ACCUMULATION OF CAPITAL AND DIVISIBLE RESERVES IN LABOUR MANAGED FIRMS[*]

*Ermanno C. Tortia***

Abstract

The problem of the accumulation of capital in labour managed firms and worker cooperatives has been attracting considerable attention by past research. The Furubotn-Pejovich effect is considered to be the source undercapitalisation. The paper seeks to show that the presence of undercapitalisation is due to a specific mechanism of reinvestment, i.e. reinvestment of self-financed capital funds in indivisible reserves. The introduction of divisible reserves appropriable by worker members at some point in time would solve the horizon problem. However, it is likely to engender new and unexplored problems connected with the way in which net surpluses are distributed, the reinvestment of individual shares of net surpluses and the reimbursement of individual capital quotas.

Keywords: labour managed firms, capital, investments, undercapitalisation

**Department of Economics, University of Trento and ISSAN, Institute for the Development of Non-profit Organisations, Trento. Address for corresponce: Ermanno Tortia
Postal address: via Inama, 1 – 38100 Trento, Italy
Tel. no. office: +39 0461 882251, Tel. no. home: +39 0547 53860, Fax. No.: +39 0461 882222
E-mail address: etortia@economia.unitn.it

1. Introduction

The problem of the accumulation of capital in labour managed firms[1] (LMFs hereafter) has been widely studied in the specialised literature. Most scholars tend to recognise the existence of a tendency to under-investment. However, not all authors agree and some prefer to see its substantial irrelevance. At the empirical level it is difficult to isolate the effects of institutional variables underpinning the existence of under-investment. These institutional variables are mainly identified in property rights, but also in issues concerning governance. Other variables, such as the tax system, can have effects inducing relevant distortions on the basic mechanisms triggered by property rights. In this work we state the problem of under investment in LMFs as it was initially highlighted by Furubotn and Pejovich and by Vanek already in 1970. Starting from the explanation of the reasons that justify the suspect of misallocation of capital funds in LMFs, we then focus on institutional factors.

In the second part of the paper we concentrate on the idea to introduce divisible reserves as a device to solve the main problems caused by the presence of a truncated temporal horizon for worker members.

---

[1] Meade (1972, p. 402) defines labour managed firms as follows: "… a system in which workers get together and form collectives or partnerships to run firms; they hire capital and purchase other inputs and they sell the products of the firm at the best prices they can obtain in the market for inputs and outputs; they themselves bear the risk of any unexpected gain or loss and distribute the resulting surplus among themselves, all workers of any one given grade or skill receiving an equal share of the surplus; their basic objective is assumed to be to maximise the return per worker… the workers may be hiring their capital resources either in a competitive capital market fed by private earnings or else from a central governmental organisation which lends out the State's capital resources at rentals which will clear the market".

The introduction of divisible reserves has important positive potential as far as it would engender higher worker involvement at the financial level. Labour remuneration would be increased by shares of the net residuals and workers would receive a greater part of the value added, net of the costs of capital.

However, divisible reserves present new potential shortcomings that need to be carefully dealt with. They concern the mechanisms of distribution of the net residuals, the compulsoriness of capitalisation on individual shares of net residuals and the mechanisms regulationg the reimbursement of individual capital quotas. Various asymmetries between labour managed firms and capitalistic firms will be highlighted in order to show the peculiar nature of distribution of value added and accumulation of capital in LMFs.

The strategy of the paper is as follows: Section 2 highlights the roots of the phenomenon of underinvestment and undercapitalisation in LMFs and worker coopratives; Section 3 takes into consideration the institutional underpinning characterising control and distribution of value added in LMFs. Property rights in LMFs are reassessed in order to found the possibility of the introduction of divisible reserves; Section four introduces the question of how to structure divisible reserves taking into consideration the main problems linked to this operation; Section five concludes the work.

2. Members' temporal horizon in socialist labour managed firms

Starting from the contributions by Furubotn and Pejovich (1970) and Vanek (1970, 1975), the literature on LMFs devoted considerable attention to the problem of the accumulation of capital. The focus is on the existence of a truncated temporal horizon for worker members in LMFs as a source of inefficient allocation of self-financed investment funds. Though some authors (Horvat, 1986a, 1986b) have preferred not to recognise the relevance of the horizon problem in LMFs, most of the literature insists on its importance. Some authors consider the horizon problem as a fatal one. Their works seek to demonstrate that a socialist LMF reach a Pareto optimal allocation only in exceptional cases, whilst inefficient allocation is the rule. The exceptionality of efficient solutions coupled with the uncertainty which characterises investment decisions in market settings and the permanence of worker members in LMFs would represent one of the most relevant explanations of why worker cooperatives are rare in market economies.

2.1. Stating the problem

Furubotn and Pejovich (1970)[2] take into consideration a model of LMF that can be defined socialist

(Horvat, 1984) insofar as capital assets are intended to be publicly owned, i.e. worker members are not allowed to privately appropriate the net residuals reinvested in the firm. They can only benefit from distributed returns on investments in the form of labour income. In other words, the system is defined as a kind of *usufruct* of socially owned capital assets. The two authors refer to the former-Yugoslav system where firms were financed by means of two main channels:

- state bank loans;
- self-finance through reinvested net residuals.

Firms were also required to maintain constant the book value of their capital assets *(capital maintenance requirement)*. In this kind of institutional setting, worker members in co-operatives[3] can use their savings to make two kinds of investment decisions. The first is an *investment in non-owned assets* made out of profits of the co-operative. The second is an *investment in owned assets* which workers can finance out of distributed labour income (wages) and save on individual accounts registered at state banks. The fundamental difference between the two types of investment is that the first is not redeemable and does not yield any individual return to members, whilst the second can be recouped and yields fixed returns. Hence, workers are induced to compare at the margin the returns on the two types of asset.

Assuming that all workers have the same preferences concerning investment projects and that they all expect to remain in the firm for the same amount of time, it is possible to calculate the returns on each type of investment necessary to render workers indifferent between the two by using the following formula:

$$PV_{LMF} = a_{LMF} \sum_{t=1}^{T} \frac{1}{(1+i)^t} = 1 \qquad (1)$$

where PV_{LMF} is the present value of the self-financed investment, a_{LMF} is the return yield by the investment in one period of time, T[4] is members'

---

[2] See also Pejovich (1990) and Furubotn (1976, 1978, 1980a, 1980b).

[3] As a matter of simplicity, we will use the terms (worker) cooperative and LMF (labour managed firm) interchangeably, though the first term is more commonly found in the empirical literature, whilst the second is more widespread in the theoretical literature.

[4] T is an intrinsically uncertain variable. It could be considered dependent on individual preferences and the outside economic environment. For example, the alternative job opportunities available to worker members tend to shorten T, and this fact is likely to increase time horizon problems for LMFs working in a dynamic economic environment. It can contribute to explain why LMFs are particularly rare in systems characterised by tough competition and strong labour marker flexibility, such as the United States and the United Kingdom. On the other hand, investments in human capital specific to a certain firm will tend to widen T since a worker that has accumulated firm

temporal horizon, which is identified with the temporal horizon of the median members when preferences are heterogeneous, i is the rate of time preference which will equal the interest rate paid by bank deposits at equilibrium. In the case of a 1 dollar investment, a is equal to the internal rate of return (IRR) gross of depreciation. If the investment is to be undertaken, its present value needs to equal its initial vale (1 in our example).

The same results are obtained by calculating the sum in (1):

$$a_{LMF} = \frac{i}{1-(1+i)^{-T}} \qquad (2)$$

Formula (2) clearly shows that a_{LMF} is always greater than i and approaches i as the members' temporal horizon increases and tends to infinity (which obviously cannot be the case). Co-operatives self-finance investments only if returns are higher than the market interest rate. Investments in productive assets are positive, but the system allocates investment funds in an inefficient way because Pareto-superior allocations are still available[5]. In this respect LMFs are Pareto dominated by capitalist firms (CMFs below) because share ownership in CMFs guarantees the acquisition of returns arising out of self-financed investments virtually *ad infinitum,* i.e. without any temporal horizon up until the duration of the firm itself. At equilibrium, CMFs select all the investment projects which yield a return superior or equal (where equality is obtained for the marginal investment) to the market interest rate. CMFs extract all the possible rents accruing to the firm's operation and have an incentive to do so by using their own funds. LMFs instead tend to select only the projects with the highest returns down to the rate of indifference between investments in owned and non owned assets a_{LMF} (the *hurdle rate*). Total returns on productive assets in LMFs will be inferior to the socially optimal returns obtainable by CMFs[6].

The limited convenience for LMFs to reinvest their own profits could be balanced by the access to external financial support in the form of bank loans or bonds. However, the comparative disadvantage with respect to CMFs can never be eliminated insofar as limited self-financing implies reduced capability to build equity and collateral (Vanek, 1970). LMFs will face a double disadvantage: the first deriving from their unwillingness to reinvest their net revenues in the firm and the second arising out of their limited ability to guarantee loans. The empirical evidence is quite supportive of these theoretical conclusions since Yugoslav firms showed a strong propensity to resort to loan financing, which was easily supplied by state banks (Horvat 1986a; Milanovic, 1983). Also in western countries, for example in Italy (Smith, 1984a, 1984b, 1994), there is evidence of the tendency of co-operatives to have a higher debt-equity ratio than capitalist firms.

A general tendency to under-capitalisation would constitute a signal of the inability to fully replace equity with bank loans or bonds. Berman and Berman (1989) find evidence of a lower capital intensity of the Plywood cooperatives of US Pacific Northwest with respect to comparable capitalist firms. Furthermore, cooperatives usually self-select themselves in labour intensive sectors (Ben-Ner,1988). However, not the same results are valid for the Mondragon cooperatives in the Spanish Basque regions (Thomas and Logan, 1982). There are various difficulties facing empirical testing of theoretical results. For example, the tax system can cause distortions. If current labour income is taxed, but reinvested profits are not, optimal choice of investments will shift in favour of future consumption and the Furubotn - Pejovich effect may be hidden even when present (Horvat, 1986a, pp. 25-26). If central authorities control the credit market and fix administratively the interest rate on loans below the free market rate, firms will tend to overuse the credit market[7], the more so in the presence of limited liabil-

---

specific human capital will have difficulties in finding comparable job opportunities in other firms and her competencies will gain economic value for the firm itself.
[5] The Pareto optimal allocation that is obtained when the last dollar invested in productive assets yields a return equal to the market interest rate.
[6] Furubotn and Pejovich, together with some other scholars (Milanovic, 1983), consider the horizon problem a fatal flaw for any kind of self-managed system, insofar as it would constitute an insurmountable obstacle to an efficient allocation and investment of self-financed capital and investment. Some authors tried to show that the problem is not as severe as it appears to be in the basic model (Stephen, 1980; Zafiris, 1982; Bonin, 1985; Horvat, 1986a, 1986b; Jossa and Cuomo, 1997, 2000; Jossa, 1999). Other scholars attempted to devise alternative financial instruments (McCain, 1977; Vanek, 1970, 1977; Conte, Smith and Ye, 1992; Smith and Waldmann, 1999; Mazzoli and Negrini, 2000; Albanese, 2003) or institutional arrange-

---

ments (Vanek, 1975, 1996; Bernan and Bernan, 1978; Meade, 1980, 1995; Dow, 1986, 1993, 1996) which could constitute viable solutions to the horizon problem.
[7] Though the issue of external loan financing is a relevant one, it is not our objective to thoroughly analyse it here. We will keep on concentrating on the way LMFs use or should use their realised profits in order to fund investment projects. In general, the problem of self-financing needs to be treated before the one of external financing is that an LMF that is completely externally financed is not conceivable, since it would lack the necessary amount of equity and collateral. In the case of a completely externally financed LMF (Vanek, 1970) various problems arise: the dilemma of the collateral (Vanek, 1970, 1975), the agency problem (Jensen and Meckling 1976, 1979), and the law of increasing risk that would require an increasing remuneration for external loans as the debt-to-equity ratio increases (Drèze, 1976, Schlicht and Von Weizsacker, 1977, Fanning and McCarty, 1983, pp. 137-139, Gui, 1985). The analysis of external finance needs to be added after the problems concerning self-finance have been settled. Here it

ity and soft budget constraints (Kornai, 1986, Buck and Wright, 1990). In these cases, firms may even turn out to be over-capitalised[8].

3. The institutional background

We will now deal more closely with background institutions supporting and influencing the accumulation of capital in LMFs, starting from property rights in the Yugoslav system, in order to highlight some of its main shortcomings and endeavour the proposal of innovative solutions. Hansmann (1988, p. 269, 1996) defines the ownership of a firm as the coupling of residual rights of control and the right of appropriation of the net residual[9].

The former refers to the owners' authority in all those events that are not explicitly dealt with in the contracts signed by the firm, especially in labour contracts. In the presence of incomplete contracts, of an uncertain economic environment and of non-standardised tasks, residual rights of control will give some degree of discretional power in managing the firm (Borzaga and Depedri, 2004; Borzaga and Tortia, 2004).

The latter is a consequence of the former (Putterman, 1988, Dow 2003)[10]: if the firm owners are to control all non-contracted operations, then they will decide also about the destination of the residual, which is non contracted by definition. As a consequence, in the general case the two rights are bundled together[11].

If we compare Hansmann's definition of the ownership of the firm with former-Yugoslav property rights, we notice that it does not entail the social ownership of the means of production. Furthermore, it does not exclude the individual appropriation of the end-of-the-period net residuals. It not even excludes the reduction of the stock of physical assets collectively owned by worker members, allowing the possible removal of the capital maintenance requirement. The application of Hansmann's definition to labour managed firms yields important implications. In LMFs members enjoy residual rights of control. As a consequence, members' right to appropriate the residual implies that the remuneration of capital is contracted in advance of the operation of the production process. The reason is that there cannot be two residual in a unique production organisation and, if the unique residual is appropriated by labour, it cannot be appropriated by capital (Jossa and Cuomo, 1997).

Furthermore, the residual has the economic nature of labour remuneration since labour as a factor of production is entitled to decide about the destination of the residual. The remuneration of capital is not the residual variable any more as it happens in CMFs, hence it needs to be a cost subtracted from the residual and contracted ex-ante.

The nature of labour remuneration of the net residual and the appropriation by worker members lead to the search of workable reinvestment mechanisms compatible with LMFs property rights. As a rule, workers ought not to appropriate the net residual in cash, but they have to reinvest their share of the net residual in order to finance investments. In this sense, the net residual in LMFs tends to have exactly the same functions as in CMFs: it serves primarily to finance the acquisition of firm specific physical capital.

The accumulation of net residuals, which engenders the creation of divisible reserves of capital, can allow LMFs to escape the problems linked to the dilemma of the collateral (Vanek, 1970), to the law of increasing risk (McCain, 1977), and to the lack of equity (Gui, 1985).

---

is sufficient to state that the two forms of finance are likely to be substitutable only to a limited extent. In general they can be thought to be complements more than substitutes. A firm, both LMF and CMF, will be able to obtain external finance only if it accumulates equity and collateral.

[8] Among the papers that elaborate on the problem of under-capitalisation in LMFs from a theoretical point of view, the one by Zafiris (1982) and Bonin (1985) are worth mentioning. The book by Jossa and Cuomo (1997) and Jossa (1999) give a valid review of the literature and present a comprehensive and detailed exposition of the theoretical aspects, as does Tortia (2003) with a more empirical imprinting. Dow (2003) supports the introduction of a market for membership rights.

[9] The residual is what if left at the end of the period, and corresponds to the profit in CMFs. Meade (1980, pp. 89-93) distinguishes between "residual" and "net residual". The *residual* is equal to *total net labour earnings,* the value added of the firm less the cost of capital. *Net residual* is the value added less the cost of capital less current labour income (a variable that roughly corresponds to wages in CMFs).

[10] For a detailed and interesting discussion of the interplay and possible causal links between residual rights of control and residual rights of appropriation see Dow (2003).

[11] In Hansmann's words (1988): "In theory, the right to control and to residual earnings could be held by different persons. In practice, however, they are generally joined, since those with control would otherwise have little incentive to use their control to maximise the residual earnings. To be sure, if all aspects of control could be contracted for ex-ante, then this problem would not arise. But control can

usually be thought of as authority over precisely those aspects of firm policy that, because of high transaction costs or bounded rationality, cannot be specified ex-ante in a contract, but rather must be left to the discretion of those to whom the authority is granted".

4. Divisible reserves in labour managed firms

In the presence of the introduction of divisible reserves, the net residual will need to be divided among members following some kind of rule. Since the net residual has the nature of labour income it needs to be distributed consequently, as extension of the current labour income already paid during the accounting period. At the empirical level, the tradition of co-operative movements clearly shows peculiar institutions that go in this direction. For example, in Italy cooperatives can distribute part or the whole net residual in this way (under the label of *ristorni).* The same rule is followed by the group of cooperatives in Mondragon, which are reported among the most successful cooperative experiences.

The end-of-the-year extensions of current labour income constitute additional remuneration for workers, which is not paid to employees in capitalistic firms. Different property rights imply different rules of appropriation of the value added produced by the firm, hence worker remuneration in LMFs differs from what is usually found in capitalist firms. Workers income will include a current part, similar to wages paid by capitalist firms, and a residual part which is more similar to dividends paid out to shareholders in CMFs. Individual shares of end-of-the year residuals serve various functions: first of all they are commonly used to self-finance risky investment projects; second, they constitute collateral needed to obtain credit from financial institutions; third, they buffer workers against short-term fluctuations in the firm's proceeding, this way limiting too strong fluctuations in current labour income; fourth, they are liable to absorb negative economic results such as losses. If they are reinvested in the firm, then the problem arises of how to remunerate them. The standard mechanism present in CMFs, i.e. sharing of the net residual on the basis of the amount of contributed full-risk capital, is barred out because the net residual has the nature of labour remuneration and is appropriated by worker members. Furthermore, capital is not the controlling factor of production, but it is contracted ex-ante. Hence the appropriate remuneration is contracted too and is equal to a fixed interest rate similar to what is paid by the firm on external debt. The remuneration may be higher than the market interest rate due to the higher financial risk undergone by individual capital quotas as compared to standard loans. Yet it is still contracted and, as a rule, fixed. Individual shares of residual labour income, when used to self-finance the firm, can be equated to a form of equity capital, since they perform the same functions as equity, but differences with equity found in capitalist firms need to be kept in mind: first and foremost the fact that they are remunerated by a fixed interest rate, whilst equity capital in CMFs receives the full residual (profit).

4.1. The compulsory capitalisation of individual quotas and the danger of free riding

The idea to use shares of residual labour income as part of equity in LMFs encounters an obstacle in the possible phenomenon of *free riding*. If the decision about what part of the individual quotas of the net residual is to be reinvested in the firm is left to the free decision of individual members, free riding is likely to ensue. The whole collective of members does have an interest in investing the optimal amount on money in the firm because they will receive the maximum benefit by doing so and they will be able to maximise the collective wealth over their whole life expectancy. However, each singular member may prefer to withdraw his individual quota and to put it at other uses. Withdrawing members' would gain the future returns on investments made by their fellow workers since, as a rule, in LMFs the sharing of the residual is made on the basis of collective decisions or rules that benefit the whole membership. In big firms, the withdrawal of each individual quota may do little harm to the firm's patrimonial solidity since it may only reduce investments by a tiny fraction. However, the spread of this kind of behaviour would cripple the firm's growth potentials. If free-riding is the danger, it is to be kept at bay, and the best way to do so is imposing mandatory reinvestments of part or the whole of individual shares of net residuals.[12] This statement can be supported by resorting to a wide array of experimental results in the field of public goods finance (Fehr and Fischbacher, 2002; Fehr and Gächter, 2000), but also to the neoclassical theory of public goods and club goods (Cornes and Sandler, 1986). Without any constraint on individual behaviour, the financing of public goods leads to severe free-riding phenomena which render the pursuit of production impossible. The imposition of mandatory contribution and of a system of punishments (fines) against deviant behaviour results in completely different results. Since deviance is punished, everybody can trust the commitment to finance the endeavour, making production possible. In our case, if reinvestment is mandatory, fines against deviant behaviour are not necessary, since the net residual or the due part of is reinvested directly by the firm.[13]

4.2. The reimbursement of individual capital quotas

A second fundamental asymmetry between capital quotas in capitalistic and labour managed firms arises because, in LMFs, worker members necessarily have to quit the firm at some point in time. Accumulation of equity capital is strictly linked to

---

[12] This mechanism of mandatory reinvestment is found in the Basque cooperatives in Mondragon.

[13] For more comprehensive arguments, see Tortia (2000).

members' position since it is the results of reinvestment of labour income residuals. When a member quits the organisation he is not entitled to any form of labour remuneration any more, hence he is not entitled to labour income residuals too. Furthermore, quitting members loose their share of control over the firm. Control and risk-bearing are necessarily linked because lack of control implies the impossibility to shield against economic risk implied by the presence of equity capital. Consequently, quitting members are not in a position to accumulate new equity capital and to exert control over the use of the quotas accumulated in the past. These problems are absent in CMFs because, in their case, capital quotas are not linked to the position of individual members: they are accumulated by means of reinvested profit, and they can be sold at a price mirroring the present value of future returns on the firm's investments. No temporal horizon exists and, in principle, capital quotas can freely circulate without restraints *ad infinitum.*

The most common solution to the problem of lack of control over equity capital by quitting members is the mandatory reimbursement of individual capital quotas,[14] which is referred to as the well-known phenomenon of equity capital variability cooperative firms. This is the solution found, for example, in the Italian and Spanish legislation[15]. Equity capital variability can constitute a serious financial obstacle for cooperatives, which, in this respect, are usually considered to be at a disadvantage with respect to capitalistic firm (Dow, 2003). The compulsoriness of reimbursement can weaken the financial structure of the firm, the more so if many owners of important shares of capital quit the firm over a short period of time. Beside, the variability of capital reduces the firm's possibilities to offer collateral to financial institutions, which will take a more conservative position when deciding whether to finance the firm.[16]

---

[14] *Capitale sociale* in the Italian Cooperative tradition.

[15] For Example, the Italian cooperative law defines cooperatives as "variable capital companies" as opposed to capitalistic firms *(società di capitali),* which are "fixed capital companies".

[16] The main alternative to the reimbursement of individual capital quotas is the creation of a market for membership rights (Dow, 2003) whereby workers sell their position as members of the cooperative upon quitting to a new incoming member. The price of the quota reflects the present value of future returns on the membership position. Dow (1986, 1993, 1996) shows that, at equilibrium, the market for membership rights would have the same efficiency features as markets for shares in capitalist economies. However, empirical evidence, for example the one concerning the plywood cooperatives in USA Pacific North-West, points out various shortcomings linked to this kind of market, which render its implementation hardly practicable. The main shortcomings are the difficulty to find new suitable members willing and able to buy the membership position. The new member needs to be accepted by incumbent members and, at the same time, wealthy enough to

When an important part of the firm's capital is accumulated in the form of divisible reserves that are to be reimbursed to members, financial instability can step in causing, in the most extreme cases, financial distress. Issue concerning asymmetric information and moral hazard are to be taken into account too. If members have access to privileged information concerning the economic and financial position of the firm, they can decide to quit strategically in order to have their quotas reimbursed before other liabilities come to the point of restitution, this way aggravating the crisis. The prediction of this kind of event does indeed push many cooperatives to avoid the accumulation of divisible reserves in the form of individual capital quotas and to resort to indivisible reserves, which cannot be appropriated by members at any point in time. This is the case, for example, in Italian cooperatives where the shares of the net residual attributed to members, in most cases, is tiny. Accumulation of capital by means of indivisible reserves has the advantage of stabilising the equity capital of the firm. Not being appropriable by anyone, it is fixed and can both finance investment projects and serve as collateral. However, as it was underlined in section two, indivisible reserves do not involve members financially at the individual level and undergo the shortcoming linked to the presence of a limited temporal horizon for members (Furubotn-Pejovich effect).[17]

Some proposals have been advanced which aim at solving this problem.[18]

---

afford the price of the position. Furthermore, prices for membership positions can be extremely high in capital intensive sectors and not affordable by incoming members, even when they are fit for the job position. Asymmetric information is likely to play a crucial role in limiting the effectiveness of the market for membership rights. When the value of the membership position is difficult to evaluate by new comers, the actual price paid can be significantly inferior to its market value. Indeed, most plywood cooperatives in the USA have been sold out to capitalist companies after having been actibe companies for roughly half a century.

[17] Not the same is true in the case of divisible reserves. If we come back to formula (2) in section two, and using the same symbols, we can see that divisible reserves escape the problem of the temporal horizon. Since they need to be reimbursed at some point in time, they can be assimilated to loans. If we take into consideration the present value of 1 Euro invested in a bank deposit:

$$PV_{BA} = i \sum_{t=1}^{T} (1+i)^{-t} + (1+i)^{-T} = 1 \quad (3)$$

we can see that the sum is equal to 1 whatever the value of T and *i*. Indeed, (3) is an identity, not a equilibrium condition. The present value of one Euro deposited in a bank account, yielding an interest of *i* for T periods of time and withdrawn at time T is 1.

[18] No solution is to be found in the financial structure of CMFs, since, as already stated, in their case the problem of the temporal horizon is absent.

Tortia (2002, 2004) and Zevi (2003) take into consideration various possibilities. The first step is constituted by the transformation of individual capital quotas in debt to be repaid by the firm to quitting members.[19]

This way the problem of the lack of control of quitting members over risky quotas of capital is solved. Furthermore, the payment of debt held by quitting members can be made dominated by the payment of standard loans held by third parties (Cuomo, 2003). This arrangement is required because it limits the danger to dilute third parties rights to have their credits paid back before equity. As for reimbursement of individual quotas, proposed solutions are as follows:

- Extended terms for reimbursement. Suitable longer terms for reimbursement can be devised in order to reduce financial pressures on firms and to lessen the risks members' moral hazard: if a long time span lasts between quittance and reimbursement the possibilities for members to ask for reimbursement strategically can be greatly reduced.
- Sale of the credit to financial institutions. Quitting members could have to possibility to sell their credit toward the firm to financial institution. This could be a step toward the reconciliation of firm's and member's interests. Members would increase their liquidity and firms would have terms of repayment long enough not to endanger their financial stability.
- Transformation of credits in bonds saleable on regulated financial markets. Credits held by quitting members could also be allowed to circulate on financial markets. The market will fix the price of the title and, again, members would have the possibility to increase their liquidity. Banks and other ad hoc financial institutions could be in charge of buying individual shares and make them circulate on the market.

These solutions need to be deepened and further discussed at the theoretical level.[20] Experimentation by cooperatives would be a crucial test if new solutions are to spread. At any rate, a suitable legal framework allowing this kind of experimentation is all the more necessary.

5. Concluding remarks

The Furubotn-Pejovich effects has been acknowledge by various authors as the main shortcoming crippling the efficient allocation and accumulation of self-financed capital funds in labour managed firms, when collective ownership of the means of production and indivisible reserves of capital are accepted as the institutional standard. The literature studying Yugoslav-type economic systems is thus able to explain the roots of undercapitalisation, self-selection in labour intensive sectors and lower labour remuneration in worker cooperatives also in western countries.

Among the proposals seeking to correct the distortions caused by the Furubotn-Pejovich effect the introduction of divisible reserves of capital seems to be particularly promising. Its main positive features are the higher worker involvement at the financial level with the corresponding addition of shares of the value added to labour remuneration, and the elimination of the horizon problem, which is the source of the Furubotn-Pejovich effect. In this work we concentrated our attention on the potential problems arising from the introduction of divisible reserves. Different property rights between capitalist and labour managed firms (shareholder owned *versus* worker owned firms) give rise to fundamental asymmetries, which are particularly relevant as long as the mechanisms of distribution of the net residuals, and the reimbursement of individual capital quotas are concerned. Our understanding of the problem make us state that it is on these asymmetries that future research will have to focus if viable solutions to increase the growth potential of worker cooperatives are to be found.

References

1. Albanese M (2003), Le difficoltà di finanziamento delle labour managed firms e il razionamento del creadito, *Economia Politica,* vol. XX, no. 3, pp. 303-333.
2. Ben-Ner A. (1988), Comparative Empirical Observations on Worker-Owned and Capitalist Firms, *International Journal of Industrial Organisation,* vol. 6, pp. 7-31.
3. Berman K. V. and Berman M.D. (1978), The Long Run Analysis of the Labour Managed Firm: Comment, *The American Economic Review,* vol. 78, no. 4, pp. 701-705.
4. Berman K. V. and Berman M.D. (1989), An Empirical Test of The Theory of Labour Managed Firms, *Journal of Comparative Economics,* vol. 13, pp. 281-300.
5. Bonin J. P. (1985) Labour management and Capital Maintenance: Investment Decisions in the Socialist Labour-Managed Firm, *Advances in the Economic Analysis of Participatory and Labour managed Firms,* vol. 1, London, Jai Press Inc., pp.55-69.
6. Borzaga C. e Depedri S. (2004), Interpersonal Relations and Job Satisfaction: Some Empirical Results in Social and Community Care Services, in Gui B. e Sugden R. (eds.), *Economics and Social Interaction: Accounting for Inter-*

---

[19] This is the route followed, with different institutional details, by both Italian and Spanish legislation.
[20] Also the emerging field of experimental economics could play an important role in giving general indications about viable and preferable institutional solutions before in-field experimentation is to start.

personal Relations, Cambridge, Cambridge University Press, forthcoming.

7. Borzaga C. and Tortia E. C. (2004), Worker involvement in social enterprises. Toward a new assessment of workers' perceived satisfaction and fairness, University of Trento, Department of Economics, *mimeo.*

8. Buck T. - Wright M. (1990), Control in Vertical Hierarchies, Soft Budgets, and Employee Buy-Out, *Economic Analysis and Workers' Management,* vol. XXIV, no. 4, pp. 377-393.

9. Conte M. A., Smith S. C. and Ye M. (1992), Optimal Internal Investment in a Labour-Managed Firm with Heterogeneous Membership: An Overlapping Generations Approach, *Journal of Comparative Economics,* vol. 16, no. 2, pp. 479-493.

10. Cornes R. and Sandler T. (1986), *The Theory of Externalities, Public Goods, and Club Goods,* Cambridge, Cambridge University Press.

11. Dow G. K. (1986), Control Rights, Competitive Markets, and the Labour Management Debate, *Journal of Comparative Economics,* vol. 10, no. 1, pp. 48-61.

12. Dow G. K. (1993), Why Capital Hires Labour: A Bargaining Perspective, in *The American Economic Review,* vol. 83, no. 1, pp. 118-134.

13. Dow G. K. (1996), Replicating Walrasian Equilibria using Markets for Membership in Labour-Managed Firms, *Economic Design,* vol. 2, pp. 147-162.

14. Dow G. K. (2003), *Governing the Firm. Workers' Control in Theory and Practice,* Cambridge, UK, Cambridge University Press.

15. Drèze, J. H. (1976) "Some Theory of Labour Management and Participation", *Econometrica,* vol. 44, n. 6., pp. 1125-1139.

16. Fanning C. and McCarthy T. (1983), Hypotheses Concerning the non-Viability of Labour-Directed Firms in Capitalist Economies, *Economic Analysis and Workers' Management,* vol. XVII, no. 2, pp. 123-154.

17. Fehr E. and Fischbacher U. (2002), Why Social preferences matter – The Impact of Non-Selfish Motives on Competition, Cooperation and Incentives*, The Economic Journal*, vol. 112, March, pp. C1-C33.

18. Fehr E. and Gächter S. (2000), Fairness and Retaliation: The Economics of Reciprocity*, Journal of Economic Perspectives*, vol. 14, pp. 159-181.

19. Furubotn E. G. (1976), The Long Run Analysis of the Labour Managed Firm: An Alternative Interpretation, *The American Economic Review,* vol. 66, no. 1, pp. 104-123.

20. Furubotn E. G. (1978), The Long Run Analysis of the Labour Managed Firm: Reply, *The American Economic Review* vol. 68, no. 4, pp. 706-709.

21. Furubotn E. G. (1980a), The Socialist Labour Managed Firm and Bank-Financed Invest-ments: Some Theoretical Issues, *Journal of Comparative Economics*, vol. 4, pp. 184-191.

22. Furubotn E. G. (1980b), Bank Credit and the Labour-Managed Firm: Reply, *The American Economic Review,* vol. 70, no. 4, pp. 800-804.

23. Furubotn E. G. and Pejovich S. (1970), Property Rights and the Behaviour of the Firm in Socialist State: The Example of Yugoslavia, *Zeitschrift für Nationalökonomie*, vol. 30, no. 5, pp. 431-454.

24. Gui B. (1984), Basque versus Illirian Labour-Managed Firms: The problem of Property Rights, *Journal of Comparative Economics,* vol. 8, pp. 168-181.

25. Gui B. (1985), Limit to External Financing: A Model and an Application to Labour-Managed Firms, in Jones D. C. - Svejnar J. (eds.), *Advances in the Economic Analysis of Participatory and Labour managed Firms,* vol. 1, London, Jai Press Inc., pp. 107-120.

26. Hansmann, H. (1988), Ownership of the Firm, *Journal of Law, Economics and Organisation,* vol. IV, no. 2, pp. 267-304.

27. Hansmann, H. (1996), *The Ownership of the Enterprise*, Harvard, Harvard University Press.

28. Horvat Branko (1984), Work and Power: the Prospects for the Disalienation of Work, *Economic Analysis and Workers' Management,* vol. XVIII, no. 4, pp. 365-369.

29. Horvat Branko (1986a), Farewell to the Illyrian Firm, *Economic Analysis and Workers' Management,* vol. XX, no. 1, pp. 23-29.

30. Horvat Branko (1986b), The Theory of the Worker Managed Firm Revisited, *Journal of Comparative Economics,* vol. 10, pp. 9-25.

31. Jensen M. and Meckling W. (1976), The Theory of the Firm: Managerial Behaviour, Agency Costs, and Ownership Structure*, Journal of Financial Economics,* vol. 3, no. 4, pp. 305-360.

32. Jensen M. and Meckling W. (1979), Rights and Production Functions: An Application to Labour-Managed Firms and Codetermination, in *Journal of Business,* vol. 52, no. 4, pp. 469-506.

33. Jossa B. (1999), Wallerstein, il liberalismo e l'impresa democratica, *Studi economici,* vol. 69, n. 3, pp. 33-49.

34. Jossa B. and Cuomo G. (1997), *The Economic Theory of Socialism and the Labour-Managed Firm*, Cheltenham - Brookfield, Edward Elgar Publishers.

35. Jossa B. and Cuomo G. (2000), *La teoria economica del socialismo e l'impresa autogestita*, Torino, Giappichelli.

36. Kornai J. (1986), The Soft Budget Constraint, *Kyklos,* vol. 39, no. 1, pp. 3-30.

37. Logan C. and Thomas H. (1982), *Mondragon: an Economic Analysis,* London, Allen & Unwin.

38. Mazzoli M - Negrini R. (2000), Incentive-Compatible Financial Instruments for Co-operative Firms: a Few Policy Considerations,

Department of Economics, University of Modena and Reggio Emilia, *mimeo.*

39. McCain R. A. (1977), On the Optimum Financial Environment for Worker Cooperatives, *Zeitschrift für Nationalökonomie*, vol. 37, no. 3-4, pp. 355-384.

40. Meade J. E. (1972), The Theory of Labour-Managed Firms and Profit-Sharing, *Economic Journal*, vol. 82, March, Supplement, pp. 402-428.

41. Meade J. E. (1980), Labour Co-operatives, Participation and Value-Added Sharing, in Clayre A. (eds.), *The Political Economy of Co-operation and Participation. A Third Sector*, Oxford, Oxford University Press, pp. 88-108.

42. Meade J. E. (1995), *Full Employment Regained. An Agathotopian Dream*, Cambridge, Cambridge University Press.

43. Milanovic B. (1983), The Investment Behaviour of the Labour Managed Firm: A Property rights Approach, *Economic Analysis and Workers' Management,* vol. XVIII, no. 2, pp. 327-338.

44. Pejovich S. (1990), *The Economics of Property Rights: Toward a Theory of Comparative Systems*, Dordrecht - Boston - London, Kluwer Academic Publishers.

45. Putterman L. (1988), The Firm as Association versus the Firm as Commodity. Efficiency, Rights and Ownership, *Economics and Philosophy,* vol. 4, pp. 243-266.

46. Schlicht E. - von Weiszacker C. C. (1977), Risk Financing in Labour Managed Economies: the Commitment Problem, *Zeitschrift für die gesamte Staatswissenschaft,* (Special Issue on Profit Sharing), pp. 53-66.

47. Smith S. C. (1984a), Does Employment Matter to the Labour-Managed Firm? Some Theory and Empirical Illustration, *Economic Analysis and Workers' Management,* vol. XVIII, no. 4, pp. 303-318.

48. Smith S. C. (1984b), Labour Managed Cooperatives and Private Firms in North Central Italy: an Empirical Comparison, *Industrial and Labour relation Review*, vol. 46, no. 1, pp. 103-118.

49. Smith S. C. (1994), Innovation and Market Strategy in Italian Industrial Cooperatives: Econometric Evidence on Organisational Comparative Advantage, *Journal of Economic Behaviour and Organisation,* vol. 23, pp. 303-320.

50. Smith S. C. and Waldmann R. J. (1999), Investment and Supply Effects of Industry In-dexed Bonds: the Labour Managed Firm, *Economic Systems,* vol. 23, no. 3, pp. 245-267.

51. Stephen F. H. (1980), Bank Credit and the Labour-Managed Firm: Comment, *The American Economic Review,* vol. 70, no. 4, pp. 796-799.

52. Tortia (2000).From Wage Flexibility to Value Added Distribution: The Structure of Labour Remuneration in Labour Managed Firms, Working Paper 9/2000, University of Ferrara, Department Economics Institutions Territory.

53. Tortia (2002), L'accumulazione di capitale nelle imprese controllate dai lavoratori ed il problema delle riserve divisibili. Risvolti teorici e studi sul campo nella provincia di Ferrara", *Rivista della cooperazione*, no. 2, 2002, pp. 132-145.

54. Tortia (2003) Property Rights, Distribution of Value Added, and Accumulation of Capital in Labour Managed Firms, *Economia Politica,* vol. XX, no. 2, pp. 251-186.

55. Tortia (2004), L'accumulazione di capitale e la distribuzione del valore aggiunto nelle imprese controllate dai lavoratori, in Screpanti E. and Tortia E. (eds.), *Democrazia economica. Tra stato e mercato,* Napoli, Edizioni Pettirosso, pp. 123-156.

56. Vanek J. (1970), *The General Theory of Labour Managed Market Economies,* New York, Ithaca, Cornell University Press.

57. Vanek J. (1975), The Basic Theory of Financing of participatory Firms, in Vanek J. (eds.), *Self-management. Economic Liberation of Man,* New York, Ithaca, Cornell University press, pp. 445-455.

58. Vanek J. (1977), *The Labour-managed Economy: Essays,* New York Ithaca, Cornell University Press.

59. Vanek J. (1996), Some Fundamental Considerations on Financing and the Form of Ownership Under Labour Management, in Prychitko D. L. and Vanek J. (eds.), *Producer Co-operatives and Labour Managed Systems*, Cheltenham, Edward Elgar Publishers, pp. 125-138.

60. Zafiris N. (1982), Appropriability Rules, Capital Maintenance, and the Efficiency of Cooperative Investment", *Journal of Comparative Economic,* vol. 6, pp. 55-74.

61. Zevi A. (2003), Il fenomeno cooperativo e le modifiche in corso nell'ordinamento italiano, in Buonocore V. and Jossa B. (eds.), *Organizzazioni economiche non capitalistiche. Economia e diritto,* Bologna, Il Mulino, pp. 125-148.