THE LABOR MANAGED FIRM: PERMANENT OR START SUBSIDIES?

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Abstract

Given a range of market failures that persist in the present-day capitalist firm, we explore a novel argument of why the alternative of the labor managed firm is largely absent and argue public intervention should primarily be aimed at the start-up phase of labor managed firms rather than providing permanent tax subsidies. We derive the crucial condition for the emergence of labor managed firms, and show that this condition is unduly restrictive from an efficiency point of view.

INTRODUCTION

The predominance of the capitalist firm (henceforth KMF) over the labor managed firm (henceforth LMF) is a striking feature of Western economies, given Samuelson's (1957) equivalence between capital hiring labor or labor hiring capital. In an interview in *Juncture* (2014), Piketty claimed revisiting property relationships and involving workers in the ownership and management of their company to be complementary to other measures such as a wealth tax in fighting rising levels of inequality. In a similar vein, Blasi, Freeman and Kruse (2013) argue for more profit sharing and employee ownership. Questions of equity and democracy aside, many authors (e.g. Klein 1987; Kruse 1992; Kandel and Lazear 1992) have put forth efficiency arguments for further reaching democratic and return rights for employees. Especially the inability to specify complete labor contracts gives rise to socially costly monitoring expenses faced by the KMF, unable to meet welfare enhancing combinations of higher pay and higher effort by its employees relative to the LMF (Bowles and Gintis 1993).

Proponents of LMFs however face an analytical dilemma, since if the LMF is superior, then why does the LMF not thrive in a competitive environment (Dow 1993)? Moving beyond existing arguments on wealth and credit constraints or risk aversion on behalf of employees to explain the prevalence of the KMF over the LMF, we engage in a novel argument recently put forth by Schwartz (2012). The question of the largely absent LMF is not so much the question of why LMF do not thrive in market economies, but why so few are started to begin with. In his account the organizational form of a LMF is as a public good, the benefits of which (among them residual claimancy, job security and participation in decision-making) are shared between workers. To explain the absence of LMFs we should therefore first and foremost study possible collective action problems in the start-up phase.

In this contribution we set out to formalize and expand upon this insight, offering a game theory analytical framework to judge both whether and what kind of government intervention may be warranted. Section 1 contrasts the LMF to the KMF, defining a firm in which both control and return rights rest with labor as the LMF, while in the KMF these rest with the suppliers of equity finance or owners of its physical assets. Section 2 discusses a number of market failures arising in the KMF and the mechanisms through which the LMF may be able to overcome them. In the third section we provide a short overview of existing explanations for the absence of LMF and engage in a novel argument that the absence of LMFs is due to

its organizational structure being a public good for the prospective workers. Section 4 presents this argument in an analytic framework using the extensive form from game theory. The policy implications are discussed in section 5. To address collective action problems in the start-up phase of the LMF, we suggest both standardization and start subsidies may reduce the costs of setting-up LMFs and overcome the prevalent collective action problems.

DEFINING THE LMF ALONG THE AXES OF CONTROL AND RETURN RIGHTS

Dow and Putterman (1996) define the organizational structure of a firm by asking the question which party controls the firm. In a pure KMF, control rests with the suppliers of equity finance or owners of its physical assets. In contrast, in the pure LMF suppliers of non-managerial and managerial labor share formal control rights. Besides the right to control the use of an asset, there is also the right to the returns of the firm. According to Ben-Ner & Jones (1995, 532-533), owning a firm on the one hand means 'determining the objectives of an organization, the positions people occupy, the functions of these positions, who occupies them and how their occupants are induced to carry out their functions', while on the other hand it entails enjoying the 'financial and physical payoffs generated from the operation of the organization (…) distributed as profits, wages, working conditions, or through output quality and price'. Beyond what they refer to as the 'conventional firm', which we label as the KMF, three major 'shades of grey' exists: Firms that share profits, firms with employee share ownership programs (ESOP) and firms organized as (producer) cooperatives, which we label as LMFs. Differences between firms in the same product market may exist when moving east or south in Table 1, yet as Pencavel (2012) argues, there may be an argument for complementarity between both dimensions, suggesting a south-eastern movement may affect the firm's operation most, as it is the interaction between both dimensions that matters. Control rights may thus be more effective on the performance of a firm if coupled with return rights, and vice versa. In the analysis that follows we restrict ourselves to the two extremes in both corners: the LMF (with both full control and return rights for employees) and the KMF (with no control and return rights for employees).

		Control rights held by employees			
		None	Participation in Control	Sharing of Control	Dominant Control
Return rights held by employees	None	The conventional firm, KMF	Quality circles involving majority of workers	Employee representation on board of directors	Common Ownership
	Small	Profit sharing	Profit sharing with participation program	Co-determination	Retail cooperatives
	Moderate	ESOP	Scanlon Plan	Producer cooperative	Producer cooperatives
	Majority	ESOP	ESOP	ESOP	Producer cooperatives, LMF

Table 1. Ownership structures along the axes of control and return rights (Taken from Ben-Ner and Jones 1995)

The LMF makes up only a small share of firms in Western economies. Although figures differ across studies, largely because of different definitions,[1] Fakhfakh et al. (2009) reports 1,900 worker cooperatives in France in 2008, representing only around 0.2% of all firms at that time. Cooperatives UK (2013) counted 497 worker owned cooperative businesses, with around 84,000 members. Data for the United States show only 223 worker cooperatives with an average of 11 employees each, concentrated mainly in arts, media and books industries (Artz and Kim 2011). Schwartz (2012) argues this number to be negligible, as in 2009 almost 553,000 new firms started their operations in the Unites States. Countries with relatively larger cooperative sectors are Spain, with 16,800 worker cooperatives in 2011 and nearly 80% of them situated in the service and construction sector, covering roughly 200,000 worker members (CECOP 2012) and Italy with around 31,400 production cooperatives in 2008 (Zanotti 2012), leading Europe in number and share of the cooperative worker sector. Overall, however, the picture is that the LMF is a marginal phenomenon.

MARKET FAILURES IN THE KMF

Although the KMF is the predominant organizational structure of firms throughout the Western world, Bowles and Gintis (1993) show the KMF is troubled by a range of market failures and that even under highly competitive conditions the LMF may allocate resources more efficiently than the KMF. Market failures arise from the fact that exchange on the labor market is contested. Viewing labor contracts not as 'solved political problems' (Bowles and

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[1] E.g., Ben-Ner (1989, 442) regards non-agricultural cooperatives affiliated under the main cooperative umbrella organization in a country, and does not include professions such as law, accounting or medical practices.

Gintis, 1993b, 86) but through the lens of contested exchange gives rise to a number of market failures. While the claims resulting from an exchange in a (Walrasian) ideal-type market is costless to parties engaged in it, the ex post terms of exchange in the labor market are endogenously determined by monitoring technologies and sanctioning mechanisms that are imposed by the employer. To induce effort in employees, labor markets for instance depend on the contingent renewal of contracts, renewal being a function of effort exerted in the earlier period. Theoretically, the LMF faces different incentive structures, better able to align labor time and labor effort, possibly overcoming many of the market failures present in the KMF. In this section we give an overview of market failures in the KMF and show how the LMF may overcome these, concluding with a short overview of empirical studies into productivity differences between both organizational forms.

In inducing effort, the capitalist entrepreneur is indifferent between expenditure on monitoring or on wages, concerned only with ensuring it is not possible to achieve further net gains in worker productivity through additional expenses on either instrument. Employees on the other hand will strongly prefer the use of the wage incentive, implying monitoring is socially costly, while higher wages entail redistribution of income between employer and employee. This market failure in which the KMF uses 'too many monitoring resources and not enough wage incentives' (ibid., 574) is overcome in the LMF through the wage incentive effect. All other things equal, to elicit the same work effort, the LMF will make more use of the wage incentive and less of the socially costly monitoring incentive.

Related to this market failure, monitoring technologies available to the LMF can be more effective compared to those in the KMF. While the KMF will usually resort to costly management control and all kinds of (electronic) monitoring devices, the LMF can rely more on mutual monitoring. Due to this mutual monitoring effect, the LMF benefits from an almost costless system of more 'horizontal' monitoring, internalizing the positive externalities from individual decisions to cooperate in interdependent tasks (Kruse 1992, 25), reinforced by peer pressure as a more effective type of co-monitoring (Kandal and Lazear 1992). Horizontal monitoring may often be more effective than 'vertical' monitoring in hierarchical organizations, possibly overcoming principal-agent type of incentive problems.

Another market failure arises when the KMF alienates workers from their job. The reasoning here is that lower worker motivation stems from the exclusion from decision making and ownership of the fruits of one's labor. The participation effect in a LMF relates to a notion

from Klein (1987, 320) that control rights for employees may affect company performance. Less alienation is experienced either because simply being an owner increases commitment and satisfaction, or because control rights increase worker commitment and thereby company performance. Likewise, Pierce et al. (1991, 134) relate the employee ownership of a firm to motivation, which increases due to 'the impact of ownership on instrumentality and expectancy perceptions, valence, cooperative behavior, work group norms, and peer pressure (…), through experienced meaningfulness of work and experienced responsibility for work outcomes'. A related extrinsic productivity argument in the LMF concerns the residual claimancy effect, by which effort increases as workers are aware that higher effort translates into higher profits which in turn are shared amongst employees in the LMF. Therefore, control and return rights in a LMF may increase worker commitment both through intrinsic and extrinsic mechanisms.

Bowles and Gintis (1993) give two more market failures that persist in the KMF. They show there exist Pareto-improving combinations of management pay and risk-taking, not feasible given the manager's degree of risk aversion if the residual claimant owner hires a manager more risk averse than himself. Furthermore, in their analysis of the principal-agent relationship between the lender and a borrower as a residual claimant, there exist Pareto-improving combinations of interest rates and risk-taking that are not within reach of the KMF.

Other market failures related to the inability to specify complete labor contracts relate to the hold-up problem. While the firm and the worker may be willing to invest in firm-specific assets before negotiating wages, the risk of being held up however may discourage the investor from making these investments, leading to underinvestment in for instance worker skills (Grout 1984, Tirole 1986). Kruse (1992) argues the LMF may be able to overcome some of these hold-up problems rampant in the KMF. Turnover may be lower in the LMF through identification with the firm, or valuation of the stronger link between compensation and work effort, hence making investment in firm-specific assets more likely. Monsen, Patzelt and Saxton (2009) show if firms use profit sharing schemes, depending on the pay risk and job risks faced, employees may be more willing to engage in projects leading the firm to new directions. This latter job security argument is also evoked in a different argument, claiming that while outsider-shareholders, when maximizing their income will be eager to sell their shares at above-market prices in case of a takeover, employee-shareholders may have a more long-run perspective, taking into account their own employment, especially

when they consider the takeover as hostile. Finally, efficiency may also improve if employees in the LMF are more willing to share information, increasing operational productivity and easing innovation. Technical change may furthermore be welcomed amongst employees in a LMF, as technological change will be a major driver of labor income in the LMF compared to the KMF in which it may pose a threat to existing jobs.

A large body of literature has empirically tested the hypothesized advantages of the LMF over the KMF, most recently Blasi et al (2013, Ch. 5) for the USA. Certain studies focus on the effects of different combinations of control or return rights within KMFs as in Table 1, seeking to find out whether these configurations influence firm performance. Conte and Svejnar (1988) show a large and positive productivity effect exists in participation in decision-making, with moderate levels of indirect worker ownership positively affecting productivity. Bayo Moriones et al. (2003) find no significant performance differences between the LMF and KMF in Spanish manufacturing, yet show introducing participation rights generates positive outcomes both for LMF and KMF. Fakhfakh et al. (2012) show French labor managed firms to be as or even more productive than their capitalist counterparts, using inputs more efficiently. If KMFs were to transform to a LMF, using the latter's industry-specific technologies production would be likely to increase. However, even if most studies would report favorable outcomes for the LMF compared to KMF, they still face the problem relating to the few observations for LMFs relative to the ubiquity of KMFs in the same sectors. Before one can measure the performance of LMFs relative to KMFs, it is therefore necessary to investigate why among the many new firms started each year so few LMFs are launched.

WHAT INHIBITS THE EMERGENCE OF LMFs?

If employees in the LMF use more effective monitoring technologies, are more involved in their firm, either as co-owner of the firm, or being aware that higher effort will translate into higher profits to be shared in the firm and LMFs spend less on monitoring and more on wages, then we would expect LMFs to thrive in a competitive environment. The very low incidence of LMF in Western economies however have led authors to doubt the blessings of the LMF. A large literature has offered a multiplicity of accounts of why LMFs fail. Dow (2001) categorizes these explanations along five major lines: (1) asset ownership, claiming workers have weak incentives to maintain rented assets in their LMFs, (2) work incentives, claiming as effort in a team is largely unobservable vertical monitoring will be more

effective, (3) wealth and credit rationing, claiming workers tend to be poor and face adverse selection problems on the market for credit, (4) risk aversion, claiming workers are generally more risk averse than investors, and finally (5) collective choice, arguing workers in a democratic firm will have problems reaching collective decisions.

With the exception of the wealth and credit rationing argument, all of the above arguments follow a "Panglossian" logic, asserting that 'that what is, must be optimal' (George 1997). As Schwartz (2012) argues, explanations of the absence of the LMF revolving around these arguments claim that even given market failures in the KMF, LMFs perform even worse. The first question to be answered is rather why so few LMFs are started to begin with. Given 553,000 new firms in the United States in 2009—of which a large fraction will undoubtedly fail—only a handful at most are started as worker cooperatives, so what explains why so few LMFs are formed?

Among the arguments defying such a Panglossian logic, Bowles and Gintis (1993) discuss the largely absent LMF by posing three constraints on its operation. A democratic capacity constraint inhibits new LMFs from forming, claiming workers are not attuned to democratic rule of the firm and face high costs on learning how to govern the firm democratically, preventing a workforce to become experienced with democratic management. In the same vein, George (1997) argues that economic theory departs from an exogenous preference structure, while preferences about the organization of the work place may be endogenous, shaped by experiences. Putterman (1993: 130) similarly speaks of endogeneity of preferences, claiming 'the desire [for control rights] may be non-existent or weak if workers are socialized into the expectation of subordination on the job and are conditioned to viewing work as an acceptable sacrifice making possible increased consumption during leisure time'. In addition, Bowles and Gintis pose an economic environment constraint, where path dependency in an economy with many (few) LMFs increases the likelihood of more (fewer) LMFs to start. Once a 'critical mass' of LMFs in an economy is reached, one may expect new ones to more easily form. Finally, akin to Dow's wealth and credit rationing argument, the wealth inequality constraint claims workers are often asset-poor, unable to borrow large sums to purchase firm stock with limited collateral, if any. Furthermore, while the worker in a KMF can diversify his assets and thereby risk, the employee of a LMF concentrates both his returns from work and savings in a single asset. Uncertainty about the returns and prospects for the firm may prevent a risk averse worker from sharing in its ownership.

Schwartz (2012, 266) dismisses the wealth inequality constraint, claiming there is no 'evident reason that they [LFM] are less creditworthy than capital-managed firms': Past examples have shown incidences of self-financed takeovers by workers (e.g. United Airlines), while (union) pension funds may have assets exceeding the value of firms employing these (union) workers. As pension funds manage deferred wages of workers, trade unions might consider using pension fund money to buy capital shares, and hence decision-making, in companies on behalf of the workers. With respect to unions, although many of their goals were realized in the last century (i.e. higher wages, job security, improved labor conditions, reduced income inequality, shortening of the work week), two goals, the democratization of the firm and the bridging of the gap between labor and capital, are still on the agenda.

While the LMF may outperform the KMF, in its core 'a labor-managed firm is a public good' (ibid., 267), facing collective action problems inhibiting its emergence and giving rise to free riding behavior. Schwartz (ibid., 273) describes the collective action problem of starting a LMF as follows:

> 'Forming a labor-managed firm involves individuals pooling their resources and coming to a mutually satisfactory agreement about how to set up and manage a business—an agreement in which each must trust the others, and where enough of them actually follow through to provide the public good. Insofar as economic rationality impinges on their motivation, or their behavior tracks such rationality whatever their motivation, it creates incentives for free riding and opportunistic behavior'.

Due to the public good nature of its organizational structure, each has the 'incentive to contribute less than or none of the share required to generate the optimal amount of the good, on the pattern of an n-person prisoner's dilemma' (ibid., 283). In his account, in line with Bowles and Gintis' economic environment constraint, this collective action problem is both reinforced and exacerbated by unfamiliarity with LMFs by workers and investors:

> 'Most workers (and most lenders and investors) do not know about cooperative organization, while self-employment or small capitalist business is widely known and moderately well understood. For workers, the idea of cooperatives or other forms of worker ownership typically arises, when it does, only in extreme situations such as the threat of a plant closure. It is therefore to be expected that workers with an

entrepreneurial frame of mind or a desire to be their own bosses turn to small business—over half a million such enterprises are started every year—even though the risk of failure is very high. Not only need they not confront collective action problems—at least not on a scale or to the degree that they would in forming a cooperative—but they can operate within a familiar—and therefore attractive— organizational form' (Schwartz 2012, 277)

This final argument we apply in the following section in order to analyze both why so few LMFs are started. We present this argument in an analytic framework which enable us to formulate policy proposals that address these specific collective action problems in the start-up phase of the LMF.

THE COLLECTIVE ACTION PROBLEM IN STARTING A LMF

We interpret the governance of a LMF as a public good or club good, with higher job security, participation in decision-making and shared residual claimancy as benefits for workers. In the case of pure public goods in which exclusion is by definition not possible, the resulting Cournot-Nash equilibrium in which individual contributions are conditional upon other's contributions is characterized by underprovision. In our case exclusion is however feasible, likening its provision to that of a club good. As the supposed benefits of the LMF accrue only to those workers subscribing to theLMF, public economics literature claims such club goods generally face no market failures compared to some of the collective action problems prevalent in the provision of pure public goods. Indeed, early theories on club goods (especially Buchanan 1965) viewed these as types of cooperatives, which 'coordinated action by members to maximize the welfare of the group' (Sandler and Tschirhart 1997).

In as far as handbooks of public economics literature deal with the process of setting up a club good (see Hindriks & Myles, chapter 7), they assume a profit maximizing entrepreneur who starts a firm and demand fees (a fixed membership fee or a two-part tariff with additional user fees) of clients to make use of the facilities (e.g., a fitness center). Our question enters where the entrepreneur decides whether to organize such a club along the lines of a LMF, or to start a conventional KMF. Barham et al. (1997) shows that in a decentralized process without the assumption of coordination, i.e. without an entrepreneurial agent, any ad hoc club formation process would give rise to multiple equilibria, taking the form of a so-called coordination game. Such coordination problems may trouble the

voluntary participation in setting up a club good: Workers may be able to realize mutual gains by forming a LMF, but only by making mutually consistent choices. Free riding on the contributions of others (Olson 1965) or hold-ups because actors await others to take the lead may give rise to inaction.

Using a payoff matrix, we will specify the constraints on starting a LMF. We assume the coordination game resulting from the voluntary nature of starting the LMF can only be overcome by a single or small subset of entrepreneurial workers, taking it on themselves to form a LMF by coming to a mutually satisfactory agreement about how to set up and manage a business.[2] For any prospective entrepreneur however, we must first ask the question why this entrepreneur would not set up a KMF instead and capture the full returns to entrepreneurship instead of sharing them with fellow workers (see the first stage in Figure 1). If the entrepreneur has reasons to prefer the LMF above a KMF, in a subsequent second stage, the prospective members must prefer to join the LMF above an outside wage offer.

		L	
		C	D
E	C	a_1, a_2	b, c
	D	d_1, d_2	e, f

		L	
		C	D
E	C	$\dfrac{\pi^L - F^L}{L+1}, \dfrac{\pi^L - F^L}{L+1}$	$\dfrac{\pi^L}{L+1} - F^L, \dfrac{\pi^L}{L+1}$
	D	$\dfrac{\pi^L}{L+1}, \dfrac{\pi^L}{L+1} - \dfrac{F^L}{L}$	$\pi^K - F^K, W$

Table 2. Payoff matrix (E = entrepreneur, L = workers, C = cooperate, D = Defect), (π = profits, F = start-up costs, W = market wage)

We make use of a highly stylized payoff matrix as used in game theory in which players can either cooperate (C) or defect (D), with either a KMF entrepreneur/owner who employs L workers, or an entrepreneur who forms a LMF with L workers joining as members (see Table 2). So among the $L + 1$ persons there is at least one entrepreneurial type who is the natural candidate to take the lead, either to start a KMF or a LMF. We abstract from capital, or assume that in the short run capital is fixed. The payoff matrix is given in Table 2.

There is a cost F to start or set up a firm, differentiated by type of firm, which can be either a LMF (superscript L) or a conventional KMF (superscript K). These start or set-up cost can be

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[2] As we shall show, the LMF's entrepreneur must be willing to tolerate free riders on his entrepreneurial efforts.

interpreted broadly, not primarily in monetary expenditures, but mostly in (over)time not being compensated in terms of money or the monetary equivalent of worries and psychic cost to set-up a new business. Profits are given by π, again differentiated for the LMF and KMF. Profits in a LMF (π^L) are shared equally among members, where it must be taken into account that instead of wages as in the KMF, the income of members of the LMF is their equal share in the profits. Of course, the decision of E is influenced by the choice of L to defect or cooperate and vice versa. A Nash equilibrium is obtained if both decisions are mutually compatible, e.g. if E cooperates, then L defects and if L defects, then E cooperates. A dominant strategy arises when one choice is better than another for one player, no matter the choice made by the other. Figure 1 translates the payoff matrix of Table 2 into the extensive form representation of the game. The extensive game form allows to derive the conditions under which an equilibrium outcome is likely to evolve.
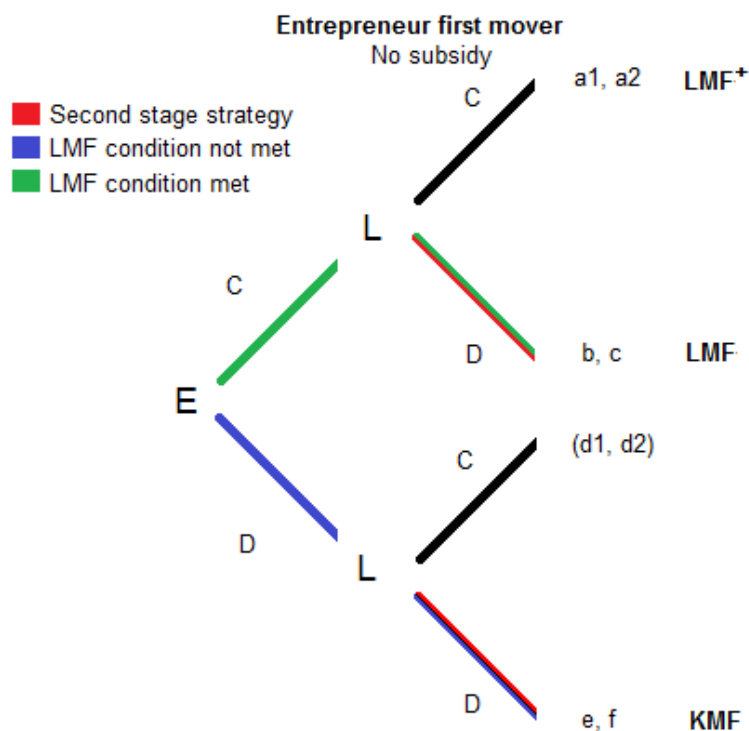

Figure 1. Extensive form, Entrepreneur (E) moves first.

Our point of departure is the collective action problem highlighted by Schwartz (2012), being the failure of workers deciding collectively to start-up a new LMF, or turn the existing KMF into a LMF. We will show that when there is an entrepreneurial agent prepared to launch a LMF, the best strategy for the workers is to defect in the start-up phase. Backward induction allows us to find the subgame perfect Nash equilibrium. As it is natural to assume E to be the

first mover, we first ask what L would do conditional on cooperation or defection by E. Anticipating L's conditional choices, E will determine its best strategy. Throughout we assume the participation of an entrepreneurial agent to be essential for the emergence of the LMF, implying with defection of E formation of a LMF would suffer from a coordination game, as explained above. We therefore rule out the possibility of emergence of a LMF in which L cooperates while E defects.

Figure 1 depicts where E is the first mover. By backward induction E will choose its optimal strategy, depending on the choices of L in the second stage. If E chooses to cooperate, L will choose to defect because c is always higher than a_2. If E defects then the emergence of a LMF is ruled out, so L is forced to defect. Therefore, if the entrepreneur is the first mover, to defect is a dominant strategy for the workers. Backward induction now implies that E anticipates that L will defect and will choose to start a LMF only if $b \geq e$ is met, which we will label as the LMF constraint:

(LMFC) $\qquad b \geq e: \dfrac{\pi^L}{L+1} - F^L \geq \pi^K - F^K \Rightarrow \pi^L \geq (L+1)[\pi^K + (F^L - F^K)]$

From an efficiency point of view, the LMF constraint turns out to be unduly stringent on the proliferation of LMFs (see Figure 2 below). Summarizing, if E cooperates, L will defect since for L to defect is a dominant strategy and if L defects, E will cooperate only if the LMF constraint is met. So (E cooperates, L defect) is a Nash equilibrium subject only to the LMF constraint. We now turn to determine whether the emergence of LFMs are (in)efficient.

The added value $\bar{V}$ per capita in the LMF and KMF can be defined as:

$$\bar{V}^K \equiv \frac{\pi^K - F^K + WL}{(L+1)}$$

$$\bar{V}^L \equiv \frac{\pi^L - F^L}{(L+1)}$$

The efficiency condition for the LMF requires $\bar{V}^L \geq \bar{V}^K$, or in terms of profits of the LMF:

(EC) $\qquad \pi^L \geq \pi^K + (F^L - F^K) + WL$

In other words, the efficiency condition (EC) states that profits of the LMF must at least be as high as the KMF's profits, the difference in start-up costs and the wage bill of the KMF.

Figure 2 graphically presents how the LMF constraint (LMFC), with a slope of $L+1$, and the efficiency condition (EC), with a slope of 1. The shaded area above EC and below LMFC shows possibly efficient LMF exist that nevertheless due to the LMF constraint not being met are not formed. The intersection point $(W - (F^L - F^K), (L + 1)W)$ can be derived by equating the RHS of EC to LMFC. To the left of the vertical line through the intersection point, the LMF constraint is too lax since firms that do not pass EC might still pass the LMF entrepreneurial constraint.

Assuming at least normal profits in KMF, so $\pi^K \geq W + F^K$, the area left of the dashed vertical line can be disregarded. The market failure of the non-emergence of LMF despite being more efficient is represented by the shaded area in between the lines EC and LMFC and the dashed vertical line at $\pi^K = W + F^K$. To give a numerical example, for $W = 10; L = 5; F^K = 10; F^L = 15; \pi^K = 26; \pi^L = 153$, EC is passed with flying colours (or in terms of added value per capita, $\bar{V}^K = 11$ and $\bar{V}^L = 23$), but the LMF constraint is still not met (the payoff for the LMF entrepreneur $\frac{\pi^L}{(L+1)} - F^L = 10.5$, while for the KMF entrepreneur it is $\pi^K - F^K = 16$).
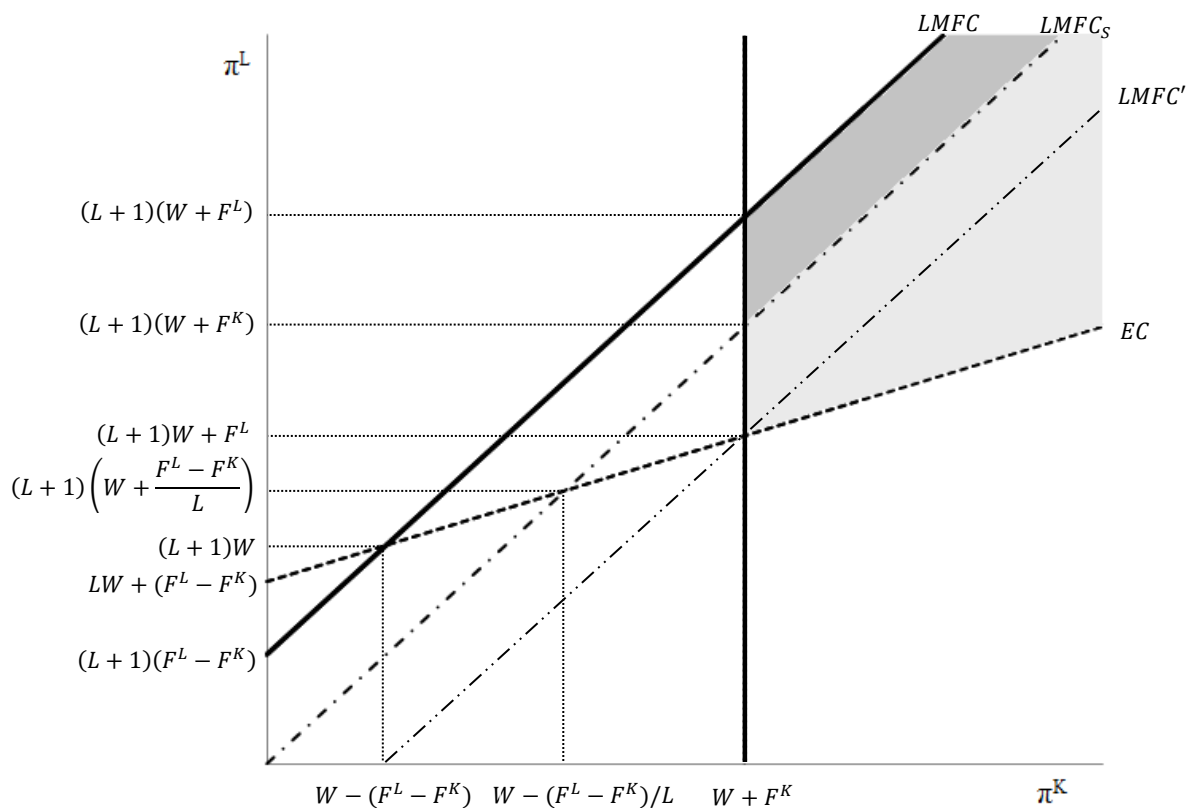

Figure 2. The LMFC and EC

Before we go on to consider the role of start subsidies in alleviating this collective action problem, note that this simple framework can easily accommodate some salient empirical findings concerning LMFs. Firstly, many real world LMFs predominantly emerged from employee buyouts of a KMF in financial dire straits (notable examples include Weirton Steel in the United States and Tower Colliery in Scotland). In terms of LMFC, this causes π^K to be low or even negative. If for simplicity we assume a single time period, π^K also represent the net present value of a KMF. If this term becomes zero, LMFC results in:

$$\frac{\pi^L}{L+1} \geq F^L - F^K$$

In other words, earnings of the entrepreneur in a LMF must now only be high enough to compensate for the extra start-up costs (and of course be higher than W), with F^L the start-up cost to transform the firm into a LMF and F^K the start-up cost of a new KMF. Graphically, the new situation is a point on the y-axis above the point of intersection of LMFC and the y-axis. If the net revenues of the new LMF are insufficient to make up for the difference in start-up cost and to pay members the going 'wage' W, it does not meet the EC condition and bankruptcy is to be preferred.

Secondly, some historical examples of LMFs are shown to be initiated by spiritually inspired entrepreneurs, of which the founder of the Mondragon cooperatives, priest José María Arizmendiarrieta, serves as the paradigmatic example. In terms of our framework, although LMFC is binding in a non-spiritual sense, it may not be relevant for the spiritual leader (to include this effect requires the use of utility functions which take into account warm glow considerations, see e.g. Andreoni 1990. These considerations could be thought to lower the experienced F^L which cause a downward shift of LMFC, increasing the likelihood a LMF is formed.

Finally, conditions are relaxed as soon E is comprised of two or more individuals (so in the cooperative row for E, F^L is shared by the number of E), which is in line with the observation that many LMFs are initiated by a couple or trio as a subset of the new partnership. In terms of LMFC, varying E and assuming the total number remains fixed to $L+1$:

$$(\text{LMFC'}) \qquad \frac{\pi^L}{L+1} - \frac{F^L}{E} \geq \pi^K - F^K \Rightarrow \pi^L \geq (L+1)[\pi^K + (\frac{F^L}{E} - F^K)]$$

Thus the slope of LMFC', the dashed line in Figure 2, is equal to LMFC, but the intercept might become negative (if $F^K > F^L/E$), which increases the probability of the emergence of inefficient LMFs. Intuitively, the cooperating founders are sharing the burden F^L, but the new LMF is not generating enough benefits to pay all members the going wage W and compensate for the higher start-up costs. Interestingly, it is easy to derive the required number for E such that line LMFC' intersects the EC line exactly at the point $(W + F^K, (L + 1)W + F^L)$ by equating the RHS of EC and LMFC', impose $\pi^K = W + F^K$ and solve for E, which gives $E = L+1$. So only when all workers are prepared to shoulder the start-up cost of the LMF, giving rise to the fully cooperative LMF$^+$ in Figure 1, then just at the long run equilibrium where $\pi^K = W + F^K$, the entrepreneurial LMF constraint is not more binding than the efficiency constraint. However, the extensive game form where the entrepreneur is the first mover has shown that to defect is a dominant strategy for L, so the outcome that all prospective members of the LMF will join right from the beginning is highly unlikely. Therefore, we turn to the instrument of start-up subsidies to address the problem of non-emerging LMFs despite being more efficient than KMFs.

START-UP SUBSIDIES

We proceed by considering the role of a start-up subsidy for the LMF. Obviously, granting subsidies without any conditions with respect to real participation in the start-up of the LMF will even strengthen free-riding incentives, because one's share in the subsidy can be cashed in while free-riding. We therefore assume that the subsidy is shared only among those who are involved in setting up the LMF, which may either be only E, or E and L together, again excluding the emergence of LMFs without the involvement of E. As with the start-up cost, the term 'subsidy' has to be interpreted broadly, so not only (over) time being compensated in terms of money, but also the free or subsidized provision of services in the form of expertise, provision of standardized forms to start a LMF, legal help and council, in sum anything that might help or ease the start-up of a LMF.[3] We first analyze the case where the subsidy S is a fixed sum.

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[3] For instance, one can think of that the subsidy is entirely in kind, in which case the Chamber of Commerce for LMFs will take care of the organizational efforts in the start-up phase.

	L	
	C	D
E C	a_1, a_2	b, c
E D	d_1, d_2	e, f

	L	
	C	D
E C	$\dfrac{\pi^L - F^L + S}{L+1}, \dfrac{\pi^L - F^L + S}{L+1}$	$\dfrac{\pi^L}{L+1} - F^L + S, \dfrac{\pi^L}{L+1}$
E D	$\dfrac{\pi^L}{L+1}, \dfrac{\pi^L}{L+1} - \dfrac{(F^L - S)}{L}$	$\pi^K - F^K, W$

Table 3. Payoff matrix with start subsidy *S*.

As Table 3 shows, the subsidy changes the payoffs. The interesting question is to what extent the subsidy relaxes the LMF constraint and how high the subsidy should be (or, if *S* is variable, what form it should take). For notational convenience, we use the subscript *s* in the conditions for the subsidized case. As a reminder, the outcome of the unsubsidized case was that the Nash equilibrium of *L* defect and *E* cooperates obtains if the LMF constraint is met, otherwise the status quo of the KMF is maintained.

To achieve a level playing field, suppose the subsidy is pitched at the difference in start-up cost of a LMF and a KMF, so $S = F^L - F^K$. Using the payoff matrix of Table 3, to defect is still the dominant strategy for *L* (if *E* cooperates, *L* defects because $c < a_2$ and if *E* defects, *L* defects because we ruled out the emergence of a LMF without entrepreneurial input). Again, anticipating defection by *L*, *E* will start the LMF if the subsidized LMF constraint is met:

(LMFC$_S$) $\quad b \geq e: \dfrac{\pi^L}{L+1} - F^L + S \geq \pi^K - F^K \Rightarrow \pi^L \geq (L+1)[\pi^K + (F^L - F^K) - S]$

Substitution of $S = F^L - F^K$ into the RHS gives $\pi^L \geq (L+1)\pi^K$, which compared to the original LMF constraint $\pi^L \geq (L+1)[\pi^K + (F^L - F^K)]$ implies a relaxation on required LMF profits of (*L*+1) times the subsidy *S*. Graphically, the LMFC line shifts down and now runs through the origin, again with a slope of *L*+1. By equating the RHS of $LMFC_s$ and EC, the intersection point occurs for $\pi^K = W + (F^L - F^K)/L$, which is in between $\pi^K = W$ and $\pi^K = W + F^K$. So at the long run equilibrium where $\pi^K = W + F^K$, the subsidized LMF constraint is still more binding than EC. Naturally, an even higher subsidy further relaxes the LMF constraint (shifting it further downwards), but at the same time increases the danger of emergence of inefficient LMFs. This naturally leads to the question what the level of *S* must be, such that the subsidized LMF constraint and EC intersect exactly at the long run

equilibrium where $\pi^K = W + F^K$. Inserting $\pi^K = W + F^K$ into $LMFC_S$ and EC and solving for S gives the firm-size subsidy $S^L = LF^L/(L+1)$, so the larger the LMF firm, the closer the required subsidy is to the full start-up costs F^L. Note that for $S \geq F^L$, the full cooperative LMF^+ (so both E and L cooperate) obtains if EC is met. Intuitively, the subsidy is now so high, and given that the subsidy is targeted to those who join in the start-up stage, also L (because $a_2 \geq c$) wants to join the LMF right from the start-up phase. The disadvantage is the emergence of inefficient LMFs, which is more likely to happen if in the relevant range around $\pi^K = W + F^K$ the $LMFC_S$ line is below the EC line.

Finally, is there a subsidy that incentivize the entrepreneur to start a LMF irrespective if L cooperate or defect when a LMF is at least as efficient as the KMF? This requires devising a subsidy that sets the efficiency condition EC equal to LMFC$_S$:

$$\pi^K + (F^L - F^K) + WL = (L+1)[\pi^K - (F^K - F^L) - S^*]$$

Solving for S^* gives:

$$S^* = \frac{L}{L+1}[\pi^K - W + F^L - F^K]$$

The information required to provide this subsidy is not only the firm size and the start-up costs of a LMF as in the firm-size subsidy S^L above, but also the profits in a KMF, the wages paid in a KMF and the start-up costs of a KMF. Using more information, if available, allows for a more efficient subsidy. Note that in the competitive long run equilibrium, with $\pi^K = W + F^K$, $S^* = S^L$.[4]

As Figure 2 shows, the provision of subsidies helps the formation of LMFs that are more efficient than KMF, e.g. for firms where $\pi^K = W + F^K$ the subsidy eliminates the collective action problem and causes a new LMF to emerge. However, for firms where $\pi^K < W + F^K$ the subsidy can lead to the emergence of inefficient LMFs, that it, where due to the subsidy the LMF constraint is passed, but not the EC constraint. Using our numerical example, for $S^* = S^L = 12.5$ and $W = 10; L = 5; F^K = 10; F^L = 15; \pi^K = 15$, for the range $\pi^L = [45; 75)$, the subsidized LMF constraint $LMFC_S$ is met, but not EC.

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[4] As can be seen from the expression for S^*, even if there is no difference in start-up costs, a subsidy is required to compensate the entrepreneur for any earnings he could make in excess of W.

JUSTIFYING START SUBSIDIES FOR LMFs

If market failures prevail in the KMF and are serious enough, while the LMF has properties that may be conducive to attenuate or solve them, there is an argument for public intervention. We have elaborated on a major problem of LMFs, namely that it is plagued by a collective action problem in the start-up phase, that can be solved by providing a start-up subsidy. As the burden of proof is on the side of LMF proponents, we present a more general argument to support our claim that government intervention, if any, should concentrate towards subsidies to help start up new LMFs. Following Meade (1972), we relate these arguments to the observation that LMFs will respond differently to exogenous (demand) shocks than KMFs.

A major difference between a LMF and a KMF relate to shocks in demand for their output. While higher demand results in expansion of employment in KMFs, it reduces employment in the LMF (the so-called Illyrian firm, that is, the firm which is assumed to maximize income per worker), coupled with higher average earnings (see Meade ibid., 407-8). A KMF located in an industry with increasing demand and so a higher product price will attract more workers at the prevailing wage level W up until the point that the marginal product of labor is again equal to W.[5] A LMF, situated in the same industry, will not have an incentive to expand employment because the rise in the marginal product of labor will be less than the rise in average earnings of its members. This insight is corroborated empirically by studies of Burdín and Dean (2009) and Pencavel (forthcoming). A KMF system can thus rely more on expansion and contraction within existing firms, while a LMF system must rely more on the free entry of new firms. These same mechanisms are at work if competition is monopolistic. Meade (ibid., 411) notes the importance of free entry, arguing that 'in the Co-operative system this situation is ultimately restored only by the free entry of new firms into any industry which has become exceptionally lucrative as a result of a rise in its selling prices. It is thus clear that the competitive pressures of free entry play a much more important role in a Co-operative than they do in an Entrepreneurial system'.

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[5] To give an example, suppose capital costs C are 50, $P = W = 1$, $L = 50$ and $Q = 100$, with $\pi^K = P \cdot Q(L) - WL - C$, maximizing profits requires $MP_L = P \cdot \partial Q / \partial L = W$ so in the initial situation $\partial Q / \partial L = 1$. If P rises to 1.25, then $\partial Q / \partial L$ must go down to 0.8, so L will increase. For the LMF, in the initial situation average earnings are $(PQ - C)/L = 1$ and rises to 1.5 due to the price increase. For the LMF, L will be reduced until the marginal product of labor again equates the higher average earnings.

Second, in a LMF dominated economy Keynesian-inspired measures are ineffective. Demand-driven policies to curb growing unemployment in an economy with many LMFs would require decreasing total demand (see above, when demand increases, the LMF contracts employment and vice versa) or increasing taxes on LMFs to increase fixed overhead costs, which gives LMF an incentive to increase employment. As such policies would be generally undesirable, employment cannot be increased by any other policies but setting up new firms. Meade (1972, 415) here notes unemployment's 'cure must be found in a longer-term structural policy aimed at promoting the institution of new firms by the unemployed in order to help them in their desire to enjoy the average earnings of an employed worker rather than the pittance of unemployment benefit'.

CONCLUSION AND DISCUSSION

While standard neoclassical economic theory assert indifference between capital hiring labor and labor hiring capital, the majority of firms in Western economies are organized along a structure with control and return rights held by equity finance or owners of its physical assets. We show that in an economy characterized by contested exchange, this type of organization faces a number of market failures which firms in which control and return rights reside with labor may be able to overcome. We present a number of standing arguments that explain the absence of LMFs, yet argue that before studying why LMFs may fail in the economy we should ask the question why so few are started to begin with. We follow Schwartz' (2012) argument that the LMF constitutes a public good or club good (if excludable to its members) and faces severe collective action problems in its start-up phase, inhibiting its emergence. By exploring this notion in a game theoretical framework, we are able to explain some salient features of existing LMFs and contribute to understanding of why so few LMFs are started.

Arguing from a market failure perspective, public intervention may be warranted. We argue government intervention should aim at the startup phase of LMFs. Government may either actively subsidize LMF in the form of monetary payments to initiators of these cooperatives, or may seek to lower the nonmonetary entry barriers for LMF firms by providing standardized forms, legal counselling and other in-kind services. We show the importance of free entry of firms in an economy with many LMFs and conclude that subsidies may be able to relax constraints and induce cooperation.

To conclude, one may ask why the start-up of a LMF has to be subsidized, but not a KMF in the same sector. This is indeed a legitimate question and the burden of proof here resides on

the side of proponents of the subsidy. In particular, they have to show that the market failures inherent in some types of KMF and efficiency and other gains of the LMF are such that these subsidies are justified. Meade (1972, 927) claims that 'it may well be the case that the merits of participation should be so highly prized as to make the encouragement of such institutions a major objective of governmental policy'. Furthermore, LMF subsidies may only be warranted in some parts or sectors of the economy. We do expect that even with a full-blown subsidy scheme not all new firms will be LMFs. An innovative entrepreneur with a highly profitable business plan would be wise to start a KMF rather than a LMF, since in the former he or she is the only residual claimant of (monopolistic) profits, while in the latter the value of the innovation has to be shared. For many other business, where normal profits are expected, a LMF above a KMF is to be preferred if the efficiency constraint can be met. We also believe LMFs should be structured along Meade's (1972) Discriminating Labor-Capital Partnerships, but this is beyond the scope of this paper.

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