehension of its benefits, which may, again, be relevant for services like schooling, pharmacies and rehabilitative care.

In order to include this problem into our model, we would have to expand its static framework into a dynamic one. An example of such an exercise is Lundgren (2008), who compares public good provision by a firm, which he denotes as corporate social responsibility, in a static framework and a dynamic framework. Since the latter allows for the creation of reputations and goodwill, it would be interesting to compare how nonprofits, co-operatives and firms perform in such a setting.

Identity and member heterogeneity

As discussed in Hart & Moore (1998), decisions in a co-operative depend on the preferences of the median member instead of the average member. This may lead to situations where projects that provide a very large payoff for a minority of members, but only a mediocre payoff for the majority, may not be accepted. This argument might be very relevant for multistakeholder community co-operatives where only a minority of members is an actual consumer of the services involved. The inefficiencies that arise from this problem grow as member heterogeneity increases.

We pointed out before that Defourny et al. (2002) identified the condition of necessity as one of the necessary conditions for setting up a co-operative. However, they also mention a second condition, the condition of collective identity. For a formal treatment of introducing identity formation into economic theory, we refer to the seminal work of Akerlof & Kranton (2000). Introducing identity into our model may lower the alignment costs of the co-operative, as a stronger collective identity may weaken the problems associated with member heterogeneity[34].

Size and scope of the provision

As proposition 2 only holds for efficiency comparisons of organizational types in public service provision of identical size, we definitely have to address the issue of endogeneity of the size of provision with respect to its organizational form. The same holds for the scope of the service provision. While quality comparisons in proposition 1 are based on the assumption that decision making is based on an identical draw of the distribution of valuations θ, it is rather straightforward to evaluate what happens when membership consists of subsets of this distribution with higher (respectively lower) valuations for the good. Again, accounting for endogeneity in this respect would allow us to evaluate the scope different organizational forms will take.

This may result in an equilibrium with relatively homogeneous (branches of) co-operatives, each serving different classes of members with specific needs and preferences[35]. Such an equilibrium can be found in Japan, where health co-operatives appear to provide an alternative for people who are not satisfied with the quality level of other providers. According to Kurimoto (2002), Japanese health co-operatives play an innovative role, reflecting the preferences and needs of the local community, while limiting themselves to small scale care provision, complementing a larger scaled system of government provision.

[34] Novkovic (2008) points out that traditional economic theory often predicts the failure of co-operatives in many circumstances, while co-operatives appear to be much more successful and widespread in reality. We concur with her conclusion that an inclusion of co-operative values and principles into formal economic theory, being important drivers for collective identity, may shed an entirely different light on theoretical predictions on the relative performance of co-operatives.

[35] A similar solution is proposed by Ben-Ner (2002). In the alternative he proposes, relatively homogeneous groups of customers (like consumer co-operatives) bundle their demand to initiate a workable form of product differentiation, where prices and product characteristics are tailored to the needs of this group of consumers.

Note also that our model does not exclude equilibria in which firms, nonprofits and co-operatives coexist in the same market[36]. Handy (1997) points out that such a coexistence can be assigned to heterogeneous preferences between users, where consumers choose service providers that deliver a quality level according to their preferences[37]. Ben-Ner (2002) assigns this possibility to the fact that consumers differ in their treatment of information, resulting in a different assessment of asymmetric information, and in their ability to act collectively. We believe that such coexistence can be ascribed to differences in almost all of the elements we presented during the exposition of the model and the discussion of its extensions.

3. CO-OPERATIVE PROVISION IN AN EVOLVING WELFARE STATE

In this section, we discuss the inferences that can be made from our model on co-operative organizational performance when evaluating the challenges our welfare states have to deal with. As pointed out by Hart & Moore (1998), ownership structures are not static, so it may be interesting to look at changes we may expect in the light of an evolving welfare state. José Carlos Guisado, president of the IHCO, formulated the following, pretty controversial, statement in a 2005 IHCO newsletter[38]:

> *"We are approaching the year 2010. In terms of public welfare, however, we might just as well be approaching 1910. The situation in Western countries shows great similarities to that one hundred years ago."*

He continues with listing several challenges, such as the impact on an ageing baby boom generation on social security budgets and on the demand for health and social care, the threatening of industrial employment by processes of globalization and technological developments, weakening the tax base and increasing the costs of unemployment benefits and reemployment schemes, and the increasing cost of housing. Finally, he concludes:

> *"Co-operatives will be the people's alternative when public welfare systems no longer can cope with their own structural shortcomings."*

We will evaluate his statement by using our model to evaluate the technological, economic, social and political changes our welfare states are confronted with[39].

3.1. A declining role of the government

Over the last 30 years, most welfare states faced a shift of government intervention in terms of active government provision, government funding and government regulation[40]. As government provision declines, whether for political-ideological[41] or budgetary reasons, several geographical regions will face a decline in public service supply. Especially in remote areas, where alternatives were already scarce before, this may result in a dramatic decrease of

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[36] We refer to Handy (1997) for a nice diagrammatic analysis of the coexistence of government, for-profit and non-profit institutions within the same activity domain.

[37] Besley & Ghatak (2007), who consider public good provision as a side product of private good production, being an interpretation of corporate social responsibility, also find that "more responsible firms" also earn higher profits, as a reputational premium, coming from a subset of customers that have a high valuation of these public goods.

[38] http://www.ica.coop/ihco/publications/2005-1-ihco-news.pdf

[39] Ben-Ner (2002) provides a similar analysis when comparing the comparative institutional performance of governments, nonprofits and firms, focusing on the change in characteristics of goods in terms of (non-)rivalry, (non-)excludability and the degree of asymmetric information.

[40] For an interesting review of the role of the market versus the state, we refer to Shleifer (1998). Besley & Ghatak (2001) offer an interesting contribution to the debate, stating that ownership of public goods should lie with the party who valuates the good most.

[41] We refer to Bénabou (2008) for a formal framework of ideology, linked to evaluations on the "proper scope" of governments versus markets.

the price elasticity of demand and a relative increase in market power of remaining alternatives. For firms, as for non-user dominated co-operatives, this will result in an increase in an equilibrium with higher prices, but also higher quality. As the difference between this higher quality level with the nonprofit quality level decreases, the convexity of our effort cost function makes the marginal cost of achieving this higher quality level increase as well. We learn from proposition 2 that this makes public services more likely to end up in the basin of attraction for firms (when alignment costs are high) or co-operatives (when alignment costs are low).

Next to this high price – high quality equilibrium, provided by firms and non-user dominated co-operatives, we may also find a low(er) price – low(er) quality equilibrium that coexists with the former. These providers may attract consumers whose inclination to respond to a quality increase is less than proportional. As we learn from part B in proposition 1, non-profits and user-dominated co-operatives may deliver the highest quality level in that case, although this may require side payments to compensate for this overly expensive quality provision. This result is in line with the observation of Rose-Ackerman (1986), where for-profits enter the market in response to a lack of sufficient supply and differentiate their product to provide different varieties and appeal to different groups in the population.

Many welfare states are also facing a decline in government funding for privately provided public service provision. For nonprofits, but also for user-dominated co-operatives, this may result in a decrease of quality provision, as their budgets become tighter. As we can see in proposition 2, this change in quality provision reduces the effort cost difference between firms and non-user dominated co-operatives on the one hand and nonprofits and user-dominated co-operatives on the other hand, increasing the efficiency of the latter two for public service delivery. There might be, however, some compensation by the former two. For firms and non-user dominated co-operatives, a reduction of government funding would reduce demand, which, under the current set-up of the model, would result in a bigger mark-up for the firm, resulting in a quality increase. As a result, the final outcome remains unclear.

Thirdly, whereas many governments reduced their role in active service provision, most governments implemented stricter quality standards for private providers to become eligible for a legal recognition, allowing them to provide the service. An increase in these standards would give a natural advantage to nonprofits and co-operatives, as firms are likely to be the first for which the participation constraint will be binding. If subsidies are linked to the quality level, this would lead to an increase in quality provision for all three types of organizations, as it makes the effort cost function less convex. From proposition 2, we know that this will result in a greater basin of attraction for nonprofit and co-operative provision of public services.

3.2. Technological developments

Technological developments may have an impact on several aspects of public services provision. As pointed out by Ben-Ner (2002), the technological revolution affects both the demand side and the supply side of the market. From the demand side, technological developments, like the internet, allow consumers to perform a better screening to ensure a match with their preferences and reduce asymmetric information. If consumers include a mental risk premium in their calculus of valuations, as is the case when people are risk averse, better screening techniques may reduce this mental risk premium, resulting in a higher average valuation of quality. As we learn from proposition 2, this will increase the basin of attraction of both nonprofits and co-operatives. Technological developments may also permit people to help themselves, reducing their dependence on public services. As an example, technological improvements of the last decades increased the ability of the elderly and people

with disabilities to remain independent from others, allowing them to stay longer in their homes. This increases the price elasticity, leading to a better position for firms and non-user dominated co-operatives.

From the supply side, members and boards of directors may increase their control over management by being able to establish more sophisticated monitoring instruments. As monitoring becomes cheaper, costs of asymmetric information decrease. This will make the effort cost function less convex and increases the basin of attraction for co-operatives and nonprofits. Note, however, that monitoring instruments, like external quality audits and performance measurement tools, may be costly. Therefore, one has to be careful that the negative budgetary impacts these costly tools may have on quality provision do not outweigh the quality gain caused by a less convex effort cost.

3.3. Shifts in demand

Most welfare states are confronted with an ageing population, which dramatically amplifies demand for public services in the areas of health and social care. As the increase of capacity cannot follow changes in demand at the same pace, the price elasticity of demand becomes less elastic. The effects of this evolution are qualitatively the same as that of a reduction in active government provision. On the other hand, as noted by Ben-Ner (2002), this effect may be compensated by the fact that, at the same time, market sizes for public services increased due to lower transportation costs and transaction costs, having a positive effect on the price elasticity of demand.

Not only the quantity of total demand has been changed. Nowadays, consumers may – on average - have a higher valuation of the quality level of public services. This may be induced by the fact that the needs of an ageing population may become bigger. An increased valuation of the public service augments the quality level of co-operatives and nonprofits, and as we learn from proposition 2, increases their basin of attraction, becoming the better performing organizational form in these public services.

Another aspect of a changing demand is the increasing responsiveness of consumers towards shifts in quality. As consumers are – again on average - better informed, more empowered and more self-assured nowadays compared with some decades ago, their quality elasticity of demand, but also the slope of their demand function with respect to quality, has increased. Next to this, social organizations and movements may also have increased their expectations towards quality provision for their members. This evolution results in an increase in quality by all three types of organizational forms. When looking at efficiency, we learn from proposition 2 that this will shift firms and co-operatives to become the more attractive alternative.

3.4. Changes in heterogeneity

Crucial for the success of co-operatives, compared to nonprofits and firms, is their ability to cope with member heterogeneity. Hart & Moore (1998) state that co-operative work well if their activities are narrowly defined, in which case presumably members' interests are aligned. Their finding is in line with proposition 2. As we pointed out in the discussion of the model's extensions, we would allow a strong common identity to act as a substitute for member homogeneity as well. A change in community heterogeneity is, however, one of the challenges many welfare states have to cope with.

First, an increase in intercontinental migration flows may have not only have its consequences on the supportability of our welfare states as such[42], it will also increase heterogeneity of

[42] We refer to Luttmer (2001) and Banting (2005) for a discussion on this issue.

values, preferences and needs in receiving communities as well. As heterogeneity in society increases, the median voter is less informative and the potential for conflicts resulting from a disalignment of interests grows. This means that increased migration flows will place community based co-operatives in a more difficult position, enlarging the basin of attraction for demutualization towards a firm or a nonprofit. Next to ethnicity, however, other sources of heterogeneity, like income and age, may have an impact as well. As most welfare states today face an increase in income inequality, but a decrease in demographic heterogeneity, the effect on organizational performance may appear unclear. Large regional differences may apply, however. While urban areas are traditionally populated by a big variety of people, resulting in a large heterogeneity in terms of income, age and ethnicity, and thus values, preferences and needs, rural areas are often far more homogeneous in these terms. Interregional migration flows towards urban centers, leave an increasingly homogeneous and older population in remote areas. Not surprisingly, it is exactly in those areas that the relative prevalence of co-operative public service provision is high.

3.5. Social cohesion

Although defined in a much broader setting in the literature, social cohesion and social capital are notions that may be linked to the existence of a collective identity within an organization and the existence of other-regarding preferences, including the enclosure of the level of quality provision to others into ones own calculus. As noted by Ben-Ner (2002), the increased mobility of people, both within and across countries, reduced the percentage of people who have long term connections to their community. The same holds for an increased mobility of people in terms of employment duration and relations. As these elements may have a negative impact on social cohesion, resulting in a reduced ability to foster collective identities and empathy within communities, this may reduce the basin of attraction for nonprofits and especially of co-operatives in public service provision[43].

Bowles & Gintis (2002), however, inspect an opposite development. According to them, the role of communities and community governance will increase in importance in the future. They give examples of co-operatives and other community governance structures that solve problems like an insufficient provision of local public goods and an absence of insurance and other risk-sharing opportunities. According to them, members, but not outsiders, have crucial information about members' behaviors, capacities and needs. In areas where members may use this information to uphold norms and to make use of efficient insurance arrangements, organizational forms like nonprofits and co-operatives will have a clear advantage. Furthermore, Westerdahl & Westlund (1998) formulate a local identity hypothesis, reflecting the need for local embedment and local control in a globalizing environment. In contexts where an increase in community heterogeneity and globalization spur new forms of identity formation, this may result in an increased appeal of co-operative solutions for public service provision. The latter two explanations may explicate the relative success of public service co-operatives in modern urban regions like Japan.

3.6. Values and principles

In our baseline model, we focused on ideal-type formalizations of organizations, where we defined organizations by the calculus of its ownership. During the discussion of the

[43] There is, however, a compensating effect, stemming from a reduction in the incremental effort costs between firm quality and nonprofit and co-operative quality provision that follows from a reduced quality provision by nonprofits and co-operatives. From proposition 2, we may conclude that this would increase the basin of attraction of nonprofits and co-operatives, because they restrict an overly costly provision of quality. The evaluation of total surplus, however, would be expanded if we would have taken other regarding preferences into account, leaving us to interpret this compensatory effect as a technicality of the model.

extensions, however, we mentioned that employees, as well as managers, may be intrinsically driven to work for mission-driven organizations. Within firms, this could take the form of corporate social responsibility, while nonprofits are often set up and inspired by social movements or religious congregations. Co-operatives can rely on a set of co-operative values and principles, as defined by the International Co-operative Alliance (ICA), and may develop "co-operative social responsibility" (Develtere, Raymaekers & Meireman, 2005; Harris, 2005 and Gijselinckx, Van Opstal & Develtere, 2008).

While it is hard to make normative judgments on which of these three results in the "better" organization[44], organizations who are able to attract employees and managers who match with their mission are likely to have a competitive advantage (Besley & Ghatak, 2005). If this would result in a lower convexity cost, we learn from proposition 2 that a proper matching of motivated agents and organizations leads to an increase of the basin of attraction for nonprofits and co-operatives.

According to Ben-Ner (2002), a generation of entrepreneurs willing to operate outside the mainstream is growing. If new generations of managers start to take over postmodern values and give a higher valuation to non-monetary benefits, nonprofits and co-operatives may well have a competitive advantage if they are able to attract these entrepreneurs. According to Glaeser & Shleifer (2001), the mere existence of asymmetric information between consumers and providers will make such a career choice incentive compatible for these managers.

CONCLUSIONS

In this paper, we addressed the conditions under which co-operatives are an interesting alternative for public services provision, compared to outside ownership and nonprofit provision. Therefore, we sketched a formal model, discussed several possible extensions and evaluated the impact of several aspects of an evolving welfare state on the institutional comparative advantage of co-operatives as a provider of public services. While our baseline model draws heavily on the work of Herbst & Prüfer (2007), there are some important distinctions as well. First, Herbst & Prüfer (2007) make the assumption that all organizations make profits anyway. Because this may have a crucial impact on nonprofits and user-dominated co-operatives, we drop this assumption, which allows us to have a clearer view on the effect of side payments by governments, philanthropists or social movements. Secondly, we make a generalization of the market structure and introduce price and quality elasticities of demand instead of describing a "competitive fringe" that only captures the second best alternative. We also go deeper into the question what happens when the second order derivate or demand with respect to quality becomes negative, i.e. when the sensitivity of demand for quality becomes less than proportional, which may be the case for many commodities. Finally, we brought quantity and marginal costs into the discussion and did not restrict ourselves to a uniform distribution of valuations.

As this paper reflects work in progress, several refinements still have to be made. Next to the fact that many of the possible extensions we've discussed may be worthwhile to formalize, we still have to become clearer on the composition of membership and the issue of membership fees. While co-operatives are traditionally an instrument for mutual benefit, providers of public services should guarantee general access and focus on public benefits. This issue, which is linked to the position of those who are at the bottom of the income distribution, is also left for further research.

Nevertheless, we believe that the contribution of this paper exists in applying some recent insights from economic theory to a field that, according to the International Health Co-

[44] We won't go as far as Pezzini (2006), who states that co-operatives are "good" firms by definition.

operative Organization, affects the lives of 100 million households over the world. In addition, we applied these insights to the challenges that are engendered by several aspects of an evolving welfare state. While the discussion was focused on those public services that are affected most by these developments, i.e. health and social care, we may apply this framework to challenges other public services are facing as well. More specifically, in many parts of the world, co-operatives are also prevailing in public services like schooling, employment initiatives for disadvantaged groups in society, social housing and the production and distribution of water and electricity.

A closer look at explanations for the different prevalence between regions of a co-operative public service provision is left for further research. While this paper may provide a framework to explore this issue, another crucial element in defining the comparative institutional performance of organizational types is the legal framework they have to operate in. Furthermore, as we limited our analysis to a comparison of ideal-type organizations, a refined exploration of other bottlenecks and challenges should be a line to follow as well. In the hope that the future will bring richer data on this issue, empirical work could be crucial in characterizing key elements for the comparative institutional performance of different types of organizations. Marcuello (1998), Chou (2002) and Gregg et al. (2008) seem to provide promising examples of empirical work to apply in this setting.

Through democratic ownership and control co-operatives try to balance the need for profitability with the needs of their members and the wider interests of the community. In virtue of its properties, co-operatives claim a hybrid position between those of the firm and the non-profit institution. From the baseline model we learn that co-operatives will prevail over other organizational forms in market niches where the need to attract professional managers is sufficiently high and the heterogeneity of preferences among members is sufficiently low. Nonprofit organizations will rather prove to be the most efficient option for services that are mainly provided by voluntary workers and highly intrinsically motivated managers, often remunerated below market prices. The combination of consumption with ownership makes co-operatives more market-driven than nonprofits, stimulating them to produce efficiently and to stay innovative. The success of co-operatives, however, depends on their ability to integrate different interests of their members. If alignment costs, stemming from membership heterogeneity, become too high, demutualization processes may be unavoidable, as outside ownership becomes a more interesting option. Membership heterogeneity, however, can be compensated by fostering prosocial behavior through mechanisms like group cohesion and social pressure (Bowles & Gintis, 2002). As the efficiency of these mechanisms increases with the frequency of social interactions, social organizations and movements may play a key role in shaping the necessary conditions for a successful co-operative provision of public services.

Government policy may play an equally important role in determining the relative performance of co-operatives in public services provision. First of all, a necessary condition for co-operatives to enter these markets is that the legal framework has to allow them to do so. Here, co-operatives are at risk, as local legislators and members of regional and federal parliaments are often unfamiliar with co-operatives, leaving them as a blind spot in legislative work on recognitions and regulations for public services. Some countries, however, like Italy, Portugal, Spain and France, have introduced specific legal forms that allow co-operatives to play a role in public services provision. The success of these legal frameworks may be subject to hysteresis, however, as switch costs (in terms of hiring specialized lawyers, costs of notaries, etc.) may not outweigh benefits. If policy makers are sympathetic to the idea of a co-operative provision of public services, an active promotion of this organizational form towards the broad public, for instance through education and social organizations, may be

necessary. Finally, government policies that complement and support civil society actors in fostering community formation would as well lower perceived heterogeneity and increase the relative efficiency and thus attractiveness of co-operatives.

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APPENDIX

Proof of proposition 1

We start with part A of the proposition, where $\frac{\partial^2 x}{\partial q^2} > 0$.

Comparing quality provision by the firm with the social optimum:

$$\left(\frac{\partial e(q)}{\partial q}\right)^*_{SO} - \left(\frac{\partial e(q)}{\partial q}\right)^*_{F} = \bar{\theta}\left(x_A + \varepsilon_q x\right) + \frac{\partial x}{\partial q}\left(-\frac{\partial c}{\partial x_A}\right) - \left(p - \frac{\partial c}{\partial x_A}\right)\frac{\partial x}{\partial q}$$

$$= \bar{\theta}\left(x_A + \varepsilon_q x\right) - p\frac{\partial x}{\partial q}$$

$$= \bar{\theta}\, x_A + \bar{\theta}\frac{\partial x}{\partial q} q - p\frac{\partial x}{\partial q}$$

$$= \bar{\theta}\, x_A + \frac{\partial x}{\partial q}(\bar{\theta}\, q - p)$$

As the latter expression is positive for any positive amount of service provision, we obtain $q_{SO} > q_F$.

Now, we compare quality provision by the constrained nonprofit organization with the social optimum:

$$\left(\frac{\partial e(q)}{\partial q}\right)^*_{SO} - \left(\frac{\partial e}{\partial q}\right)^*_{N,con} = \bar{\theta}\left(x_A + \varepsilon_q x\right) + \frac{\partial x}{\partial q}\left(-\frac{\partial c}{\partial x_A}\right) - \left(\theta^i q - \frac{\partial c}{\partial x_A}\right)\frac{\partial x}{\partial q} - \theta^i x_A = 0 \text{, so } q_{SO} = q_{N,con}$$

Comparing the co-operative with the social optimum:

$$\left(\frac{\partial e(q)}{\partial q}\right)^*_{SO} - \left(\frac{\partial e(q)}{\partial q}\right)^*_{C} = \theta\left(x_A + \varepsilon_q x\right) + \frac{\partial x}{\partial q}\left(-\frac{\partial c}{\partial x_A}\right) - \frac{\gamma}{\sigma}\theta^i\left(x_A + \varepsilon_q x\right) - \frac{\partial x}{\partial q}\left(p(1-\frac{\gamma}{\sigma}) - \frac{\partial c}{\partial x_A}\right)$$

If $\gamma = \sigma$, $\left(\frac{\partial e(q)}{\partial q}\right)^*_{SO} = \left(\frac{\partial e(q)}{\partial q}\right)^*_{C}$, resulting in $q_{SO} = q_C$

If $\gamma < \sigma$, $\left(\frac{\partial e(q)}{\partial q}\right)^*_{SO} > \left(\frac{\partial e(q)}{\partial q}\right)^*_{C}$ as $\frac{\gamma}{\sigma}\theta^i\left(x_A + \varepsilon_q x\right) > \frac{\partial x}{\partial q}\left(p(1-\frac{\gamma}{\sigma}) - \frac{\partial c}{\partial x_A}\right)$ for $\frac{\partial e}{\partial q} > 0$ to hold, which yields $q_{SO} > q_C$.

For the same reason $\gamma > \sigma$, would result in $\left(\frac{\partial e(q)}{\partial q}\right)^*_{SO} < \left(\frac{\partial e(q)}{\partial q}\right)^*_{C}$, but as no side payments nor initial endowments are available, the co-operative would be constrained by its budget restriction, yielding $q_{SO} = q_C$.

Finally, we compare quality provision by the firm with quality provision by the co-operative.

$$\left(\frac{\partial e(q)}{\partial q}\right)_C^* - \left(\frac{\partial e(q)}{\partial q}\right)_F^* = \frac{\gamma}{\sigma}\theta^i\left(x_A + \varepsilon_q x\right) + \frac{\partial x}{\partial q}\left(p(1-\frac{\gamma}{\sigma}) - \frac{\partial c}{\partial x_A}\right) - \left(p - \frac{\partial c}{\partial x_A}\right)\frac{\partial x}{\partial q}$$

$$= \frac{\gamma}{\sigma}\theta^i\left(x_A + \varepsilon_q x\right) - \frac{\gamma}{\sigma}p$$

$$= \frac{\gamma}{\sigma}\frac{\partial x}{\partial q}\theta^i q + \frac{\gamma}{\sigma}(\theta^i x_A - p)$$

This expression is always positive for any $\gamma \neq 0$, resulting in $q_F < q_C$ for $\gamma \neq 0$ and $q_F = q_C$ for $\gamma = 0$.

Now, we turn to part B of the proposition, where $\frac{\partial^2 x}{\partial q^2} < 0$. Specifically in this case we have to be careful whether the convexity assumptions of the effort cost function hold.

For the firm, $\frac{\partial^2 e}{\partial q^2} = \frac{\partial^2 x}{\partial q^2}\left(p - \frac{\partial c}{\partial x_A}\right) \geq 0$ only holds when $p - \frac{\partial c}{\partial x_A} \leq 0$, which renders losses for the firm. Since the benefit of providing quality is lower than the cost of doing so, the firm will choose $q_F = 0$.

For the (break-even constrained) nonprofit, just as for the social optimum, $\frac{\partial^2 e}{\partial q^2} \geq 0$ holds when $\frac{\partial^2 x}{\partial q^2}\left(\bar{\theta} q - \frac{\partial c}{\partial x_A}\right) + 2\bar{\theta}\frac{\partial x}{\partial q} \geq 0$. This is equivalent to $\left|\frac{\partial^2 x}{\partial q^2}\right| \leq \frac{2\bar{\theta}\frac{\partial x}{\partial q}}{\left(\bar{\theta} q - \frac{\partial c}{\partial x_A}\right)}$. If this condition holds, quality provision will be as in part A of the proposition. Otherwise, quality provision will reduce to $q_N = 0$ because quality provision would become to costly compared to its benefits.

For the co-operative, $\frac{\partial^2 e(q)}{\partial q^2} \geq 0$ holds when $\frac{\gamma}{\sigma}\tilde{\theta}\left(2\frac{\partial x}{\partial q} + q\frac{\partial^2 x}{\partial q^2}\right) + \frac{\partial^2 x}{\partial q^2}\left(p(1-\frac{\gamma}{\sigma}) - \frac{\partial c}{\partial x_A}\right) \geq 0$, which we can rewrite as $\frac{\gamma}{\sigma}2\tilde{\theta}\frac{\partial x}{\partial q} + \frac{\partial^2 x}{\partial q^2}\left(p - \frac{\partial c}{\partial x_A}\right) + \frac{\gamma}{\sigma}\frac{\partial^2 x}{\partial q^2}\left(\tilde{\theta} q - p\right) \geq 0$. In this statement we see the combination of the conditions for a firm and the conditions of a nonprofit to keep on providing quality. In general, the co-operative will provide quality as stated in part A of the proposition as long as $\left|\frac{\partial^2 x}{\partial q^2}\right| \leq \frac{\frac{\gamma}{\sigma}2\tilde{\theta}\frac{\partial x}{\partial q}}{\left(p - \frac{\partial c}{\partial x_A}\right) + \frac{\gamma}{\sigma}\left(\tilde{\theta} q - \frac{\partial c}{\partial x_A}\right)}$. Otherwise, this will result in $q_C = 0$, because in that case, positive quality levels would lead to losses, both in terms of profits as in terms of consumer surplus.

If $\gamma < \sigma$ and $\gamma \neq 0$, the conditions for a co-operative to switch to zero quality provision are (weakly) less stringent than those for the firm, resulting in $q_F \leq q_C$. As long as $p - \frac{\partial c}{\partial x_A} > 0$,

the conditions for a co-operative to switch to zero quality provision are (weakly) more stringent than those for the nonprofit and the social optimum. Therefore, we obtain $q_N = q_{SO} \geq q_C \geq q_F = 0$.

If $\gamma = 0$, we can easily see that the concavity condition for the co-operative refolds to that of the firm, resulting in $q_N = q_{SO} \geq q_C = q_F = 0$.

If $\gamma \geq \sigma$, the budget constraint for the co-operative becomes binding, such that the concavity conditions for the co-operative, the nonprofit and the social optimum become identical. This results in $q_N = q_{SO} = q_C \geq q_F = 0$.

QED

Proof of proposition 2

We defined total surplus as:

$$TS = \int_0^1 \left((\theta^i q - p) x_A(p,q) \right) \phi(\theta) d\theta + x_A(p,q)\left(p - c(x_A)\right) - e(q) - D_j \text{, with } j \in \{F, N, C\},$$

which we can reformulate as:

$$TS = \left(\bar{\theta} q - \frac{\partial c}{\partial x_A} \right) x_A - e(q) - D_j \text{, with } j \in \{F, N, C\}.$$

Now, we evaluate this total surplus for every organizational form, resulting in:

$$TS_F = \left(\bar{\theta} q_F - \frac{\partial c}{\partial x_A} \right) x_A - e(q_F) \text{ for the firm,}$$

$$TS_N = \left(\bar{\theta} q_N - \frac{\partial c}{\partial x_A} \right) x_A - e(q_N) \text{ for the nonprofit, and}$$

$$TS_C = \left(\bar{\theta} q_C - \frac{\partial c}{\partial x_A} \right) x_A - e(q_C) - D_C \text{ for the co-operative.}$$

Total surplus under nonprofit provision exceeds total surplus under firm provision if:

$$\begin{aligned} TS_N - TS_F &= \left(\bar{\theta} q_N - \frac{\partial c}{\partial x_A} \right) x_A - e(q_N) - \left(\bar{\theta} q_F - \frac{\partial c}{\partial x_A} \right) x_A + e(q_F) > 0 \\ &= \left(\bar{\theta} q_N - \bar{\theta} q_F \right) x_A - \left(e(q_N) - e(q_F) \right) > 0 \\ &\Leftrightarrow \bar{\theta} x_A > \frac{\left(e(q_N) - e(q_F) \right)}{q_N - q_F} \end{aligned}$$

Total surplus under co-operative provision exceeds total surplus under firm provision if:

$$TS_C - TS_F = \left(\bar{\theta}\, q_C - \frac{\partial c}{\partial x_A}\right) x_A - e(q_C) - D_C - \left(\bar{\theta}\, q_F - \frac{\partial c}{\partial x_A}\right) x_A + e(q_F) > 0$$

$$= \left(\bar{\theta}\, q_C - \bar{\theta}\, q_F\right) x_A - \left(e(q_C) - e(q_F)\right) - D_C > 0$$

$$\Leftrightarrow D_C < \bar{\theta}\, x_A - \frac{\left(e(q_C) - e(q_F)\right)}{q_C - q_F}$$

Total surplus under co-operative provision exceeds total surplus under nonprofit provision if:

$$TS_C - TS_N = \left(\bar{\theta}\, q_C - \frac{\partial c}{\partial x_A}\right) x_A - e(q_C) - D_C - \left(\bar{\theta}\, q_N - \frac{\partial c}{\partial x_A}\right) x_A + e(q_N) > 0$$

$$= \left(\bar{\theta}\, q_C - \bar{\theta}\, q_N\right) x_A - \left(e(q_C) - e(q_N)\right) - D_C > 0$$

$$= -\left(\bar{\theta}\, q_N - \bar{\theta}\, q_C\right) x_A + \left(e(q_N) - e(q_C)\right) - D_C > 0$$

$$\Leftrightarrow D_C < -\bar{\theta}\, x_A + \frac{\left(e(q_N) - e(q_C)\right)}{q_N - q_C}$$

QED