ISTITUTO STUDI SVILUPPO AZIENDE NON PROFIT
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PROFIT VERSUS NON-PROFIT FIRMS IN THE SERVICE SECTOR: AN ANALYSIS OF THE EMPLOYMENT AND WELFARE IMPLICATIONS

by

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Working paper n. 18

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Abstract

In the dynamic model presented in the paper, manufacturing and service firms coexist. Two general equilibrium frameworks are compared, in which the service-providing firms are for profit enterprises or, alternatively, non-profit organizations. Unlike in the related literature, a non-profit firm has no comparative advantage in dealing with the asymmetry arising from the fact that customers do not know ex ante the quality of the service. The paper shows that steady-state employment is higher when the service-providing firms are non-profit organizations. Moreover, the steady state associated with the presence of non-profit organizations is Pareto-superior if they enjoy a significant advantage at motivating their employees.

JEL Classification Numbers: J21, J64.

Key Words: Work effort, unemployment, redistribution, asymmetric information, reputation, third sector.

INTRODUCTION•

Scholars and policy-makers have recently paid closer attention to the employment-creation potential of non-profit organizations – and not so much in the

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• The authors are grateful to Benedetto Gui, Marco Musella and Luisa Segnana for their helpful comments and suggestions on earlier drafts of this paper. Helpful comments were also received by those taking part in the July 1998 Conference of the International Working Party on Labour Market Segmentation at the University of Trento and in the November 1998 Seminar of the Research Group on the Role of the Nonprofit Sector at the University of Padua. The usual disclaimer applies.

USA, where the sector is well established, but in the European countries, where the sector is significantly smaller in size, reputation and independence.

Whilst attention initially concentrated on the ability of non-profit organizations to expand the supply of social services, mainly in favour of groups suffering from social exclusion, in recent years interest has increasingly shifted to the possibility that these organizations might help to create jobs. This possibility was first officially considered in the Delors White Paper (European Commission, 1993) and was thereafter discussed by numerous European Commission documents. As a result, the enlargement of the non-profit sector has been supported by the European Social Fund and by a Specific Pilot Action aimed at evaluating its employment potential (European Commission, 1999b). Finally, the development of entrepreneurial non-profit organizations has been included among the guidelines that the member States must follow in preparing their Employment National Action Plans.

To date, these policies have not given rise to substantial scientific debate, although the literature contains arguments -- both theoretical and empirical -- for and against their efficacy. Of the empirical arguments in favour of the employment potential of the non-profit sector, the most important is the growth observed in the number of new non-profit organizations and related employment (Salamon and Anheier, 1995 and 1996). This growth has taken place mainly in the sector of personal, social and community care services -- which is the sector in which most non-profit organizations operate, and which is underdeveloped in most European Countries compared to the size of its equivalent in the United States (European Commission, 1999a). High demand, both latent and explicit, for social and community care services strengthens the conviction that the bulk of new jobs should be created in this sector and, consequentrly, by non-profit organizations, which are particularly suited to operating in it.

The employment potential of non-profit sector can also be supported by theoretical arguments. Several explanations of the existence of non-profit organizations seek to demonstrate that their characteristics (mainly the non-profit distribution constraint) reduce the market or contractual costs associated with some sort of market failure specific to the good or the service produced. In particular, the literature has emphasized the relevance of the information aymmetry between consumer and producer (Hansmann, 1980 and 1996; Ben-Ner, 1986; Ben-Ner and van Hoomissen, 1991). Other explanations seek to demonstrate that non-profit organizations exist to satisfy the demand for public goods that the government does not provide because they do not fit demand by the median voter (Weisbrod, 1977 and 1988). In both cases it is possible to conclude that, in the sectors in which the non-profit organizations operate, the level of employment is positively correlated with the number of such organizations because they provide goods or services that would not be provided (at least in the same quantity and quality) by other types of organizations.

These arguments in favour of the employment potential of the non-profit organizations are matched by various arguments against it. Indeed, one may argue that the the extra employment created by such organizations crowds out an equal volume of employment created by the public sector or by for-profit firms, especially in view of the fact that the non-profit organizations appear to be closely dependent on public funding and tax relief. It is often added that they survive and grow because they derive comparative advantages from wages and working conditions worse than those applied by other organizations, in particular those employing public employees: in the absence of such advantages their net contribution to the level of employment would be null (or even negative).

Also the theoretical arguments in support of the job creation potential of non-profit organizations have been criticized. The contention by Hansmann (1980) that those who exercise control over a non-profit organization – unlike the owners of for-profit firms -- gain no advantage from exploiting any superior information that they may possess concerning product quality, since the organization is barred from distributing its net earnings, has been criticized from several points of view. It implicitly assumes, in fact, that the interests of those in control of a non-profit organization coincide perfectly with the interests of each consumer who buys its service. But this is not in general true. On one hand, the interest of the individual consumer is that infinite care, attention and effort – all resources that are in limited supply – should be devoted to her/him in exchange for a price as low as possible.

On the other hand, a resource constraint applies to every organization, even to a non-profit organization genuinely committed to its "mission" of delivering its service in that combination of quality and quantity which maximize the discounted sequence of utilities which its representative customer can obtain by consuming it in the course of time. Therefore, also a non-profit organization has an incentive to increase its revenues in order to improve the combination of quantity and quality of the service that it provides. Indeed, if this kind of organization must compete in the marketplace and rely only on the revenues obtained by selling its services to consumers in order to survive and carry out its mission, its interests do not coincide with those of any consumer. In other words, a non-profit organization with these characteristics has an incentive to charge a price for its services which is not justified by their quality content. Hence, consumers cannot be certain ex ante about the quality of a service: the non-profit distribution constraint – in itself -- does not suppress the incentive to exploit the information asymmetry to the advantage of those delivering the service. This implies that a non-profit organization must establish a reputation for being non-exploitative of consumers in exactly the same way as a for-profit provider of services must do so in order to overcome information asymmetry (see Ortmann, 1996).[1]

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[1] Moreover, Hansmann's theory tends to explain a donative non-profit organization, where the trust relations with the donors are crucial, better than a commercial or productive non-profit one (the so-called social enterprise) providing private merit goods whose quality can be tested by the consumers (as is the case of most of the services provided by the organizations that the European policies intend to promote).

This short discussion demonstrates that European policies to increase the employment potential of the non-profit sector have been insufficiently supported by economic analysis, at both the macro and micro levels. The aim of this paper is to make a contribution in this direction by assessing whether and to what extent the presence of non-profit organizations producing personal, social and community care services can help to create new employment. For this purpose, the model presented here compares the employment and welfare implications of two institutional frameworks: in the first of them all firms – both in the manufacturing and in the service sector – are assumed to be for-profit organizations, while in the second only the manufacturing firms are for-profit since those operating in the service sector are assumed to be non-profit organizations. A satisfactory analysis of this sort requires a general equilibrium set-up, since a change in the nature of the organizations operating in a large sector of the economy has important allocative and distributive effects that cannot be studied in the partial equilibrium set-up generally used by the literature on non-profit organizations.

In order to avoid the main objections set out above, it will be assumed in the model that non-profit organizations must compete in the market: they supply their services directly to private consumers and that they do not benefit either from a privileged relationship with the public administration or from tax concessions. Moreover, as already mentioned, they do not operate in the manufacturing sector, but only deliver services – which is the sector, as a matter of fact, in which these organizations are concentrated.[2] It is also assumed that any comparative advantage that these organizations may enjoy over for-profit firms does not depend on any presumed lesser capacity of the latter to reassure consumers concerning the quality of the services delivered.

In contrast, we admit that a non-profit organization may enjoy a comparative advantage over a for-profit firm because of its greater ability to motivate employees. This greater ability have been explained by the fact that those who work in this kind of organization may be more easily induced to share in its mission: the "external social benefits generated by the firm employing the worker" may play an important role in motivating the firm's employees (see Preston, 1989; Mirvis, 1992; Borzaga, 2000). However, the higher steady-state level of employment obtained when service-producing firms are non-profit rather than for-profit does not depend on the possible motivational advantage enjoyed by non-profit organizations. The same applies to the larger quantity and (possibly) the better quality of the services enjoyed by the consumers in the long-run equilibrium obtained when the service-producing firms are non-profit. Indeed, the paper shows that these outcomes depend on the different objectives and constraints of the two types of organizations. On the contrary, the welfare implications of replacing for-

[2] Typically, the non-profit organizations operating in the health, education and social services industries can be considered examples of the organizations modeled in the paper.

profit firms with non-profit organizations in the service sector are sensitive to the existence (and the importance) of this motivational advantage.

In fact, the elimination of the for-profit firms in the service sector also has major redistributive effects, since (i) it suppresses a significant source of non-labour income for the owners of these firms, (ii) it raises the number of wage earners, thus increasing the labour share on total income, (iii) it raises the level of work effort (care, attention) of those previously unemployed and (possibly) that of all the other workers employed in the service sector, and (iv) it raises the long-run equilibrium quantity and (possibly) quality of the services provided to consumers, without affecting the output of the manufacturing sector. In this way, the model captures the important redistributive role played by non-profit organizations, thereby filling a void in the literature on the subject. Indeed, the paper shows that any assessment of the welfare implications of a change in the nature of the firms operating in the service sector must take account of these redistributive aspects. In addition, it is shown that the shift from for-profit to non-profit organizations can give rise to a Pareto improvement only when the motivational advantage enjoyed by the non-profit organizations is not negligible.

The paper is organized as follows. Section 1 presents the model. Section 2 is devoted to deriving the optimizing behaviour of the agents. In section 3 we characterize the equilibrium paths of the economy, both for the case in which the service-producing firms are for profit and the case in which they are non-profit.

Section 4 compares the equilibrium paths emerging in the two cases, discussing their redistributive and welfare implications. Section 5 contains a summary of the main results of the paper and provides a brief comment.

1 THE MODEL

Let us consider an economy in discrete time with a constant population of identical individuals -- whose large number is normalized to be one -- which consume both a manufactured good x_t and a service which may differ with respect to its quality q_t. The manufactured good is homogeneous and is produced by a large number of perfectly competitive firms. Similarly, there is a large number of firms which provide the service, whose quality depends on the effort and care of their employees. In its turn, the workers' level of effort and care can be influenced in the service sector by the incentives and ability of organizations to motivate their members.

<u>The manufacturing firms</u>

The large number of firms producing the homogeneous consumer good x_t is normalized to be one. They produce according to the technology

$$x_t = S_t^{\xi}, 0 < \xi < 1, \tag{1}$$

where S_t are the workers employed in period t by the representative firm producing the consumer good. Since production is standardized, it requires a fixed level of effort e_t=ê to any single worker. In each t the representative firm chooses its labour input in order to maximize its profit:

$$\pi_t^m = \pi(S_t, w_t) = S_t^{\xi} - S_t w_t, \tag{2}$$

where w_t is the real wage paid to the firm's employees. Note that x_t is not storable and is taken to be the numéraire of this economy.

<u>The service-producing firms</u>

Also the large number of firms producing the consumer service is normalized to be one. The units of the service that a firm provides in period t, N_t, depend on the number of workers employed by the firm in that period, L_t:

$$N_t = L_t^{\varsigma}, 0 < \zeta < 1. \tag{3}$$

The quality of the service provided by the firm in period t, q_t, depends on the effort level e_t of its employees in that period:

$$q_t = e_t. \tag{4}$$

Since the workers' effort is perfectly observable, the representative firm makes pay contingent on the observed effort level:

$$v_t = \nu(e_t), \tag{5}$$

where v_t is the wage paid by the firm to its employees in period t if their observed effort level in that period is e_t.

In each t an individual buys the service that s/he wants to consume from one single producer, which amounts to saying that in each period the consumer selects a unique (perceived) quality level for the service that s/he wants to buy. Consumers cannot observe q_t ex ante (before they have purchased the service) and they know that the quality of the service may vary across firms and time. On the other hand, they are informed ex post about the quality of the service provided by each firm. In particular, it is assumed that the perceived quality of the service supplied in period t by a firm, q_t^e, is based on its reputation, which depends on its past performance in terms of quality:

$$q_t^e = \chi q_{t-1}^e + (1 - \chi) q_{t-1}, 0 < \chi < 1, q_0^e \text{ given,} \qquad (6)$$

where we assume for simplicity that χ =.5. Moreover, note that (6) entails both $q_t^e = q_{t-1}^e$ if $q_{t-i}^e = q_{t-1}$ and $\lim_{t \to \infty} q_t^e = q^{\bullet}$ if $q_t = q^{\bullet}$ $\forall t > 0$. In other words, a firm's reputation and the consumers' guess about the quality of its service do not change if the quality level observed in the current period confirms what the consumers expected; and this reputation tends asymptotically to be equal to the observed level of quality if the latter remains constant forever, whatever the initial firm's reputation may be.

The price that a firm can charge for each unit of service depends on its reputation for quality:

$$p_t = p(q_t^e), \tag{7}$$

where the "hedonic" function $p(q_t^e)$ is given to any single firm.

Thus, the period profit function of a service-producing firm is:

$$\pi_t^s = \pi(q_t^e, L_t, v_t) = p(q_t^e)L_t^\varsigma - v_t L_t. \tag{8}$$

<u>Individuals as consumers and workers in for profit and non-profit firms</u>

If y_t is the total income of an individual in period t, we have:

$$y_t \geq x_t + p(q_t^e)N_t, \tag{9}$$

where the hedonic function $p(q_t^e)$ is given to any single consumer.

The period utility that an individual obtains by consuming the service is separable between the units N_t and the quality q_t of the service that s/he buys:

$$g(N_t, q_t) = N_t^\alpha + q_t^\beta, 0 < \alpha < 1, 0 < \beta < 1. \tag{10}$$

Separability is assumed in (10) in order to simplify the analysis, in the light of the fact that both opposite cases can be plausible: the case in which the increment in utility obtainable by consuming an additional unit of the service is larger as the quality of the service is relatively low (quantity tends to substitute for quality), and the case in which consuming more units has a larger impact on utility as the quality of the service is high (quantity and quality tend to be complement).

The household's total income is given by

$$y_t = h_t + d_t^m + d_t^s, \qquad (11)$$

where h_t is the household's labour income, d_t^m is the household's share of the manufacturing firms' total profits, and d_t^s is the household's share of the service-producing firms' total profits in period t. The household's labour income is given by:

$$h_t = \begin{cases} 0 & \text{if the individual is not employed} \\ w_t & \text{if the individual works in a manufacturing firm} \\ v_t = \nu(e_t) & \text{if the individual works with effort } e_t \text{ in a service-producing firm.} \end{cases} \qquad (12)$$

For simplicity and without loss of generality, we assume that all households are entitled to receive an equal share of the manufacturing firms' profits:

$$d_t^m = \pi_t^m. \qquad (13)$$

In contrast, we assume that only a proportion k^s of total population is entitled to receive an equal share of the profits generated by the service-producing firms:

$$d_t^s = \begin{cases} \dfrac{\pi_t^s}{k^s} & \text{if the individual receives profits generated by the service-producing firms} \\ 0 & \text{otherwise, } 0 < k^s \leq 1. \end{cases} \qquad (14)$$

An individual has a period utility function that is quasi-linear:

$$u_t = x_t + g(N_t, q_t) - f(e_t, i), \; i = \pi, n\pi, \qquad (15)$$

where $f(e_t,i)$, which captures the disutility of being employed in a firm instead of staying at home, gives the minimum wage for which an individual is willing to work at an effort level e_t in a for-profit firm ($i=\pi$) or in a non-profit firm ($i=n\pi$):

$$f(e_t, i) = \begin{cases} 0 \ \text{ if the individual is not employed } (e_t = 0) \\ \eta_\pi \hat{e}^\gamma \ \text{ if the individual works in a manufacturing firm } (e_t = \hat{e}),\ \gamma \geq 1 \\ \eta_i e_t^\gamma \ \text{ if the individual works with effort } e_t \text{ in a service - producing firm.} \end{cases} \quad (16)$$

Since we attribute a non-monetary objective to the non-profit organizations, they may be more able than the profit-seeking enterprises to motivate their employees also by means of non-monetary incentives. Indeed, such organizations may at least partly share their 'mission' with their workers, who may be willing to work at the same effort level but for lower pay than the employees of a for-profit firm. In other words, a non-profit firm may motivate its workers by relying on a mix of self-interest and a genuine desire to help in achieving the common goals of the organization. Thus, we assume that $\eta_\pi \geq \eta_{n\pi} > 0$.

The problem that the an individual has to solve in each t is the following:

$$\max_{q_t, N_t, e_t} \sum_{j=0}^{\infty} \theta^j u_{t+j}, \theta \equiv (1+r)^{-1}, r > 0, \quad (17)$$

where r is the (exogenously given) interest rate, subject to the information asymmetry implying that a firm's reputation for quality q_t^e signals the 'true' level of quality embodied in the service offered by that firm, and subject to the period budget constraint (9). For simplicity and without loss of generality, the discount rate is assumed to be equal to the inverse of 1+r.

The utility function implicitly implies that the service satisfies a basic need. Even if some household is unemployed in t, s/he receives a share of the firms' profits (thanks to his/her property rights or to a redistributive policy), which allows him/her to devote any additional income to increasing his/her consumption of x_t: for all households and in all periods, the demand for the service is independent of the level of income, and the consumption of x_t is strictly positive.

Objectives of firms operating in the service sector: for profit versus non-profit

We consider two alternative settings which differ with respect to the goals and organizational arrangements of firms operating in the service sector. In the first setting the representative firm seeks to maximize profits, while in the second the representative firm seeks to maximize the discounted sequence of utilities that an individual can obtain by consuming its service.

In each period, a for-profit firm chooses its wage and labour policy in order to maximize its value, i.e. its discounted sequence of profits:

$$\max_{v_t, L_t} \sum_{j=0}^{\infty} \theta^j \pi^s_{t+j}, \tag{18}$$

subject to (3)-(8).

In contrast, a possible formulation of the problem for a non-profit organization might be the following:

$$\max_{v_t, L_t} \sum_{j=0}^{\infty} \theta^j g(N_{t+j}, q_{t+j}), \tag{19}$$

subject to (3)-(8) and to the intertemporal budget constraint

$$\sum_{j=0}^{\infty}(1+r)^{-j}\pi_{t+j}^{s} \geq 0. \tag{20}$$

It should be emphasized that (20) must be satisfied if the firm wants to continue operating: the non-profit organization must be able to finance its operations in the marketplace without making systematic losses. The presence of competition among non-profit firms enables consumers to choose the most favourable combination of quality and prices, inducing the organizations to optimize their operations in order to survive. Indeed, also a non-profit organization has an incentive to raise its revenues in order to increase the quantity and improve the quality of the service that it provides. In particular, a quality improvement entails a cost increase which may conflict with the organization's interest in balancing its intertemporal budget constraint. Therefore, even non-profit firms are faced by a reputation problem *vis-à-vis* the consumers: in itself, the fact that an organization is oriented toward the maximization of the welfare that a consumer can obtain from its service does not provide the consumer with a guarantee about the quality of the service that s/he pays for. Finally, one should consider that the objective of maximizing the consumer's welfare coincides with the managers' interest in increasing the economic value of the organization's activities: they can exert constant control on a larger amount of resources by providing more units of the service and improving its quality without jeopardizing the long-term survival of the organization.

Market equilibrium conditions

It is straightforward from (9)-(17) that the necessary conditions for inducing an individual to work in a manufacturing firm or in a service-producing firm with an effort level e_t are, respectively,

$$w_t - \eta_\pi \hat{e}^\gamma \geq 0, \tag{21a}$$

and

$$v(e_t) - \eta_i e_t^\gamma \geq 0, i = \pi, n\pi, \tag{21b}$$

where the optimal effort level of the worker depends on the incentive wage scheme of the firm and its organizational form (for-profit versus non-profit).

Assuming perfect labour mobility between the manufacturing and the service segments of the labour market, equilibrium requires

$$w_t - \eta_\pi \hat{e}^\gamma = v(e_t) - \eta_i e_t^\gamma, \; i = \pi, n\pi. \tag{21c}$$

If $w_t - \eta_\pi \hat{e}^\gamma = v(e_t) - \eta_i e_t^\gamma > 0$, each household strictly prefers working rather than remaining at home and the equilibrium is necessarily characterized by full employment. Indeed, if there are unemployed workers, they apply downward pressure on wages in both labour markets, and they raise the effort that the workers are willing to make in the service sector for any given pay level, up to the point where $w_t - \eta_\pi \hat{e}^\gamma = v(e_t) - \eta_i e_t^\gamma = 0$. Therefore, the presence of unemployment implies that at equilibrium $w_t - \eta_\pi \hat{e}^\gamma = v(e_t) - \eta_i e_t^\gamma = 0$: an unemployment equilibrium ($S_t + L_t < 1$) is a situation in which the optimizing firms do not create enough jobs to employ the entire workforce, even if the employed workers do not enjoy any rent.

An equilibrium quantity of the manufactured good is such that

$$x_t^s = x_t^d. \qquad (22)$$

The equilibrium price of the service $p_t = p(q_t^e)$ must be such that at that price both the units of the service supplied are equal to the units demanded and the reputation for quality of the service-producing firms is equal to the quality level demanded by the representative consumer:

$$N_t^s = N_t^d, \qquad (23)$$

and

$$q_t^e = q_t^d. \qquad (24)$$

2 THE OPTIMIZING BEHAVIOR OF THE AGENTS

Households

Maximizing (17), we obtain the conditions that the consumers' demand for the service must satisfy for optimality:

$$p(q_t^e) = \alpha N_t^{\alpha-1} \tag{25a}$$

and

$$p'(q_t^e) N_t = \beta q_t^{\beta-1}, \tag{25b}$$

and the condition that the effort level of a household must satisfy if s/he works in a service-producing firm:

$$v'(e_t) = \gamma \eta_i e_t^{\gamma-1},\ i = \pi, n\pi. \tag{25c}$$

It is evident that the rule applied by an optimizing household to decide whether to work and --possibly-- in what type of firm to work produces the conditions (21).

Equation (25a) states that for optimality the price charged for one additional unit of the service characterized by the (perceived) quality level desired by the consumer must be equal to the marginal increase in utility obtainable with this additional consumption. Equation (25b) establishes that -- along an optimal path --the increment in expenditure that a consumer is willing to incur for a marginal improvement in the (perceived) quality of the units of the service that s/he intends to buy must be equal to the additional utility brought about by this improvement. Finally, equation (25c) states that the optimal level of effort by a worker employed in a service-producing firm must be such that a marginal increment in the effort level causes an increase in disutility equal to the increase in pay that the worker can receive thanks to this additional effort.

Manufacturing firms

For optimality, the manufacturing firms equalize the value of the marginal productivity of labour to the market wage:

$$\xi S_t^{\xi-1} = w_t. \tag{26a}$$

From this condition one can easily obtain the optimal demand for labour of the manufacturing firms:

$$S_t = S(w_t) = \left(\frac{\xi}{w_t}\right)^{1/(1-\xi)}. \tag{26b}$$

Service-producing firms as for profit organizations

Maximizing the Hamiltonian

$H=\sum_{t=0}^{\infty}\theta^t \left\{ p(q_t^e)L_t^{\zeta} - v(e_t)L_t - \lambda_t\left[q_{t+1}^e - \frac{(e_t+q_t^e)}{2}\right]\right\}$ with respect to L_t, e_t and q_{t+1}^e,

and eliminating the multiplier λ_t, we obtain the following conditions that an optimal path must satisfy:

$$\zeta p(q_t^e)L_t^{\zeta-1} = v(e_t), \tag{27a}$$

$$L_t v'(e_t) = \frac{\theta L_{t+1}^{\zeta} p'(q_{t+1}^e) + \theta L_{t+1} v'(e_{t+1})}{2}. \tag{27b}$$

An optimal path must also satisfy equation (6) and the transversality condition

$$\lim_{t\to\infty}\theta^t 2L_t v'(e_t)q_t^e = 0. \tag{27c}$$

Finally, the optimal wage scheme of the service-producing firm must satisfy (21c), taking into account that optimal workers' behaviour entails (21b) and (25c).

The condition (27a) equalizes the value of the marginal productivity of labour at the optimal effort level to the wage that must be paid to generate that level of effort. Condition (27b) captures the intertemporal trade-off that the firm has to face: together with (27c), it states that along an optimal path the additional labour cost incurred in the current period by the firm to marginally improve the quality of all the units produced must be equal to the discounted increment in future revenues due to the higher prices that it will be able to charge on all the units of its service thanks to its improved reputation. In other words, its reputation for quality can be considered the only asset owned by a firm, and along an optimal path the current value of this asset must be equal to the discounted sequence of additional revenues that the firm can obtain from a marginal improvement in its reputation.

Service-producing firms as non-profit organizations

A non-profit organization operating in the marketplace must satisfy its intertemporal budget constraint, but it may run current budget decifits and surpluses[3]. This fact can be captured by writing the dynamic budget constraint of the non-profit firm as

$$D_{t+1} = (1+r)D_t - p(q_t^e)L_t^{\zeta} + v(e_t)L_t, \tag{28}$$

where D_t is the debt of the firm in period t. Consistently with (20) we must have both D_0=0 and $\lim_{t\to\infty} D_t(1+r)^{-t} \le 0$. Thus, we can maximize the Hamiltonian

$$H = \sum_{t=0}^{\infty} \theta^t \left\{ L_t^{\alpha\zeta} + e_t^{\beta} + \sigma_t \left[D_{t+1} - (1+r)D_t + p(q_t^e)L_t^{\zeta} - v(e_t)L_t \right] - \lambda_t \left[q_{t+1}^e - \frac{(e_t + q_t^e)}{2} \right] \right\}$$

with respect to L_t, e_t , q_{t+1}^e and D_{t+1}. By eliminating the multiplier λ_t, we obtain the following conditions that an optimal path must satisfy:

$$\zeta p(q_t^e)L_t^{\zeta-1} = v(e_t) - \frac{\alpha\zeta L_t^{\alpha\zeta-1}}{\tilde{\sigma}} \tag{29a}$$

and

$$L_t v'(e_t) = \frac{\beta e_t^{\beta-1}}{\tilde{\sigma}} + \frac{\theta L_{t+1}^{\zeta} p'(q_{t+1}^e) + \theta L_{t+1} v'(e_{t+1})}{2} - \frac{\theta\beta e_{t+1}^{\beta-1}}{2\tilde{\sigma}}, \tag{29b}$$

where along an optimal path $\sigma_{t+1} = \sigma_t = \tilde{\sigma} = \dfrac{\alpha\zeta\tilde{L}^{\alpha\zeta-1}}{v(\tilde{e}) - p(\tilde{q}^e)\zeta\tilde{L}^{\zeta-1}} > 0, \forall t$ ("~" denotes the steady-state value of a variable as firms are non-profit in the service sector).

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[3] If in t a non-profit firm makes a temporary profit (loss), $d_t^s > 0\ (< 0)$ and a proportion k^s of the households reduce (increase) their net credit toward the service firms.

In fact, an optimal path must also satisfy equation (6), and the transversality conditions

$$\lim_{t\to\infty} \theta^t 2[\tilde{\sigma} L_t \nu'(e_t) - \beta e_t^{\beta-1}] q_t^e = 0 \qquad (29c)$$

and

$$\lim_{t\to\infty} \theta^t \tilde{\sigma} D_t = 0. \qquad (29d)$$

Again, the optimal wage scheme of the service-producing firm must satisfy (21c), taking into account that optimal workers' behaviour entails (21b) and (25c).

Comparing (27) and (29), one can see the differences in optimizing behaviour between the for profit firm and the non-profit organization.

The non-profit firm does not equalize the value of the marginal productivity of labour at the optimal effort level to the wage that must be paid to generate the optimal effort level, since it also cares about the additional benefit that the representative household can obtain in the current period from a marginal increase in the units of the service. This current benefit has more weight in the optimal decision-making of the firm when in its optimal plan the firm attributes a smaller (time-invariant) value to the discounted sequence of future marginal benefit obtainable by the consumers thanks to a small improvement in the firm's current balance sheets. In other words, the smaller $\tilde{\sigma}$ is, which captures the concern that the firm must have for the future implications for its 'mission' of more 'generous' financial behaviour in the current period, the more the firm's current employment policy differs from the policy that would be optimal for a profit-maximizing firm.

Furthermore, the non-profit organization does not equalize the additional labour cost incurred in the current period because of a marginal improvement in the quality of all the units produced to the discounted increment in future revenues due to the higher prices that it will be able to charge on all the units of its service thanks to its improved reputation. Indeed, the non-profit firm’s optimal plan must also take account of the beneficial impact on the current consumers’ welfare due to the improvement in the quality of its service taking place in the current period. Again, the smaller $\tilde{\sigma}$ is, the more the firm's current policy on quality differs from the policy that would be optimal for a profit maximizing firm. In other words, the non-profit organization equalizes the additional labour cost that it must incur in the current period in order to achieve a marginal improvement in the quality of all the units produced to the discounted sequence of additional revenues that the firm can obtain by a marginal improvement in its reputation <u>plus</u> the current marginal benefit accruing to the consumers because of the better quality of the service (weighted by the inverse of $\tilde{\sigma}$).

Finally, one should consider that the optimal wage scheme of a non-profit firm internalizes the possible advantage in terms of workers' non-monetary motivations that this type of organization may enjoy.

3 THE EQUILIBRIUM PATHS

Manufacturing sector

The presence of unemployment in period t implies that the wage at which the manufacturing firms would employ all the workers who do not work in a service-producing firm is strictly below the minimum wage at which a worker is willing to work in a manufacturing firm: even at $w_t = \eta_\pi \hat{e}^\gamma$ some worker remains unemployed. Thus, in the presence of unemployment, the employment level of the manufacturing sector must be such that

$$S_t = S = \left(\frac{\xi}{\eta_\pi \hat{e}^\gamma} \right)^{1/(1-\xi)} < 1 - L_t, \qquad (30)$$

where we have used the optimal labour demand (26b), and where

$$w_t = w = \eta_\pi \hat{e}^\gamma . \qquad (31)$$

The presence of full employment in period t implies that the wage at which the manufacturing firms are induced to employ all the workers who do not work in a service-producing firm is larger than or equal to the minimum wage at which a worker is willing to work in a manufacturing firm. Thus,

$$S_t = \left(\frac{\xi}{w_t} \right)^{1/(1-\xi)} = 1 - L_t, \qquad (32)$$

from which we obtain that

$$w_t = w(L_t) = \xi (1 - L_t)^{\xi - 1} \geq \eta_\pi \hat{e}^\gamma . \qquad (33)$$

Note that the wage that clears the labour market of the manufacturing sector increases with the employment level of the service sector. Indeed, the labour supply of the manufacturing sector shrinks as more people are employed in the service sector, thus exerting upward pressure on w_t.

<u>The dynamics when the service-producing firms are for profit</u>

When the service-producing firms are for-profit, equations (4), (6), (23), (24), (25), (27), (31) and (33) can be used to obtain the system of difference equations in L_t and q_t^e governing the equilibrium path of the economy:

$$\Phi(L_t, L_{t+1}, q_{t+1}^e) = \gamma\eta_\pi L_t(f(L_t))^{\gamma-1} - \frac{\theta\beta(q_{t+1}^e)^{\beta-1}}{2} - \frac{\theta\gamma\eta_\pi L_{t+1}(f(L_{t+1}))^{\gamma-1}}{2} = 0, \tag{34a}$$

$$\Psi(L_t, q_{t+1}^e, q_t^e) = q_{t+1}^e - \frac{\left[q_t^e + f(L_t)\right]}{2} = 0, \tag{34b}$$

where

$$f(L_t) = e_t = \begin{cases} \left[\dfrac{v(L_t) - w(L_t)}{\eta_\pi} + \hat{e}^\gamma\right]^{1/\gamma} & \text{if there is full employment} \\ \left[\dfrac{v(L_t)}{\eta_\pi}\right]^{1/\gamma} & \text{if there is unemployment} \end{cases} \tag{34c}$$

and

$$v(L_t) = v_t = \alpha\zeta L_t^{\alpha\zeta-1}. \tag{34d}$$

Apparent in (34) is the negative relationship linking the employment level and the effort level of the workers (and thus, the quality level of the service) along an equilibrium path. Moreover, no link exists between the manufacturing sector and the service sector in the presence of unemployment.

In contrast, in the presence of full employment, both the effort level and the wage rate prevailing in the service sector depend on the conditions of the labour market in the manufacturing sector, which in their turn are affected by L_t: since $v_t = \xi(1 - L_t)^{\xi-1} - \eta_\pi \hat{e}^\gamma + \eta_\pi e_t^\gamma$, the optimal wage scheme must offer higher pay for any effort level as employment in the service sector increases. A similar effect is brought about by a reduction of the (standardized) disutility of working in a manufacturing firm (lower $\hat{e}$): in the presence of full employment, an improvement of the working conditions in the manufacturing sector tends to increase the monetary compensation that is necessary to induce the workers of the service sector to provide a given level of effort.

By setting $L = L_{t+1} = L_t$ and $q^e = q_{t+1}^e = q_t^e$, one can solve (34) for the steady states of this economy. In a steady state characterized by unemployment we have:

$$\overline{q}^e = \overline{q} = \overline{e} = \overline{e}(\theta, \eta_\pi, \alpha, \beta, \gamma, \zeta),\ \overline{e}_\theta < 0, \overline{e}_{\eta_\pi} < 0,\text{[4]} \tag{35a}$$

(the bar "$^-$" denotes the steady-state value of a variable as firms are for-profit),

$$\overline{L} = \left(\frac{\alpha\zeta}{\eta_\pi \overline{e}^\gamma}\right)^{1/(1-\alpha\zeta)}, \tag{35b}$$

$$\overline{v} = \eta_\pi \overline{e}^\gamma \tag{35c}$$

and (30)-(31). This steady state characterized by unemployment exists if and only if $\hat{e} > \hat{e}_{min}$, where $\hat{e}_{min} = \overline{m}(\alpha, \beta, \theta, \gamma, \eta_\pi, \xi, \zeta)$ is that value of $\hat{e}$ satisfying

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[4] $$\overline{e}(\theta, \eta_\pi, .) = \left[\frac{\alpha\zeta}{\eta_\pi^{\alpha\zeta}}\left(\frac{\gamma(2-\theta)}{\theta\beta}\right)^{1-\alpha\zeta}\right]^{\frac{1}{\alpha\gamma\zeta+(1-\alpha\zeta)\beta}}.$$

$\mathrm{S} = \left(\dfrac{\xi}{\eta_\pi \hat{\mathrm{e}}^\gamma} \right)^{1/(1-\xi)} = 1 - \overline{\mathrm{L}}$ (if $\hat{\mathrm{e}} = \hat{\mathrm{e}}_{\min}$, there is full employment): there is structural unemployment if the minimum wage required by the households to work in a manufacturing firm is so high relatively to the other parameters' values that the service-producing firms are unable to absorb all the workers left unemployed by the manufacturing firms.

It is easy to check that $\overline{m}_\theta > 0$: one can see in (35) that, as the agents discount the future less heavily because of a lower interest rate ($\theta \uparrow$), the steady-state level of the effort (and the steady-state level of the quality of the service) decreases, thus increasing the steady-state level of employment. A lower interest rate raises the threshold which the wage paid in the manufacturing sector cannot exceed without creating structural unemployment. In fact, as the future increments in firms' profits resulting from an additional investment in quality are discounted less heavily, firms tend to invest up to a point at which the marginal cost of their investment is higher. This is implemented by enlarging the workforce to which a current marginal increase in pay can apply. This effect dominates the reduction in the marginal cost of a quality improvement due to the lower level of quality at which the firms operate. As a result, a larger θ brings about a higher steady-state level of employment and activity in the service sector (number of units produced), associated with a lower quality and effort level and with a lower price of the service.

Since the same effort level is associated with more disutility $(\eta_\pi \uparrow)$, $\overline{m}_{\eta_\pi} < 0$: we have in (35) that both the steady-state level of employment and the effort level in the service sector decline. Considering (30)-(31), it is apparent that a larger η_π has a depressing impact on total steady-state employment also by raising the minimum wage at which the workers are willing to work in a manufacturing firm (note that a similar effect on S is caused by an increase in ê).

One can check that the system obtained by linearizing (34) around its steady state (35) exhibits saddle-path stability[5]: the linearized system characterizes a unique path converging to the steady state with unemployment. Moreover, the existence of a steady state with unemployment entails the existence of a full-employment steady state which tends to be dynamically unstable (see the Appendix). Indeed, the interdependence between the labour markets of the two sectors in the presence of full employment creates a potential for dynamic instability, owing to the fact that a small deviation of L_t from its (full-employment) steady-state value tends to cause a relatively large movement of e_t in the opposite direction. Indeed, a higher (lower) employment level in the service sector is associated with both a lower (higher) v_t and a reduced (expanded) labour supply in

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[5] The characteristic equation of the linearized system is the following:
$\lambda^2 - \left\{ \frac{2}{\theta} + \frac{1}{2} - \frac{(2-\theta)(1-\beta)(1-\alpha\zeta)}{2\theta[1+\alpha\zeta(\gamma-1)]} \right\} \lambda + \frac{1}{\theta} = 0$, where λ_1 and λ_2, which are the characteristic roots, are such that $\lambda_1 > 1$ and $0 < \lambda_2 < 1$. For instance, let $\zeta = .8$, $\alpha = \beta = .5,\ \gamma = \eta_\pi = 1,$ and $\theta = .9$: one has $\overline{e} = .581, \overline{L} = .5366,\ \lambda_1 = 1.9768$ and $\lambda_2 = .562.$

the manufacturing sector, which pushes w_t upwards (downwards). Thus, the effort level must decline (increase) considerably in the service sector, since otherwise the firms operating in this sector cannot attract more (less) workers in spite of the lower (higher) v_t. In its turn, this sharp fall (increase) in e_t causes a dramatic quality deterioration (improvement) in the current period, thus leading to a rapid decline (rise) in the reputation of the service-producing firms. In the proximate future, the consumers' willingness to pay for an improvement in the perceived quality of the service will be high (low), so that the firms will be induced to opt for a combination of higher (lower) quality and decreased (increased) quantity, implying higher (lower) wages and a lower (higher) employment level in the service sector. This will trigger a movement in the opposite direction, giving rise to fluctuations that become more violent as time passes: as $\hat{e} > \hat{e}_{min}$, one can check for reasonable parameters' values that explosive cycles characterize the dynamics of the system obtained by linearizing (34) around its full-employment steady state (see the Appendix).

The dynamics when the service-producing firms are non-profit

When the service-producing firms are non-profit, equations (4), (6), (23), (24), (25), (29), (31) and (33) can be used to obtain the system of difference equations in L_t and q_t^e governing the equilibrium path of the economy:

$$\Omega(L_t, L_{t+1}, q^e_{t+1}) = \gamma\eta_{n\pi}L_t(e(L_t))^{\gamma\text{-}1} - \frac{\theta\beta(q^e_{t+1})^{\beta\text{-}1}}{2} - \frac{\theta\gamma\eta_{n\pi}L_{t+1}(e(L_{t+1}))^{\gamma\text{-}1}}{2} +$$

$$+ \frac{\theta\beta(e(L_{t+1}))^{\beta\text{-}1}}{2\tilde{\sigma}} - \frac{\beta(e(L_t))^{\beta\text{-}1}}{\tilde{\sigma}} = 0, \tag{36a}$$

$$\Lambda(L_t, q^e_{t+1}, q^e_t) = q^e_{t+1} - \frac{[q^e_t + e(L_t)]}{2} = 0, \tag{36b}$$

where

$$e(L_t) = e_t = \begin{cases} \left[\dfrac{s(L_t) - w(L_t) + \eta_\pi \hat{e}^\gamma}{\eta_{n\pi}}\right]^{1/\gamma} & \text{if there is full employment} \\ \left[\dfrac{s(L_t)}{\eta_{n\pi}}\right]^{1/\gamma} & \text{if there is unemployment} \end{cases} \tag{36c}$$

and

$$s(L_t) = v_t = \frac{(1+\tilde{\sigma})\alpha\zeta L_t^{\alpha\zeta\text{-}1}}{\tilde{\sigma}}. \tag{36d}$$

By comparing (34) and (36), one finds that for any given effort level, the employment level tends to be higher as the firms operating in the service sector are non-profit. This is due to the fact that the objective function of the non-profit firms increases with the quantity and the quality of the service that they are able to provide to the consumers.

By setting $L = L_{t+1} = L_t$ and $q^e = q^e_{t+1} = q^e_t$, one can solve (36) for the steady states at which the debt of the non-profit firms is not distant from the initial condition $(D_0 = 0 = \tilde{D})$. In a steady state characterized by unemployment we have:

$$\widetilde{\mathrm{q}}^{\mathrm{e}} = \widetilde{\mathrm{q}} = \widetilde{\mathrm{e}} = \widetilde{e}(\theta, \eta_{\mathrm{n}\pi}, \alpha, \beta, \gamma, \zeta),\ \widetilde{e}_{\theta} < 0,\ \widetilde{e}_{\eta_{\mathrm{n}\pi}} < 0^{6}, \tag{37a}$$

$$\widetilde{\mathrm{L}} = \left(\frac{\alpha}{\eta_{\mathrm{n}\pi} \widetilde{\mathrm{e}}^{\gamma}} \right)^{1/(1-\alpha\zeta)}, \tag{37b}$$

$$\widetilde{\mathrm{v}} = \eta_{\mathrm{n}\pi} \widetilde{\mathrm{e}}^{\gamma} \tag{37c}$$

and (30)-(31). This steady state characterized by unemployment exists if and only if $\hat{\mathrm{e}} > \hat{\mathrm{e}}_{\min}$, where $\hat{\mathrm{e}}_{\min} = \widetilde{m}(\alpha, \beta, \theta, \gamma, \eta_{\pi}, \eta_{\mathrm{n}\pi}, \xi, \zeta)$ is that value of $\hat{\mathrm{e}}$ satisfying $\mathrm{S} = \left(\frac{\xi}{\eta_{\pi} \hat{\mathrm{e}}^{\gamma}} \right)^{1/(1-\xi)} = 1 - \widetilde{\mathrm{L}}$.

Again, one can check that linearizing (36) around (37) the system thus obtained exhibits saddle-path stability.[7] Moreover, also in the case in which the service-producing firms are non-profit, the existence of a steady state with unemployment entails the existence of a full-employment steady state that tends to be dynamically unstable (see the Appendix). The reasons for this dynamic

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[6] $\widetilde{e}(\theta, \eta_{\mathrm{n}\pi}, ..) = \left\{ \frac{\alpha}{\eta_{\mathrm{n}\pi}^{\alpha\zeta}} \left[\frac{\gamma\zeta(2-\theta)}{\theta\beta\zeta + \beta(1-\zeta)(2-\theta)} \right]^{1-\alpha\zeta} \right\}^{\frac{1}{\alpha\gamma\zeta + (1-\alpha\zeta)\beta}}$.

[7] The characteristic equation of the linearized system is the following: $\lambda^2 - \left\{ \frac{2}{\theta} + \frac{1}{2} - \frac{\zeta(1-\beta)(1-\alpha\zeta)(2-\theta)}{2\theta\zeta[1+\alpha\zeta(\gamma-1)] + 2\alpha\gamma\zeta(1-\zeta)(2-\theta) + 2\beta(2-\theta)(1-\alpha\zeta)(1-\zeta)} \right\}\lambda + \frac{1}{\theta} = 0$, where λ_1 and λ_2, which are the characteristic roots, are such that $\lambda_1 > 1$ and $0 < \lambda_2 < 1$. For instance, let $\alpha = \beta = .5$, $\gamma = \eta_{\mathrm{n}\pi} = 1, \zeta = .8$ and $\theta = .9$: one has $\widetilde{\mathrm{e}} = .636, \widetilde{\mathrm{L}} = .6697, \lambda_1 = 2.0215$ and $\lambda_2 = .5496$.

instability are similar to those discussed for the case in which all firms are profit maximizers.

4 COMPARING THE EQUILIBRIUM PATHS

Comparison between the steady-state levels of employment, quality and income

We focus only on the steady states characterized by unemployment, since the economy exhibits the tendency to move away from the full-employment steady state both in the case in which the service-producing firms are for-profit and in the one in which they are non-profit. Comparing (35) and (37), one can check that $\widetilde{\mathrm{L}} > \overline{\mathrm{L}}$ even if $\eta_{\pi} = \eta_{n\pi}$. *Even without relying on their possibly greater ability to motivate the workers, the non-profit organizations – which seek to maximize the discounted sequence of utilities that the representative household can obtain from their service —can satisfy their intertemporal budget constraint while employing more people than the profit-maximizing firms*. Therefore, in the presence of non-profit organizations, the wage paid in the manufacturing sector may be higher without creating structural unemployment (in fact, $\widetilde{m}(.) > \overline{m}(.)$ even if $\eta_{\pi} = \eta_{n\pi}$). These results, which do not depend on the alleged superiority of non-profit organizations in dealing with asymmetry in information on quality with respect to the consumers, are reinforced admitting that $\eta_{\pi} > \eta_{n\pi}$.

Furthermore, the fact that $\widetilde{\mathrm{L}} > \overline{\mathrm{L}}$ can be consistent with $\widetilde{\mathrm{q}} > \overline{\mathrm{q}}$ and $\widetilde{\mathrm{v}} > \overline{\mathrm{v}}$: the steady-state level of quality and the steady-state wage of the service-producing firms may be higher, as the latter are non-profit rather than for-profit.[8] In other words, non-profit firms not only produce more units of the service employing more people, but they may also offer a combination of better quality and increased quantity, guaranteeing their long-term survival in the marketplace, i.e., satisfying their intertemporal budget constraint.

Finally, note that at steady state aggregate income is higher in the presence of non-profit firms: $\mathrm{x} + p(\tilde{\mathrm{e}})(\tilde{\mathrm{L}})^{\zeta} > \mathrm{x} + p(\bar{\mathrm{e}})(\bar{\mathrm{L}})^{\zeta}$, where $\mathrm{x} = \left(\frac{\xi}{\eta_{\pi}\hat{\mathrm{e}}^{\gamma}}\right)^{\xi/(1-\xi)}$. The loss in income due to the fact that the households do not receive any profit from the service-producing firms is more than compensated by the increase in labour income due to the enlarged employed workforce.

Welfare implications

A regime shift in the service sector from profit-maximizing firms ($\mathrm{i} = \pi$) to non-profit organizations ($\mathrm{i} = \mathrm{n}\pi$) leads to an increase in the share of labour income on aggregate income. In the presence of inequalities in the distribution of non-labour income, the effects of this shift on the steady-state welfare of an individual depend on whether s/he obtains a portion of the service-producing firms'

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[8] In particular, we have $\bar{\mathrm{q}} \geq \tilde{\mathrm{q}}$ and $\bar{\mathrm{v}} \geq \tilde{\mathrm{v}}$ if and only if $\theta \leq \hat{\theta}$, where $\hat{\theta} = \frac{2(1-\zeta)}{1+\zeta^{-\alpha\zeta/(1-\alpha\zeta)} - 2\zeta}$. Considering the parameters' values given in the preceding notes, one has $\theta = .9 > \hat{\theta} = .71378, \tilde{\mathrm{q}} = \tilde{\mathrm{v}} = .636 > \bar{\mathrm{q}} = \bar{\mathrm{v}} = .581$.

profits in the steady state with $i = \pi$. In particular, we can state the following proposition:

Proposition (i) *If we ignore the possible advantage of the non-profit organizations in motivating their workers (i.e., if we assume that $\eta_{\pi} = \eta_{n\pi}$), and if there are households which are not entitled to receive the profits of the service-producing firms (i.e., if we assume that k^S<1), then ia) these households tend to be better off in the steady state emerging when the service-producing firms are non-profit (i.e., in the steady state characterized by (37)) rather than in the steady state emerging when all firms are profit maximizers (i.e., in the steady state characterized by (35)), while ib) those receiving an equal share of $\overline{\pi}^S$ tend to be worse off in (37) rather than in (35) (see the Appendix).*

The intuition underlying proposition (i) is simply that the households receiving the smaller share of non-labour income (for instance, because of an unequal distribution of property rights, or because of the lack of a tax policy redistributing income in favour of those with fewer assets) tend to prefer the framework in which the service-producing firms are non-profit, while the opposite is true for the "richer" portion of the total population. However:

Proposition (ii) *If we assume that $\eta_{\pi} = \eta_{n\pi}$, but also assume that all households receive an equal share of the firms' profits (i.e., if k^S=1), then each household is better off along the equilibrium path (34) (i.e., if i=π) rather than along (36) (i.e., if i=nπ) (see the Appendix).*

One can paraphrase proposition (ii) by stating that a society which is egalitarian in terms of distribution of non-labour income, and in which people are not particularly motivated to undertake non-profit activities, should not display any preference for non-profit rather than profit-maximizing firms. Moreover:

Proposition (iii) *If again* $\eta_{\pi} = \eta_{n\pi}$ *and* $k^S<1$ *as in proposition i), then a regime shift in the service sector from* $i=\pi$ *to* $i=n\pi$ *is Pareto dominated by an egalitarian redistribution of the claims on the firms' profits which safeguards the profit-seeking nature of all firms (see the Appendix).*

Again, if people are not more motivated when involved in a non-profit activity than when they are employed in a profit-seeking enterprise, an egalitarian redistribution of property rights (or, more generally, an egalitarian profit redistribution) is a better policy than a regime shift from profit to non-profit firms in the service sector.

One should not neglect the welfare implications of the possible greater ability of the non-profit organizations to motivate those working for them. Indeed:

Proposition (iv) *If the comparative advantage of the non-profit organizations in motivating their workers* ($\eta_{\pi} > \eta_{n\pi}$) *is sufficiently large, then (37) is always Pareto superior to (35) in the presence of transfers compensating those who may lose in the shift from (35) to (37) (see the Appendix).*

Note that these transfers are not necessary for the Pareto improvement if k^S is sufficiently close to 1 (i.e., if the distribution of the profits generated by the service-producing firms is not concentrated).

5 CONCLUSIONS

Also for non-profit organizations—as for profit-maximizing firms—it is costly to increase the quantity and to improve the quality of the service that they provide. However, the different objectives of the two types of organization give rise to different optimizing behaviours. Indeed, a for-profit firm equalizes the value of the marginal productivity of labour (as the workers' effort is at its optimal level) to the wage that must be paid to generate this optimal effort level. In contrast, a non-profit organization tends to operate with more people, thus pushing the value of the marginal productivity of labour downwards, because it also takes account of the marginal benefit that the representative household can obtain in the current period from an additional unit of the service. The amplitude of this deviation from the employment policy that would be optimal for a profit-maximizing firm meets a limit in the concern that the non-profit firm must show as regards the future implications for its 'mission' of an excessively 'generous' behaviour in the present, causing its balance sheets to deteriorate. Similarly, a non-profit organization deviates from the quality policy that would be optimal for a profit-maximizing firm: the former does not equalize the additional cost incurred in the current period by increasing its workers' effort and improving the quality of its service (as the employed workforce is at its optimal level) to the present value of the additional revenues that it can obtain in the future by improving its reputation, since also the marginal benefit accruing to the consumers thanks to the better quality of its service is taken into account. Again, the non-profit organization is aware that an excessive financial effort to improve the quality of its service in the present may undermine its future ability to carry out its mission.

Given these different optimizing strategies, a shift from an institutional framework in which the service-producing firms are for-profit to a framework in which they are non-profit increases the steady-state employment level of the service sector, even if non-profit organizations are no better at motivating workers through non-monetary incentives. This raises aggregate employment and reduces unemployment, since the economy tends to stabilize around steady states characterized by unemployment and to move away from full-employment steady states. Moreover, households can benefit from the increased quantity and (possibly) from the better quality of the services that they consume.

In the presence of unemployment, the manufacturing sector is not affected by the increased volume of activity in the service sector brought about by the non-profit firms, since (i) the additional manpower employed by the non-profit organizations was unemployed when the service-producing firms were for-profit, (ii) the wage in the manufacturing sector remains unchanged, and (iii) the additional demand for the service is financed by the increased income generated in the service sector. This increased income resulting from a change of regime in the service sector from profit-maximizing firms to non-profit organizations is associated with a larger share of labour income on total income, due to both a reduction in the volume of distributed profits and to an increase in the mass of wages. Also the steady-state wage paid to the workers in the service sector may be higher when firms are non-profit, thus raising the associated steady-state level of the service quality even in the absence of a non-profit firms' advantage at motivating workers.

In evaluating the welfare implications of a regime shift from profit-maximizing firms to non-profit organizations in the service sector, one should consider the distribution of non-labour income among individuals, which may be determined by the firms' shares owned by households or by some redistributive policy. Ignoring the possible advantage to non-profit firms in motivating workers through non-monetary incentives, households receiving a smaller share of the non-labour income tend to be better off in the steady state to which the economy can converge when the service-producing firms are non-profit, while the opposite is true for households receiving a larger share of the non-labour income. Under these circumstances, however, the regime shift is Pareto-dominated by an egalitarian redistribution of the non-labour income, which keeps the profit-seeking nature of the service-producing firms unchanged. By contrast, the steady state to which the economy can converge when the service-producing firms are non-profit is Pareto superior to the steady state to which the economy can converge when all firms are profit maximizers, if the non-profit organizations enjoy an important comparative advantage because of their greater ability to motivate workers by means of non-monetary incentives.

The tendency of the non-profit organizations to employ more people than the profit-maximizing firms may be consistent with the argument that economies characterized by firms whose objectives did not coincide with profit maximization (e.g. Japan) exhibited a lower natural rate of unemployment. Indeed, an optimal rule implying that the value of the marginal product of labour is pushed below the cost of an additional worker is also applied by capitalist firms whose managers seek to increase their volume of activity and treat the minimum rate of return that must be guaranteed for their shareholders as a constraint. Since labour is not scarce and workers are not subtracted from other productive uses, the existence of some sector(s) adopting this kind of behavioural rule is likely to reduce the number of workers that are involuntarily unemployed. It is a matter of dispute whether this reduction leads to a Pareto improvement.

A natural extension of the model presented here is to allow for the coexistence of profit-maximizing firms and non-profit organizations competing in the service sector. The derivation of the resulting steady-state equilibrium, entailing different combinations of price and quality for the service, will be the subject of a future study.

APPENDIX

1 Proof, for the case in which all firms are for-profit, that the existence of a steady state with unemployment entails the existence of a full-employment steady state that is locally unstable

By setting $L = L_t = L_{t+1}$ and $q^e = q_t^e = q_{t+1}^e$ in (34), we obtain the system of equations that a (full-employment) steady state must satisfy:

$$q^e = e\,, \tag{A1a}$$

$$n(L) = \hat{e}\,, \tag{A1b}$$

where $n(L) = \left[\dfrac{\eta_\pi (z(L))^\gamma - v(L) + w(L)}{\eta_\pi}\right]^{1/\gamma}$,

$$z(L) = e = \left[\frac{\beta\theta}{(2-\theta)\gamma\eta_\pi L}\right]^{1/(\gamma-\beta)},\ v(L) = v = \alpha\zeta L^{\alpha\zeta - 1},\ w(L) = w = \xi(1-L)^{\xi-1}.$$

To see that the existence of a steady state with unemployment necessarily implies the existence of a full-employmnent steady state, consider that: (i) the steady-state value of the workforce employed in the service sector given by (35b), $\overline{L}$, is that value of L satisfying $v(L) = \eta_\pi (z(L))^\gamma$; (ii) $\eta_\pi (z(L))^\gamma$ - v(L)>0 for L<$\overline{L}$ and $\eta_\pi (z(L))^\gamma$ - v(L)<0 for L>$\overline{L}$; (iii) a steady state with unemployment exists if and only if $\hat{e} > \hat{e}_{min}$, where $\hat{e}_{min}$ is that value of $\hat{e}$ such that $n(\overline{L}) = \hat{e}$, and (iv) the function *n*(L) is continuous in L for $L \geq \overline{L}$ and is such that $\lim\limits_{L\to 1} n(L) \to \infty$.

Together with the participation condition (21b), (i) and (ii) imply that in a full-employment steady state the employment level of the service sector, $\overline{L}_{ful}$, must be such that $\overline{L}_{ful} \geq \overline{L}$, while (iii) and (iv) imply that for any finite value of $\hat{e} > \hat{e}_{min}$ there exists a value L<1 satisfying (A1). Therefore, we can conclude, considering (iii), that if there is a steady state with unemployment, then there also exists $\overline{L}_{ful}$ satisfying (A1) such that $\overline{L}_{ful} > \overline{L}$.

The characteristic equation of the system obtained by linearizing (34) around the (full-employment) steady state satisfying (A1) is the following:

$$\lambda^2 - \left\{ \frac{2}{\theta} + \frac{1}{2} + \frac{(1-\beta)\beta \bar{e}_{\text{ful}}^{\beta\text{-}2} \frac{df(\text{L})}{d\text{L}}\Big|_{\text{L}=\bar{\text{L}}_{\text{ful}}}}{2\gamma\eta_\pi \left[\bar{e}_{\text{ful}}^{\gamma\text{-}1} + (\gamma-1)\bar{\text{L}}_{\text{ful}} \bar{e}_{\text{ful}}^{\gamma\text{-}2} \frac{df(\text{L})}{d\text{L}}\Big|_{\text{L}=\bar{\text{L}}_{\text{ful}}} \right]} \right\} \lambda + \frac{1}{\theta} = 0,$$

where λ_1 and λ_2 are the characteristic roots. Moreover, since $\frac{d^2 n(\text{L})}{d\text{L}^2} > 0$ for $\text{L} \geq \bar{\text{L}}$, it follows necessarily that

$$\frac{dn(\text{L})}{d\text{L}}\Bigg|_{\text{L}=\bar{\text{L}}_{\text{ful}}} > 0 \text{ if } \hat{e} > \hat{e}_{\min}. \tag{A2a}$$

One can check that (A2a) entails $-\frac{df(\text{L})}{d\text{L}}\Big|_{\text{L}=\bar{\text{L}}_{\text{ful}}} > \frac{\bar{e}_{\text{ful}}}{(\gamma-\beta)\bar{\text{L}}_{\text{ful}}}$, which in its turn implies that both characteristic roots are greater than unity in absolute value. For instance, let $\alpha = \beta = .5$, ξ=.25, $\hat{e}$=.62002 $\gamma = \eta_\pi = 1$, $\zeta = .8$ and $\theta = .9$: one has $\bar{e}_{\text{ful}}$ =.266, $\bar{\text{L}}_{\text{ful}}$ =.7926, λ_1=b+ic and λ_2=b-ic, where b=.03674, c=1.0534 and i= $\sqrt{-1}$. The system is unstable since $\sqrt{\text{b}^2 + \text{c}^2} = \sqrt{\theta^{-1}} > 1$.

2 <u>Proof, for the case in which the service-producing firms are non-profit, that the full-employment steady state existing when $\hat{e} > \hat{e}_{\min}$ is locally unstable</u>

By setting $\text{L} = \text{L}_{t+1} = \text{L}_t$ and $\text{q}^e = \text{q}^e_{t+1} = \text{q}^e_t$ in (36), we obtain the system of equations that must be satisfied by a (full-employment) steady state at which the debt of the non-profit firms is not far away from the initial condition $(\text{D}_0 = 0 = \widetilde{\text{D}})$:

$$\text{q}^e = \text{e}, \tag{A3a}$$

$$\chi(\text{L}) = \hat{e}, \tag{A3b}$$

where $\chi(\mathrm{L}) = \left[\dfrac{\eta_{\mathrm{n}\pi}(\varepsilon(\mathrm{L}))^{\gamma} - \vartheta(\mathrm{L}) + \mathrm{w}(\mathrm{L})}{\eta_{\pi}}\right]^{1/\gamma}$, $\quad \vartheta(\mathrm{L}) = \mathrm{v} = \alpha\mathrm{L}^{\alpha\zeta - 1}$,

$\varepsilon(\mathrm{L}) = \mathrm{e} = \left[\dfrac{\beta\theta\zeta + \beta(2-\theta)(1-\zeta)}{(2-\theta)\zeta\gamma\eta_{\mathrm{n}\pi}\mathrm{L}}\right]^{1/(\gamma-\beta)}$ and $\mathrm{w}(\mathrm{L}) = \mathrm{w} = \xi(1-\mathrm{L})^{\xi-1}$.

Following the same arguments used for the case in which the service-producing firms are for-profit, one can show that the existence of (37) entails the existence of a (full-employment) steady state satisfying (A3).

The characteristic equation of the system obtained by linearizing (37) around the (full-employment) steady state satisfying (A3) is the following:

$$\lambda^2 - \left(\frac{2}{\theta} + \frac{1}{2}\right)\lambda +$$

$$+\frac{\dfrac{\lambda\zeta(1-\beta)\beta\tilde{\mathrm{e}}_{\mathrm{ful}}^{\beta-2}}{2}\left.\dfrac{d\mathrm{e}(\mathrm{L})}{d\mathrm{L}}\right|_{\mathrm{L}=\tilde{\mathrm{L}}_{\mathrm{ful}}}}{\zeta\gamma\eta_{\mathrm{n}\pi}\left[\tilde{\mathrm{e}}_{\mathrm{ful}}^{\gamma-1} + (\gamma-1)\tilde{\mathrm{L}}_{\mathrm{ful}}\tilde{\mathrm{e}}_{\mathrm{ful}}^{\gamma-2}\left.\dfrac{d\mathrm{e}(\mathrm{L})}{d\mathrm{L}}\right|_{\mathrm{L}=\tilde{\mathrm{L}}_{\mathrm{ful}}}\right] + (1-\zeta)\beta(1-\beta)\tilde{\mathrm{e}}_{\mathrm{ful}}^{\beta-2}\left.\dfrac{d\mathrm{e}(\mathrm{L})}{d\mathrm{L}}\right|_{\mathrm{L}=\tilde{\mathrm{L}}_{\mathrm{ful}}}} + \frac{1}{\theta} = 0,$$

where λ_1 and λ_2 are the characteristic roots. Moreover, since

$\dfrac{d^2\chi(\mathrm{L})}{d\mathrm{L}^2} > 0$ for $\mathrm{L} \geq \tilde{\mathrm{L}}$, it necessarily follows that

$$\left.\frac{d\chi(\mathrm{L})}{d\mathrm{L}}\right|_{\mathrm{L}=\tilde{\mathrm{L}}_{\mathrm{ful}}} > 0 \text{ if } \hat{\mathrm{e}} > \hat{\mathrm{e}}_{\mathrm{min}}. \tag{A2b}$$

One can check that (A2b) entails $-\left.\dfrac{d\mathrm{e}(\mathrm{L})}{d\mathrm{L}}\right|_{\mathrm{L}=\tilde{\mathrm{L}}_{\mathrm{ful}}} > \dfrac{\tilde{\mathrm{e}}_{\mathrm{ful}}}{(\gamma-\beta)\tilde{\mathrm{L}}_{\mathrm{ful}}}$, which in its turn implies that both characteristic roots are greater than unity in absolute value. For instance, let $\alpha = \beta = .5$, ξ=.25, ê=.62002 $\gamma = \eta_{\pi} = 1$, $\zeta = .8$ and $\theta = .9$: one has $\tilde{\mathrm{e}}_{\mathrm{ful}} = .5071$, $\tilde{\mathrm{L}}_{\mathrm{ful}} = .75$, λ_1=b+ic and λ_2=b-ic, where b=.5448976, c=.902329 and i= $\sqrt{-1}$. The system is unstable since $\sqrt{\mathrm{b}^2 + \mathrm{c}^2} = \sqrt{\theta^{-1}} > 1$.

3 Proof of propositions i), ii), iii) and iv)

We need to establish some facts.

Fact 1: *along the equilibrium paths governed, respectively, by (30)-(31) and (34), and by (30)-(31) and (36), individual utilities may differ only with respect to the amount of firms' profits received by each household.*

This fact can be verified by using equations (9)-(16), (21c), (30) and (31) to obtain the utility level that a household can achieve along an equilibrium path characterized by unemployment:

$$u_t = \begin{cases} u(\pi_t^s) = \pi_t^m + \dfrac{\pi_t^s}{k^s} - p(q_t^e)N_t + N_t^\alpha + q_t^\beta \text{ if the household receives some} \\ \qquad \text{profit generated by the service - producing firms} \qquad\qquad \text{(A4)} \\ u(-\pi_t^s) = \pi_t^m - p(q_t^e)N_t + N_t^\alpha + q_t^\beta \text{ otherwise,} \end{cases}$$

where $\pi_t^m > p(q_t^e)N_t$ (even the unemployed workers can satisfy their basic needs, i.e. , the manufacturing firms' profits received by each individual are sufficient to allow him/her to buy some x_t even if s/he is unemployed and if s/he does not obtain any π_t^s).

Fact 2: *along the equilibrium paths governed, respectively, by (30)-(31) and (34), and by (30)-(31) and (36), the summation of the individual utilities is invariant with respect to all income distributions which make it possible for each individual to consume a strictly positive amount of x_t in every t.*

This fact can be verified by adding the utility functions of all households to obtain

$$U_t = \pi_t^m + \pi_t^s - p(q_t^e)N_t + N_t^\alpha + q_t^\beta, \qquad \text{(A5a)}$$

where U_t is the summation of the individual utilities and $\pi_t^m > p(q_t^e)N_t$. Note that (A5a) can also be written as

$$U(S_t, L_t, e_t, q_t, i) = S_t^\xi - \eta_\pi \hat{e}^\gamma S_t - \eta_i e_t^\gamma L_t + L_t^{\alpha\zeta} + q_t^\beta, \; i = \pi, n\pi. \qquad \text{(A5b)}$$

Fact 3: *the equilibrium paths of the economy do not depend on the income distribution (again, for all distributions that guarantee all households at least that minimum income with which to consume a strictly positive amount of x_t in each t).* One can easily check that k^S does not appear in (34) and (36).

Fact 4: *the path characterized by (30)-(31) and (34) can be obtained from the solution of the problem of a benevolent planner which maximizes the summation of the discounted sequence of individual utilities, taking into account that consumers base their (ex ante) assessment of the service quality on past experience (and setting $\eta_i = \eta_\pi$).*

Maximizing the Hamiltonian

$$H = \sum_{t=0}^{\infty} \theta^t \left\{ U(S_t, L_t, e_t, q_t, \pi) - \lambda_t \left[q_{t+1}^e - \frac{(e_t + q_t^e)}{2} \right] + \rho_t (q_t^e - q_t) \right\}, \text{ where}$$

U(.) is given by (A5b), with respect to S_t, L_t, e_t, q_t, q_{t+1}^e, λ_t and ρ_t, and eliminating the multipliers, one obtains (30)-(31) and (34).

From the four above facts one can establish the following proposition: *There is always a redistribution of π_t^s across households such that with $\eta_{n\pi} = \eta_\pi$ each household is better off along the equilibrium path emerging when all firms are profit maximizers.*

In particular, the path with $i=\pi$ is Pareto superior to the path with $i=n\pi$ if the distribution is equalitarian ($k^S = 1$, so that all households have an equal level of utility in every period along both equilibrium paths).

Propositions (ii) and (iii) are obvious implications of the proposition stated above.

Proposition (ia) is true since, in the absence of an appropriate redistribution, $\theta \geq \hat{\theta}$, where $\hat{\theta} = \dfrac{2(1-\zeta)}{1+\zeta^{-\alpha\zeta/(1-\alpha\zeta)} - 2\zeta}$, is a sufficient condition for having the "poorer" households better off in the steady state (37). Indeed, one can use (25a) and (A4) to write

$$\tilde{u}(-\tilde{\pi}^s) - \bar{u}(-\bar{\pi}^s) = (1-\alpha)\tilde{N}^\alpha + \tilde{q}^\beta - (1-\alpha)\bar{N}^\alpha + \bar{q}^\beta . \qquad \text{(A6)}$$

Given that $\widetilde{\mathrm{N}} > \overline{\mathrm{N}}$, $\theta \geq \hat{\theta}$ is a sufficient (but not necessary!) condition for having $\widetilde{\mathrm{u}}(\text{-}\tilde{\pi}^{s}) > \overline{\mathrm{u}}(\text{-}\pi^{s})$ since it entails $\widetilde{\mathrm{q}} \geq \overline{\mathrm{q}}$.

Proposition (ib) is true, since with $\widetilde{\mathrm{u}}(\text{-}\tilde{\pi}^{s}) > \overline{\mathrm{u}}(\text{-}\pi^{s})$ and $\overline{\mathrm{U}} = \left[(1\text{-}\mathrm{k}^{\mathrm{s}})\overline{\mathrm{u}}(\text{-}\pi^{s}) + \mathrm{k}^{\mathrm{s}}\overline{\mathrm{u}}(\pi^{s})\right] > \widetilde{\mathrm{U}} = \widetilde{\mathrm{u}}(\text{-}\tilde{\pi}^{s})$ we must have $\widetilde{\mathrm{u}}(\text{-}\tilde{\pi}^{s}) < \overline{\mathrm{u}}(\pi^{s})$. Indeed, it is worth noting that in (37) also the steady state utility of the households 'richer' because all firms are for-profit is equal to $\widetilde{\mathrm{u}}(\text{-}\tilde{\pi}^{s})$ (in (37) the service-producing firms do not generate any profit).

As a numerical example showing that proposition (i) holds, let $\alpha = \beta = \mathrm{k}^{\mathrm{s}} = .5, \gamma = \eta_{\pi} = 1 = \eta_{\mathrm{n}\pi}, \zeta = .8$ and $\theta = .9$. In this case, we have $\theta > \hat{\theta} = .71378$, $\widetilde{\mathrm{u}}(\text{-}\tilde{\pi}^{s}) - \overline{\mathrm{u}}(\text{-}\pi^{s}) = .0713$ $\overline{\mathrm{U}}\text{ - }\widetilde{\mathrm{U}} = .0066$ and $\overline{\mathrm{u}}(\pi^{s}) - \widetilde{\mathrm{u}}(\text{-}\tilde{\pi}^{s}) = .0846$.

One can check that proposition (iv) is true by letting $\alpha = \beta = .5$, $\gamma = \eta_{\pi} = 1 < \eta_{\mathrm{n}\pi} = .95$, $\zeta = .8$ and $\theta = .9$, thus obtaining $\widetilde{\mathrm{U}}\text{ - }\overline{\mathrm{U}} = .01139 > 0$.

If k^S=1 (egalitarian profit distribution), which implies that all households reach an equal utility level $\overline{\mathrm{u}} = \overline{\mathrm{U}}$ when $\mathrm{i} = \pi$ and an equal utility level $\widetilde{\mathrm{u}} = \widetilde{\mathrm{U}}$ when $\mathrm{i} = \mathrm{n}\pi$, everybody is better off in the steady state (37) without any transfer. If k^S<1, income transfers can be made (following a regime shift from $\mathrm{i} = \pi$ to $\mathrm{i} = \mathrm{n}\pi$) in favour of those possibly losing out because of the foregone profits of the service-producing firms, so that their welfare is not lower in (37) than in (35).

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