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Abstract

A homogenous goods market with nonprofit and profit companies engaged in monopolistic competition is proposed. In a short run equilibrium, entrance of more companies of both types increases consumer surplus and reduces company profit. However, nonprofit companies under a long run zero profit constraint will act inefficiently and have higher marginal costs than profit companies. From this follows that more funds for donations to nonprofit companies reduce the welfare to be gained on the market. Depending on the size of donations, nonprofit companies may have higher, the same or lower (quality) output than profit companies.

JEL: L10, L13, L21, L25, L31, L33, L38, I31, I38

Key words: Nonprofit, Market structure, Monopolistic competition, Efficiency, Funding, Donations, Grants, Welfare

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1. Introduction

Not-for-profit and for-profit, or nonprofit and profit companies, are competing suppliers on markets for hospital services, old age and child care, education, research and rental housing. An early estimate of the sector's importance is reported by Rose-Ackerman (1996) and later by Kendall, Knapp and Fonder (xxx), who report the following nonprofit market shares in residential care: England (15%); US (19%); France (29%); Japan (43%); Germany (60%); Italy (81%) and for preschool day care: Japan (36%); US (59%); Germany (35%); England (82%). The role of nonprofit providers has lead to a large body of theoretical and empirical work trying to explain the existence and behaviour of these companies in competition with profit companies. The most recent survey of the economic literature in the field seems to be Malani, Philipson and David (2003), who distinguish between three types of economic models, namely the Altruism model, the Physician Cooperative Model and the Noncontractible Quality Model. The frame for the models is the competitive market and the derived effects on firm and industry behaviour are confined to this market type. Goering (2008) studies a nonprofit company in two duopolistic markets with either a profit or a public company and in a market with three companies of each type. Preston (1988) models monopolistic competition for donations with a zero profit restriction for both profit and nonprofit companies. In her model, goods differ by variety and some goods give external social benefits. Nonprofit companies receive donations, which are positively correlated with the social benefit of the variants produced. Consequently, nonprofit companies will produce goods with external social benefits and profit companies will produce private goods. From this follows that donations to nonprofit companies are beneficial as a correction of market failure.

The model to be presented below has a linear demand function on a market where nonprofit and profit companies are engaged in monopolistic competition. The products are homogenous private goods without external effects. Cournot competition leads to a short run Nash equilibrium; and two propositions on the beneficial effect of entrance of nonprofit and profit companies on the market are stated. Subsequently, a zero profit condition is imposed on both types of companies for the long run equilibrium. Free market entry secures zero profit for profit companies, and the restriction inherent in the name "nonprofit" together with an assumption that patrons will stop donating to nonprofit companies that constantly earn a positive profit substantiates a zero profit restriction for nonprofit companies as well[1]. It is furthermore assumed that the total amount of funds for nonprofit

[1] Formally, a nonprofit company is allowed to earn profit, but not to distribute it to its patrons.

companies is exogenously determined and that all nonprofit companies receive a fixed output independent minimum donation. The last because it is unrealistic to have the available total funds spread out to an infinite number of nonprofit companies; and with free entry of identical nonprofit companies they all get the minimum donation[2]. Funds for nonprofit companies consist of public grants and private donations. Heutel (2009) studies tax return files of nonprofit organizations and finds evidence for crowding in of private donations with public grants acting as a positive signal to private donors. Andreoni and Payne (2010) use a panel of more than 8,000 charities and find crowding out of private donations mainly because public grants leads to reduced fund raising efforts by the charitable organizations. The assumption that total available funds for nonprofit companies is exogenously given with a fixed donation to each company gives a number of companies proportional to the amount of available funds. This may seem restrictive, but is partly corroborated by Luksetich (2008) who, using Internal Revenue Statistics panel data over 14 years, finds a significant positive relation between both government grants and program service revenues and the number of nonprofit companies, and only weak evidence for a relation from the number of companies to the amount of government grants and program service revenues.

The model is of the altruism type, and nonprofit companies are supposed to maximize a target function with a weighted combination of profit and output measured in quality corrected units. Lakdawalla and Philipson (2006) model firms with non pecuniary motives as profit and output maximisers with a cost advantage compared to profit firms in a competitive market. In the present model, nonprofit companies may in the short run have higher, equal to or lower marginal productions costs than profit companies. Empirical evidence gives no clear indication of costs differences between the two types of companies; see Malani, Philipson and David (2003) with references. A recent study by Mullins and Walker (2009) shows preliminary evidence of higher efficiency of private developers of social housing compared to nonprofit providers. Benz (2005) finds higher job satisfaction among nonprofit workers, and Borzaga and Tortia (2006), based on a sample of 228 Italian public, nonprofit and profit operators in the social service sector, show that incentives consisting of opportunities to engage in meaningful relations have a positive influence on worker's satisfaction. Worker satisfaction may be part of the remuneration, and religious nonprofit operators have the highest job satisfaction and the lowest wages. A similar tendency is found for

[2] Rose-Ackerman (1982) presents a model with nonprofit companies engaged in monopolistic competition over donations.

social cooperatives, whereas other nonprofit operators have lower satisfaction and higher wages than profit operators.

The present paper is analytical and leads to important propositions. The firsts treat the short run equilibrium and state that entrance of more companies of both types increases consumer surplus and reduces company profit. The zero profit conditions come into play in the long run and lead to the proposition that output independent donations to nonprofit companies force them to act inefficiently and have higher marginal production costs than profit companies. From this follows the proposition that more output independent funds for nonprofit companies reduce the welfare gain on the market.

The next section presents the short run model with Cournot-Nash equilibrium. Section 3 expands the model to cover the long run equilibrium where both companies must obey a zero profit restriction. Having done this, section 4 derives two important propositions for the market in long run equilibrium and looks at the relation between the size of donations and nonprofit company behaviour. Finally, section 5 concludes.

2. The short run equilibrium

The model covers a market with profit and nonprofit companies engaged in monopolistic competition. The unit of output q is measured in appropriate units of health care, education, child care or housing service, and are assumed homogenous, e.g. measured as a quality weighted number of treatments, supplied hours or square meters during a time period. It can be asserted that consumers perceive output from nonprofit companies to be of higher quality than output from profit companies, which is in conflict with the homogeneity assumption. However, Malani and David (2008) show that the majority of nonprofit providers do not signal their status on their home pages and yellow sides, which in their interpretation shows that nonprofit is not a signal of quality.

Both profit and nonprofit companies operate as suppliers on the market[3]. The total number of companies, each indexed with an i, on the market is m composed of p profit companies ($p \leq m$) and $m - p$ nonprofit companies. The companies are assumed identical within their respective group. Each profit company supplies the amount q^p and each nonprofit company supplies the amount q^n.

[3] Public suppliers are not included. Alternatively, the market can be understood to be the part left after public suppliers have taken their exogenously determined share.

With the price P per period for a unit of output, the market demand is assumed to be linear according to the equation

$$P = a - b(\sum_{1}^{p} q_i^p + \sum_{p+1}^{m} q_i^n) \tag{1}$$

In equation (1) and in the following equations all parameters are assumed to be positive unless otherwise stated. The parameter a indicates the size of the market. The supplied units are produced by the companies, each with total production costs $F + (c + s)q$ per period, i.e. with a fixed cost F and a constant marginal cost $c + s$. However, the marginal cost element s is zero for profit companies, but may be positive, zero or negative for nonprofit companies. Nonprofit companies are assumed to be less efficient in production in the following presentation of the model, and so $0 < s$; an assumption to be discussed further in section 4. For supply to be sold on the market, it is furthermore assumed that $c + s < a$. The nonprofit companies take their marginal costs $c + s$ as given in the short run, and all the companies on the market take the supply from competitors as given and react by optimising own output. A reaction pattern like this seems reasonable whenever it takes time to bring new supply to the market, e.g. because planning and production of new output take time and force companies to initiate changes of supply in good time before it appears on the market.

Profit companies adjust their supply in order to maximise their profit π_i:

$$\pi_i = Pq_i^p - cq_i^p - F = \left[a - b(\sum_{1}^{p} q_i^p + \sum_{p+1}^{m} q_i^n) - c \right] q_i^p - F. \tag{2}$$

In order to maximize profit, (2) is differentiated with respect to q_i^p and set equal to zero:

$$\frac{\partial \pi_i}{\partial q_i^p} = a - 2bq_i^p - b(\sum_{j \neq i}^{p} q_j^p + \sum_{p+1}^{m} q_i^n) - c = 0.$$

The marginal revenue for a profit company can be written

$$MR = a - b(\sum_{j \neq i}^{p} q_j^p + \sum_{p+1}^{m} q_i^n) - 2bq_i^p .$$

This shows that the marginal revenue of a company is lower the more other profit and nonprofit companies supply. The profit maximization behaviour of profit companies gives a reaction function for the supply from each company:

$$q_i^p = \frac{a - b(\sum_{j \neq i,1}^{p} q_j^p + \sum_{p+1}^{m} q_i^n) - c}{2b} . \tag{3}$$

Remembering that the output quantities are identical for all firms within their respective group subscripts can be dropped and the reaction function (3) for profit companies can be changed to

$$q^p = \frac{a-c}{(1+p)b} - \frac{m-p}{1+p} q^n . \tag{4}$$

The slope of the reaction function is negative with the implication that an increase of output from each nonprofit company leads to a fall of the output from each profit company[4].

The objective for nonprofit companies is less obvious. Gleaser and Shleifer (2001) explain the existence of nonprofit companies by assuming that the management of nonprofit companies maximise profit, but use it for perquisites for some or all employees. The regulation of nonprofit companies normally allows a positive profit, but the companies are not allowed to pay dividends to private persons. A reason for such companies to target a modest profit could be as an insurance against "bad" times where unforeseen negative profits will cut into the accumulated positive profit. In addition, nonprofit companies may be more precautious than needed and thus collect profit over time. Public and private funders of nonprofit companies require performance measuring of the companies and this naturally leads to an aim for output performance. The complexity and effect of measuring performance of nonprofit operators is the subject of a recent number of papers, see Alexander, Brudney and Yang (2010) and Thomson (2010). A way to catch both the profit and the

[4] Note, that a proportional tax on profit does not change the reaction function for profit maximizing companies.

output motive is to propose a target function for nonprofit companies, which is a weighted average of profit and output[5]:

$$T_i = \sigma q_i + (1-\sigma)\pi_i. \quad 0 < \sigma < 1. \tag{5}$$

In equation (5), the parameter *σ* is the weight nonprofit companies attach to output versus profit. A high *σ* indicates that nonprofit companies are eager to produce a big volume (or high quality) of output, whereas companies with a low *σ* have management (and employees) who are more inclined to seek profit either as insurance against unforeseen bad times or as a potential source for perquisites. It is assumed that *σ* is a strategic company parameter, which is fixed in the short run, but may be changed by the board of the company when the overall strategic aims of the company are on the agenda from time to time. It is further assumed that all nonprofit companies have the same *σ*.

Further it is assumed that each nonprofit company receive a donation *D* as a lump sum grant, independent of its output performance. Few donations are probably completely independent of the output performance, which may imply that *D* is small. Possible payments directly connected to output like a subsidy per unit should be considered part of the price *P*. The assumption is that both types of companies obtain the same "price" per unit of output. Profit for nonprofit companies is then:

$$\pi_i = Pq_i^n - (c+s)q_i^n + D - F. \tag{6}$$

As for profit companies, nonprofit companies decide their output taking the output from other suppliers as given. With this, they maximise the target *T* with respect to q_i^n to find the optimal quantity:

$$\frac{\partial T_i}{\partial q_i^n} = \sigma + (1-\sigma)(a - b(\sum_1^p q_j^p + \sum_{j \neq i, p+1}^m q_i^n) - 2bq_i^n - (c+s)) = 0. \tag{7}$$

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[5] Goering (2008) proposes profit plus consumer surplus of the stakeholders as the target for nonprofit companies. Deneffe and Masson (2002) find that US nonprofit hospitals consider both profit and output as objectives.

The maximization leads to a reaction function for nonprofit companies:

$$q_i^n = \frac{a - b(\sum_1^p q_i^p + \sum_{j \neq i, p+1}^m q_j^n) - (c+s) + \frac{\sigma}{1-\sigma}}{2b}. \tag{8}$$

A new variable $v = \sigma/(1-\sigma)$ with $0 < v < \infty$ is now introduced to indicate nonprofit companies focus on output compared to profit maximization. A higher v means more focus on output performance[6]. With this, equation (8) can be changed into (without subscripts):

$$q^n = \frac{a-c-s+v}{(1+m-p)b} - \frac{p}{1+m-p} q^p. \tag{9}$$

The slope of the reaction function is negative for nonprofit companies with the implication that an increase of output from profit companies leads to a fall of the output of nonprofit companies. The reaction functions (4) and (9) lead to a Cournot-Nash equilibrium with the following output for profit companies:

$$q^p = \frac{a-c+(m-p)(s-v)}{(1+m)b}. \tag{10}$$

For q^p to be positive, the inequality $v < s + (a-c)/(m-p)$ must hold. In the following it is assumed that this inequality holds and q^p is positive.

For nonprofit companies, the supply in the Cournot-Nash equilibrium is

$$q^n = \frac{a-c-(1+p)(s-v)}{(1+m)b}. \tag{11}$$

[6] Both σ and v are fixed in the short run, but may be changed by the board of nonprofit companies from time to time.

For q^n to be positive, the inequality $s-(a-c)/(1+p) < v$ must hold. It is assumed that both q^n and q^p are positive, so that

$$s - \frac{a-c}{1+p} < v < s + \frac{a-c}{m-p}. \tag{12}$$

From (10) and (11), the difference in supply between the two types of companies can be written

$$q^n = q^p + \frac{v-s}{b}. \tag{13}$$

If nonprofit companies focus more on output performance, i.e. v increases, this will increase the difference in supply between the two types of companies. However, if nonprofit companies are inefficient producers with a high s, they may supply less than profit companies.

To see the effect of more profit companies entering the market, differentiate (10) and (11) with respect to p and keep the difference $m-p$ constant, so that $\partial p = \partial \mathrm{m}$:

$$\frac{\partial q^p}{\partial p} = -\frac{a-c-(m-p)(s-v)}{(1+m)^2 b} = -\frac{q^p}{1+m} < 0. \tag{14}$$

Equation (14) tells us that more profit companies on the market will reduce the output of each company in the Cournot-Nash equilibrium. This is also the case for nonprofit companies because of equation (13), which implies that $\frac{\partial q^p}{\partial p} = \frac{\partial q^n}{\partial p}$. To see the effect of more nonprofit companies entering the market, differentiate (10) and (11) with respect to m and keep p constant:

$$\frac{\partial q^n}{\partial m} = -\frac{a-c-(1+p)(s-v)}{(1+m)^2 b} = -\frac{q^n}{1+m} < 0. \tag{15}$$

More nonprofit companies on the market will reduce the output of both nonprofit and profit companies in the short run Cournot-Nash equilibrium. The total supply on the market Q in equilibrium is

$$Q = pq^p + (m-p)q^n \;\Rightarrow$$

$$Q = \frac{m(a-c)-(m-p)(s-v)}{(1+m)b}. \tag{16}$$

The effect on total output Q of profit companies entering the market is found by writing

$$Q = pq^p + (m-p)(q^p + \frac{v-s}{b}) = mq^p + (m-p)\frac{v-s}{b} \;\Rightarrow$$

$$\frac{\partial Q}{\partial p} = q^p - \frac{mq^p}{1+m} = \frac{q^p}{1+m} > 0. \tag{17}$$

In a similar way, the effect on total output Q of nonprofit companies entering the market is:

$$Q = p(q^n - \frac{v-s}{b}) + (m-p)q^n = mq^n - p\frac{v-s}{b} \Rightarrow$$

$$\frac{\partial Q}{\partial m} = q^n - \frac{mq^n}{1+m} = \frac{q^n}{1+m} > 0. \tag{18}$$

An increase of the number of both types of companies on the market will increase total output. The equilibrium price on the market can now be derived from the demand curve:

$$P = a - \frac{m(a-c)-(m-p)(s-v)}{1+m}. \tag{19}$$

The results so far can be summarized in a first proposition:

Proposition 1 (short run): When more companies – either profit or nonprofit companies - enter the market, total output grows and the price falls, leading to an increase of consumers surplus.

Both Skak (2006) and Goering (2008) show the positive effects of letting more nonprofit companies enter a market. However, this is done in a market setting where incumbent companies are protected by entry barriers and it is possible to exogenously inject nonprofit companies into the market. This may be considered to be rather unusual market conditions and restricts the validity of the proposition. Moreover, injecting more companies into the market has negative effect on the profitability of existing companies. The profits of profit and nonprofit companies are respectively

$$\pi^p = (P - c)q^p - F, \tag{20}$$

$$\pi^n = (P - c - s)q^n - F + D. \tag{21}$$

Taking equation (14) and (15) into account, proposition 1 now leads to proposition 2:

Proposition 2 (short run): When more companies – either profit or nonprofit companies - enter the market, company profit falls.

Proposition 2 tells us that there must be limits to the entrance of new companies. With free entry additional companies will enter as long as the profit is positive. In the long run equilibrium, profit must be zero for profit companies, and the same condition is imposed on nonprofit companies in the next section.

3. The long run equilibrium

The long run equilibrium must also be a short run equilibrium, which means that the preceding section's Cournot-Nash equilibrium conditions must hold. Use of equations (10), (19) and (20) leads to the following expression for profit companies' profit

$$\pi^p = \frac{\left[a - c + (m - p)(s - v)\right]^2}{(1 + m)^2 b} - F.$$

This can be shortened to

$$\pi^p = bq^{p2} - F. \tag{22}$$

The long run zero profit under free entry thus requires profit companies' output to be[7]

$$q^p = \left[\frac{F}{b}\right]^{1/2}. \tag{23}$$

Note that higher fixed costs *F* require more output from each profit company in order to have zero profit. Now that the quantity q^p is fixed, the zero profit condition for profit companies can be used to find the equilibrium price

$$\pi^p = (P-c)\left[\frac{F}{b}\right]^{1/2} - F = 0 \Rightarrow$$

$$P = c + (bF)^{1/2}. \tag{24}$$

Equation (24) tells us that higher costs lead to a higher equilibrium price. With the price *P* fixed, total output is found from the market demand function as

$$Q = \frac{a-c}{b} - \left[\frac{F}{b}\right]^{1/2}. \tag{25}$$

Total output increases in the size of the market *a* and falls with an increase of both marginal costs *c* and fixed costs F. From equation (24) it is easy to see that the price *P* increases in *b* and total output *Q* falls.

All nonprofit companies are assumed to get a donation per period of size *D*, which adds to their profit. They cannot survive with a continuing negative profit, and it is assumed that donors find it

[7] A proportional tax on profit does not change the zero profit condition.

unacceptable if nonprofit companies have positive profit and accumulate capital in the long run. As a consequence, nonprofit companies are constrained by a long run zero profit restriction[8]:

$$\pi^n = (P - c - s)q^n - F + D = 0 \tag{26}$$

The zero profit restriction has the consequence that the parameter *v*, which is nonprofit companies' focus on output performance, becomes endogenous in the long run. Nonprofit companies may in the short run perceive their focus on output performance as being under their sovereign control; but it is not in the long run. To see this, use equation (13) and the zero profit restriction for profit companies to change (26) into

$$\begin{aligned}
(P - c - s)q^n - F + D = (P - c)q^p - F \quad &\Rightarrow \\
-sq^p + (P - c - s)\frac{v - s}{b} + D = 0 \quad &\Rightarrow \\
v = s + \frac{bsq^p - bD}{P - c - s} \quad &\Rightarrow \\
v = s + \frac{s(bF)^{1/2} - bD}{(bF)^{1/2} - s}. &
\end{aligned} \tag{27}$$

In the long run, nonprofit companies' inclination to put weight on output *v* is ruled by the size of the donation *D* they receive each period. If more output increases profit, i.e. $P - (c + s) > 0$, an increase of the donation *D* will lead to a reduction of nonprofit companies' inclination to produce output in order to obey the nonprofit condition. A bigger donation *D* will however increase their weight on output performance if they can reduce profit by producing more output, i.e. $P - (c + s) < 0$. The last is more likely if nonprofit companies are comparatively inefficient output providers with a high *s*. To summarize:

[8] A binding constraint with a minor positive profit will not change the thrust of the model, but act as a lower donation *D* in equation (26). Rose-Ackerman (1982) presents a model with nonprofit companies engaged in monopolistic competition over donations.

Proposition 3 (long run): A long run zero profit constraint on nonprofit companies has the consequence that bigger output independent donations D will reduce company output when the marginal profit is positive and increase company output when the marginal profit is negative.

Finally, the number of companies in the market must be found. The number of nonprofit companies *m-p* will to be fixed by the available total funds for donations. Funds consist of private donations and public grants and it is assumed that the total available funds are fixed at the amount *Δ*. Lakdawalla and Philipson (2006) likewise assume funds for nonprofit companies to be scarce. Furthermore, donations must be distributed evenly among the identical nonprofit companies who compete for funds, and each receives a minimum donation *D*. The number of nonprofit companies on the market is then

$$m-p=\frac{\Delta}{D}. \tag{28}$$

Support for this relation is found in Luksetich (2008) who finds a significant positive correlation between both government grants and program service revenues and the number of nonprofit companies. With *m–p* known, the total number of companies *m* on the market can be found by use of equation (16):

$$Q=mq^{p}+(m-p)\frac{v-s}{b} \quad \Rightarrow$$

$$m=\frac{Q}{q^{p}}-\frac{v-s}{bq^{p}}(m-p) \;\Rightarrow$$

$$m=\frac{a-c}{(bF)^{1/2}}-1-\frac{s(bF)^{1/2}-bD}{bF-s(bF)^{1/2}}(m-p). \tag{29}$$

Furthermore, adding and subtracting the number of profit companies *p* on the left side gives

$$p+(m-p)=\frac{a-c}{(bF)^{1/2}}-1-\frac{s(bF)^{1/2}-bD}{bF-s(bF)^{1/2}}\,(m-p) \quad \Rightarrow$$

$$p = \frac{a-c}{(bF)^{½}} - 1 - \frac{b(F-D)}{bF - s(bF)^{½}}(m-p). \tag{30}$$

The casual structure of the model is illustrated in table 1. The first equations including (19) take the number of companies on the market *p*, *m* and *m-p* as exogenously given together with the weight nonprofit companies put on their output performance *v*. This gives the quantities supplied and the market price in the short run Cournot-Nash equilibrium. However, the long run zero profit constraint on nonprofit companies forces these companies to correct their output performance accordingly and makes the weight *v* they put on output endogenous. Also the number *m-p* of nonprofit companies becomes endogenous and determined by the amount of available funds *Δ* together with the minimum donation *D*. Relation (29) and (30) then fixes the number *m* and *p* of total and profit companies on the market.

Table 1: Causal structure of the model

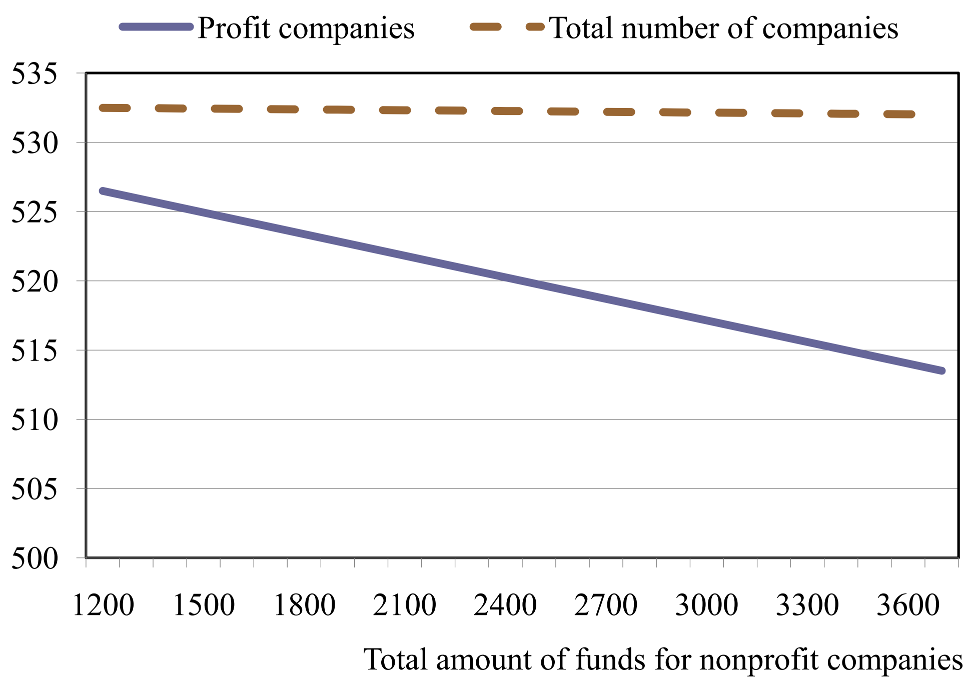
	Endogenous variables				short run exogenous long run endogenous				Exogenous variables				
Equation	q^p	q^n	Q	P	p	m	v	m-p	s	c	F	D	$Δ$
(10)	X				X	X	X	(X)	X	X			
(11)		X			X	X	X		X	X			
(16)	X	X	X		X	X	X	(X)	X	X			
(19)			X	X	X	X	X	(X)	X	X			
(27)							X		X		X	X	
(28)								X				X	X
(29)						X		X	X	X	X	X	
(30)					X			X		X	X	X	

Note: The exogenous parameters *a* and *b* are not included in the table.

4. Long run market behaviour

Proposition 1 for the short run no longer holds for the long run. It stated that more nonprofit companies on the market would reduce the price and increase consumers' surplus. But equation (24) shows that this will not be the case in the long run, because the zero profit condition for profit companies fixes the price *P* as a function of company costs *c* and *F* and the parameter *b*. This also locks the total quantity Q so that more funds for nonprofit companies only expand the companies' share of the market. Figure 1 illustrates how more funds for nonprofit companies affect the number of companies in the market. The derivative $\partial m / \partial (m-p) = -(v-s)/bq^p$ from equation (29) shows that only if nonprofit companies are inefficient output providers and put modest weight on output performance, can more funds lead to a higher total number of companies on the market.

Figure 1: The total number of profit companies and of all companies as a function of available funds for nonprofit companies.



Note: The parameter values are $a = 200000$; $b = 70$; $c = 300$; $s = 50$; $F = 2000$; $D = 200$.

A long term peculiarity of nonprofit companies follows from the long run endogeneity of v as derived in equation (27). It shows that v is negative for D positive if nonprofit companies are as efficient producers as profit companies and have $s = 0$. Hence, for v positive, s must be positive.

Proposition 4 (long run): Nonprofit companies receiving output independent donations and attaching some weight to output performance are inefficient market suppliers compared to profit companies.

This is contrary to Lakdawalla and Philipson (2006) who treat nonprofit companies as companies with a cost advantage compared to profit companies. The inefficiency of nonprofit companies in the present model comes from the long run zero profit restriction in combination with the obligation to show positive output performance. As a consequence, donations received lead to inefficient use of resources because of the need to hold profit down to zero in the long run. Nonprofit companies may be able to control the cost element s whereas the marginal cost element c is exogenously given by the technology. The derivative of (27) $\partial v/\partial s$ is positive for $D < F$[9]. This is probably not an unrealistic assumption with D only covering donations, which are completely independent of the companies' long run output performance. With this assumed hereafter, nonprofit companies have a possibility for increasing both their marginal costs and the weight they put on output performance, and still keep the long run zero profit restriction. If they do so, they gain market power and may produce more output than their profit competitors. Presumably, donors will be pleased by this behaviour. Noguchi and Shimizutani (2006) look at the market for at-home care for elderly in Japan and find both higher quality (more output) and higher wages for nonprofit operators compared to profit operators. An increase of s will reduce both the number of profit companies and the total number of companies and give bigger market shares for nonprofit companies. Take derivatives with respect to s of the equations (29) and (30) to see this. But there is a limit to the size of s. Equation (27) shows that v becomes infinitely large as s approach $(bF)^{½}$ and negative thereafter. However, donors do not look for output performance alone, but also keep an eye on the costs of production, which must impose a limit on the size of s.

The dashed lines in figure 2 are isotarget curves that illustrate how donors' target function may look. Donors aim for high v and low s[10]. When s increases up to s_0 donors become really worried, this is illustrated by close isotarget curves around s_0. The D-lines are zero profit lines that show nonprofit companies' possibility for substitution between v and s under the long run zero profit restriction[11]. Profit companies with $(s,v) = (0,0)$ are placed at O in the figure, and the zero profit line

[9] Note that if $D < F$ we must have $P- (c + s) > 0$, because $(P- c - s)q^n = F – D$ under the zero profit restriction.

[10] Rose-Ackermann (1982) includes the number of people served and production costs in the utility function of donors. Moreover, she also models that money spent on donations increases the utility.

[11] The zero profit D-lines are positively sloped because an increase of marginal production costs s reduces profit, but this can be neutralized by an increase of the weight v on output performance, because this will push some profit companies out of the market and give higher marginal revenue and more profit to nonprofit companies.

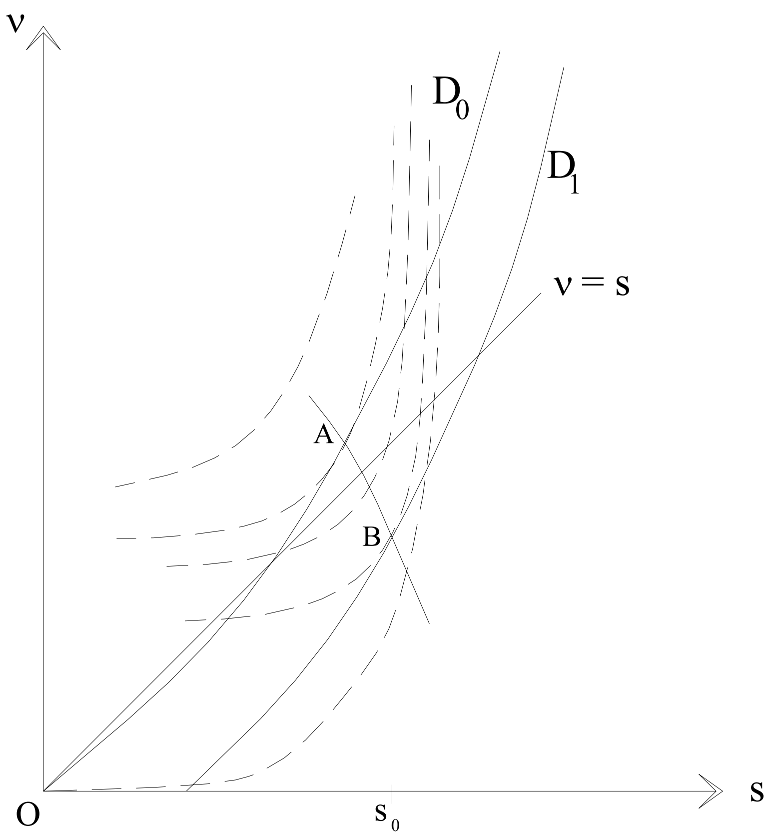
D_0 for nonprofit companies shows combinations of (s,v) when D is close to zero[12] and the number of companies is very big. Nonprofit companies receiving the donation D_0 will choose the position A under the assumption that they seek to maximise donors' revealed preferences. Thus, donors gain from donation because the isotarget curve through A is on a higher level than the isotarget curve[13] through O. Nonprofit companies have higher output than profit companies in A because it is above the $v = s$ line, see equation (13). An increase of the minimum donation level from D_0 to D_1 gives the zero profit line D_1 (a bigger s for unchanged v) and the position B where nonprofit companies produce less than profit companies[14]. This is not to the benefit of donors compared to A because B is on a lower target level. However, B is on a higher target level than O in spite of the fact that output is lower and marginal costs are higher than for profit companies. Donors' higher welfare comes from nonprofit companies' high aim for output performance as declared by the companies and/or perceived by donors.

Figure 2: Donors' preferred combinations of output performance and inefficiency

[12] Setting D equal to zero in (28) gives infinitely many nonprofit companies.

[13] Donors' isotarget curves are not social welfare curves.

[14] Figure 1 assumes constant donation size D. However, nonprofit companies can be expected to change their output performance and marginal costs as indicated in figure 2 if more funds lead to a change of D. This will impact on the number of profit companies that are be pushed out of the market when Δ changes.



Note: The figure illustrates non-profit companies' zero profit lines with $D_0 < D_1$ and dashed donor isotarget curves.

How will more funds for nonprofit companies affect welfare? The model is partial so statements on welfare are confined to effects on markets where the companies operate. Equations (24) and (25) secure that consumers surplus is unaffected by the amount of funds available for nonprofit companies; only costs differences between the two types of companies matters. More funds will bring more inefficient nonprofit companies on the market as providers of the fixed total supply. This gives a fifth proposition.

Proposition 5 (long run): More output independent funds for nonprofit companies will reduce welfare gains on the market.

Figure 2 illustrated how donors may benefit from nonprofit companies' aim for output performance. However, the aim does not lead to more total market output; it only influences the share of inefficient nonprofit production. Proposition 5 takes account of the change of efficiency in production. A more encompassing model may include a welfare component based on donors' joy from giving to nonprofit companies who aim for output. If this is added to the model, the social welfare maximum may well be an interior solution that includes output independent donations to nonprofit companies.

It is difficult to evaluate empirically the predictive power of the economic literature's different market models with profit and nonprofit companies because they have fairly similar predictions. A market demand increase – an increase of the parameter *a* in the model above – will bring more profit companies on the market in all models as long as funds for nonprofit companies (and the number of public output providers) are unchanged. But the above presented model differ from the one presented by Lakdawalla and Philipson (2006) in its prediction of higher marginal costs for nonprofit companies compared to profit companies. However, the empirical evidence gives no clear answer on cost differences. Another special characteristic of the above model is its prediction of an inclination for nonprofit companies to have both higher marginal costs than profit companies and a high aim for output performance, but not necessarily higher output. Whether or not nonprofit companies have lower, higher or the same output as profit companies depends on the size of output independent donations and the donors' revealed preferences[15]. The mixed empirical evidence on the output of nonprofits companies compared to profit companies as surveyed by Malani, Philipson and David (2003) can be said to be consistent with this feature of the above presented model.

5. Conclusion

In this paper, a model with nonprofit and profit companies engaged in monopolistic competition on a market with a linear demand function is developed. Nonprofit companies maximize a weighted average of output and profit and both types of companies take the output of others as given and react by optimizing own output. A stable Cournot-Nash equilibrium is established in the short run, and the entrance of more companies of both types on the market increases consumers' surplus and reduces profit. In the long run, free entry leads to zero profit for profit companies, and it is argued that also nonprofit companies work under a long run zero profit restriction. This is because donors find it unacceptable when nonprofit companies have positive profit and accumulate capital over the long run. The long run zero profit constraint has the consequence that output independent donations force these companies to act inefficiently and have higher marginal production costs than profit companies. From this follows that more funds for nonprofit companies reduce the welfare to be

[15] In figure 2, donors will prefer not to give output independent donations if they have isotarget curves that are steeper than the zero profit lines.

gained on the market. Depending on the size of donations, nonprofit companies may have higher, the same or lower (quality) output than profit companies.

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