Utility Maximization Function and Optimum Wage-Investment Split in a Labor Managed Firm

by Aniqa Moinuddin

Under the direction of Steven Schmeiser

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Economics Department

Mount Holyoke College

South Hadley, MA 01075

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INTRODUCTION

This paper presents a theoretical model showing how a labor managed firm (LMF) would determine the optimum trade-off between salary levels and investment decisions with the maximization of total utility of its workers as the objective. This study is based on the premise that labor managed firms have an inherent incentive structure that respects the rights of all individuals who are associated with it and thus contributes to a model for the theory of the firm that is consistent with 21st century moral codes. The dehumanized models of the neo-classical theory of the firm entirely ignore the issues of rights and dignity of people within economic organizations thus legitimizing this practice for real world businesses. In this model, we demonstrate that the LMF derives positive utility from salary rather than regarding this as a cost to be minimized. Economic literature of the LMF has traditionally overlooked the role that wages play and this study attempts to compensate for this discrepancy by demonstrating the importance of wages for understanding the short run behavior of the LMF.

Part I summarizes David Ellerman's explication of the private-property based, worker-controlled Democratic Firm (1992) and outlines the principles we take away from it to apply to our economic model. Part II presents a utility function that incorporates the wage/investment trade-off decision of such a firm in

a single maximization problem that solves for an optimum salary and also demonstrates that the firm has incentive to increase investments rather than salary when the payoff from investments rise. Part III summarizes economic theories of the labor- managed firm developed in the mid twentieth century as well as the theories regarding the impacts of profit sharing and incentive pay developed more recently and how these may relate to this model. Finally Part IV presents a summary of the structure and operations of Mondragon, the closest real world illustration of a labor managed market economy, consisting of 82,000 worker owners with over USD 63 billion in assets in the Basque region in Spain.

CHAPTER 1

PRINCIPLES OF ECONOMIC ORGANIZATION

Ellerman argues that all firms should be organized according to the concept of the "Democratic Firm (1990)" which is constructed upon two main principles: (a) people should appropriate the positive and negative fruits of their labor and (b) people should have the democratic right to self-governance in their workplace.

1.1   Labor's Right to Whole Product

The first principle is derived from the traditional labor theory of property, introduced by John Locke and subsequently developed to its complete essence by Classical Laborists such as Proudhon (1840) and Hodgskin (Ellerman, 1992). The juridical equivalent of this concept states that the consequences of the actions of individuals must be imputed back to the agents who performed the action. Therefore, individuals who are conscious moral agents are the only ones who are responsible for their actions. Labor is the human effort that is employed in production and may be physical, mental or entrepreneurial in nature. When the juridical principle of responsibility is applied to the production process where the distinct inputs identified in economics are labor and capital, it is clear that 'only

labor is responsible'. People associated with an organization may provide labor, capital or both. As per principle (a) it is by virtue of providing labor that one is endowed with the natural right to appropriate any property that is generated from the production process and, by the same token, also shoulder all liabilities that may be incurred. According to Ellerman, it is therefore the whole product as expressed below that should be appropriated by labor. Therefore, a firm that respects this first principle would require that workers be the primary recipients of gains and risk bearers for all activities of the firm.

1.2 Property Rights and Capital Providers

In capitalist firms, capital owners appropriate the whole product as a general rule. The justification for this is that they 'own the firm' and thus everything that the firm produces. However, the firm is less a piece of property and more a 'nexus of contracts' between various groups and individuals (Jensen and Meckling, 1976; Ellerman, 1992). The only part of the firm that can be owned is the stock of capital which does not constitute the whole firm which is fundamentally a holistic association of people defined by the persons who work in it. Shareholders do not have a 'natural property right' *per se* over the new property that is generated by the firm through the production process. Their claim to the whole product is based on the employment contract by signing which workers relinquish their rights to the product of their labor. To the extent that the shareholders' existing claim to residual earnings of the firm is derived from a

contractual arrangement and the workers' claim to residual earnings is derived from a natural right, the latter takes precedence because the natural right of labor to the whole product imposes the obligation on all others, including the shareholders, to grant them this right thereby making the employment contract illegitimate to begin with. What then are the rights of these capital providers? Vanek summarizes this in one of his twelve principles of a labor-managed firm: "While capital, or more precisely the source of financial capital, does not command any right of control, it is entitled to adequate remuneration at a rate reflecting the relative scarcity of that factor in the economy."(1975, pp. 34). Therefore, the economic application would require that external financing for a firm where workers appropriate gains and liabilities be obtained through loans.

1.3   Democratic Self-Governance

The second principle is that of democratic self-governance which requires that people should have the ability to influence the rules and decisions that impact their lives on a regular basis. Ellerman argues that, by the democratic principle of self-governance, workers should elect the governing body of the firm. He identifies the firm as not simply being responsible for the administration of its affairs but also for the governance of those working within it. There are two types of control rights that arise within the corporate structure:(i) Direct control rights, which is the positive right to participate in running the day-to-day affairs of the

firm; and (ii) Indirect control right, which is the 'negative decision constraining right'.

The direct control right, as per the 'democratic principle' of self-governance, must be vested in those who are governed directly by the policies of the firm (i.e. the workers). However, the right to self-determination does not give workers the power to treat affected parties as they please. Therefore, indirect control rights should also be granted to all affected parties including local residents, capital providers and consumers. Ellerman categorizes shareholders as affected parties since the returns earned on their stocks depend on the decisions made by the firm. The inclusion of this consideration in an economic model of a 'self-interested' worker-controlled firm implies that it aims to maximize the gains of all the stakeholders (workers *and* shareholders) that make up the firm.

A Democratic Firm restructures the way rights are granted within a wealth-creating entity. People are granted direct control rights and the right to claim a share of the residual earnings of the firm by virtue of holding the 'functional role' of being a worker in the firm. The workers are therefore both principals and the agents of all activities within the firm. The study of agency costs due to the separation of ownership of shareholders and control by the management in the corporate structure has been a central topic of corporate governance. Given that there is no separation between principal and agent in the labor managed firm, studies on this aspect of corporate governance can yield significant insight in comparing the labor managed firm with the investor

controlled model. While this particular distinction is clear from the onset simply from the manner in which the incentive structures of the two types of firms are designed, key differences in economic behavior may be expected to arise from the role reversal that occurs when one shifts from the investor controlled firm to the capitalist firm. At this point, having the principles as guiding tools, it would be useful to employ the analytical tools of economics to observe how these differences in economic behavior may look like.

CHAPTER 2

MODEL FOR OPTIMUM SALARY-INVESTMENT SPLIT
IN A LABOR MANAGED FIRM

Conversion to a Democratic Firm essentially calls for the reversal of the

hiring relationship in a firm: instead of capital hiring labor, labor hires capital.

The simplest economic model of this firm would require that the utility function

of the firm maximize total utility for all workers. Starting with this premise, we

modify Jean Tirole's (Theory of Corporate Finance, 2006) debt-financing model

for an individual entrepreneur to illustrate the investment decision of a firm that

seeks to maximize the total utility gained by workers from 'salary' (s) i.e. funds

set aside by the firm for payment to existing workers until earnings from

investments are realized. Assuming that there is a tradeoff in utility for a worker

between consuming an additional dollar in salary now and investing it for higher

returns in the future, we set up a workers' utility maximization problem that

solves for the optimum salary. This utility function of the LMF[1] adds to the

existing theory of the labor managed firm by lending an alternate and more

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[1]   The term 'labor-managed firm' specifically refers to the Democratic Firm as
would be modeled with economic tools. David Ellerman does not think that
economics is insufficient to model the Democratic Firm and therefore I use
the term, LMF, that earlier economists like Jaroslov Vanek and J. E. Meade
used to analyze the worker controlled firm. (Ellerman, 2012)

flexible objective function than the net revenue maximization per worker that has been traditionally used (Part III). However, we take care to ensure that the assumptions about the firm's behavior are consistent at all levels with the two overriding principles of the Democratic Firm mentioned in Part I.

2.1 Credit Rationing in Competitive Capital Markets

Any firm, irrespective of whether it is an LMF or a capitalist firm, seeking external debt finance would face similar constraints while seeking external funds in competitive capital markets. Therefore, we use Tirole's investment models as a starting point for conceptualizing what general factors affect a credit constrained firm's ability to obtain financing and then assess how the specific case of the LMF differs from that of the conventional capitalist firm because of the differences in their internal incentive structures.

2.1.1 The Fixed Investment Model

Project: The model assumes that there is one project that the firm/borrower would like to pursue which requires an investment I and the cash in hand of the borrower is A and $A<I$. External financing needs are therefore I-A. The expected return from this project is R, to be shared between the firm and the lender who get R_b and R_l respectively. There are two possible scenarios - one where the project is successful and generates R and one where it fails and generates no return. The probability of success and failure are p and $(1-p)$

respectively. The project is subject to moral hazard and so the borrower gains a private benefit, **B**, from exerting low effort. There are only two levels of effort considered for this problem: high and low. Low effort corresponds to a lower probability of success, p_L while high effort leads to higher probability p_H; $(p_H > p_L)$.

Loan contract: We consider the case of competitive loan markets where lenders don't make a profit from lending. This zero profit constraint for lenders can then be written as:

$p_H R_l = I - A$...(i) where the expected payoff to lenders is equal to the amount lent.

It is assumed that the loan contract induces the borrower to employ high effort. This is achieved when the condition that the payoff from exerting effort is greater than the payoff from not exerting effort is met. This is expressed as follows: $p_L R_b + B < p_H R_b$ ...(ii) so that the summation of the expected payoff from the project assuming low effort and obtaining private benefit is less than the expected payoff from putting high effort for the borrower.

Let the interest be i. The return to lender is then given by: $R_l = (1+i)(I-A)$ ...(iii). Rearranging equation (i), we are able to get the share of R that would meet the zero profit constraint of the lender: $R_l = (I-A)/p_H$ ...(iv)

From (iii) and (iv), we are also able to deduce that i must be greater than 0:1/ $p_H = (1+i)$. Therefore, unless p_H is 1 and there is no risk of the project being unsuccessful, then i represents the default premium and must be greater than 0.

The timings for the different events identified are summarized in the following diagram:

Loan agreement   Investment   Moral Hazard   Outcome

In the absence of moral hazard, the project is viable since it has a positive net present value (NPV) when the borrower behaves: $p_H R - I > 0$. But NPV is negative when low effort is exerted even if private benefit is included: $p_L R - I + B < 0$.

The above relation can be rewritten $as\ [p_L R_l - (I - A)] + [p_l R_l + B - A] < 0$ which illustrates that in case of low effort, which will lead to probability p_L of success, either the lender must lose money in expectation or the borrower would be better off spending the money for personal consumption than by investing it. This implies that no loan that incentivizes the borrower to misbehave will be granted.

Once the financing has been secured, the terms of the contract must safeguard the borrower's stake in the agreement throughout the period of implementation. The return to the borrower must be such that the expected earnings from 'behaving' are greater than the summation of the expected earnings plus the private benefit from 'not behaving'. The incentive compatibility constraint (IC) for the borrower is therefore:

$$p_L\ Rb\ + B > p_H\ Rb$$

From this IC, we can infer that the highest income that can be given to the lender while maintaining the incentives of the borrower is:

$$R - B/\Delta p$$

Therefore, the expected pledgeable income is: $\rho_o = p_H (R - B/\Delta p)$

The lender must at least break even so $\rho_o = p_H (R - B/\Delta p) > I - A$ which is the individual rationality constraint of the lender. From the above, we can rearrange the equation to get: $A > p_H (B/\Delta P - R) + I$. This expression then gives us a minimum level of net worth that must be held by the borrower within the firm in order to obtain the required funding for the project given a level of uncertainty about the success and maintaining the incentives of all parties involved.

At this point, we incorporate a small difference to tailor our assessments to a firm that would eventually be structured as a worker- controlled firm as opposed to an investor controlled firm. The former would set aside a certain amount of 'salary' for the principal for undertaking this venture. If salary is paid out of expected earnings and must be determined beforehand then that expense will come out of the cash in hand of the firm and the above equation would be modified in the following manner: $A - salary\ expenses > p_H \left(\frac{B}{\Delta P} - R\right) +$ I. And the interpretation is therefore that the cash in hand and expected pledgeable income must exceed the total amount invested and the salary amount determined. Therefore, there is tradeoff between higher salaries that can be taken out at

present and the amount of external financing that the firm is able to secure. The exact nature of this tradeoff is developed in the continuous investment model.

Perhaps the most appropriate application of the fixed investment model is the case of a start-up. A single project is deemed as the most appropriate for starting off the venture and the individual or group of individuals would seek financing beyond their existing net worth. They are likely to share equally in the risks and gains of the outcome of the project. At this point, the capitalist start-up does not look very different from the labor-managed start up and it is clear that the same external conditions of competitive markets, exogenously set rate of return R, private benefit B of shirking and the same internal constraints from the tradeoff of utility and effort apply. Once the venture goes past the point of being considered a start-up to a small size business with formal accounting methods and working capital, the impacts of organizing residual rights and the resultant shift in the incentive structure become more apparent in the investment decisions of the firm. Additionally, there are a variety of investment projects with differing rates of returns that may be under consideration. We turn to the continuous investment model to assess the relatively more mature stage in the firm's life in the next section and also treat the firm as a single unit designed to maximize the interests of the principal.

Before turning to that problem, there are two general conclusions from the basic framework at this point. First is that the ability of the borrower to obtain external outside financing depends on the amount of net worth (A) that is

available. The second implication is that with the higher agency cost the amount

that can be obtained decreases (p. 118). The agency cost is given by the

combination of personal benefit B and likelihood ratio $\Delta P / p_H$ for different effort

level. This can also be expressed as p_H / p_L that measures how certain the

borrower can be about the outcome of exerting effort *ex ante* of experiencing the

outcome.

2.1.2   Continuous Investment Model

In Tirole's next model, there is a set of possible investment opportunities

(I) and the returns from investment (*RI*) and the personal benefit (*BI) for exerting*

low effort which are directly proportional to the size of the investment. The

project is once again subject to moral hazard which implies that it has a positive

NPV when the borrower behaves: $p_H RI \geq I$ (expected returns are greater than the

actual level of investment) and a negative NPV when the borrower shirks

$p_L RI + BI < I$ (expected payoff from investment plus the net benefit from

shirking is less than the amount invested). The equilibrium investment is assumed

to be finite by setting the following condition:

$p_H RI < I + p_H B / \Delta p$ which means that the expected net return from

every dollar of investment $(p_H RI - I)$ is greater than the per unit agency cost

$\tau_H B / \Delta p.$

Lender's credit analysis: To induce the lender and borrower to undertake this investment project the individual constraint of the borrower (IC_B) and the individual rationality constraint of the lender (IR_l) must hold:

$IC_B: p_H R_b - p_L R_b \geq BI$: The expected payoff from behaving is greater than the private benefit for shirking

$IR_l: p_H(RI - R_b) \geq I - A$: The expected return of the lender is greater than the initial amount that they invested.

Substituting IC_B into IR_l we get the condition that I≤**k**A. The condition that I≤ kA must be binding since (assuming credit markets are competitive) any social surplus made from the project would go to the borrower so she would want to borrow as high an amount as possible. So we get I = kA, where

k=$1/(1 - p_H \left(R - \frac{B}{\Delta p} \right)$

Given that investments must be finite, $p_H \left(R - \frac{B}{\Delta p} \right) < 1$. The denominator of k is always less than 1 and therefore k>1. This result implies that the borrower can lever her net worth at all times with k being the multiplier. Therefore the borrower can obtain external financing and therefore invest in a project that costs more that her present equity.

The borrower can only attain **k** times the amount of her equity where **k** can also be expressed as function of the per unit payoff that can be pledged to the investor. This pledgeable income can be denoted as $\rho_o = p_H(RI - R_b)$. Conversely, she must borrow d times her wealth where $d = \rho_o /(1 - \rho_o)$ - this is debt

capacity per unit of net worth. The borrower's gross utility can be expressed as:

$U_b^g = vA = \frac{\rho_1 - \rho_0}{1 - \rho_0} A$ where v is the shadow value of every unit of equity and vA is the

total value that the borrower can obtain and $\rho_1 = p_H R$ which is the total expected

return from this investment.

2.2 Salary-Investment Tradeoff in a Labor Managed Firm Faced with Credit Rationing

We have now outlined a complete model that explains why and how credit

rationing occurs in a competitive market and how different factors impact a

borrower's ability to lever her wealth for obtaining external financing in an

environment where there multiple investment opportunities and expected returns.

We have also seen that when the fixed investment model is adapted to the LMF

there is some tradeoff between amount of salary that can be set aside right now

and the amount that can be pledged for the investment into the firm. Now we put

these concepts together to give us the exact tradeoff between the per unit of salary

set aside at present and the expected future return forgone as a result of the

reduction of the size of the investment.

There is a dollar-to-dollar reduction in the amount *I* that is available for

investment as salary amount (*s*) is withdrawn from the net worth as expressed by

the following debt capacity constraint:

$$A - s > p_H \left(B/\Delta P - R \right) + I$$

From the continuous investment model, we know that for every unit of investment the expected pledge-able income is $\rho_o = p_H(RI - R_b)$. With the return per unit of investment set at R, the maximum return that the borrower can take for each unit of investment is: $R - \rho_o$. We denote this term as *g:*

$$g = R - p_H \left(R - \frac{B}{\Delta p} \right)$$

The above expression, therefore, also gives us the loss in future returns if a dollar is taken out as salary at present. For workers to have any inducement whatsoever to invest even a dollar instead of taking it as salary at present, *'g'* must be greater than 1. We now have the pieces required to construct the necessary utility function of the LMF.

2.3   Utility Function of the LMF

The LMF's utility function is considered an aggregate approximation of the preferences of the workers involved in production. It is assumed that the number of workers is fixed from the start to completion of the project and that they are interested in purely financial gains. Therefore, the firm maximizes utility obtained from salary and the expectation of future returns from investments[2]. Net earnings from the firm are a summation of assured salary that is drawn out of the net worth and the future profit share minus the costs incurred in implementing the

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2   Note that workers may have preferences that may deviate from pure financial gains and when they do they must be incorporated in the utility function. The firm adheres to the principles of the democratic firm and the economic equivalent of adhering to democratic principles would be fairly incorporating the preferences of workers into the utility function.

project. All workers share equally in the earnings of the firm. This labor-managed firm takes the place of the borrower in the continuous investment model and has limited cash in hand 'A' to put up for the investment[3]. The design of loan contract induces a high effort of workers[4] and that corresponds to the high probability p_H of success. With this high effort, implicitly determined, there are two possible scenarios if the particular investment I is pursued:

1. The project succeeds and full incomes are realized. Firm earns $g(A - s) = RI - R_l$ in payoff and workers also receive salaries over the timeline of the project. From the above, we get the expression for **g** quoted in the facing page and p_H, the probability of success.

2. The project fails in which case workers only have **s** at the end. (1-pH) is the probability of failure.

Therefore the utility function contains the expectation of future utility from salary and profit in the event that the first scenario is realized and the expected utility from just salary in the event that the 2nd scenario is realized. **Total utility =**

$$p_H[u(g(A - s) + s)] + (1 - p_H)u(s)$$

$$=> p_H[u(g(A - s) + s)] + u(s) - p_H u(s)$$

This expresses the intuition that has been stated regarding the eventual tradeoff in gains between salary now and profit in the future. At this point, it is

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3   In practice, an employee owned firm is in fact represented by a single legal entity known as an employee stock ownership trust (ESOT) are is represented by a trustee who has a fiduciary responsibility of looking after the best interest of the workers).
4   The words 'workers' and 'firm, when it refers to an LMF are used interchangeably in this Part since the firm takes on the collective identity of the workers.

worthwhile to examine the salary component, which appears to be providing both positive utility and negative utility in the above function. In conventional capitalist firms, salaries are treated as a 'cost', which by definition is an element that generates negative utility. Therefore, it is apparent that even the most basic formulation of the utility function of an LMF must treat *s* as a distinct element. Not doing so would obscure a crucial conflict that exists within the LMF and is unique to its incentive structure. This conflict stems directly from the fact that it is the workers who are in control and their preferences are distinct from that of investors since they have immediate needs to be met. In contrast, the typical profit maximization imperative is insufficient for understanding the LMF because the simple groupings of 'cost' and 'revenue' are unable to incorporate a reasonable treatment of 'wage' in the analysis. Furthermore, this element of wage, due to its dual and opposing impact on total utility, has the potential of giving balance to the dynamics of the firm. It eliminates incentives to move towards either of the two extremes of wanting to invest infinitely or to increase present worker salaries to untenable levels.

2.4   Optimum Salary-Investment Split

The conflict identified above in the total utility derived from increasing salary allows us to set up a maximization problem that would solve for an **optimum level of salary**.

$$max_s \quad p_H[u(g(A - S) + S)] + (1 - p_H)u(S)$$

$$= (1-g)p_H u'\big(gA + s(1-g)\big) + (1-p_H)u'(s) = 0$$

This equation solves for the salary at which the workers' marginal 'cost'

from increasing an additional unit of salary $[gp_H u'\left(\square A + s(1-g)\right) + pu'(s)]$

is equal to marginal benefit gained from it $\_p_H u'\big(gA + s(1-g)\big) + s) + u'(s)$[5].

At any point before the optimum, pledging additional units of salary will lead to a

net utility gain, since the utility from taking salary out now is greater than the

utility from expectations of gains from investments. In the diagram below this

point can be conceptualized as s* and the curves represent the marginal benefit

(MB) and marginal cost (MC) of varying levels of salary.

Where:$f(g,s) = (1-g)p_H u'(g(A-s) + s) + (1-p_H)u'(s)$

2.5   Comparative Statics Varying g and p_H

Taking the first order derivative of total utility with respect to *g* tells us

about the change in utility with change in the amount of payoff from investment.

This is positive for all values of *g* producing the intuitive result that total utility

increases with higher values of *g*. However, the change in *s* with respect to *g* is

slightly more ambiguous since d(total utility)/ds can be positive or negative

depending on whether we are operating above or below the optimum salary s*

and therefore ds/dg can switch relationships accordingly (Appendix I). The first

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[5]   First derivative of utility functions are always assumed positive. Our marginal cost is the absolute value of the summation of all the terms where the first derivatives of the utility functions are preceded by a negative sign. While the marginal benefit is the summation of all the terms where the derivative of the utility function would be preceded be a positive in the expression

order derivative of total utility with respect to p_H, is also positive; higher

probability of success of the project leads to a greater utility.

2.6   Individual Worker Utility Function and Risk Aversion

The expression for total utility is also applicable to individual worker

decisions and can derive the optimum split in salary and incentive pay for

individual workers given their degrees of risk aversion. To conceptualize this

idea, it is important that each individual worker's net worth be separable from

everyone else's so that A which, in the previous example is modeled as the firm's

net worth, is replaced by the worker's individual equity A_i and the return R of

the individual is a share of the return based on pre-determined distribution

scheme. For example, in an n-person firm this can be denoted by the fraction

$\frac{x_i}{\sum_{i=1}^{n} x_i}$, where x can be considered as a work share granted to all employees[6].

Therefore, the expected payoff for some worker i, can be given by

$$g_i = \frac{x_i}{\sum_{i=1}^{n} x_i} R(1 - p_{H)}R + \left(R - \frac{B}{\Delta p} \right).$$

Incorporating these changes we get the following workers' utility maximization

problem for some worker i:

$$max_s \quad p_H[u(g_i(A_i - s) + s)] + (1 - p_H)u(s)$$

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[6]   Meade (1972) incorporates the idea of maximizing net revenue based on work-
   shares into the Illyrian Firm to form the Inegalitarian Cooperative discussed
   further in Part III. The concept of 'work shares is derived from there.
   Mondragon's formula, illustrated in page 31 of this paper uses the worker's
   share of the payroll to allot surplus earnings.

The sum of all $(A_i - s)$ in this case would determine the optimum level of investment the firm should pursue given the utility functions of those working in the firm. Depending on whether the worker has a high or low degree of risk aversion, the utility function would vary if we use the constant and absolute risk aversion (CARA) utility function to assess how individuals of different levels of risk aversion choose optimum salary.

Edward Lazear developed a theoretical model that approaches the concept of how optimum compensation schemes can be designed in the event of observable individual outcome within profit maximizing framework in his book 'Personnel Economics for Managers' (1998). The model demonstrates that, given a profit maximizing firm and a utility maximizing risk neutral worker, the level of compensation that would induce the optimum level of worker-effort while simultaneously maximizing firm profit is, in fact, the net revenue of the firm, paid out entirely in the form of piece rate pay (pp 354-358) to workers. The optimum salary amount turns out to be a negative, when agent is considered risk neutral suggesting that it is optimum for the worker to deposit a payment to the firm in exchange for employment. The cab industry and markets for independent franchise operators are cases in point. The cab driver and franchise operator pay a fee to their parent company in exchange for the license to operate their independent businesses although, technically, the latter remains the owner of the business. When the model for piece rate pay is modified to assume that the worker is risk averse, the optimum compensation package changes to a combination of a positive base salary and an output contingent pay but the

components still add up to the net revenue of the firm. The ratio of output contingent pay to base salary is inversely proportional to the magnitude of risk aversion since the more risk-averse a worker is the more he needs the assurance of a higher base salary. However, the model is limited to designing compensation packages for work where individual effort is directly observable and measurable. For instance, for Safelite Glass Corporation, it was relatively easy to switch from a system of fixed salary to an incentive based pay system since the 'output contingent pay' component could be easily computed since it was based simply on the number of windows a worker installed. Following this change in compensation scheme, Safelite experienced a significant increase in profits and worker productivity (Lazear, 2000). These increases in productivity can be explained by the principal-agent theory which states that blue collar workers with no output based pay may have the tendency to shirk leading to inefficiencies within the firm. In a way, output contingent pay makes workers the principal thereby eliminating this problem.

The theoretical frameworks reviewed by Dow assert that there is a tradeoff between incentive and assurance (Holmstrom and Milgrom, 1991, 1994) and ultimately control should best be in the hands of those who are relatively less risk averse or more entrepreneurial minded (Knight, 1921). The LMF utility maximizing function applied to workers can help assess the degree of risk aversion and also the base-to-incentive pay ratio in the case of non-observable effort. Recognizing that there are individuals across the spectrum of risk

neutrality and risk aversion, one can reasonably conclude that individuals are likely to opt for wage schemes that are in accordance to their degree of risk aversion. This would likely automatically put the more entrepreneurial types in leadership positions earning at the higher wage bracket. However, they would also have to bear a relatively higher level of risk within the enterprise since a greater share of their compensation package would come from performance based pay. Nothing about the concept of risk aversion suggests that capital owners should be the ones to provide the insurance to risk-averse workers and therefore the risk-averse nature of workers cannot act as an impediment to making workers the recipients of profits.

2.7   Research and Best Practices on Finance of Cooperatives

Attracting sufficient capital is often one of the biggest challenges faced by purely worker managed firms. Cooperatives which have to ensure the subsistence of workers automatically end up with limited wealth available for investment. Having a low level of equity wealth can also be a hindrance to attracting sufficient levels of debt financing for any borrower in credit markets as suggested by the conclusions from the fixed investment model. Cheddad, Cook and Heckelei (2005) find evidence of this in the agricultural cooperatives the United States where analysis of panel data reveals that "agricultural cooperatives' capital expenditures are significantly affected by the availability of internal funds". Berman and Berman (1989) find evidence that the plywood cooperatives have a lower capital-to-labor ratio that their capitalist competitors.

The sources that are available to LMFs for raising capital are examined below:

- **Membership Deposit**
Most successful cooperatives require that members deposit a minimum amount with the cooperative in order to gain membership. This can usually be earned through working over a probationary period, after which members are entitled to full membership rights. Evergreen Cooperative Laundry, in Cleveland, requires members to 'buy membership' into the firm. Employees buy into the company through payroll deductions of 50 cents an hour over three years (for a total of $3,000). Employee-owners are likely to build up a $65,000 equity stake in the business over eight to nine years--a substantial amount of money in one of the hardest-hit urban neighborhoods in the nation.' (Alperovitz, Williamson, & Howard, 2012). From the Mondragon experience, it can be seen that the costs of membership shares can increase very rapidly over the course of a few years to as much as a year's worth of salary. The metric that annually adjusts the cost of the membership share is elaborated in the 'Finance' section of the following chapter.

- **Equity Finance**
Workers in labor managed firm could sell non-voting shares in an external market to raise external capital. Putterman notes that moral hazard is likely to become a factor as investors will worry that workers will use their decision making abilities in an opportunistic manner as a result of which investors will lose out on the highest possible returns on their shares. However, if workers are able to demonstrate that there is complete convergence in their interests and that of external investors, then they may still be able to attract equity financing (Bonin, Jones and Putterman, 1993).

- **Debt Financing**
This is likely to be the most desirable form of financing for a labor managed firm. This allows them to take out a loan upon an agreement to pay a fixed interest rate on the principal amount and repay in full at some future date. Chris Doucouliagos argues that institutional bias significantly reduces the accessibility of the loan capital markets for cooperatives. This is mostly due to the fact that it is not certain how exactly this form of business organization ensures future success for itself and Pencavel (2001) as quoted by Dow (pp 190) notes that bankers find it difficult to deal with the democratic structure of LMFs particularly while negotiating the terms of the contract.

2.8   Summary

This approach in modelling a labor managed firm using a utility function rather than a profit maximizing constraint is consistent with the economic tools that have become popular in corporate governance and personnel economics and adds a different perspective in studying Meade's Inegalitarian Cooperative (1972). This also enables flexibility in incorporating such constraints as risks, legal and institutional settings and preferences other than those of pure profit maximization and hence adds some realistic nuances to what Vanek himself termed as the 'dehumanized' model of the LMF (1970). Utility functions are commonly applied to the corporate form to model the agency problem that arises due to the divergence of interest between shareholders and managers and to solve for the resulting agency costs and inefficiencies. However, extending these concepts to the labor managed firm would allow the analysis to move beyond issues of internal contracting (between principal and agent within a firm) to understanding interaction of the LMF in external markets. The preference of the principals would directly determine decisions about investments, employment levels, product choice, etc. It must be noted that an LMF is not completely free of agency costs due to conflicts between management/institutional rules and those workers who are in the minority or those with little direct control over decisions. However, as illustrated with the governance structure of Mondragon, the 'agents' with major control represent, through elected authority, all the principals of the firm.

Therefore, there are institutionalized channels whereby all levels of workers are able to hold management accountable and ensure that the preferences of principals are reasonably represented.

CHAPTER 3

EXISTING THEORY OF THE LABOR MANAGED FIRM

In this part we review past economic theory of the labor-managed firm, as constructed by the contributions of Benjamin Ward, Evelyn Domar, Jaroslav Vanek and James E Meade that explain how a reversal in the hiring relationship between labor and capital affect the model of a firm and consequently its behavior.

3.1   The Objective Function

The first economic postulation of the labor managed firm was done by Ward in (1958) when he sketched out the Illyrian firm with the objective function which maximizes net revenue per member in the firm. Workers are assumed to share in earnings equally and provide homogenous labor of equal intensity. In the short-run model, labor (L) adjusts for a fixed amount of capital (K) and in the long run both K and membership is variable. The production function facing this firm is first increasing and then decreasing and the firm operates at a point where marginal product is a downward sloping function for number of members for a fixed capital level and a sufficiently large membership. The objective function for the Illyrian firm therefore is illustrated

by:

$max_N \ Y = (pQ - rK)/N$ where Y is income to be maximized, p is price of

product, Q is quantity sold, r is rent of capital and K is capital stock (Ward, 1958).

This has become the preferred objective function of the LMF for

theoreticians and Vanek used this approach to model individual firms in his

General Theory of the Labor Managed Market Economy (1970). However, he

notes in a different publication (1975) that this is only one of five objective

functions that labor managed firms may choose to pursue. The others that the firm

might want to pursue are(i) purely social objectives instead of personal financial

gains (non-profit organizations), (ii) combination of personal and social objectives

(iii) maximizing employment and (iv) maximization of pure profit or net revenue

after fixed deductions for wages. Objectives (i) and (ii) were ruled out due to the

complexity of modeling social objectives with economic tools, (iii) is seen as

contentious and (iv) will cause the behavior of the labor managed firm to be quite

similar to that of the capitalist firm as modeled in neo classical economics but this

cannot be done unless a full objective process for wage setting is formulated. In a

capitalist economy, wage rates are set in external labor markets since those who

demand labor (the employers) and those who supply labor (the employees) are

distinct parties with opposing relationships between wage and work. The higher

the wage the more workers are available while employers will hire fewer workers.

This tension allows (at least theoretically) for a wage to be determined in the labor

market.   However, in a labor- managed economy where the workers constitute the

firm, there is no such conflicting preference that can determine an equilibrium wage level. This gap however can be filled with our model that outlines an internal wage setting decision for a labor-managed firm.

3.2 Long Run Equilibrium

The common neoclassical assumptions about the conditions under which the firm operates holds if:

1. The firm is a price taker

2. There are no barriers to entry or exit

3. The firm produces a single undifferentiated product

4. Input and capital markets are competitive

An economy created by earning-maximizing labor controlled firms would have the same long term equilibrium solutions for competitive markets and Pareto efficiency. Net revenue per worker, as denoted by Y, is maximized when the value of the marginal product of a member is equal to the income per member. Labor hires capital at competitive market interest rate until the point that marginal value of the product for capital is equal to the interest that is paid. Any disturbance in equilibrium in the long run whereby the price of one of the factors of production increases would cause this net revenue-maximizing firm to demand less of that input causing the marginal product of the input to increase until it was equal to the higher income of the factor. If earnings in a particular industry increase, there would be an incentive to create cooperatives in that

industry and production would shift until average earnings in the industries were equal to the average marginal products. These are essentially the same dynamics that are hypothesized in the neo-classical economic theory of markets. In the theory of how markets work, the firm is treated as a 'black box' (Jensen and Meckling), and so long as it remains an entity seeking to maximize interest in a competitive market the laws of the market should apply in the same way regardless of the internal organization of this box- which is essentially what the hiring relationship affects. While this picture of the market is far removed from reality, it can almost be seen as an 'ideal theoretical economy' and one to be aspired to and a standard against which other economic theories could very well be judged.

3.3 Short Run Adjustment

In the short run, where stock of capital is fixed, if membership adjustment can be done at no cost, the firm will tend to be in equilibrium with respect to membership. However, the nature of this adjustment is seen to be the mirror opposite of the capitalist firm. With an increase in product price (p), the LMF operating on the downward sloping marginal productivity of the labor curve would tend to reduce the size of the workforce (N) and contract production. This is because, when operating at the downward sloping side of the marginal product curve for labor, an increase in price of the product, while raising the incomes for all members would lead to a state where incomes could be further increased if

some workers were fired. Basically, 'the optimum' size of the workforce would shrink. Later, Meade developed the Inegalitarian Cooperative (1972) where the net revenue is maximized per work share and different workers are granted different amounts of work shares so that there is no longer a direct incentive to reduce the number of workers. This provides theoretical support for a backward sloping supply curve for labor in the labor managed firm.

3.4   Competition

One of the many interesting outcomes that arise from a rigorous analysis of the labor managed economy is the fact that, due to the incentive of existing LMFs on the market to sometimes react to higher product prices by reducing output, this excess capacity in the industry can only be met through the entry of new firms (Vanek; as quoted in Meade, 1972). Meade notes that this fares much better for the maintenance of the conditions of the free market which states that there are low or no barriers to entry. However, for the capitalist economy, in the short run, firms always have an incentive to expand production with a rise in product price thus absorbing additional demand in the economy without leaving room for additional players. Our comparative statistics of g with regard to salary for an LMF suggests that the response of a labor managed firm to an expectation of higher returns will not be as uniform as expected from neo classical economics (Appendix I). Depending on what level of salary the firm is operating on, there may or may not be an incentive to continually invest to increase

production.

3.5   Wages in Traditional Theory

Since the firm's net revenue is consumed by workers, traditional theory has failed to give much attention to the manner in which this net revenue is split between an assured wage and a volatile profit share. However, given that workers are generally risk averse agents, there is in fact a difference in the utility obtained for a worker between taking earnings now or taking earnings in the future. Furthermore, the question of how a firm would assure a living wage for the workers is particularly important for any theory of the labor managed firm since the decision to actually set up a firm depends on this. In the capitalist firm, production decisions lie in the hands of those with 'excess means of production' i.e. the capitalists and investors and therefore the subsistence of the principal is not an inherent concern of the firm. However, for the labor managed firm, the earnings from the firm is what the workers would rely on and so for a pragmatic study of the dynamics of this firm, it is crucial to factor wage considerations in decisions. Given that this is a key difference between the capitalist firm and the LMF at the early stages of its genesis, the impact of this difference would only magnify as the two firms evolve and perhaps even explain key differences in economic behavior.

CHAPTER 4

MONDRAGON: PUTTING PRINCIPLES AND PRACTICE TOGETHER

In this part, I summarize the model of the Mondragon Cooperative
Corporation (MCC), which was founded on a multitude of principles, which
dictated the nature of the systems that were to be built to ensure welfare of all
the worker-owners and the sustainability of the operations. I give a brief
overview of the conditions under which Mondragon was created and the
principles that it was institutionally required to adhere to and then proceed to
examine the policies and structures employed in the areas of governance,
finance and compensation to implement these core principles.

4.1   Background of Mondragon

According to its website, MCC is presently the seventh largest Spanish
company in terms of asset turnover and the leading business group in the Basque
region. As of 2010, its employee strength was 83,859 and annual revenue 14,755
million euros. It identifies as a worker cooperative federation comprising of
around 200 cooperatives engaged in a variety of businesses spanning finance,
industry, retail and knowledge. 85% of their employees are worker owners who
had to pay an upfront fee to work in the firm. They are entitled to a share of the

corporate profit, have representation in the governing bodies and are beneficiaries of a social security system through their respective cooperatives. These features are not a result of the company's more recent growth and prosperity but are rooted in the company's founding principles and were developed in the very early years (1956-70) of its life span. The association started with a small technical college (founded by a priest, José María Arizmendiarrieta) where the youth of the town were taught humanism and trained in engineering. Students from this college started the first cooperative enterprise, ULGOR, which produced and marketed paraffin stoves for the locality. As they grew, they organized themselves on the basis of the cooperative principles of Open Admission, Democratic Organization, the Sovereignty of Labor, Instrumental and Subordinate Nature of Capital, Participatory Management, Payment Solidarity, Intercooperation, Social Transformation, Universality and Education. The policies that are summarized in Part I are designed to uphold these principles throughout the life of the cooperatives. Caja Laboral Poplar, a credit union, was subsequently set up under the guidance of the priest and the leadership of a section of the ULGOR management. It was developed as a secondary cooperative to meet financing needs of the cooperatives that had started emerging in the region. CLP was the crux that connected the cooperatives into a single association. To be eligible for financing and related services of CLP, cooperatives were required to adopt the founding principles of ULGOR. Additionally, the governing body of CLP required

representation from each member cooperative. Cooperatives therefore had to sacrifice some autonomy but were able to reap the benefits of cooperation such as sharing of resources, access to finance and adaption to shifting workforce structure. Over time, as the cooperatives became increasingly more advanced, there was greater focus on innovation resulting in the development of specialized cooperatives to facilitate research and innovation not only in the technical fields but also in the fields of management and finance.

An important lesson to be learnt from the Mondragon experience is that the objective of profit maximization need not be overly emphasized (or even explicitly professed) in order to achieve it. Even though there is no overt focus on profit maximization in Mondragon's founding principles, the very nature of the system of participatory management and profit sharing ensures that there is sufficient incentive for workers to put in their best efforts to maximize profits.

4.2   Wage Determination

Thomas and Logan provide a thorough explanation of the method of wage determination used by the organization during 1968 and1982. Around 1950, three guidelines were followed for this purpose:

1. Maintenance of a three-to-one wage differential;

2. Retention of a common average wage level across all associated cooperatives;

3. Ensuring uniformity with wage levels of other (privately owned) enterprises in the region.

The CLP, at that point, was the central body that decided on policies in consultation with representatives of member cooperatives. It constructed an index system which determined the wages of workers in different positions. The index was based on the average wages in capitalist enterprises such as Union Cerrajera and Elma.

Overall, after analyzing the inter-cooperative and intra-cooperative wage differentials of 1976, Thomas and Logan conclude that Mondragon was successful in meeting the 1-3 wage differential requirement. They also note that this was achieved through intense consultations aimed at finding alternative solutions which would be able to cope with the shifting economic climate without compromising the founding principles of the organization (Pg 147). However, at present, competitive pressures have forced MCC to increase the scale for permissible wage differential to 1-8 (MCC Website).

Whyte and Whyte record that originally Mondragon planned on having a compensation policy that merely kept pace with prevailing wage rates but with the passage of time it became clear that such a policy was not sustainable. By 1978, Mondragon had grown to become the most important commercial entity in the Basque region and its business transactions had extended to the international arena. However, their wage policies were causing difficulties in securing credit (the cost of which was rising rapidly), financing inventory and bridging slack periods in seasonal production. ULARCO, the industrial unit, decided to play a more active role in setting compensation. The principles that

were proposed by the leaders of ULARCO to reform pay policies (BBC 1980) were:

1. Economic rationality: Compensation should be performance-based.

2. Autonomy: Mondragon should formulate its own compensation system and sever links with prevailing wage rates.

3. Flexibility: The new pay formula should be flexible enough to adapt to different economic climates.

The proposed formula maintained the link with the consumer price index and factored in the financial health of the cooperatives (as measured by their net cash flows) in determining changes in pay. Real wages would increase in 'good years' and decrease in 'bad years'. The fact that pay could decrease with a decline in profitability was a contentious issue that was heavily debated at various levels of governance. The discussion focused mainly on fixing a 'profitability threshold' below which effecting a decrease in real wages would be justified. The year1977, which experienced a cash flow over sales of 13%, was originally proposed as the baseline year but the governing council rejected this proposal on the grounds that its approach was not 'scientific' but was based rather on 'inference from experience'. Finally, 10% was accepted as the 'profitability threshold' (when pay increase would exactly match CPI) below which pay would decrease.

4.3   Governance System

The main principle that determines the governance structure of MCC and its component cooperatives is the democratic principle of self- governance.

4.3.1 Individual Cooperatives

Spanish law requires a cooperative to be governed by three mandatory organs: a General Assembly, a Supervisory Board and a Watchdog Council. All authority within the cooperative is conferred through the democratic system of 'one member-one vote.' The General Assembly (GE) comprises of all the members of the cooperative. The GE elects the members of the Supervisory Board which then appoints the Chief Executive. It is the prerogative of the CE to choose Division Directors but these choices have to be endorsed by the Supervisory Board. This system ensures that those who are empowered to administer the cooperative are ultimately accountable to all the individual members. The Watchdog Council is also elected directly by the General Assembly and its task is to monitor the overall management of the cooperative and the activities of the Supervisory Board. During meetings, the Watchdog Council also serves as a conduit for disseminating the views and opinions of the general members of the cooperative.

All Mondragon cooperatives not only adhere strictly to these minimum requirements but also have two additional organs - the Social Council and the Management Council. The Social Council is elected by the departments to

represent the interests of the front line workers and to promote communication between management and workers. It has the power to make decisions regarding wage differentials, job evaluations, duty hours, working conditions, administration of social funds, welfare payments, etc.

4.3.2   Mondragon Complex Organization

All Mondragon cooperatives are linked by a common thread – their membership in CLP, the credit union. In order to secure access to financing, the Associated Cooperatives must hold accounts in CLP and sign the Contract of Association confirming their acceptance of the major cooperative principles governing membership, governance, wage determination and surplus distribution. Members are required to deposit a minimum amount with the CLP which is the primary source of the Bank's pool of loanable funds. The General Assembly of CLP is designed to allow broad based membership and discourage oligarchic tendencies that usually tend to develop in financial institutions. Prerequisites to membership in the General Assembly of CLP are: (a) employment in CLP or in one of the Associated Cooperatives or (b) an account with the CLP.

Associated cooperatives are required to make available all financial records to their respective General Assemblies at the end of every year; audits may also be conducted at any time of the year at the request of at least 10% of the members of the cooperative. This ensures that there is no

deviation from the conditions that were laid out in the Charter of Association. The interest rate on loans is set each year by the General Assembly of each cooperative but this cannot exceed the rate set by the Bank of Spain.

Thomas and Logan stress that this association between the credit union and the industrial cooperatives present a unique and effective model in cooperative history and solves one of the major problems of cooperatives -- sourcing sufficient financing to run their enterprises smoothly and profitably. The relationship also ensures a level of 'quality control' in the associated cooperatives since they are required to adhere to some basic principles embodied in the Mondragon philosophy but without sacrificing any great measure of operational autonomy. All cooperatives benefit from mutually shared resources and cross diversification of risk when it comes to financing. Moreover, the diverse broad- based composition of the General Assembly of CLP ensures that their main focus is on leveraging resources and funds to produce the maximum benefits for the individual member cooperatives. This is the ideal form of organization and prioritization for financial institutions as their primary purpose in a market economy is to mediate funds efficiently from high liquidity to low liquidity sectors rather than merely delivering a product or a service. 'Banking' is considered a service, since helping customers and businesses figure out their needs through personalized attention is a productive activity (in the sense that it creates value), but ultimately these are services that stem from the primary

function of collecting deposits and providing credit. Mondragon therefore rightly categorizes their financial sector cooperatives as secondary cooperatives which are considered ancillary units for the industrial cooperatives. This high level of democratic check and balance prevents many of the conflicts that are seen to occur between a trade union and the management in a traditional firm.

A comprehensive job evaluation drive conducted by the ULGOR management in 1978 led to several downgrades triggering one of the biggest strikes in Mondragon's history. Discontented members appealed to the General Assembly and after intense negotiations (interrupted by several walk outs), it was agreed that there would be no change in the way in which jobs were usually evaluated. Despite occasional internal conflicts regarding pay differentials, inter cooperative relations etc., the overall competitiveness, internal structure and general morale of the cooperatives have remained largely unaffected.

4.4   Finance

4.4.1   Member Accounts and Surplus Distribution

At the time of joining, members are required to pay a fee, which is calculated to cover the costs of financing the creation of the new position. 25% of the fee is payable upfront at the time of joining and the rest is paid from monthly earnings over the next two years. In 1958, the total entry fee was twice the

average annual fee and by 1977 this amount was increased to 3.5 times. The

threshold payments are adjusted each year based on the following formula:

$$C_n = C_{(n-1)} \cdot \frac{\left(\frac{Res_{n/}}{Cap_n}\right)}{\left(\frac{Res_{n-1}}{Cap_{n-1}}\right)} \cdot Price_n/Price_n$$

C_n is the new capital contribution and $C_{(n-1)}$ is the contribution for the previous

years; Res_n and Res_{n-1} stand for the collectively owned reserves of the

cooperative in the current and past years and Cap_n and $獲ap_{n-1}$ stand for the

total amount held in individual capital accounts. The adjustment therefore

considers (i) changes in the weight of collectively owned reserves versus

individually owned capital accounts and (ii) changes in the price level during the

current year. Therefore, every incoming member helps maintain the balance

between the two types of funds.

There are a total of three funds that the surplus is divided into-- the social

security fund, the reserve fund and the member capital accounts fund. Ten percent

of the surplus is allocated to the social security fund regardless of the level of

profits earned. The reserve fund which is held collectively within the cooperative

is a form of forced savings to ensure 'job security, financial viability of

enterprises and long term growth and profitability.' 20% to 50% of the surplus

earned in a particular year is allocated to the reserve fund depending on the

profitability of the enterprise during that year. The rest is allotted to individual

member accounts based on the following formula:

$$(1 - \alpha).Y = \alpha.Z = \sum \frac{\sum j(Ej + Ij)}{(E+1)}.\alpha.Z$$

Where

α=alpha coefficient

Y=pure surplus

Z=computable base

E=total payroll costs

I=total interest paid out

j= 1,...., k number of cooperator

As shown, contributions to individual accounts are based on relative earnings of members and their capital contributions. Surplus value in Mondragon is much more unequally distributed than earnings although the mechanism through which this occurs makes the system quite equitable over long periods of time across generations and worker-types. A survey of earnings and capital accounts of a 'typical cooperator' with limited promotion to the ranks of the higher salaried employees with that of a fast rising senior level executive demonstrates that the former still manages to accumulate a level of wealth (through the system of forced savings) that is quite comparable to that of the latter. (Appendix III).

4.4.2 Reserve Fund

The surplus or the net earnings of the firm is divided into three parts -- the Reserve Fund, the Social Security Fund and the Member Capital Accounts.]*

(Repetition?) The relative size of contributions to each of these funds depends on the size of earnings. Member capital accounts are internal accounts of cooperatives. Each member receives a part of the profit based on the ratio of their salary to the total labor cost. Therefore, almost all the surplus value produced flow back to the firm in the form of retained earnings or internal financing capacity. There is a minimum deposit requirement for the internal accounts that workers must respect and in this way the cooperatives are able to ensure financing through both retained earnings and safe internal debts from workers.

4.4.3   Role of CLP

Member cooperatives have to fulfill major structural requirements imposed by CLP in order to avail its financial and economic services. Since the CLP is forbidden by the terms of its charter to engage in business with capitalist firms, its fortunes are inextricably tied to those of the cooperatives – which is to say that it could grow only as long as the cooperatives prospered. Incoming members are required to pay an enrolment fee which is equivalent to a year's salary. As a normal practice, CLP helps incoming workers to finance this initial fee.

Thus, incoming workers pay the initial portion of the enrolment fee upfront and work off the balance through salary deductions. After the fee (or capital contribution) is fully paid off, they earn the right to claim a share of the surplus.

4.5 Member Admission and Response to Business Cycles

Mondragon's resilience in the face of economic adversity is aptly summed up by the following account (Source??) of its performance during and after the recession that hit Spain between 1975 and 1985: "While the Basque region lost well over 100,000 jobs during this period, the Mondragon cooperatives added workers. In part, the cooperatives were able to do this by retraining workers and transferring them from depressed cooperatives to expanding ones. Credit for this is also due to financial and managerial assistance provided by the bank in restructuring troubled cooperatives." This practice of not resorting to layoffs clearly sets Mondragon apart from other business organizations. According to the company website, they have not laid off a single worker in all the years of its existence." (Huet, 2001).

The example of Mondragon demonstrates that principles coupled with carefully designed incentive structures can lead to very sophisticated business structures for labor managed organizations. However, principles are still the guiding tool in the formation and assessment of this structure and it is the broad based control of the workers in the organization that helps maintain accountability and adherence to those initial principles- thus leading to an organization can adapt to various economic climates and also changing cultures.

CONCLUSION

The study of the labor-managed firm, which adheres to the principles of the labor theory of property and self-governance, would be a step in the direction of making economics about people. In mainstream/neoclassical economics basic units of the economy have been capitalist firms and their objective function has been designed to maximize profits. Provided that the perspective of the firm is the only one microeconomics views the world through, wage is widely understood to be a cost. The paradigm consisting of the profit maximizing imperative coupled with the view of wage being a cost, normalizes and sustains the systemic pressure to reduce payment made to people for investing their work, in order to have more left over for people who invest their money. The impact of this is seen today when the most successful businesses end up moving operations overseas where governments do not enforce minimum wage standards or environmental standards, switching to capital intensive methods when profitable, laying off workers at economic downturns etc. Essentially a society that attempts to promote freedom of the non-democratic capitalist firm sets the stage for a systematic conflict of interest: should it support the minimization of costs for the firm or the maximization of the welfare of the people in the workplace?

The study of the Democratic Firm aligns the incentives of the firm with that of the people working in it and is at present particularly useful for understanding the behavior and designing better structures for employee owned firms and cooperatives, particularly in the year 2012 which was declared as the International Year for Cooperatives by the United Nations. However, while economic tools can demonstrate the impacts on firm and individual behavior as a result of structuring rights and contracts in a particular way, it is, alone, incapable of providing justifications for how human organizations *should* be designed. And it is adhering to this sentiment that the justifications of the institutional design for the firm to be modeled and then enforced them as necessary conditions within which various economic rules and forces may act.

> "It's the ownership structures and the employment structures that surround the market that need to be fixed. The market can be tamed, as need be, by people and by the power of the state. Firms themselves are likely to behave more responsibly if they are labor- or worker-owned, for a very simple reason: people are less likely to want to foul their own nests. So there is a certain quantum leap forward socially that we can expect as a function of more democratic ownership structures in the economy."-
> Christopher Mackin, 2012

APPENDIX I

COMPARATIVE STATIC WITH RESPECT TO g

To show that $\dfrac{\partial s}{\partial g} = -\dfrac{\frac{\partial u(g,s)}{\partial g}}{\frac{\partial u(g,s)}{\partial s}} < 0$

$$u(g,s) = p_H[u(g(A-S)+S)] + (1-p_H)u(S)$$

$\dfrac{du(g,s)}{dg} = (A-s)p_H u'(g(A-s)+s) > 0$; Since the first derivative of utility is always assumed to be positive and we know that investment (A-s) is positive

$\dfrac{du(g,s)}{ds} = (1-g)p_H u'(g(A-s)+s) + (1-p_H)u'(s) > 0$; When we are operating beyond s*, optimum salary

$\dfrac{du(g,s)}{ds} = (1-g)p_H u'(g(A-s)+s) + (1-p_H)u'(s) < 0$; When we are operating beyond s*, optimum salary

APPENDIX II

MONDRAGON DATA FOR WEALTH CREATION OF COOPERATORS

Table 7a. *Capital accumulation by the 'typical average' cooperator**

Year	Rank (index)	'Threshold' payments (thousand pesetas)	Revaluations** (thousand pesetas)		Pure surplus** allocations (thousand pesetas)		Capital account (thousand pesetas)	'Yield' on capital account (4)+(5) %	Average yield for 5-year periods from 1958 %
(1)	(2)	(3)	(4)		(5)		(6)	(7)	(8)
1956	1.25	99.0	(0)		0	(0)	99.0	0.0	
1957	1.25	50.0	(0)		0	(0)	149.0	0.0	
1958	1.25		8.2	(5.5)	0	(0)	157.2	5.5	
1959	1.25		5.0	(3.2)	32.0	(20.4)	194.2	23.6	
1960	1.25	2.1	.3	(0)	36.5	(18.8)	233.1	18.8	14.9
1961	1.25	10.0	2.1	(0.9)	30.0	(12.9)	275.2	13.8	
1962	1.25		6.1	(2.2)	28.6	(10.4)	310.0	12.6	
1963	1.25	-14.0	13.8	(4.4)	33.5	(10.8)	343.3	15.2	
1964	1.25		13.0	(3.4)	33.1	(9.7)	389.4	13.1	
1965	1.40		10.3	(2.6)	47.3	(12.2)	447.0	14.8	14.7
1966	1.40	10.0	22.4	(5.0)	53.1	(11.9)	532.5	16.9	
1967	1.50	4.3	9.2	(1.8)	63.0	(11.8)	600.4	13.6	
1968	1.50	2.0	13.3	(2.2)	65.9	(11.0)	681.6	13.2	
1969	1.50		24.9	(3.7)	79.1	(11.6)	785.6	15.3	
1970	1.50		45.5	(5.8)	47.8	(6.1)	878.9	11.9	11.4
1971	1.50		4.3	(.5)	19.4	(2.2)	902.6	2.7	
1972	1.50		47.8	(5.3)	79.1	(8.8)	1029.5	14.1	
1973	1.50		62.7	(6.1)	94.0	(9.1)	1186.5	15.2	
1974	1.50		175.6	(14.8)	71.8	(6.1)	1433.6	20.9	
1975	1.60		161.8	(11.3)	55.7	(3.9)	1651.1	15.2	17.0
1976	1.60		196.5	(11.9)	81.0	(4.9)	1928.6	16.8	

* In this table no reference is made to interest payments (6% per annum) to cooperators (see text for explanation).
** Percentage increase with respect to capital account of previous year is given within parentheses.

Table 7b. *Capital accumulation by the 'above average' cooperator**

Year	Rank (index)	'Threshold' payments (thousand pesetas)	Revaluations** (thousand pesetas)		Pure surplus** allocations (thousand pesetas)		Capital account (thousand pesetas)	'Yield' on capital account (4)+(5) %	Average yield for 5-year periods from 1958 %
(1)	(2)	(3)	(4)		(5)		(6)	(7)	(8)
1956	1.60	82.3	0	(0)	0	(0)	82.3	0	
1957	1.60	16.7	0	(0)	0	(0)	99.0	0	
1958	1.60		9.3	(9.4)	0	(0)	108.3	9.4	
1959	1.70	1.5	3.4	(3.1)	41.7	(38.5)	154.9	41.6	
1960	1.80		.2	(.1)	50.5	(32.6)	205.6	32.7	24.8
1961	2.00	26.3	1.7	(.8)	41.9	(20.4)	275.5	21.2	
1962	2.00		5.4	(2.0)	47.7	(17.3)	328.9	19.3	
1963	2.00	-20.0	13.8	(4.2)	66.7	(20.3)	389.4	24.5	
1964	2.30		13.8	(3.5)	53.4	(13.7)	456.6	17.2	
1965	2.50		11.6	(2.5)	86.0	(18.9)	554.2	21.4	20.0
1966	2.50	40.8	26.3	(4.7)	90.3	(16.3)	711.6	21.0	
1967	2.70	91.0	2.4	(.3)	111.8	(15.7)	916.8	16.0	
1968	2.70	76.4	19.4	(2.1)	115.8	(12.6)	1128.4	14.7	
1969	2.90		40.0	(3.5)	153.8	(13.6)	1322.2	17.1	
1970	2.90		76.6	(5.8)	88.7	(6.7)	1487.5	12.5	12.4
1971	2.90		7.3	(.5)	36.4	(2.4)	1531.2	2.9	
1972	2.90		81.0	(5.3)	145.4	(9.5)	1757.6	14.8	
1973	2.90		107.1	(6.1)	180.7	(10.3)	2045.4	16.4	
1974	2.90		302.8	(14.8)	131.7	(6.4)	2479.9	21.2	
1975	2.90		280.1	(11.3)	106.1	(4.3)	2866.1	15.6	17.9
1976	2.90		341.2	(11.9)	187.8	(6.6)	3395.0	18.5	

* In this table no reference is made to interest payments (6% per annum) to cooperators, which are paid in cash (see text for explanation).
** Percentage increase with respect to capital account of previous year is given within parentheses.
Source: The primary data consist of a record of all amounts entered into the account under a specific heading. Tables 7a and b have been constructed on this base.

Source: *Distribution of Earnings and Surplus,* Thomas and Logan, 1982.

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