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# Social and Relational Variables in Worker Cooperatives: Implications for the Objective Function

## ABSTRACT

Traditional economic theory is focussed on a particular type of firm profit maximisation in which labour is a production factor and its social characteristics are not considered. However, in interpersonal relationships, even those in the workplace, identity and sociality play a role in workforce productivity and can change the objective function of a firm. This is especially the case in cooperatives, which are owned by the workers. This paper demonstrates that the social variables in worker cooperatives can influence the constraints of the maximising function and that a firm's objective can be the maximisation of income per worker or the stabilisation of employment levels. Thus, worker cooperatives have a greater resilience in economic crises than traditional investor-owned firms. In the current period of expected recession related to the COVID-19 emergency and the consequent lockdowns, a reflection on the effects of smart working on social variables and the implications for the flexibility of firms' objectives is fundamental to understanding the possible resilience of worker cooperatives in a pandemic.

## KEY-WORDS

RELATIONAL GOODS, SUBJECTIVE WELL-BEING, WORKER-OWNED ENTERPRISES, OBJECTIVE FUNCTION

## 1. Introduction

Classical economists, such as Smith, Marshall and Mill, have affirmed the importance of social interactions in economic analyses. Such interactions include the influence of working conditions on personality<sup>1</sup>. In contrast, the neoclassical approach assumes the self-seeking nature of individuals and rejects social and interpersonal variables; thus, the social aspects of production are excluded. But is this realistic? This approach considers the workforce to be a production factor with similar rules and outputs to other production factors. However, the reality is different in a workforce composed of individuals who have feelings. They are influenced by social and relational variables, and this can affect work performance. Traditional economic analyses do not consider worker identity. Only organisational and ownership factors are examined.

The recent economic literature has focussed on the influence of a good work climate and the mutual support of workers in the production process. Studies indicate that the inclusion of social and relational variables in the economic analysis of an enterprise can provide an understanding of their influence on production efficiency and surplus levels (Rob and Zemsky, 2002).

The present study analysed the effects of the introduction of relational goods<sup>2</sup> on the production function of firms and the role of social norms<sup>3</sup> in a specific type of firm: the worker cooperative, or worker-owned firm (WOF)<sup>4</sup>, in which social norms are fundamental in avoiding the free rider

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<sup>1</sup> Marshall (1873; 1890) believed that an individual's personality was shaped by religion and, above all, by work. Smith (1776) affirmed that personality is determined by the three main roles of capitalist society: landowners, capitalists and wage earners. For Smith, the role played by the individual in the society also determined the individual's behaviour in the non-working context according to the values he tended to favour. Mill (1871) considered the associations of cooperatives capable of introducing "a change in society that would combine the freedom and independence of the individual with the intellectual, moral and economic advantages of associative production" (1871: 25).

<sup>2</sup> Relational goods are non-material goods which can only be produced and consumed within groups and which are intrinsically linked to relationships and interactions (Uhlener, 1989).

<sup>3</sup> Identity economics captures the idea that people make economic choices based on both monetary incentives and their identity: holding monetary incentives constant, people avoid actions which conflict with their concept of self. Akerlof and Kranton (2000) provide a framework for incorporating social identities into standard economics models, expanding the standard utility function to include both pecuniary pay-offs and identity utility. The authors demonstrate the importance of identity in economics by showing how predictions of the classic principal-agent problem change when the identity of the agent is considered. In this framework, social norms are regarded as collective representations of acceptable group conduct as well as individual perceptions of particular group conduct.

<sup>4</sup> Worker cooperatives are enterprises which are owned and controlled by worker-members. In his 1958 model, Ward studied the behaviour in worker cooperatives in a former Yugoslav-type economic environment. He assumed that average labour income maximisation was the objective of the worker-members. Domar (1966) and Vanek (1970) completed the analysis. Currently, the most common explanation of worker cooperatives is provided by the Ward-Domar-Vanek model (Dow, 2018). Because the members of the cooperative are entrepreneurs who take the strategic and distributional decisions, they appropriate the entire value-added (net of the cost of capital). The worker cooperative is the best example of worker-owned enterprises.

problem. Investor-owned firms (IOFs) are ultimately controlled by the capital suppliers, and WOFs are ultimately controlled by the labour suppliers.

The focus of this study is WOFs, which have been resilient in the face of global economic crises<sup>5</sup>. This suggests that although these enterprises have not been spared by these crises, they have experienced fewer firm closures and job losses than traditional businesses. It is possible that relational goods and social characteristics are influential in situations of worker ownership and can modify the objective function of the cooperative<sup>6</sup>.

This study proposes a different perspective for the analysis of human relations in the workplace starting from the literature on relational goods and social norms in the workplace. In particular, previous studies have described the effects of relational goods on output (Bruni and Zamagni, 2007); however, the role of social norms (e.g., not shirking) has not been considered. Moreover, many studies have examined the dual role of the objective function of WOFs (Craig and Pencavel, 1993; Burdín and Dean, 2012) but, thus far, they have not linked social and relational characteristics to the objective function of the firm. The present study contends that these characteristics can have an effect on the constraints of a firm in which the workers are also the owners.

This paper is organised as follows: Section 2 describes the role of relational goods in firms. Section 3 focusses on the social characteristics of firms. Section 4 reports on the resilience of WOFs in terms of job recovery during the recent economic crisis. Section 5 describes a new objective function which includes the social characteristics of WOFs. Section 6 investigates the ability of WOFs to be resilient to the current COVID-19 crisis. Section 7 presents the study's conclusions.

## 2. Relational goods in firms

In a seminal paper published in *Public Choice* in 1989, Carole J. Uhlaner introduced the concept of relational goods within the rational choice theory<sup>7</sup>. Uhlaner (1989: 254) stated:

“These goods arise as a function of a relationship with others ... Relational goods can only be enjoyed if shared with some others ... [Such goods] exist after appropriate joint actions have been taken by a

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<sup>5</sup> The 2012 CICOPA-CECOP report (Roelants et al., 2012) demonstrated the high level of cooperative resilience in the face of the financial and economic crisis. Other empirical evidence is reported in Section 4.

<sup>6</sup> Borzaga and Tortia (2017) propose a new approach to the analysis of firms. The enterprise is considered fundamentally as collective action in the pursuit of private, mutual and socially beneficial objectives. In this perspective, investor owned and profit maximizing companies represent special, not general cases of entrepreneurial action. Cooperative enterprises are introduced as organizations in which spontaneous co-operation becomes dominant, though not necessarily exclusive. This approach helps explain their peculiar governance and working rules.

<sup>7</sup> In addition to considering Uhlaner (1989), please refer to the following articles on the subject: Gui and Sugden (2005), Bruni and Porta (2007), Bruni and Zamagni (2007), Bartolini (2010) and Donati (2019).

person and nonarbitrary others ... the others must either be specific individuals or drawn from some specific set. The identity of the 'other' in relationship matters".

The concept of relational goods refers to the quantity and quality of relational experiences. Specifically, relational goods concern interpersonal relationships which are characterised by non-instrumental motivations (i.e. intrinsically motivated relationships). These relationships offer opportunities for social interaction and the development of mutual empathy. Thus, the identities and motivations of the interacting individuals are essential elements in the creation and valorisation of the goods themselves. Relational goods have two specific characteristics. The extent to which they are enjoyed depends on the identities and participation levels of those involved and the quality of the social environment (Antoci, Sacco and Vanin, 2002). They are produced and consumed simultaneously, and externalities are associated with their consumption.

For the most part, relational goods are consumed in private interpersonal interactions. However, in recent years, studies have begun to stress the importance of relational goods which are consumed in the workplace (Gui, 2000; Gui and Sugden, 2005)<sup>8</sup>. In Gui's approach to relationality (2002), these goods offer "instrumental" opportunities for individuals. From a productivity perspective, these opportunities include the ability to specialise in a specific field, the ability to set economies of scale for the consumption and production of material goods and the possibility of achieving a goal which requires collaboration. When most of an individual's life is spent in the workplace, it also becomes a social space. Thus, individuals might produce and consume relational goods within enterprises. The extensive literature on organisation theory indicates that the relationship between an individual and an enterprise is not solely an economic exchange. It also includes a sense of belonging which expresses the fundamental need for identity. This engenders a psychological exchange of intangibles, such as loyalty, mutual trust and a sense of fairness, which are nevertheless real (Rousseau, 1995, cit. Bruni and Zamagni, 2007). Recent studies have shown that the organisational structure plays a role in these dynamics.

A study on WOFs by the European Foundation for the Improvement of Living and Working Conditions (Eurofound, 2019) found that a majority of the workers surveyed found their line managers supportive and encouraging. When asked how supportive their line managers and co-workers were in comparison to those at other organisations, a large majority of the workers indicated that they were "better" or "much better". A worker at a Spanish multistakeholder cooperative stated:

*"From my point of view and personal experience, the work environment here is excellent. My boss and colleagues are very supportive, and I have had all the opportunities to develop. I feel very privileged in relation to my colleagues and my supervisors. We are a kind of family here".*

Because WOFs are value-driven organisations in which worker development and involvement in decision-making are core values, the workers could be expected to have positive opinions of their

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<sup>8</sup> Gui (2002) also used Coleman's definition of social capital. According to that perspective, social capital results from the changes in interpersonal relationships which facilitate activities that demonstrate the relationship between relational assets and social capital accumulation processes.

colleagues. Some indicated that the levels of support were related to the personal characteristics of the line manager. However, most workers mentioned peer support and the encouraging, friendly, family-like working atmospheres which were an aspect of the organisational culture.

Bruni and Zamagni (2007) asserted that the enjoyment of relational goods was associated with the cooperative action in the utility function of a WOF worker. They affirmed that the consumption of relational goods could have a significantly greater mitigating effect on free riding than would buying the power to make decisions. In our opinion, it is likely that workers at IOFs often have to choose between higher incomes and relational assets. In large companies, career progression often requires moving to other locations, and this results in the loss of workplace relationships and specific capital. Opportunities to achieve career progression while remaining at the same site lead to increased competition among the workers. Rivalries among those involved in productive activity are accentuated as workers seek to impress their owners and supervisors. If workers have the opportunity to work towards achieving common goals over extended periods of time while retaining ownership of the firm, relational goods are more easily consumed in the workplace, and this contributes to positive workplace relationships.

Of course, cooperatives are composed of individuals who can create conflict. They might engage in opportunistic decision-making and thus destroy relationships. Ben-Ner and Ellman (2013) asserted that selfishness and shirking can endanger the economic stability of cooperatives because selfish workers lack the incentive to engage in mutual monitoring. Therefore, they shirk their monitoring and job responsibilities. The solution is to hire unselfish workers who exhibit the identities, social preferences and capabilities which minimise shirking and increase monitoring<sup>9</sup>.

### **3. Social norms in cooperatives**

The social characteristics of the workforce are related to the importance workers place on co-workers' behaviour. This, therefore, implies a respect for social norms (i.e., norms which are shared by many or most individuals) which are not formally enforced and instead result from players having social preferences which discourage actions causing negative externalities towards others and encourage actions causing positive externalities. In our framework, the respect for social norms is related to the consumption of relational goods among workers. According to our idea, in firms in which relational goods are consumed by most workers, worker behaviours tend to be of great importance and social norms are respected. Microeconomic analyses have considered the role

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<sup>9</sup> Puusa, Hokkila and Varis (2016) found that, in some cases, the value of co-operation seemed to be centred on concrete benefits, thereby offering a practical tool for managing individual entrepreneurial activity. The individually orientated co-operators seemed to perceive other members as enabling elements in a purely professional and profitable sense (i.e. an extension of employment opportunities and not the starting point for employment).

of social norms<sup>10</sup>; however, the effect of social norms on firms' incentive structures has received much less attention. The most prominent study is perhaps that of Kandel and Lazear (1992), who developed a model of the norms in work teams in which cooperation has been problematic. Their results have been partially confirmed by other studies (Knez and Simester, 2001; Garicano, Palacios-Huerta and Prendergast, 2005). Huck, Kübler and Weibull (2012) define these norms as resulting from the players' social preferences, which discourage actions which would have negative outcomes and encourage actions which lead to positive externalities. The presence of such externalities triggers the social norms, which promote actions which induce positive externalities. Thus, social norms can have a somewhat positive effect on firm productivity through team incentives.

A growing body of empirical literature suggests that group norms might have significant effects on worker behaviour<sup>11</sup>. In a laboratory study, Fehr, Fischbacher and Gächter (2002) found that individuals in groups with high average contributions made a greater contribution to the public good than those in groups with low contribution levels. Falk and Ichino's (2006) non-laboratory experiment on the effects of peer pressure yielded similar results.

The traditional economic theory of WOFs implicitly excludes considerations of the effects of social norms in the workplace in relation to the free rider problem. In a well-known paper, Alchian and Demsetz (1972) argued that the inefficiency of a partnership would lead to organisational change. They discussed the inefficiency of WOFs for ensuring a sufficient supply of effort and suggested that firms hire a principal to monitor the agents. The monitor should be given title to the firm's net earnings so that he/she has the appropriate incentives for work. Such an arrangement would restore efficiency. It would also change the partnership into an IOF with the monitor effectively acting as the owner<sup>12</sup>.

Examining the problem of control of the labour process, Putterman (1984) initiated a line of enquiry which was at odds with Alchian and Demsetz's (1972) approach. He indicated that the role of the central monitor need not imply residual claimancy. This role could be performed by other institutionalised agents, such as appointed managers or elected directors. Moreover, the basic idea underlying Alchian and Demsetz's analysis would hold if there are no transaction costs; however, in such a circumstance, there would be no firms (McCain, 1977). If there were no transaction costs, any enterprise could operate efficiently regardless of how the right to participate in managerial decision-making might be assigned. This implies that capitalistic firms tend to be more durable than

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<sup>10</sup> See Moffitt (1983), Besley and Coate (1992), Bernheim (1994), Albanese and Villani (2015) and the literature cited in these studies.

<sup>11</sup> Bandiera, Barankay and Rasul (2005) conducted a very intriguing field experiment.

<sup>12</sup> Holmstrom (1982) showed that the free rider problem was the result of not only the unobservability of the actions but also the imposition of budget balancing. In this theory, the principal does not have a monitoring role; thus, specific group incentives alone can eliminate the free rider problem. These incentives impose penalties on those who waste output and award bonuses to those who exceed output. In both instances, the principal should either enforce the penalties or finance the bonuses. Thus, in Holmstrom's view, the principal's primary role is to break the budget-balancing constraint.

self-managed firms not for the reasons identified by Alchian and Demsetz but, rather, as a result of lower transaction costs, especially in the area of governance<sup>13</sup>.

In contrast, Bowles and Gintis (1987; 1998) demonstrated that the risk of worker opportunism in WOFs is lower than in IOFs as mutual monitoring is a strong instrument for increasing the probability of successful monitoring. Ben-Ner (2018) asserted that cooperatives are grounded in a relatively cohesive community of interest, such as the workplace. This cohesion moderates the free riding problem and the provision of the needed resources at the founding of the organisation.

More recently, Thompson (2015) proposed a “social” theory of the firm. It privileges “deep-level cooperation” and the solidaristic behaviour on which it is predicated. A crucial feature of the theory is that the bureaucratic organisational structures required for coordination may jeopardise deep cooperation because of their adverse effects on behaviour. Although an appropriate organisational culture can mitigate the effects of this trade-off, it must still be substantiated in organisational structures, thereby giving rise to distributive issues. This shows that cooperatives would be better positioned to achieve an organisational culture of deep cooperation than would conventional firms<sup>14</sup>. Far from failing to achieve coordination, as has been implied by the competence-based theories, cooperatives might be better able than conventional firms to implement the bureaucratic organisational structures which might be required for coordination (i.e. hierarchical management systems and a complex division of labour) without compromising deep cooperation because worker control could counteract any adverse behavioural effects<sup>15</sup>.

Craig and Pencavel (1992; 1994) and Craig et al. (1995) found slightly higher labour productivity and technical efficiency (6–14 per cent) in cooperatives than in unionised and non-unionised IOFs. Bartlett et al. (1992) found better economic performance in WOFs than in IOFs in

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<sup>13</sup> Many studies have shown that some forms of monitoring, as with the division of labour and other aspects of organisational structure, are chosen not for efficiency but for maintaining and reinforcing the employer’s authority (Marglin, 1974).

<sup>14</sup> Thompson (2015) affirms that the predominant economic theories of the firm neglect the importance of cooperation based on trust and loyalty and that, as a result, their criticisms of worker cooperatives are incomplete. While competence-based theories tend to focus exclusively on coordination and thus fail to acknowledge that the development and application of productive knowledge also involves cooperation, contract-based theories cling to a rigid model of behaviour which does not account for the type of cooperation thus involved. Thus, although contract-based theories denigrate cooperatives for failing to achieve cooperation, cooperatives may, in fact, be more propitiously situated than conventional firms to achieve the cooperation involved in the development and application of productive knowledge.

<sup>15</sup> Sacchetti (2015) provided a taxonomy of production organisations on the basis of the social preferences related to two variables: (i) the form of governance (i.e. ownership and control rights) and (ii) other strategic decisions which characterise the management of the company at a more operational level once its fundamental legal structure has been chosen. The author asserted that cooperative firms set up processes which include at least one major stakeholder. This is typically not the investor but the weakest stakeholder (i.e. the stakeholder which would incur the greatest loss if it were not an owner). Inclusion preferences, however, do not extend beyond membership. Albeit founded upon democratic governance principles, these cooperatives are accountable mainly to their members. Thus, they do not implement specific practices for the inclusion of other types of interests. This could also be one of the limits of cooperatives.

Italy's industrial sector. In particular, they found strong evidence that Italian producer cooperatives achieve higher levels of both labour and capital productivity than comparable investor-owned firms. Their results can be attributed to three distinct organisational features which lower organisational costs and increase worker welfare and productivity in cooperatives: (i) cost reductions through a flatter organisational structure and fewer intermediate clerical positions devoted to monitoring activities; (ii) cost reductions through conflict reduction, which leads to a lower incidence of sabotage and strikes or other forms of industrial action; and (iii) improved worker involvement through membership representation. In experimental settings, Frohlich et al., (1998) obtained similar results for worker productivity and wage equity.

Dow (2018) asserted that the survival advantages of WOFs over IOFs reflected the self-selection of unusually productive workers. WOFs fare very well against capitalistic firms because they tend to offer non-pecuniary benefits which IOFs cannot replicate. In addition, we believe that the workers' consumption of relational goods in a workplace which favours good relationships creates a basis for the respect for social norms. Thus, the characteristics of WOFs enable them to have a greater adherence to social norms than would IOFs. Of course, this depends on the worker characteristics<sup>16</sup>. In general, the findings of theoretical and empirical studies seem to indicate that WOF organisational structures and governance models encourage a respect for social norms. This is manifested in less free riding and opportunism than that observed in IOFs.

#### 4. Job recovery in worker cooperatives

The high resilience of WOFs during the recent economic crisis demonstrates the role of organisational structures in response to economic phenomena. Alves, Burdín and Dean (2016) highlighted the greater employee resilience, as exhibited through job creation and destruction, in labour-managed firms than in IOFs. Workers place greater value on employment stability (Guest, 2002; Depedri, Tortia and Carpita, 2012). Therefore, increased stability would be associated, *ceteris paribus*, with improved worker welfare, which could translate into lower absenteeism and turnover and increased productivity. Burdín and Dean (2009) made an economy-wide comparison of WOFs and IOFs in Uruguay in 1996–2005. They found substantially more pronounced wage variations in cooperatives than in conventional enterprises. This differential was explained by the cooperatives' need to maintain employment stability during the economic fluctuations and crises, which began in 2001.

Arando et al. (2010) indicated that the employment creation and preservation rates in the Mondragon group of WOFs in 1983–2009 were much higher than the average rates for the Spanish

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<sup>16</sup> As was previously indicated, Ben-Ner and Ellman (2013) found that if the workers are selfish, the cooperative cannot survive.



economy, both in and outside the Basque Region where the group is located. The analysis of firm performance during the economic crises indicates that the Mondragon cooperatives engaged in less adjustment of employment (or did not adjust at all) in response to reduced firm performance. The same study observed that during the 2009 economic crisis, the Mondragon industrial cooperatives laid off fewer than 1 per cent of their worker-members<sup>17</sup>. This was attributed mainly to flexible wages and work schedules. Following the 2007–2008 financial crisis, employment in the entire Mondragon group fell by approximately 9 per cent; however, only temporary, non-member workers were affected. This was in contrast to the 20 per cent drop in employment in Spain and the 2 per cent drop in the Basque Region. Delbono and Reggiani (2013) studied a group of Italian production cooperatives in 2003–2010 and 1994–2011. They compared the performance of the cooperatives with the overall trend in the same sectors and found that wage adjustments had a stabilising effect on employment with respect to demand shocks.

The 2012 CICOPA-CECOP report (Roelants et al., 2012) confirmed the high level of cooperative resilience in the face of the financial and economic crisis. Focussing on France and Spain, the report argued that although cooperatives were spared by the crisis, they were better able than other types of businesses to limit firm closures and redundancies. In some cases, they restored a job creation pattern. Some national actors, particularly in Spain and Italy, have attributed this to the workers' acceptance of reduced hours and wages (Eurofound, 2019). Other studies have highlighted the capacity for job retention and even job growth in the face of economic crises (European Parliament, 2013; Pérotin, 2016).

In the next section, the results of the empirical data and the fundamental role of the social and relational variables in firms are discussed.

## **5. The social variable in the objective function of cooperative firms**

Many studies have analysed the dual aspects of the objective function of WOFs. This is at odds with the studies which focussed on the maximisation of income per worker, as proposed in the traditional Ward–Domar–Vanek (WDV) model. Specifically, Craig and Pencavel (1993) estimated the parameters of a generic objective function which considered the behavioural assumptions suggested by the WDV theoretical model. The study focussed on a panel of WOFs and conventional firms in the plywood industry in the United States. The cooperative chose the employment level, work hours, wages and inputs in order to maximise the workers' welfare. The results indicated that the WOFs had a variety of objectives which emphasised both employment and income per worker. The study considered several production functions, including the generalised Cobb–Douglas form and quadratic and transcendental logarithmic (translog) functions. The cooperatives and the

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<sup>17</sup> Members who were made redundant continued to receive 80 per cent of their wages.

conventional firms were assumed to have the same production technology. Craig and Pencavel found that no simple behavioural model adequately described the cooperatives. Therefore, to the extent that the cooperatives deviated from profit maximisation, they did so by placing a positive emphasis on employment rather than income per worker. The study concluded that there was little support for the assumptions of the traditional cooperative model; however, they cautioned that the estimation of the parameters was imprecise<sup>18</sup>.

Burdín and Dean (2012) provided new evidence on the objectives pursued by worker-managed firms. Following a strictly neoclassical framework but allowing for a more general specification of the WOF goals, they demonstrated the inaccuracy of the assumptions of the basic neoclassical model. Their results support the view that WOFs are concerned with both employment and income per worker. Their model drew almost entirely on that of Craig and Pencavel (1993). Thus, Burdín and Dean's estimation of the parameters of a generic welfare function showed that these parameters determined the relative importance of income per worker vis-à-vis employment levels in WOFs. They measured wage and employment elasticity to determine the optimal level of welfare in WOFs. They used a general objective function which was written as a Cobb–Douglas function of total profit and total employment (where profit was income per worker minus opportunity cost per worker), all multiplied by employment. As in Craig and Pencavel (1993), workers' interests are weighted by theta parameter. A theta value near zero implied employment maximisation, a theta intermediate value implied mixed objective and a theta value approaching positive infinity implied the maximisation of income per worker. In their model, the theta value was defined as the worker's interests relative to the group's (Burdín and Dean, 2012)<sup>19</sup>.

The cited models contain few references to the social aspects and simply show the dual nature of the objective function to be maximised in WOFs. We believe that the inclusion of social and relational variables in the organisational dynamics of cooperative firms and the workers' ownership can influence the objective function of WOFs and can also explain the resilience of WOFs. Specifically, the objective function of a WOF is partly lucrative and partly social (Zamagni and Zamagni, 2008). The lucrative part places an emphasis on maximisation of income per worker, and the social part emphasises the role of job retention. Starting from this hypothesis, we present a model in which the first or second element prevails with reference to the economic environment the company faces and in relation to the consumption of relational goods among workers.

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<sup>18</sup> Dow (2018: 93) provided a comprehensive analysis of Craig and Pencavel's (1993; 1994) contributions to the study of the objective function of worker cooperatives.

<sup>19</sup> It would also be interesting to conduct a formal analysis in which the value of the theta parameter in their model is defined with regard to the relational variable(s) to measure the optimal welfare level of a cooperative firm. However, the results of their model would probably be unchanged because the theta value would be closer to zero in worker cooperatives, in relation to the consumption of relational goods in the firm.

The following analysis of WOFs is not a formal analysis of the effects of social and relational variables on workforce performance<sup>20</sup>. It is an examination of the effects of social characteristics on workers in terms of the objective function. It is assumed that the IOFs and WOFs had equal productivity and a competitive labour market. The level of sociality in a firm is defined by the value of parameter  $s$  which can be 0 or 1. We assume that the value of  $s$  is positive if more than an average number of workers consume relational goods in the workplace. In particular, we assume that  $L$  is the total number of workers in a firm and  $L_r$  is the portion of workers consuming relational goods in the workplace. The value of  $s$  is one if  $L_r > L/2$  and is zero if  $L_r < L/2$ .

The value of  $s$  could modify the firm's objective function in a situation in which the workers are also the owners and can thus decide to modify members' income.

The following is an analysis of a standard enterprise which generally corresponds to an IOF. The profit function of a generic IOF  $j$  is represented by the following equation:

$$\pi_j = X_j - w_j L_j - r_j K_j \quad (1)$$

where  $X_j$  represents total revenue,  $w_j L_j$  is the cost of labour and  $r_j K_j$  is the cost of capital (where the interest rate is  $r$  and capital is  $K$ ). The objective is to maximise profit or, in the event of a crisis, to stabilise its value. In the event of revenue contraction, it cuts costs through lay-offs. Consequently, the objective of the IOFs during a crisis is subjected to the constraint:

$$\pi_{j(t)} = \pi_{j(t-1)} \quad (2)$$

In the case of a demand shock, total revenues ( $X_j$ ) decrease, and in order to respect the constraint of Equation (2), reducing the cost of labour  $\bar{w}_j L_j$  is the only solution. If the capital costs and wage levels do not change ( $w_{j(t)} = w_{j(t-1)} = \bar{w}$ ), as exogenously determined by the capital and labour markets, the only solution to respect the constraint is to reduce  $L$  through lay-offs ( $\delta X_j = \delta \bar{w}_j L_j$ ).

The value (zero or positive) of parameter  $s$  does not influence the constraints or objectives of IOFs. The workers and owners are not the same individuals. Thus, if a good working climate is associated with the workers' consumption of relational goods (i.e. the value of the parameter  $s$  is positive), the owner of the firm does not consider this parameter in its maximisation process because the owner's consumption of relational goods is zero. In this case, the value of  $s$  is always considered 0.

In WOFs, the members are also the owners of the enterprise. Thus, to save their jobs and those of the other workers, they can make choices, such as instituting reduced profits and/or flexible wages. In analyses based on the traditional cooperative (WDV) model, the maximised value is the average income, and the value of the residual which is realised is distributed in full among the members. Therefore, the income of the members of a generic WOF is represented by:

$$\pi_{si} = \pi_i / L_i \quad (3)$$

<sup>20</sup> This was examined by Bruni and Zamagni (2007).

where  $\pi_i/L_i$  is the employee's share of the profits:

$$\pi_i = X_i - w_i L_i - r_i k_i \quad (4)$$

where  $X_i$  presents the total revenues,  $w_i L_i$  is the cost of labour and  $r_i k_i$  is the cost of capital (where the interest rate is  $r$  and capital is  $K$ )<sup>21</sup>.

If, as probably happens in relation to the results of the literature on the resilience of cooperatives, in WOFs the value of parameter  $s$  is 1, the workers enjoy the benefits associated with the consumption of relational goods<sup>22</sup>. It is like a virtuous circle. The consumption of relational goods fosters a respect for social norms, and this creates a good working climate in which the relational goods are more easily consumed. Thus, the social characteristics are a component of the objective function as the lucrative aspect<sup>23</sup>. It can, therefore, be hypothesised that in crises, the social function of the cooperative would be the preservation of jobs ( $L$ ) because of the importance of worker identity and the solidaristic preference for job preservation. Therefore, the objective of a WOF during a crisis could be subjected to the following constraint:

$$L_{i(t)} = L_{i(t-1)} \quad (5)$$

In the case of a demand shock, if total revenues ( $X_i$ ) decrease, keeping steady the cost of capital, the only solution to respect Equation (5) is to reduce profits:

$$\pi_{i(t)} < \pi_{i(t-1)} \quad (6)$$

Thus, the members' incomes decrease:  $\pi_{si(t)} < \pi_{si(t-1)}$ .

However, they can only decrease to the minimum required by the average member ( $\pi_{si(min)}$ ):

$$\pi_{si(t)} = \pi_{si(min)} \quad (7)$$

Thus, if the cost of capital  $r_i k_i$  and the number of workers  $L_i$  are fixed, when  $X_i$  is reduced, the only solution to comply with the constraint imposed by Equation (5) is to reduce the workers' share

<sup>21</sup> In the original Ward (1958) model, worker cooperatives, for the sake of maximising average income revenue per worker, would react to the increased output prices by reducing employment. The critics of worker cooperatives have considered this conclusion a perverse effect of the reaction to market stimuli. It has been widely criticised theoretically (e.g., Meade, 1972; Drèze, 1976) and refuted by several empirical tests (e.g., Bonin, 1981; Montias, 1986; Nantz and Sparks, 1990). In most studies, WOFs appear to have a more rigid but not downward sloping supply curve. This supports the present study regarding the enduring rigidity of cooperatives  $L$ .

<sup>22</sup> We can also have a case of WOFs in which the value of  $s$  is 0 as social and relational variables are not important for most of the workers. In this case, there is no difference from IOFs in terms of the constraint of the objective function. They will maximise individual profits, respecting equation (2).

<sup>23</sup> The parameter does not appear in the formula, as we simply assumed that the value of  $s$  equals unity in WOFs.

of the profits, also to the level of  $\pi_{si(min)}$  if necessary<sup>24</sup>, leaving the number of workers unchanged  $L_{i(t)}=L_{i(t-1)}=\bar{L}_i$ .

Another solution, often analysed in the literature, is to reduce wages. In WOFs, the workers are the owners; thus, they can emphasise the lucrative or social aspects of the firm's objectives on the basis of the macro environment. For cooperatives, hiring the right workers and maintaining a supportive environment are key to sustainability. Therefore, in firms with good relationships and social interactions, the WOF model is more appropriate than the IOF for expressing these variables. This is related to the governance structure<sup>25</sup>.

## 6. Relational variables during COVID-19

The COVID-19 pandemic and the ensuing social distancing policies enacted in many countries have placed the organisation of production and work processes under unprecedented stress. Analyses of the effects of the pandemic on the labour market (Coibion, Gorodnichenko and Weber, 2020) are generating alarming projections on job and income losses (Cetrulo, Guarascio and Virgillito, 2020). WOFs exhibited resilience in the previous economic crisis. The present study investigated their ability to be resilient in the current crisis. In particular, quarantines could diminish the positive influence of workplace relationships, and this could have an effect on WOFs' resilience.

The previously discussed benefits associated with workplace relationships could be affected by the pandemic-induced crisis in the following three ways: the characteristics of the production process, the extent of the lockdown and the macroeconomic consequences of crisis. During a lockdown, individuals can opt for smart working, and this reduces social interactions. However, the option to adopt smart working depends on the job characteristics. Cetrulo, Guarascio and Virgillito (2020) revealed that the work-from-home jobs were held primarily by managers and executives, academics, technical professionals and clerical support workers. Sales and service workers, craft agriculture workers, manual operators, artisans and elementary workers have little to no opportunity to work from home.

In the World Cooperative Monitor, Euricse and ICA (2019) presented the distribution of the sectors represented by the world's top 300 cooperatives and mutuals: insurance, 39 per cent;

<sup>24</sup> If the cooperative enterprise were to face excessive reductions in profit (i.e. negative profits and wage reductions below labour market participation), the wages would not cover the cost of the effort required of the business. Thus, the workers would immediately leave the company. This would be voluntary abandonment rather than dismissal.

<sup>25</sup> Why this was less likely to be observed in IOFs than in cooperatives was a concern. The explanation is twofold. In IOFs, fearing lower labour levels due to low wages, they would hardly be willing to pay them (Shapiro and Stiglitz 1984). Moreover, Albanese, Navarra and Tortia (2015) showed that workers in IOFs would not accept flexible wages as they face the problem of employers' moral hazard: in the event of a negative shock, the risk that the wages will be lowered to the minimum level of the non-shirking constraint condition indicated in the Shapiro–Stiglitz model is very high. Albanese, Navarra and Tortia (2019) also indicated that more efficient monitoring and the absence of wage premiums to compensate for the expected costs of contract failures result in lower levels of non-shirking constraints in WOFs than in IOFs.

agriculture, 31.7 per cent; wholesale and retail trade, 17.7 per cent; banking and financial services, 7 per cent; industry and utilities, 1 per cent; and health, education and social care, 1 per cent.

Regarding the consumption of relational goods and the effects of their positive externalities, the WOFs which rely on workplace-based jobs (i.e. agriculture, retail trade, health and social care) might be more greatly affected by COVID-19 quarantine measures in terms of the reduction in the positive social effects of the consumption of relational goods. With the implementation of smart working, social platforms can be a substitute for face-to face-relationships. However, the positive effects of relational and social variables can be achieved if management uses incentives to encourage the use of social platforms for advice, opinion exchange and other forms of interaction which are necessary to maintain a minimum level of worker collaboration and sociality.

The effects of incentives on the social interactions related to the use of social platforms in the previously presented model can be measured by the variations in the value of parameter  $s$ , the level of sociality in a firm. After the lockdown,  $s_2$  is its post-pandemic value. It can be equal to  $s_b$ , its pre-pandemic value (equal to 1 in WOFs) or it can also be zero. Whether the value of  $s$  is closer to one or zero depends on the production characteristics. Where possible, digital empowerment and the creation of networking platforms for workers can be an incentive to keep parameter  $s$  close to its pre-pandemic value. Unfortunately, the inability to engage in smart working would preclude interaction, and this could reduce the value of  $s$ .

Regarding the second issue, the extent of the lockdown, the absence of physical interpersonal relationships in the workplace for a short period would not change the employees' preference for good workplace relationships. Social platforms can facilitate relationships; thus, the positive effects of good workplace relationships would not be totally lost during a lockdown. Presumably, the limitations on collaboration during quarantine would lead to a reduction in relational goods and their positive externalities on the value of  $s$ . Thus, WOFs could be less resilient in the face of the pandemic-induced crisis than they were in the 2008 crisis. However, the most important variable for explaining the possible resilience of worker cooperatives is the magnitude of the recession and the consequent reduction in earnings. If the severity of the crisis results in a reduction in the value of the income of the average member ( $\pi_{si(t)}$ ) to a value lower than the minimum required by the average member ( $\pi_{si(min)}$ ), as expressed in equation (7), the WOF will close. Workplace relationships and the workers' attention to social interactions would be compromised, and the workplace could no longer exist.

## 7. Conclusions

This study sought to answer two questions: What is the role of the social and relational characteristics of the labour factor in firms? How do these characteristics influence the firms' objective functions? WOFs are created by individuals with shared interests (Ben-Ner, 2018). However, as Marshall asserted, working conditions influence workers' attitudes towards social and relational aspects and, thus, their goals.

If a good work climate (i.e. the workers are friends) exists in terms of the consumption of relational goods and the respect for social norms (no free riding), WOFs are the model of firm with a more flexible, if more complex, objective function. The objective of maximum income per worker or maximum employment prevails in considerations of the macroeconomic conditions.

The standard economic analyses, which do not consider the social and relational characteristics of the labour factor, do not fully explain workforce performance and the objective functions in WOFs. The prominent role of the lucrative aspect in the economic literature has not been confirmed by empirical analysis. Worker-owners tend to prefer job stability. The importance of this aspect is included in the traditional economic theories which focus on the dual role of WOFs; however, social characteristics have not been considered. This neglects the reality that the workforce is composed of individuals who value identity, relationships and social interactions.

Based on the findings of the present study, therefore, we have concluded that the worker cooperative is the firm model in which the social and relational characteristics of the workforce influence the objective function of the firm, while in IOFs they do not. The WOF firm model also permits the inclusion of social preferences. This has implications for the constraint of its objective function and, thus, the workforce can be preserved.

The pandemic and the related smart working modality present new challenges for the relational and social aspects of worker cooperatives. The key characteristic which favoured the resilience of worker cooperatives during the 2008 crisis might not be present in the COVID-19 crisis. Currently, there are no data on the post-pandemic resilience of worker cooperatives. The dual-objective function and its constraint on WOFs in terms of worker preferences is not likely to change in the short term. However, long lockdowns could erase positive workplace relationships and their benefits. The use of social platforms can be helpful. In a recent study on a post-COVID-19 society, Child (2020) affirms that co-determination and workplace self-management have the potential to alleviate the social and economic challenges of contemporary societies.

The COVID-19 emergency and the subsequent lockdowns have led to a period of expected recession. Thus, the possibility of a flexible objective function is of primary importance, and cooperatives could again possess the key characteristics for resilience. The real problem is instead represented by the magnitude of the COVID-19 crisis because workplaces cannot be preserved when firms fail.

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