Equilibrium unemployment as a worker insurance device: Worker insurance and wage setting in worker owned enterprises

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Equilibrium unemployment as a worker insurance device:

Wage setting in worker owned enterprises

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Abstract

Shapiro and Stiglitz model on efficiency wages shows that worker owned firms perform higher levels of wage and employment than in investor owner firms, but empirical evidence doesn’t support the first result. Starting by the economic literature on workers cooperatives we extend the Shapiro and Stiglitz’s analysis by introducing horizontal control among worker members and employer opportunism. Our results reconcile theory and empirical record showing how in cooperatives both unemployment and wages can be lower than in investor owned companies.

Key words: efficiency wage; contract failure; asymmetric information; moral hazard; worker owned enterprises.

JEL codes: D21, D86; J31, J54; J64
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Introduction

Benjamin Ward, in his 1958 model, studied the behaviour of worker cooperatives in a former Yugoslav-type economic environment and assumes average labour income maximization is the worker-member objective in cooperatives. Since members are entrepreneurs and control strategic and distributive decisions, they appropriate the whole value added (net of the cost of capital). Under the assumption of perfect competition and perfect variability of labour in the short run, average per member income is maximized when marginal productivity is equal to average productivity of labour\(^1\). Ward model has two main results. First, members in cooperatives obtain a higher income relative to employees in investor owned companies, since they appropriate the competitive equilibrium amount of labour remuneration plus a share of pure profits. Second, worker cooperatives, for the sake of maximising average revenue per worker, will react to increases in output prices by decreasing employment. This second conclusion has been widely criticized and put under scrutiny (Bonin, 1981, Montias, 1986, Nantz and Sparks, 1990), while the first is often considered to be holding.

Carl Shapiro and Joseph Stiglitz, in their 1984 model on unemployment as a worker discipline device, show that worker owned firms (WOFs hereafter) can achieve the Pareto optimal level of

\(^{1}\) In the long run competitive equilibrium, instead, given the exhaustion of short term profit opportunities and the convergence of prices towards minimum average costs, labor remuneration in worker owned and investor owned firms would tend to coincide.
equilibrium unemployment since, when the owners of the firm coincide with its workers, equilibrium unemployment is lower and wages are higher than in investor owned companies (IOFs hereafter). The macroeconomic equilibrium presented by Shapiro and Stiglitz (1984) in the presence of WOFs corresponds to the implications of the Ward-Vanek model determination of wages.

Empirical evidence doesn’t support the cooperative literature and efficiency wages model results. In this paper we present a comparative static exercise extending the results of Shapiro and Stiglitz model, obtaining equilibrium wages in worker cooperatives\(^2\) that are lower than the economy wide level.

From the theoretical viewpoint, while notable contributions warned against the risk of the spread of free riding (sub-optimal effort contribution) in teamwork (Alchian and Demsetz, 1972), we notice that horizontal control in the form of peer monitoring in cooperatives can be more effective in limiting free riding than hierarchical control by supervisors (Bowles and Gintis, 1987) reducing cost of monitoring and efficiency wages levels. Furthermore, we show the efficiency wage in worker owned enterprises is lower than in investor owned companies due to lower expected costs of employer moral hazard, abuse of contractual power and hidden action by the employer.

Our analysis is a synthesis (new, to our knowledge) between economic literature on worker cooperatives and the traditional model of Shapiro and Stiglitz applied to worker owned firms and introduce the employer opportunism effects on efficiency wages levels in comparative terms. The results obtained are also an explanation to reconcile theory and empirical evidence on level of wages and unemployment in workers cooperatives.

\(^2\) The worker cooperative is the most representative case of worked owned enterprises. This latter category, instead, also includes capitalistic companies owned by employees alone (employee owned companies). Our arguments apply to this second category too. We use the two terms interchangeably for the sake of simplicity. In a similar fashion, we use interchangeably the terms investor owned firms and capitalistic enterprises.
The three main implications of the model are:

1) A cooperative economy is always characterized, other conditions being equal, by higher employment levels than a capitalist economy;

2) Wages in cooperative firms are lower than wages in investor owned enterprises;

3) The risk of unemployment is higher in capitalist firms than in worker cooperatives.

The paper is organized as it follows. In Section 1 we report stylized facts related to unemployment and wage levels in cooperatives. In Section 2 we explain the theoretical background of our analysis, discussing both the costs of monitoring and the cost deriving from employer moral hazard and hidden action. In Section 3, after reporting the Shapiro and Stiglitz (1984) model, as applied to worker owned firms, we present the core of our model, which relates to the advantages of horizontal control and includes the costs of employer opportunism. In Section 4 we summarize the comparative results related to WOFs and IOFs, which are derived from our model. Section 5 concludes.

1. Stylized facts

Shapiro and Stiglitz model (1984) shows that WOFs perform higher level of employment and wages compared to IOFs, but their prediction clashes with empirical evidence with reference to the level of wages. In most studies, indeed, capitalist enterprises show higher wages compared to worker cooperatives. In particular, Bartlett et al. (1992) compare similar groups of cooperatives and investor owned enterprises IOFs in the industrial sector in Italy, finding that worker cooperatives pay lower wages, mainly due to managers’ reduced pay and, to a lower extent, to
lower white-collars’ pay.\(^3\) The focus of this study is on light manufacturing industrial sectors, which are, on average, highly competitive since they are populated by small and medium sized enterprises, and the Italian industrial sector was, at the time of the study, one of the largest and most competitive in western countries. To this contribution, Burdin (2016) adds that lower wages in cooperatives can be also due to a stronger outflow of educated workers from worker cooperatives than from investor owned enterprises. Pencavel, Pistaferri and Schivardi (2006), using employee matched panel data including all Italian firms, show that worker cooperatives are only apparently characterized by higher wages than IOFs: once controlling for a set of characteristics, especially for the sector of activity, cooperatives display wages that are, on average, 14% lower than in IOFs. Using Eurostat data and data on a smaller sample of North-Eastern Italian enterprises (in the province of Ravenna, Emilia-Romagna region), Navarra (2016) notices that cooperatives pay lower wages than the average market wage in the area, with the exception of the construction sector, in which cooperatives hold significant market power. This evidence is not limited to Italy: Craig, Pencavel, Farber and Krueger (1995) show that wages in the plywood lumberjack cooperatives in US Pacific North West are 2% lower than wages in capitalist firms of similar size in the same sector. Clemente, Diaz-Foncea, Marcuello and Sanso-Navarro (2012) address the wage-gap issue in Spain. They observe that wages in worker-owned cooperatives are lower than in other organisation types. This result holds across sectors, while it does not always hold when cooperatives owned by stakeholders different from workers are considered. The result is also confirmed by the quintile analysis of the wage gap: wages in worker-owned cooperatives are always lower than in capitalist firms, while the opposite applies to non-worker-owned cooperatives when the higher quintiles are considered. Similar conclusion have more recently been reached by Bailly, Chapelle and Prouteau (2017) on

\(^3\) The ratio of managerial pay to unskilled manual pay was almost 75% higher in private firms than in cooperatives, the difference being attributable primarily to significantly lower managerial salaries in cooperatives; (ibid.: 110).
economy-wide data for France. These same contributions explain low wages by the need to stabilize employment.

Lower levels of wages in cooperatives aren’t related to lower production efficiency in worker cooperatives. Pencavel, Pistaferri and Schivardi (2006) find no difference in productivity to explain the wage gap. Craig and Pencavel (1992, 1994) and Craig et al. (1995) compare US plywood cooperatives to IOFs of similar size in the same sector. They find slightly higher labour productivity and technical efficiency (between 6 and 14 per cent) in cooperatives relative to both unionized and non-unionized investor owned mills. Estrin (1991), on the Italian case, finds, in worker cooperatives, higher labour productivity, which, however, doesn’t translate into higher wages. Bartlett et al. (1992) find better performance in worker cooperatives relative to IOFs in the industrial sector in Italy. The causes are found in three distinct organisational features of cooperatives, which would lower organisational costs and increase worker welfare and productivity: (i) lower incidence of control costs in terms of flatter hierarchical structure and lower utilization of intermediate clerical positions devoted to monitoring activities; (ii) lower costs of conflict, especially lower incidence of strikes, other forms industrial action, and sabotage in cooperatives; (iii) better forms of worker involvement through membership representation. Similar results concerning worker productivity and wage equity have been obtained in experimental settings by Frohlicha, Godarda, Oppenheimer and Starke (1998).

Related evidence deals with the well-established and widely studied phenomenon of employment stabilization occurring in cooperatives and employee owned companies (Kruse, 2016). A recent paper by Alves, Burdin and dean (2016) highlight that labour managed firms display a more stable job dynamic than analogous capitalist firms, both in terms of job creation and destruction. Since workers are reported to value strongly employment stability (Guest, 2002; 4

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4 The idea of employment insurance as opposed to wage insurance was first introduced in the theory of labour managed firms by Miyazaki and Neary in 1983.
Depedri, Carpita and Tortia, 2012), increased stability would correspond, *ceteris paribus*, to increased worker welfare, which can translate into lower absenteeism and turnover, and into increased productivity. The idea that wage flexibility in terms of profit sharing is important in reducing unemployment was already present in classical contributions in the theory of labour managed firms (Meade, 1972). When empirical tests are considered, most of them show that WOFs face demand shocks by avoiding layoffs and, in order to reduce layoffs, they let wages fluctuate more than their capitalist counterparts (Kruse, 2016). In the Uruguayan case, this result is highlighted by Burdin and Dean (2009) and Alves, Burdin and Dean (2016). Both works find that output prices affect employment in IOFs, but not in worker cooperatives. Burdin and Dean (2009) consider the economy wide comparison between worker cooperatives and IOFs in Uruguay in the decade spanning from 1996 to 2005. They find substantially more pronounced variation in wages in cooperatives relative to conventional enterprises. The stark difference in wage dynamics is explained by the necessity for cooperatives to preserve stable employment in the face of economic fluctuation and crisis, which, in this country, started in 2001. Moreover, Arando et al. (2010) show much better performance in employment creation and preservation in the Mondragon group of worker cooperatives, than the average of the whole Spanish economy in the period 1983-2009, both inside and outside the Basque Region where the group is located. Cooperatives showed better than average propensity to create, but not to reduce employment. The analysis of firm performance during the economic crises occurred over the same time-span, shows that Mondragon cooperatives adjusted less (or didn’t adjust at all) employment to reduced firm performance. In the same paper, it is observed that during the economic crisis in 2009, industrial cooperatives in Mondragon laid off less than 1% of their worker-members\(^5\). This result has been achieved mainly thanks to relevant degrees of wage and working-hour flexibility for members. Following the financial crisis in 2007-2008, total employment in the whole Mondragon group fell by about 9%, but most lay-offs were

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\(^5\) Laid-off members were still paid 80% of their wages.
represented by temporary non-member workers. This is contrasted to 20% average employment fall in Spain, and 2% in the Basque Region. Delbono and Reggiani (2013) analyse a group of Italian production cooperatives in the periods 2003-2010 and 1994-2011 and contrast co-ops behaviour with the overall trend in the same sectors. They find a stabilizing effect on employment with respect to demand shocks, thanks to adjustments of wages.

More recent reports dealing with the effects of the global financial crisis started in 2007 show that, in Italy, from fall 2008 to the end of 2013, cooperatives increased their overall employment by 6.8%, (by 80 thousand workers) while employment in private enterprises, on the contrary, shrank by 473 thousand units out of a national total of about 22 million. Still more remarkably, in cooperatives, the number of permanent workers increased by about 100 thousand, while short term contracts fell by about 20 thousand. About 50 per cent of increased employment in cooperatives is accounted for by socially-oriented cooperatives, the so-called social cooperatives, which operate in the social service sector (Euricse 2015). The 2012 CECOP (Roelants et al, 2012) report confirms the high level of cooperative resilience to the financial and economic crisis. Focusing on France and Spain, the report argues that, although cooperatives have not been spared by the crisis, they have been able to limit firm closures and lay-offs better than the average business, in some cases even restoring a job creation pattern. This effect is stronger where the peculiar features of cooperatives (the presence of a membership base and democratic governance) are strengthened by legislation or statutory by-laws, for example through the partial imposition of the non-profit distribution constraint and through the accumulation of locked assets. Also through the creation of cooperative groups, consortia and mutualized financial tools.

In Sections 3 and 4 starting by the S-S analysis, we develop a model which aims at explaining lower wages in worker cooperatives, which, as we have shown in the review of the empirical literature, cannot be explained by lower worker productivity. We also show that cooperative
enterprises favours higher employment and lower unemployment at the aggregate level, in line with theoretical and empirical evidence.

2. Theoretical background

Our theoretical argument starts from the observation that WOFs, when compared to IOFs, are able to reduce the costs connected to labour contracts thanks to improved horizontal monitoring and eschewing the risk of exploitative labour relations.

2.1. Costs of monitoring

Alchian and Demsetz (1972) introduced one of the most radical critiques against the possibility that teamwork led by a set of principals would be able to deliver efficient production in a decentralized economy. When the outcome of team production cannot be exactly imputed to each individual worker, free riding on effort contribution is likely to spread, leading to inefficiently low provision of effort. Only the presence of a central monitor endowed with strong monetary incentives which consist, in the standard case, of being the residual claimant or enterprise owner, can remedy the intrinsic inefficiency of team production. The authors explain in this way the historical and institutional emergence of capitalist ownership as the conjunct result of profit maximization by the owner and of tight control over the labour process.

While dealing with the same problem of control over the labour process, a line of enquiry at odd with Alchian and Demsetz’s was initiated by Putterman (1984) who evidenced that the role of the central monitor does not need to imply residual claimancy. This role can be carried out effectively by other institutionalized agencies, such as appointed managers or elected directors. In more general terms, the new institutionalist approach by Ostrom (1990) showed that, contrary to the well-known thesis by Olson (1965), in many actual circumstances groups of principals can solve social dilemmas such as the spread of opportunism in collective action. This is achieved through a
complex and often time and effort-consuming process of development of suitable governance structures, which include both incentives (monetary and non-monetary) and sanctions against offenders. Empirical research first developed in the field of the management of common-pool natural resources evidenced that appropriate governance and working rules can be effective in sustaining efficient cooperative activities over long time spans.⁶

The literature initiated by Jensen and Meckling (1976) demonstrated the existence and the importance of agency costs in principal-agent interactions. This approach complements the one by Alchian and Demsetz (1972) within the tradition seeing the firm as a nexus of contracts, since, in the presence of asymmetric information, agency costs are thought to be minimized by resorting not only to the monitoring of the agent, but also to highly powered monetary incentives. However, since this argument deals with second best organisational equilibrium, it also leaves open the possibility that social structures different from principal-agent interactions achieve Pareto superior outcomes. Insofar as it deals with higher than competitive wages in IOFs, and with the lowering of wages and agency costs in flatter hierarchical structures such as worker cooperatives, our argument develops within this line of enquiry.

The economics literature specialized in the study of worker owned and worker controlled enterprises demonstrated that, since mutual monitoring is a stronger instrument than hierarchical control in reducing the incidence of agency costs in terms of shirking and free riding, the risk of worker opportunism is lower in worker cooperatives than in capitalistic firms (Bowles and Gintis, 1987, 1998). Following a different but converging explanatory strategy, also new institutionalism reached similar conclusions, especially in the works by Henry Hansmann (1996, 2000).

⁶ As Elinor Ostrom (1990: 45) puts it: “Dilemmas nested inside dilemmas appear to be able to defeat a set of principals attempting to solve collective-action problems through the design of new institutions to alter the structure of the incentives they face. … But some individuals and/or communities have created institutions, committed themselves to follow rules, and monitor their own conformance.”
Organisational costs in terms of agency and control costs would be lower in producer and worker cooperatives than in investor owned companies thanks to reduced information asymmetry and horizontal (peer) monitoring. This effect would be especially strong when members’ features, preferences and objectives are homogeneous since, in this case, their monitoring ability is strongest, and coordination in the pursuit of collective objectives is easier and less costly to accomplish.

2.2. Labour Contract failures

2.2.1. Contrasting interests and hierarchical relations

The idea of contrasting interests between employers and employees, besides depending on different economic objectives (profit maximization vis a vis utility maximization), as formalized in the principal-agent relation, can be enlarged and made to depend on the hierarchical nature of relations existing between them, as spelled out by new institutionalist classics (Coase, 1937, Simon, 1951). The different objective functions is at the basis of the analysis focusing on worker’s shirking behaviours, i.e. lowering effort under limited monitoring. As a reaction, over and above control mechanisms, employers can leverage on efficiency wages and the threat of lay-off in the presence of involuntary unemployment as a discipline device. The existence and relevance of psychological costs in terms of the need of employed workers to align their behaviour to the employer’s objectives has been under-researched by orthodox economics (Prendergast, 1999). Some behavioural economists have, instead, explicitly considered the costs connected with the imposition of hetero-directed objectives on workers. The seminal work by Frey (1997), as based on previous contributions in social psychology (Deci, 1971; 1975; Deci and Ryan, 1985), highlights the possibility of the crowding out of intrinsic motivations by monetary incentives. This effect can be understood as primarily connected with hetero-direction in labour relations, since employees are not

7 In the presence of heterogeneous membership, instead, more complex governance solutions suited to reconciling different and possibly divergent members’ objectives would be needed (Albanese, 2016; Borzaga and Tortia, 2017).
allowed, as a norm, to select autonomously their preferred tasks, while monetary incentives can be used by employers as alignment devices, which negatively impact on workers’ motivation. Furthermore, the employer’s objectives and choices may not always be aligned with the optimal accumulation of human capital along the lifecycle of the worker. Short sighted choices dictated by the necessity to maximize profits can reduce investment in training and development of new skills. Furthermore, given the existence of asymmetric information and contrasting interests between the employer and the employee, workers in IOFs may not accept wage reductions or moderation (increased wage dispersion) when the economic conditions of the firm don’t fare well, since they may not be able to ascertain whether wage moderation is required by the financial and economic sustainability of the organisation, or it is instead a way to increase private appropriation by shareholder-owners (Albanese et al., 2015). Because of these reasons, workers in IOFs may show a tendency to increase wage demands by threatening lower productivity levels. In turn, employers can react by increasing the equilibrium level of the wage, but, at the same time, by using equilibrium unemployment as a threat to discipline workers⁸.

In our framework of analysis, cooperatives represent an instance of collective action in the pursuit of entrepreneurial objectives, substituting principal-agent relations with mutual benefit interaction. Principal-agent relations require that the agent’s objectives are aligned to the principal’s ones and second best contractual solutions can reduce, but never eliminate agency costs (Prendergast, 1999). Cooperatives can reduce agency costs by resorting to horizontal control and better alignment between individual and organisational objectives. This is achieved through worker involvement and participation in decision making. However, other governance costs, especially decision making costs, can be inflated by participatory governance and cooperatives need to reduce

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⁸ This upward profit to wage spiral, in the absence of wage flexibility, engenders higher risk of lay-off when the economic conditions of the organisation worsen. Eventually, too high wage demands by workers, and concessionary behaviour by employers, can aggravate business cycle fluctuations at the macroeconomic level.
them by contriving effective governance solutions and working rules (Ostrom, 1990; Hansmann,
1996). Decision making power in the definition of the firm’s objectives and production plans would allow worker members in worker cooperatives to at least partially redress these problems. Hierarchy in cooperatives is either absent (in case of direct worker control) or based on delegation by members. Involvement in the setting of strategic and operational objectives puts worker members in a better position than employees in IOFs. They can better align organizational objectives to their own preferences, for example in the setting of the optimal schedule for the inter-temporal accumulation of human capital (Borzaga and Tortia, 2017; Ellerman, 2017). Consequently, the negative impact of hierarchy on workers’ welfare and psychological wellbeing is expected to shrink when compared to IOFs. In our model, better alignment and lower hierarchical intensity imply lower incidence of worker misbehaviour in terms of shirking, and absence or lower incidence of compensatory wage demands by workers, that is a level of equilibrium wage that is, ceteris paribus, nearer to the market clearing one in worker cooperatives than in IOFs.

2.2.2. Employer opportunism: moral hazard, hidden action and abuse of authority

Some authors (Ben-Ner, 1988; Screpanti, 2001; Dow, 2003) evidenced that ex-post opportunism in the employment relation in not alien not only to the employee, but also to the employer side. The employer can, in several common instances, diffuse wrong, biased, or incomplete information concerning the economic and financial conditions of the organisation in order to increase profits by reducing wages or halting their growth. The employer can also, because of the same reasons, start too risky investment plans when expected losses, but not gains, are borne by workers in terms of reduced wages and/or higher risk of lay-off. Asymmetric information and hidden action can lead workers in IOFs to prefer fixed to fluctuating wages, since fixed wages represent a better guarantee against the risk of employers behaving opportunistically to increase profits (Albanese et al., 2015). A similar conclusion is reached by Chang et al. (2002): in their model, profit sharing (that is a form of variable pay of employees) does not bring positive effects if moral hazard if possible on firm’s
side. Their model, like Albanese et al. (2015), posits that, together with workers’ opportunism (incorporated in the efficiency wage model) there can be opportunism on the employer’s side, who may conceal the true value of profits. This prevents profit sharing agreements to have the otherwise predicted positive effects. A similar effect is obtained when the employer exploits contract incompleteness to abuse his/her authority and impose worse contractual conditions on workers, for example by requiring increased work pace without increasing worker remuneration. In this stream, abuse of authority is understood as the main failure in the social contract between the owners of the organisation and the other stakeholder groups (Sacconi, 2012).

Coherently with the arguments developed so far, it can be hypothesized that workers internalize the expected costs of employer opportunism concerning hetero-direction, abuse of authority, limited access to sensitive information, higher risk of lay off, and unfairly low wages by demanding compensatory wage increases. Against the risk of employer’s opportunism, workers may show a higher propensity to reduce effort unless some monetary compensation is paid as insurance in the form of wage premium. In turn, the employer may prefer concessionary wage bargaining in order to prevent shirking and other forms of misbehaviour. Wages are set at higher than market clearing levels because employees are looking for compensation against employer opportunism and employers for disciplining devices against shirking. As in Shapiro and Stiglitz (S-S hereafter) model, high equilibrium unemployment can be read as negative external effect of labour contract failures.

9 This problem has been evidenced in related research streams, which build on the idea of corporate social responsibility.

10 This failure requires the introduction of both legal regulation and self-regulation aimed at developing multi-stakeholder governance (Blair and Stout, 1999). Direct worker control can be understood as a similar, but more radical and thorough solution to the same problem, since this solution would imply, in its most radical form, the overcoming of the employer relation per se (Jossa, 2014).
In the next section we build a model including all the effects described before extending the S-S analysis.

3. Efficiency wages in IOFs and WOFs allowing for heterogeneous monitoring costs

In their efficiency-wage framework, S-S (1984) show that involuntary unemployment can be compatible with the equilibrium of the labor market, when the monitoring of the work activity is not perfect. This kind of involuntary unemployment is not due to workers’ unwillingness to accept salaries lower than the current ones, but to the employers’ unwillingness to lower wages down to the market clearing level to eschew the risk of workers shirking on effort contribution. S-S make four assumptions: (i) the information available to entrepreneurs is imperfect as workers can perform “hidden actions”; (ii) entrepreneurs can only imperfectly monitor the commitment of workers; (iii) each worker decides his or her level of effort; (iv) each worker who is caught shirking is fired. All workers and firms are identical and there is perfect information about job availability. The employer sets wages at a level high enough to prevent shirking: this means that efficiency wages are understood as “worker discipline” device (S-S, 1984). Workers select their effort level to maximize their discounted utility stream and compare their expected utility in the two alternative states of “shirking” and “non-shirking”. The one period expected utility is expressed as sum of the utility of the current period plus the probability of state change multiplied by the change in expected utility. The employer knows that these utilities can act in such a way to induce workers to engage in his or her preferred action (non-shirking). To this end, the employer can leverage on $q$ (the probability of lay-off) and $w$ (the wage): he or she can either tighten control (increase $q$) or incentivize the worker by means of higher $w$. The Shapiro-Stiglitz (1984, pag. 438) no-shirking condition ($NSC$) is:
\[ w \geq \bar{w} + e + \left( a + b + r \right) \frac{e}{q} \tag{1} \]

The critical wage level corresponding to non-shirking behaviour \( w \) is greater: (i) the smaller the detection probability \( q \); (ii) the larger the effort level \( e \); (iii) the higher the quit rate \( b \); (iv) the higher the interest rate \( r \); (v) the higher the unemployment benefit \( \bar{w} \); (vi) the larger the flow out of unemployment \( a \).

If, as in S-S, we set:

\[ a = b \frac{L}{N - L} \tag{2} \]

we obtain

\[ w \geq \bar{w} + e + \left( b \frac{N}{N - L} + r \right) \frac{e}{q} \tag{3} \]

As concerns WOFs, S-S (1984, pag. 439) analyze the case in which the owners of the firm are the same \( N \) individuals who are employed by it, and ownership is equally distributed among the \( N \) workers. They assume in this case that the value of the unemployment benefit \( \bar{w} \) is zero\(^{11} \). In this case, the problem to be solved by the employer is:

\[ (w-e)L \tag{4} \]

subject to:

\[ w \geq e + \left( b \frac{N}{N - L} + r \right) \frac{e}{q} \tag{5} \]

and \( wL \leq F(L) \tag{6} \)

The optimal equilibrium occurs at point A in Figure 1 where the NSC intersects the schedule of the average product of labor \( w = F(L)/L \). This result concerning WOFs is different from the market

\(^{11} \) The reason is that increases in \( \bar{w} \) tighten the NSC, so all payments are made in the form of \( w \) rather than \( \bar{w} \).
equilibrium in which workers are employed by investor owned companies, which occurs at E, where the marginal product of labor schedule intersects the NSC.

Shapiro and Stiglitz (1984) demonstrate that when workers own the firm, the equilibrium level of unemployment is lower and wages are higher than in other enterprise forms\textsuperscript{12}. The macroeconomic equilibrium in the presence of WOFs corresponds to the implications of the Ward (1958) and Vanek (1970) model of the labor managed firm in terms of wages. However, empirical evidence shows that this implication of the model is often violated, since worker cooperatives have been observed several times to pay lower, not higher than average equilibrium wages. We develop a more complete explanatory model aimed at bridging the gap between S-S explanation, and empirical evidence.

In the S-S model the parameter $q$ is the probability that the worker is caught shirking and fired by the employer. When the monitoring activity becomes more effective or intensive the incentive to shirk is reduced. Each NSC is built for a given level of $q$, but $q$ – as we have argued – can change according to different ownership structures of the firm. In line with Bowles and Gintis (1987, 1998)\textsuperscript{13}, we assume that, in WOFs, peer pressure and peer monitoring underpin horizontal forms of control increasing the value of $q$.

\textsuperscript{12} This induces the two authors to affirm that wages should be subsidized using “whatever (pure) profits can be taxed away” (\textit{ibid.}, p. 440).

\textsuperscript{13} As stated, Bowles and Gintis (1987) demonstrate that in worker cooperatives the risk of worker opportunism, with workers reducing effort when not properly controlled, is lower than in capitalistic firms, and mutual monitoring is a strong instrument increasing the probability of successful monitoring.
In this case the problem is the same as in (4), (5) and (6) and the stronger is the positive effect of self-monitoring on \(q\), the larger is the reduction of efficiency wage level and the downward shift of the NSC.

In Figure 1, when the value of \(q\) increases the NSC moves downward and rightward. If the value of \(q\) is very high, the NSC curve can move to \(NSC'\) and the new equilibrium can be found in a point like \(A'\), where employment is higher and the wage lower than in \(A\). Our results imply that the S-S representation is a special case of a wider class of equilibria, which depend on the variables impacting on position of the NSC in different organizational forms. If the value of \(q\) is the same in traditional firms and in worker owned firms, the equilibrium point in WOFs is \(A\), as in the S-S model. If, instead, the value of \(q\) is higher in cooperatives, the new equilibrium is always associated to higher levels of employment than in IOFs, but wages can also result lower than in IOFs like in \(A'\). The higher is the value of \(q\) the lower is the equilibrium level of wages in WOFs.

The discussion of this result, however, can be further extended, including the analysis of not only monitoring activities, but also of the role of different forms of employer opportunism in the presence of contrasting interests in the employment relation.

4. Efficiency wages in IOFs and WOFs in presence of contractual failures.

When employer opportunism in the form of moral hazard, hidden action and abuse of authority connected with contractual power is considered, similar conclusions on equilibrium wages and employment are reached. The idea underlying this extension of the analysis it that workers, fearing that the employer would exploit privileged information and contractual power to his own advantage, can be induced to demand a higher salary compensating the risk of employer opportunism. In turn, the employer would concede wage increases in order to keep the worker on the non-shirking schedule. In this perspective, in our model we assume that the NSC includes a new parameter, \(d\),
which signals the presence of contractual failures connected with contrasting interests (c); hierarchical control (h); employer opportunism (m) as discussed in Section 2.2. These failures translate into workers’ demand for a wage premium that compensates the risk of losses both in monetary and non-monetary terms, as measured by \( d \). In formulas:

\[
d = f(c, h, m)
\]

(7)

with \( \frac{\partial c}{\partial d} > 0; \frac{\partial d}{\partial h} > 0; \frac{\partial d}{\partial m} > 0 \)

where \( c \) measures the cost of contrasting interests, \( h \) the cost of hierarchical control and \( m \) the cost of employer opportunism.

The no-shirking condition (NSC) in case of the IOF is:

\[
w \geq \bar{w} + e + d + \left( b \frac{N}{N - L} + r \right) \frac{e}{q}
\]

(8)

subject to: \( wL \leq F'(L) \)

We recall that in the case of worker-owned firms the unemployment benefit is zero and the equation of the NSC is (5). Also in this case we sum the value of parameter \( d \) to the elements that increase the minimum level of the non-shirking wage.\(^{14}\) The NSC in the case of WOFs amounts to:

\[
w \geq e + d + \frac{e}{q} \left( \frac{bN}{(N - L)} + r \right)
\]

(9)

Where \( \frac{N}{(N - L)} = u \) is the unemployment rate. That is:

\[
w \geq e + d + \frac{e}{q} \left( \frac{b}{u} + r \right)
\]

(10)

subject to: \( wL \leq F(L) \).

\(^{14}\) We assume that parameter \( d \), which represents the impact of contract failures on the NSC, is separable from the other parameters of the model, that is it is independent of effort and unemployment.
Under these hypotheses, the \( NSC \) slides upward if \( d \), the premium for the costs of contractual failures, increases. In this case, equilibrium unemployment and the equilibrium wage increase.

In Figure 2 we report the new equilibrium levels in the case of IOFs and WOFs considering the (8) and (10) no-shirking conditions and comparing them with the S-S equilibrium condition (\( NSC_{S-S} \)), under the hypothesis (implicit in the S-S model) that \( d \) and \( q \) assume the same value in the two kinds of firms. The new equilibrium is \( E' \) in the case of IOFs, while it is \( A'' \) in the case of WOFs.

\[ \text{Figure 2 about here} \]

In other words, given the different nature of control rights in worker cooperatives, worker members are in a good position to control the behaviour of decision makers (managers) and this reduce the need to demand compensatory wage and the value of \( d \) in WOFs. We include the related implications on equilibrium levels in comparative terms in IOFs and WOFs in the next section.

5. Investor owned firms and worker cooperatives: a comparison

Within the framework of our efficiency wage model, these theoretical premises allow us to hypothesize that, ceteris paribus, the \( NSC \) in IOFs is positioned above and to the left of the \( NSC \) in worker cooperatives since:

1) looking at WOFs, monitoring is more effective than in IOFs, which implies that \( q \) increases and the level of the non-shirking wage decreases, shifting the \( NSC \) curve downward. In IOFs the employer pays higher wages in order to sterilize the risk of shirking on the worker’ side.

2) contrasting interests and the risk of employer opportunism in terms of moral hazard, hidden action and abuse of authority resulting in lower wage levels and worse contractual
conditions impose positive expected costs on workers. Workers ask a compensation against the risk of losses in terms of higher levels of wage and employers prevent these risks by setting higher equilibrium wages and using unemployment as a worker discipline device. In worker cooperatives the value of parameter $d$ is always lower than its value in IOFs as the variables $c$ (contrasting interests) and $m$ (employer opportunism) are nil.

Only hierarchical control (h) may be positive. However, as a matter of course, hierarchy is either absent in cooperatives or, when it exists, it is based on delegation and instrumental to the pursuit of members’ objectives, which are factored in cooperative governance through members’ control rights. Better involvement of workers reduces the risk of worker misbehavior, reducing this way also the need for tight hierarchical relations. Hence, also in the case of hierarchical relations, we expect $d$ to be lower in cooperatives than in IOFs.

In Figure 3, standard Shapiro-Stiglitz model would predict IOF equilibrium at point E and WOF equilibrium at point A; in our model, due to positive value of $d$ in IOFs, equilibrium is found at point B on the $NSC_{IOF}$ curve, in which the equilibrium wage is higher and employment is lower relative to point E in the S-S model ($NSC_{SS}$ curve). The $NSC$ in cooperatives (labelled $NSC_{WOF}$) is, in the general case, positioned to the right and below the $NSC_{IOF}$, due to both the higher level of $q$ and lower level of $d$. Equilibrium in WOFs is found at point C, in which wages are lower and employment is higher than in IOFs, coherently with prevailing empirical evidence.

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In the perspective of our model, the S-S (1984) equilibrium represents the special case in which the parameters $d$ and $q$ are the same in the two kinds of firms (and the NSC is the same in IOFs and WOFs). In this situation wages are generally higher in cooperatives, coherently with the Ward - Vanek model of the labor managed firm, but not with empirical evidence. Our model confirm the
results of theoretical literature on unemployment levels, but, relative to the S-S case, the presence of lower monitoring costs, lower incidence of hierarchical relations and of employer opportunism in cooperatives, imply a different result in terms of efficiency wages, reconciling theory and empirical evidence.

6. Conclusion

The Shapiro and Stiglitz (1984) efficiency wage model demonstrates that Pareto optimality is an equilibrium solution not obtainable in the case of separation between owners and workers. Pareto optimality is obtained as new equilibrium level of the wage and of employment in correspondence with the intersection between the no-shirking condition curve and the average productivity of labor. The ensuing higher level of wages corresponds to the implications of the Ward-Vanek model of the labor managed firm. In contrast with theory, observed market equilibrium shows in most cases lower wages in worker cooperatives compared to similar IOFs. Our extension of the S-S model has deepened the analysis of the position of the NSC, aiming at clarifying the theoretical premises of empirical tests and at providing new explanation for the observed level of wages in cooperatives.

We have reconciled theory and empirical record by showing that, given more efficient monitoring and the absence of wage premiums compensating the expected costs of contract failures, the NSC curve in cooperatives is always positioned below the NSC curve in IOFs. We conclude that the efficiency wage in cooperatives is lower relative to IOFs, while employment is confirmed to be always higher. The result of S-S model applied to WOFs is only a special case and different scenarios may appear if we properly take into account the contractual and behavioural consequences of different ownership structures of firms.
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EQUILIBRIUM WAGE DETERMINATION IN CASE OF WORKER’S COOPERATIVES

FIGURE 1
EQUILIBRIUM WAGE INCLUDING COSTS OF CONTRACTUAL FAILURES

FIGURE 2
EQUILIBRIUM WAGE AND UNEMPLOYMENT IN INVESTOR OWNED FIRMS AND WORKER COOPERATIVES

FIGURE 3