čara, polazeći od društvene svojine nasuprot privatnoj i državnoj svojini prihvata tezu o položaju radnika kao kolektivnog preduzetnika. Upoređenja sa ponašanjem kapitalističkog preduzeća, polazeći od tradicionalne mikro-ekonomske teorije, su signifikativna.

Međutim, efektivno ponašanje radnika kao preduzetnika nije bilo dovoljno izučavano uprkos izvesnih radova koje smo naveli. Ovo se posebno odnosi na polemiku o nespremnosti radnika samoupravljača da prihvate rizik kod donošenja odluke. Proitvurečne teoretske postavke zahtevaju šira konkretna izučavanja na terenu.

Problem evaluacije aktivnosti samoupravnog preduzeća nije još uvek jasno i zadovoljavajuće definisan. Analize i upoređenja na bazi hipotetičnih i uprošćenih modela nisu bez interesa, međutim nisu inteleggibilni jer se tiču firme koja ne postoji faktički.

Polazeći od pretpostavke da su indikatori efikasnosti tesno vezani sa valorizacijom resursa, Zakon o udruženom radu, predlaže osam indikatora „rada i rezultata aktivnosti". Međutim, primena četiri od osam indikatora (računatih po radniku), podrazumeva da su oni definisani po uslovnom radniku. Znači, iste vrednosti per capita sa različitim strukturama što se tiče kvalifikacija mogu biti u relaciji sa raznim nivoima ekonomske aktivnosti.

Analiza ekonomske i socijalne efikasnosti samoupravnog preduzeća pordrazumeva uključivanje sledećih dvaju kriterijuma: a) postići organizacionu efikasnost racionalizacije procesa proizvodnje; b) u kojoj meri ono realizuje zadovoljenje socijalnih potreba (ciljeva) sadržanih u samom konceptu samoupravljanja.

Mnogi autori smatraju da je samoupravno preduzeće trenutno najbolja forma proizvodne organizacije s obzirom na stimulanse koje pruža svojim članovima. Po drugima, teško je govoriti o efikasnosti jednog sistema koji pretpostavlja nepostojanje konflikata. Ovo tim pre ako se uzme u obzir raznovrsnost ciljeva ekonomske organizacije, o kojima je bilo reči ranije, kao i mnoštvo subjekata odlučivanja u stvarnosti.

Mogu se konstatovati konflikti između ciljeva društva kao celine i pojedinaca. Ovo vodi ka nizu diferencijacija i to između: a) regiona, b) sektora proizvodnje, c) ekonomskog i takozvanog socijalnog sektora, kao i individualnih diferencijacija.

Nepostojanje izgrađenog mehanizma za rešavanje konflikata, odnosno njihovog prevazilaženja može se uzeti kao ozbiljan nedostatak jugoslovenskog samoupravnog sistema.

QUANTIFICATION OF CAPITAL—LABOUR RELATIONSHIPS

Jose-Luis MONTERO *de* BURGOS*

0. INTRODUCTION

0. 1. Purpose. Under the same heading as that of this paper, I presented a report to the First International Conference on Workers' Economic Management.

In that report, which was 69 pages long, I set out to concisely summarize my Theory of the Firm, how it was worked out, its basic formulae, and its most important possible consequences in micro and macroeconomics. In addition, I included a programme for the Theory to be put to the test and verified in the laboratory.

Bearing in mind, too, that my Theory of the Firm contained several new concepts, it was inevitable that such a condensed summary could not be easily assimilated by readers who were not well up on my previous publications. Therefore, without straying from the conception and development of the original Repont, but heeding the reasonable plea which The Editorial Committee of the Dubrovnik Conference had made to me, I have decided to view all my work from a new perspective which, although it does not present the Theory's rigorous scientific bases and dispenses with many quantitative aspects, does allow the new concepts to be more easily understood exactly as they should be applied at the firm level, nevertheless maintaining the statement of some of its more important practical consequences.

All this, of course, does not prevent an interested reader from taking recourse to the original Repont, which I shall gladly send to anyone who asks for it, as soon as it is published.

0. 2. Motivation. For ten years I have devoted a large part of my intellectual activity to the search for a new model of the firm which, on the one hand, would be worthy of mankind, and on the other, would help to overcome the radical division in the world today. I make this last remark because, at a first and superficial analysis, it can be said that today's world is divided due to the firm: one part of the world accepts the private firm and the other rejects it. One might say that the reasons for this division go deeper. But this statement is an objective fact which may be verified on a map.

*) Madrid, Spain.

Albeit if one pays close and objective attention, one will see that in the domain of the firm there is an unsolved problem which may be expounded as follows:

It is easy to bring about a situation where several workers contribute their labour to a common undertaking, setting themselves up, in this way, as partners.

It is also easy and feasible to bring about a situation where several people who have saved up part of the fruits of their labour, contribute their savings to a common undertaking, setting themselves up, in this way, as partners.

It is not known, however, how to bring about, in a generalized and stable way, situation where some workers (contributors of active labour) might be converted into partners, that is, into men on an equal footing with the savers (contributors of passive labour). Why can *yesterday's labour* not become partners with *tomorrow's labour?* That is the question.

The elementary conclusion to be drawn from this idea is that, in all probability, the present radical division in the world must bear relation to the lack of solution to this problem.

Promted by this consideration, I decided to begin a research project in order to *find the principles which allow the workers and the investors in the firm to be turned into partners.*

0. 3. Methodology. It should be borne in mind that in tackling this problem not only the revision of prevailing concepts about the firm is implied, but also the revision of many related economic concepts, including that of its legal foundations.

In this wide field, in which so much has been said, much of it contradictory, the methodology which should be employed will be that which allows the necessary elements to be chosen from all that material in order, with other new ones which must be found to form a theory which is both coherent and valid, that is, which allows the problems arising from the firm to be solved, namely those of social justice and economic growth.

This methodology is no other than the scientific reasoning which allows a theory to be drawn up, comprising a group of hypotheses selected from among others for their effectiveness, that is, according to their ability to solve the problems at hand without any experimental contradiction. For the purposes of this investigation, it shoud be understood that the Theory of the Firm which I am going to summarize does not take its point of departure from any other conclusion or concept previously communicated by any other thinker or researcher. On the contrary, the investigation was instigated and carried out without accepting any concept in the field of the firm, not even in its basics, without being checked and weeded out in the investigation itself. So, in the Theory of the Firm which I have worked out, material from various authors will be recognizable, which I have no need to indicate seeing as they tend to be common knowledge anyway. But there are also other ideas, of more or less common use, which are false and can only be proved so by rigorous research. In view of the importance of the concept at the very base of the Theory of the Firm, I shall make an exception by quoting Jaroslav Vanek who, in putting power before ownership, goes to the very heart of the matter and provides philosophical material to justify, aside from the investigation, a large part of the formulation of ownership which can be deduced from the reasoning process I have followed.

0. 4. Result of special relevance: „generic ownership". The investigation of the problem of the firm led me to a revision of the concept of ownership. In a similar way, the investigation of the problem of ownership leads one to a revision of the concept of power, which leads in turn to the concept of mankind. By this, I merely mean to say that the investigation of the problem of the firm considerably transcends the firm itself.

I believe that, at the level of this paper, the most important result is to have attained a new formulation of ownership, *what I call generic ownership,* and which I consider to be a conceptual syntheseis of the concepts of *private ownership* and *common ownership,* which is a crystallization, instrumented with the *concept of time,* come to be known as *social ownership,* in my opinion.

Given the purpose of this paper, which is to present clearly and without excessive quantitative accuracy, the solution found to the problem of the firm, I do not think it proper to enlarge upon or to give any superficial analysis of this concept.

But neither do I think it right not to include at least the definition of generic ownership, bearing in mind that, if from private ownership one can logically deduce the existence of the private firm, if from common ownership one can logically deduce the existence of state enterprise, by the same logical reasoning from generic ownership one deduces the model of the firm which I shall sketch out in this paper. Each one of the words which make up the definition has been incorporated, one by one, by a process of trial and control taken to its furthest quantitative consequences, at laboratory level and within my capacity, which, naturally, is limited. Auxiliary collaborations have helped me to widen my field, of research. Among them I must point out that of the Professor of Electronics, D. Luis Montero de Leon, who helped me in the study of the similarity of the laws of the physical world with those which can be deduced from the Theory of the Firm.

So, with the above reservations and specifications, the relationship of ownership, that is, the relationship of mankind with things as objects of appropriation, develops as if it responded to *generic ownership,* which I now define provisionally as:

"Generic ownership is the right of the person, individually or collectively, to decide on things that affect him, to the extent in which they affect him, and to enjoy its fruits or benefits, in the exercise of this right as time goes by."

0. 5. Bibliography. As a precedent for what I call „dialectical investment of ownership", I have to quote Jaroslav Janek in his work „The General Theory of Labour Managed Market Ecyonomies", Connell University Press, 1970.

As regards my own publications, which have been appearing as my work has progressed, I would quote, apart from other minor ones, the following:

.„Propiedad, Capital, Trabajo" (Ownership, Capital, Labour). Edition of the author. Madrid 1971. 229 pages.

.„La empresa, los trabajadores y el derecho de propiedad". (The firm, the workers and the right to ownership). Editorial Albiro. Madrid, 1973. 257 pages.

.„Una nueva empresa para una nueva sociedad" (A new type of firm for a new society). Editorial Fragua. Madrid, 1977. 112 pages.

.„ Ensayo sobre la Teoria de la Empresa Integrada" (Essay on the Theory of the Integrated Firm). Abridged edition of the author. Madrid, 1977. 70 pages.

.„Conferencias sobre Teoria dela Empresa Integrada" (Conferences about the theory of the integrated firm). Five conferences given at a seminary at Madrid Polytechnic University. Edited by: Escuela Técnica Superior de Ingenieros de Montes. Madrid, 1978. Of all these, I would point out particularly the last, since it is an up-to-date summary of the Theory of the Firm.

I would also indicate the first, because it describes in detail the methodology and the whole reasoning process which led me to adopt the four fundamental hypotheses which, together with another 16 complementary hypotheses, make up the Theory of the Integrated Firm. Likewise, the methodology used is summarized in:

.„Diagramas Bioclimaticos (Bioclimatic Diagrams) by Montero de Burgos and Gonzalez Rebollar. Edited by the National Institute for the Conservation of Nature. Madrid, 1973. 379 pages. In this work, a theory is presented about the relationship between climate and vegetation.

1. FIRST PART:

The power, or the right to decide, in the firm.

1. 1. The power of the partner. With the aim of making the purpose of the investigation more easily understood, it seems necessary to give, firstly, a basic description of the essential elements which comprise the character of a partner.

First of all, it should be ralized that partnership is a free act.

Therefore, the power or right to decide about the partnership must spring from the partnership itself. Moreover, it must emanate from the very act of partnership at the beginning which, were it not to have established the distribution of power, would be incomplete since the partnership would be inoperative. By this I mean that the power cannot be generated by something foreign to the act of partnership, as could be a conventional title deed.

On the other hand, the seat of power which it is intended to set up must be such as to allow its free acceptance, not only in specific cases but also in a sufficiently general way.

Also, it must be remembered that the contributions and other circumstances which relate the partner to the partnership are not necessarily the same.

Each partner, according to his circumstances, will be affected differently, with respect to the others, by the partnership. That is, the partners can be unequal when they join the partnership and so should be unequal when the power is distributed. Of course, the rules or norms for the distribution of power must be likewise freely accepted. But with no other conditions, the power thus set up is unstable. He or they with the majority give orders. The minority, under these circumstances, give neither more nor less orders. Simply, they have no say whatsoever.

Man is a free being and, clearly, if the partnership is to be a human act, it must respond to that characteristic. But man must also be responsible, and must accept the consequences of his decisions and participate in the consequences of the exercise of his power. That is, the relationship of the partner requires the existence of a quantitative relationship between the power of each member and the results of the exercise of that power.

In this way, the partner with a majority will share to a large extent in the consequences of his own mistakes and, faced with the possible disagreement of a minority partner on whom he could impose his own opinion but who now makes him responsible for his own loss, has no alternative but, at the next decision, to try and reach an agreement with the minority partner before making the decision.

Therefore, this partner relationship confers on those in the minority a power which apparently they did not have before: it obliges the one with a majority to try and reach an agreement with them, making them of equal standing.

Lastly, I must add that if the power is distributed according to circumstances, there is no reason why the result should be considered permanent and invariable. If one foresees that the circumstances which brought about the distribution of power can change, one must foresee the norms governing successive means of distribution.

1. 2. Risk as a fundamental of power in the firm. To apply generic ownership to the firm, on the one hand, and to try and achieve the character of partner on the other, obliges one to seek the basis of the power of decision.

With what I am about to say I am not attempting to find justifications for the hypothesis of the theory, which is expressed in the title of section 1.2. In accordance with the methodology used, the hypotheses do not justify themselves, but only in terms of problems solved. With these reservation I shall say that any decision, at least at the level of the firm, which is the field of investigation, is an attempt to control the future, which is uncertain. Therefore, in every decision there is the element of risk. Consequently, only these whose future could be affected by that decision have, or should have, the right of decision.

It follows then that, to the extent in which the future of a person may be affected by a decision, to that same extent his power of decision should be reckoned. And this power should be greater, the more possibility there is that the decision might be wrong; that is, the more risk involved.

I mean to say that the degree of being affected or involvement, which is for Vanek the basis of the decision, is merely the foreseeing of a situation which at present is risk.

There are risks which can be calculated directly, according to the probabilities of loss, on a statistical basis. For example, if one knows the number of firms which go under in one sector, the risk coefficient for each sector can be calculated. So the risk of a capital investment can be measured, in principle, by the product of the amount times the risk coefficient corresponding to the firm. Of course, in the lack of a sufficient technical basis, it is always possible to negotiate the coefficient, both in specific cases and at the level of business activity. However, there are other risks (other human values) whose direct assessment is not easy, or suitable methods do not exist for that purpose.

In this case, indirect assessment methods must be used reaching the intended calculation by means of successive approximations through experiment.

That is, faced with the measurement of any value, if it is not possible directly, an initial hypothetical measurement is possible which can be based on considerations of diverse nature. If the trial measurement is correct, its practical consequences, first at laboratory level and later at a general level, must be objectively admissible. If they are not, if the experiment contradicts the hypothetical to some extent, then the trial calculation can be modified, upwards or downwards, so that the practical results might be more admissible every time.

It is from this point of view that the calculation of many of the risks run by members of the firm should be considered, especially those run by the workers which are numerous and difficult to measure.

1.3.1. The Capital risk. If it is intended to be a true partnership, the statutes of the firm should contain a clause which enables the investors to liquidate the firm if a certain degree of loss is made, for example, 20 per cent of the capital investment. In this case, the capital could clearly be separated into two parts, according to the risk of each one, not taking into consideration, for the purposes of this summary, marginal risk zones:

On one side we would have the *capital at risk*, which would be 20 per cent of the example given, and which I call thus because it can be lost.

On the other, there is *secure capital*, which would be the remaining 80 per cent, and which I call thus because measures can be taken to save it.

In principle, the risk for the secure capital can be estimated at nil and so the human value of its contribution *for the purpose of general power* (only for this purpose) would be nil.

Only the contribution of capital when it is at risk has the human value capable of generating decision power, apart from, naturally, the labour risks. Once the firm's risk has been assessed, at the moment of its creation, by means of a coefficient which also indicates the risk for the secure capital, the risk for the contributor of capital and therefore his power can be calculated by the product of the capital at risk times the firm's risk coefficient.

(NOTE: it should be realized that I am making a distinction between the concepts of risk value and risk coefficient, but shortage of space in this paper prevents a theoretical analysis of these two concepts).

I have repeatedly used the expression *human value*, and I think it fitting for me to make it clear that, behind the Theory of the Firm as one of its most important hypotheses, is that which lays down that human value must be the basis of economic value. Therefore, the human value of the risk increases the economic value of a contribution at risk with regard to the secure contributions.

It should be understood that the valoration to which I refer is that corresponding to the act of contribution, at the moment of contribution. If, for example, over a period of time the risk coefficient of the sector in which the firm is included should vary, what will have varied will be the firm's risk and not that of a contribution. The risk of this, made at the moment of contribution, served to evaluate the act itself in a naturally unmodifiable way.

On the other hand, I must make it clear that the relative amount of the capital at risk and the secure capital is in no way arbitrary. As will be seen below, the relationship or quotient between the secure capital and the firm's total capital, which I call *capital security coefficent*, will be able to be determined on an objective basis.

1.3.2. Labour risk. It is clear that if we understand risk as the possibility of loss, if the firm goes under, the investor loses his capital at risk (that is his risk) and the worker loses his job. Of couse, there are lesser risks, due to the firm not developing well and its members not receiving the compensations they had hoped for. On the other hand, the future of the worker is bound up, evidently, with that of the firm and that implies that other human values are involved in the stated risks.

Without prejudice to the fact that an analysis of these values could assist in their calculation indirectly, as a first approximation the problem can be stated in this way:

Clearly, as time passes, the worker gets older, and so the upsets which the failure of the firm could cause him become greater. Therefore, it can be said from this point of view that the worker's risk grows. Despite sufficient social security payments, the worker feels progressively more integrated in his firm and its failure will affect him ever more. On the other hand, how can it be justified that a worker new to the firm has the same decision power as one who has been with the firm for 20 years and knows it well? Independent of the practical results which will be the decisive arguments, for these reasons it can be admitted that the worker's risk grows, and so could be measured by a daily quota evaluated as a cash figure which accumulates with the passage of time, as an expression of the increasing risk. I do not mean that this quota should be paid, but that it should be thus reckoned.

Bearing in mind that the cash figure of the salary must be the expresion of humaman values (training, skill, fatigue, responsibility...) which the worker contributes to the firm, the acceptable thing is that this quota should be fixed as a percentage of the worker's normal salary, for example, 10 per cent of the salary.

Thus established, in the way to be seen below, the risk quota which can be considered as an average for an economic area or for a sector would be affected firstly by the risk coefficient of a specific firm, this

being the coefficient establlished for itis sector. Each working class would modify what could be called »*the firm's average quota*«, according to the difficlty in finding a new job for each specific class, by means of a coefficient which objectively related the number of situations vacant and the number of demands in any type of employment. The problem can be complicated as much as one wants, but I think that, with what I have said, I have provided sufficient material for a satisfactory solution.

1.3.3. Erosion of the risk value. Without going into the method of calculation of that »average risk« for labour, of which I have spoken, it is clear that if the investor's risk is measured by a constant amount and the risk of the worker by a growing amount, the total risk of the members of the firm would be measured by a growing amount, unrelated to the circumstances of the firm.

This consequence leads to a series of absurdities which I shall not list but which make it invalid according to the methodology used. The only hypothesis which does not lead to absurdities is that the total »internal« risk remains constant as long as there are no increases in capital. But this is not feasible unless hypothetically there is an erosion in the risk value over a period of time.

Actually, the Theory of the Firm holds, in a general way, that all the values erode in time according to an exponential curve in this way:

$$V_t = V_0 \cdot e^{-\frac{t}{\tau}} \qquad (1)$$

where V_t is the value in time t with an initial value V_0 ($t = 0$) and t is a »time constant« wich, in turn, is the quotient of two factors, one which retards the phenomenon and the other which accelerates it. e = bais of the neperian logaritms.

$$\text{In the case in question } \tau = C/T \qquad (2)$$

where C is the risk value of the capital at risk (cash figure x risk coefficient) and T is the labour risk for each time unit (cash figure time). For example, T could be the risk quotas in one year. There are several reasons why exponential curves are adopted in the Theory or the Firm, both theoretical and practical, and ever financial. It suffices to say in this paper, as sole argument, that they give good results.

1.3.4. The evolution of risk and power. Under this hypothesis it is deduced that the capital risk, initially, constant, decreases as a consequence of the above-mentioned erosive process, which is not absurd: the investor, in receiving benefits »autoamontizes« or pays off his initial investment. The risk of losing it is therefore ever less. On the other hand, the labour risk grows because of the accumulation and despite the erosive process, which also affects the risk values. Mathematically, the Capital and labour risks would be expressed thus:

$$R_c = C_R \cdot \rho \cdot e^{-\frac{t}{\tau}} \qquad R_T = C_R \cdot \rho (1 - e^{-\frac{t}{\tau}}) \qquad (3)$$

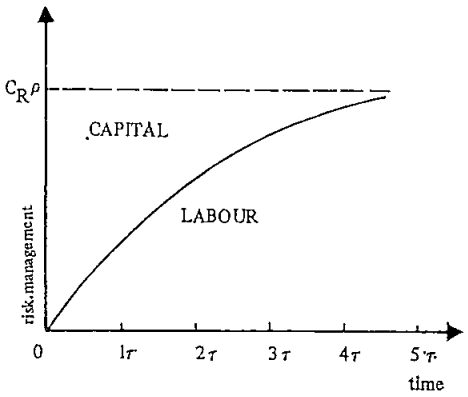
where R_c and R_T are, respectively, the capital and labour risks in time t. C_R is the capital at risk (cash figure) ρ is the firm's risk coefficient (without dimensions) and τ the time constant of the firm (time):

The total »internal« risk would be R:

$$R = R_c + R_T = C_R \cdot \rho \qquad (4)$$

that is, constant, as it should be.

Since it has been established, hypotetically, that risk is the basis of decision power (which I call right to management), it is clear that the



GRAPH n. 1

evolution of this right can be represented in general terms by the same curves as the evolution of risk.

As the sum of the functions (3) is constant, the evolution of both rights to management can be represented as in Graph No. 1. Summing up, the firm tends to be run totally by the workers in time; tends towards making itself self-ssupporting.

Mathematically, the evolution is controlled by T since the other factors of the formulae (3) are known and constant. If the value of T is high, the evolution will be rapid; if it is low, the evolution will be slow. In the first instance, the »autoamontization« of the capital at risk will come about after too long a period of time. The investor would consider this unsatisfactory, and would not invest. In the second, the worker regards self-support as too distant a prospect and would not integrate himself in the firm, would not consider it his.

1.3.5. Calculation of labour risk. What must the value of T be, that is, the labour quota? In principle, it must have an efficient value, that is, it must be satisfactory for both sides.

Without prejudicing control dynamics and other balance dynamics, which will be seen, the problem can be put thus:

Initially, by means of financial studies on a demonstrable basis, some values for T can be determined, which might determine a basis for negotiation. For example, from 8 per cent to 10 per cent of the normal salary worker. (We shall see below how to work out this salary objecti-

wely. It is even possible that in the first investments lower quotas must be used in order to overcome repudiation and suspicion from the initial investors.

As a consequence of this, there would be less integration on the part of the worker. But the first firms would be set up. After a time, the investors would eventually understand the firm's attitude and realize that what is really in their interest is not to achieve one or two per cent less in the risk quota but that the worker should be integrated into the firm, that he should bind his future with that of the firm, and that productivity should increase.

I mean by this that the investor must eventually realize that it is in his interest to attain a true partnership with the worker, that the worker should feel a real partner, and should seek the quota with which he can achieve this most efficiently. And that is exactly the same thing wich should interest the worker.

Consequently, the present attitude of confrontation in the firm would change. Capital and labour would seek the same, which would make it easier to reach an agreement. This balancing tendency, which is, of course, more complicated than shown above, I see very clearly. But, for the purposes of the reader, I shall transform my conviction into a consideration: I understand that, to those hardened to the confrontation between Capital and Labour, it is difficult to accept the possibility of harmonious relations. In fact, with the present way of understanding ownership, that is not possible. Only by changing the meaning of ownership can it be achieved.

1.3.6. Control of the risk quota and the security coefficient. It can be said that the investor's whole risk is influenced by two factors, which depend on their objective calculation: the security coefficient of the capital, which determines the capital at risk, and the labour risk quota, which controls the evolution of the capital risk.

And so, it should be borne in mind that our purpose is to find certain points of contact which turn the members of the firm into partners, that is, into interrelated people related to the society of which they form a part so that what is good for the firm is good for all its members, and vice-versa. Of course, there will always be differences of opinion over decisions to be made, but that is not contradictory to the idea of partnership. However, if faced with decisions that imply risk, as they almost all do, the different options show a correlation with the condition either of investor or worker, then a confrontation of interests arises, and the condition of partner, between investors and workers, has not been established with sufficient efficiency. Considering that, faced with the risk, the investors have to feel equally hit in order to adopt a similar internal attitude, and without going into considerations wich would lengthen this work, I would say that the security coefficient should probably oscillate between 0.7 and 0.8 and the risk quota between 0.08 and 0.10 of the normal salary, understood as initial coordinates to try out.

Keeping a statistical control of the decisions in assemblies of firms and administration boards, the existence of a correlation between decisions and the condition of the firm, of which I have spoken, would suggest two alternatives, schematically:

If this happens in the first stages of the firm, a correction of the risk quota should be especially considered.

If it happens in later stages, the correction of the security coefficient should be especially considered.

Naturally, the type of correction would depend on the type of decisions and their correlation.

Although government intervention might be necessary at the beginning, in the long run the coordinates of the Capital-Labour relations (those above and those which follow) will have to be fixed by a free agreement between worker partnerships and investor partnerships which, with a common technical-statistical basis, will seek more efficient coordinates, that is, the ones for a partner relationship which would be best for both sides.

1.4. The firm's assembly. It is unnecessary to point out that, according to the above, the firm's assembly, as the maximum decision-making body is open to all the firm's members, investors and workers, and distributes power according to the risk (of each member at that moment) which, duly calculated, must be backed up by documents.

In order to apply correctly the Theory of the Firm, it is most important to realize that there must be a sufficient relation between the power structure and the decision to be made. I mean that a specific structure is not valid for all kinds of decisions. This is a complex subject completely outside the bounds of this paper.

As regards the firm's assembly, it should be clear that, with the power structure established according to the firm's risks, in which the risks of its members are bound up, the object of the decision can only be the firm itself, considered as a unit. It can only be that for there to be a relation. Consequently, with this power structure, only decisions relating to the firm can be taken, considered as a unit, such as to determine plans or objectives, appoint a manager, establish the form and make-up of the administration board, approve balance sheets, grant benefits, etc.

To clarify the above, I will add that, for example, to decide the »salary-advanced« which affects the members much differently than the firm's risk, another power structure is needed if the decisions are to be effective and peaceful.

For a better knowledge of the mathematical structure of power, the reader may consult »Modelo de decision mayoritaria en una comunidad cientifica« (Model for majority decision in a scientific community), a Graduation Paper in Mathematical Sciences in the Universidad Complutense de Madrid, written by Javier Montero de Juan and soon to be published.

2. SECOND PART

Ownership as the right to benefit

2.1. The emission of ownership in the form of chrons. I must make

it clear, firstly, that I do not use the word »ownership« in its conventional sense. Quite separate from the power of a title of dominion, and directly bound to man, ownership cannot mean anything but »The right to the fruits or benefits« of something or some undertaking.

In this respect, I must say that the dialectic (reasoning process) of the conventional ownership relationship causes, first of all, ownership (the title) to appear and, as a logical derivation, power. That is what I call in short *ownership-power dialectic*, by which I intend to express a way of understanding ownership which causes ownership to engender power, a dialectic which is applicable both to private and common ownership. Now generic ownership, applied to the firm, develops by an opposed dialectic, the *power-ownership dialectic*, which causes the power or right of decision to appear, and the exercise of this right as a logical derivation of the power, causes ownership to appear by means of a title, which gives the right to the fruits of the undertaking or benefit.

On the other hand, conventional ownership is represented by a title, that is, by a constant surface which the shares or stakes provide. Once the shares are distributed, the object of ownership is conceptually closed to anyone whom the fate of this ownership might affect, such as the workers of the firm. On the other hand, generic ownership ensures that the ownership title (as regards right to benefit) is represented by a surface that is not constant but grows with time. Specifically, the Theory of the Firm instruments generic ownership by the periodic emision of ownership titles in a normally constant number which, being different from the conventional ones, I call *chrons*. These titles are distributed in each assembly of the firm, proportionally to the right to decide, to the right to management or power, which means no more than that *the labour of deciding* holds rewards in the form of titles giving the right to benefit.

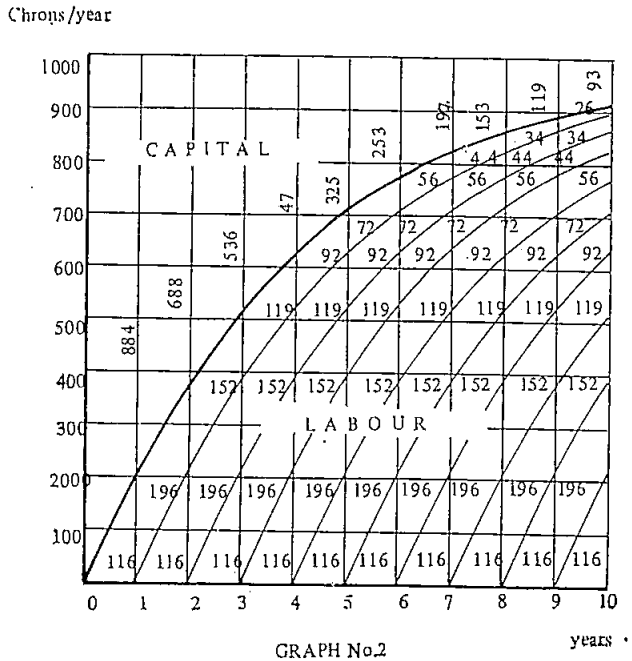
An example of this can be seen in Graph No. 2. Supposing a rhythm of emision of chrons of 1,000 per year, the ownership of the firm would be represented in the first year by 1,000 chrons, in the second by 2,000, in the third by 3,000 and so on. If the assembly is annual, 1,000 chrons will be distributed in each assembly. If, upon this surface the management exponential is drawn so that the total power or right to management of the firm corresponds to 1,000 chrons/year, the ordinate of the curve in the Labour Management and the difference compared to the total management would be the Capital Management.

On the other hand, this same curve separates ownership, or number of chrons which correspond to Capital and to Labour in accordance with the proportionality which there should always be between management and ownership. Likewise, the ownership bands which correspond to each annual Labour Management can be seen.

In consequence, the first of the differential equations of the Capital- Labour relationship can be established:

$$P = \int G.dt\,; \quad or \qquad G = \frac{dP}{dt} \tag{5}$$

in which P is ownership, G is management, t is time.



GRAPH No.2

Power and ownership, management and right to benefit evolve, therefore, at different speeds, which is slower for ownership. With regard to Capital, both rights tend to cancel each other out in relative values. But when power has almost cancelled out, a notable part of ownership still remains in favour of Capital, without power, of course, and with the tendency, in relative terms, to cancel out, too.

In the end, the Capital will have reduced to secure capital, that is, to a kind of permanent credit for the firm with the right to interest whose amount, as will be seen, is mathematically linked to the salary amount and bound up, therefore, with the prosperity of the firm.

2.2. Distribution of benefits. Once a distribution of benefits has been agreed on by the assembly, it should be borne in mind that all the chrons should be paid equally, considering all previous distribution. Therefore, the amount at each distribution should go, firstly, to the chrons which have not earned benefits, until they equal, in money per chron, the payment of the older chrons. If there is any left over, it will be distributed equally among all the chrons.

If this approach to the distribution is examined thoroughly, it will be seen that it provokes a balancing attitude not only between capital and labour but also between capital and labour but also between each of these sectors and the firm itself taken as a unit.

2.3. *Disposing of rights over the firm.* In the Theory of the Firm, there is no sense in talking of the »owner of the firm« nor of the »owner of the capital«. The firm, as a partnership, has no owner, only members who make contributions to the firm and, in return, have certain rights of management and of benefit, not a title deed.

So, in accordance with the principles laid down in the Theory, the members of the firm have absolute liberty in disposing of their rights. Without prejudice to »fair play«, which implies that a firm thus conceived might avoid the workers selling their rights in a firm which is becoming ever more theirs, and that a buying and selling office might be set up so that transactions might be carried out as far as possible, among the workers themselves there is a natural attitude which, coercion apart, will lead the workers to conserve their rights: Looking at Graph No. 2 again, it will be seen how the 116 chrons, which correspond initially to labour, in any year, produce 196 chrons in the next year. That is, by the simple geometry of the ownership emission, the chrons do not erode in the first year but they nearly double from the first year to the next. Out of pure selfishness, the workers will prefer to keep their initial rights, at least for a year. But experience shows (experience guarantees the investigation) that, if the workers keep certain of their firm's shares for a time, even under coercion, they normally hang on to them. Thus, the problem would be solved without coercion.

3. THIRD PART

Auxiliary Concepts

3. *1. Normal Salary.* Briefly and simply, as is fitting in this text, I will describe what I understand by *normal salary.*

In a country, in an economic environment, there exists what is called *national income.* This is understood as the net monetary value of the total stream of goods and services, and can be known fairly accurately. Faced with this income we have, on the one hand, certain investments of capital (at risk and secure) which should be sufficiently paid back if sufficient economic growth is desired. These investments are also calculable. Once we learn by experiment the sufficiently stimulating percentage of payment, we can know the part of the national income which, on average, is to be attributed to capital. The rest of the income corresponds to labour.

On the other hand, faced with this part of the income, we have an investigatable number of working days which can be classified with the aid of quality coefficients (of the worker) which represent the proportion of payment.

Notwithstanding the fact that the most convenient salary range can be found out by experimental means, in this way it can be known, albeit approximately, which part of the national income corresponds to each working day, according to quality, if everything unfolds normally. In other words, what I call the *normal salary* of each worker can be known.

In the same way, the part of the national income which can be attributed to capital would respond to a concept which I *call normal interest* of the capital.

The normal interest can also be determined, as will be seen. What it is important to point out now is the connection between normal salary and normal interest, at firm level, when the firm's net product is distributed. The condition of partner demands this connection and for any variation, up or down, in the salarial sector, there will be a corresponding variation in the same direction in the interest sector.

3.2. *Availability coefficient.* One of the human values to be considered, since it has economical repercussion within the firm, is that of availability. By this I am trying to say that the human value of a contribution is influenced by the time during which that contribution is not used. The greater the unused time, the greater the human value.

Of course, this value can be given to any kind of contribution to the firm, but in principle, it especially applies to contributions of capital which, once made, are normally not utilized, unlike salarial contributions whose corresponding value is normally received in the short term.

From this point of view, the interest on the capital is explained, not because the capital magically grows a little every year, but because, *in the very moment of its contribution,* it has a greater value than its cash figure. This means that, in social liquidations, an apparent increase appears which is merely a consequence of greater contributory value.

As a first approach, the availability coefficient δ can be represented by the formula:

$$\delta = 1 + n \cdot t \tag{6}$$

in which t is the time of salary control (which should coincide with the time taken by the firm to get going) and n is the interest.

The normal interest is determined by means of the curve of income distribution in an economic environment, measured by its standard or typical deviation.

By raising or lowering the normal interest, the deviation of income distribution can be made to increase or decrease respectively. The modification should tend towards achieving an optimal distribution of income, determined by experience, capable of bringing about sufficient social stability and at the same time sufficient economic activity.
The availability coefficient has a more complex formula, but more in agreement with the partner relationship than the previous one:

$$\delta = e^{-\frac{t}{\tau}} \left(1 + n \cdot \tau \left(e^{\frac{t}{\tau}} - 1\right)\right) \tag{7}$$

in which n is the interest, t is the time, and τ is the *time constant* of inflation obtained by mathematically adjusting the inflationary process to an exponential function.

3.3. Salary and interest. The Theory of the Firm sets up a relationship between salary and interest, which I think this paper should show, albeit in schematic form.

Firstly, there is the now-recognized relationship between normal salary and normal interest. Then, there is a salary lower than the normal one, which I call »critical salary«, to which zero interest corresponds. Any salary lower than the critical one does not produce interest on the capital.

According to the Theory of the Firm, the salary received periodically in cash is merely an advance on the definitive value of the salary, which is calculated at the end of so-called »control periods« which more or less coincide with the maturing time of the firm. I call this definitive salary »real salary«, to which an interest corresponds, also definitive, which I call »real interest«. On the »salary in hand« there is »interest in hand«.

Part of the advanced salary (»salary-advance«) can be in cash, as I have said, but the other part can be used to autofinance the firm: that is called »salary-investment«, which can be *at risk or secure*, as with the two classes of capital. Corresponding to these are *interest-advance* and *interest-complement.*

The relationship between salary and interest is established, at a first approach, by a simple proportionality with the corresponding coefficients of availability:

$$\frac{S}{\delta} = \frac{S_n}{\delta_n} \tag{8}$$

where: S_n, δ are the normal values of salary and of the availability coefficient which are obtained with normal interest. S is the salary which is to be correlated with the interest to which the availability coefficient δ corresponds.

More satisfactory results are obtained with the formula:

$$n = N_o s + (s-1)\frac{N_o\tau}{t} L \frac{1}{1-\frac{1}{N_o\tau}} \tag{9}$$

n = interest corresponding to .... s = salary (in normal salary: $s = S/S_n$)
N = normal interest (in so much per one, both); t = control time
L = neperian logarithm τ = time constant of inflation.

3. 4. Necessity coefficient. By necessity value I try to express the human value of a contribution which implies the renunciation of the satisfaction of some necessity of greater or lesser proportions. If one considers, for example, the coins which make up the salary, one can easily understand that, as that salary successively contributes coins to the firm, for each coin contributed until the last coins are reached for which a maximum necessity (or appetite) is felt: they represent basic necessities, maintenance, housing, etc ...

Likewise, the necessity increases above the normal.

The Theory establishes (hypothetically, of course) that the necessity coefficient marginal to the normal salary is the same for all the normal salaries. That is, it is supposed that all the workers feel the same necessity as regards their own normal salary. This hypothesis has the advantage, at least, of greatly facilitating the mathematical treatment of the problem. On the other hand, any error which might be contained in this hypothesis has no great importance in practice.

Every contribution to the firm must be multiplied by its corresponding necessity coefficient: in the case of contributions of capital, of salary-investment, or of salary-complement.

As the necessity unit is taken the necessity coefficient of the capital which, therefore, from this point of view, is contributed for its own value.

This necessity coefficient σ has roughly the formula:

$$\sigma = 1 + \alpha(1 + th\beta(1 - s)) \tag{10}$$

where: s = salary (in normal salary, S/S_n); $\alpha + 1 = \sigma_n$ = necessity coefficient marginal to the normal salary ($s = 1$); σ_o = necessity coefficient for $s = 0$; th = hyperbolic tangent; $th\beta = \dfrac{\sigma_o - \sigma_n}{\sigma_n - 1}$

The value of σ_n is determined in a way that exaggerates a contribution marginal to the normal salary to something like the equivalent of a credit for the firm. In this way, the investors will prefer to finance the firm with an external credit instead of autofinancing it with salary margins lower than the normal. That is, the investors, will have a tendency to pay the normal salary as a minimum, which is in line with the aspirations of the workers.

The value of β is regulated according to how convenient it is that firms should be autofinanced, so that saving is facilitated or spending stimulated, according to the economic situation.

4. FOURTH PART

Calculating the value of the salary

4. 1. Increases in capital. Every increase in capital means a simultaneous increase in management, proportional to the capital increased and relative to the management afforded to the original capital. Normally, the time constant of the firm changes. On the other hand, continual investments of salary and interest (salary-investment, salary-

complement and parallel interest) bring about continual increases in management according to whether the investment is secure or at risk. Therefore, every investment, apart from increasing management, produces an increase in the rhythm of emission of ownership of chrons.

4. 2. Summary of contributions to the firm. In accordance with the above, contributions to the firm can be represented schematically in this way:

Of course, the concept of Capital includes contributions from the workers of this nature, and under the concept of Labour, the contributions of the executive, as worker.

Bearing in mind that the growth of the firm, albeit originated by Labour, should be distributed harmoniously among all the partners or members of the firm, the following general norms applying:

.To a normal salary, a normal interest corresponds.

.To any variation there should correspond, upwards or downwards, a similar variation in the interest.

.Between the sector *benefit* and the sector *interest* there should be the same relationship as between *risk* and *security*. Therefore, benefit will be expressed by multiplying the interest by the risk coefficient.

Summing up, what I am trying to say is that, with this hypothesis, the value of labour can be calculated objectively, that is, »its worth against salary« can be known, the amount of which compared with the normal salary will indicate the firm's prosperity.

4. 3. Fundamentals for calculating the salary value. The aim of this paper is only to give an idea of how income can be distributed at the firm level.

The mathematical equation which expresses this distribution is of utmost importance and must be solved by seccessive approximations. I shall explain it in this way.

To start out, one must know, on the one hand, the ownership at risk (that due to the initial investment and that due to increases in capital) and on the other, the economic growth of the firm since the last check, in which growth includes the amount of salaries and advanced interest. For the purposes of calculation, an ownership is given to the secure capital and governed by the risk coefficient for the same period of time. The calculation is begun by supposing an arbitrary value for the salary to which according to known law, a determined interest corresponds. Of course, this salary should be understood as the firm's average salary.

The difference between the salary thus provisionally established and the advanced salary implies a salary-complement which, during the check period, remains in the firm. This salary-complement and its corresponding interest-complement have constituted an investment and should have given rise to a secure ownership, of a provisional nature, except for closing the calculation.

On the other hand, the difference between the firm's growth and the total amount of salaries, calculated with the trial salary, must be distributed among all the ownership among all the chrons, in the check period.

With the allowance given to the secure ownership in this way the annual interest which thus corresponds to the secure capital can be calculated. If this interest matches the trial salary, then that salary is the correct one. If it is not, then the trial salary is suitably modified (which will also modify the provisional secure ownership) and the desired approximation is obtained.

I have programmed all these operations in the language of the calculator VICTOR — 4,900. The complete programme and some examples taken from the calculator appear in the original report.

I shall send the complete programme to anyone who requests it, including the recording which takes up three magnetic cards.

That enables the Theory to be put to the test, by laboratory tests, without having to make a thorough study of it.

5. FIFTH PART

Repercussions outside the firm

5. 1. Macroeconomic control. The firm, thus conceived, inconporates a series of coefficients which can be modified at government or trade union level so that, once a coefficient is modified, the reply of all the firms in the area about the distribution of their income is foreseeable. So, an economy of integrated firms would have certain control coordinates which conventional economies do not have.

5. 2. Control of capital accumulation. It is important to bear in mind that the rights of the investors in the integrated firm cannot be expressed in the same way as conventional ownership of the firm, but as certain rights (of management and of interest) which are measured as money and so erode together with that money because of inflation. Consequently, by controlling inflation (which in an economy thus conceived will be possible) the accumulation of wealth will go no further than the society considers convenient.

On the other hand, the power of inheritance will be broken, which is the truly bad thing about inheritance. Normally, power will have passed to the workers and the inheritance, insofar as it concerns the firm, will be reduced practically to secure capital whose contribution, as we have already seen, does not give any power.

5. 3. General. The exponential curves, as I have shown them, produce an evolution which may be judged as too „rigid" at times. In order to make the evolution „more flexible" and even to stimulate business activity, directing it towards those sectors which society wishes, the evolution can be controlled by the following differential equation — the second of the Capital-Labour relationships which, together with N_o. (5), are similar to those which govern many physical phenomena, among them, electromagnetic phenomena:

G_o = initial management, constant.
C = value of capital at risk
T = labour risk quota

$$G_a = C.F + T\int F.dt + E\frac{dF}{dt} \quad (11)$$

E = stimulus to the capital;
t = time
F = business potential, equivalent to the voltage in a RCL parallel circuit, in which the intensities equal the managements.
(there is one condition of stability)

KVANTIFICIRANJE ODNOSA KAPITAL-RAD

Jose-Luis MONTERO DE BURGOS

Rezime

Autor traga za vladajućim zakonima u odnosima kapital-rad. Ovi odnosi bi mogli biti harmonični i stabilni, ukoliko bi među svim pojedincima u okviru preduzeća (investitorima i radnicima) ostvarilo partnerstvo.

Autor je izvršio selekciju dostupnog ideološkog materijala koje je često veoma kontradiktoran, kao i niza koncepcija, da bi se na taj način uz dodavanje novih koncepata mogla formirati valjana teorija o preduzeću, tj. takva da može biti od pomoći prilikom rešavanja simultanih problema socijalne pravde i ekonomskog rasta. On, pri tome, formuliše svojinu kao generičku svojinu, čija je najvažnija karakteristika moć, odnosno, pravo odlučivanja kao osnovno pravo, koje nije usko povezano sa konvencionalnom titulom prava, nego sa rizikom (u najširem smislu) koji svaki pojedinac preuzima na sebe prilikom donošenja odluka.

Što se tiče kapitala koji je podeljen na dva dela u skladu sa mogućim rizikom (kapital sa rizikom i zajemčeni kapital) samo mogućnost naknade za rizik može ulagačima pružiti osnovu za odlučivanje. To je izračunato na osnovu proizvoda stvorenog na bazi kapitala u riskantnim uslovima, pomoću koeficijenta rizika. Tako dolazimo do konstantne vrednosti.

S druge strane, uzeti su u obzir rizici koje snosi rad, od kojih je jedan mogućnost gubitka zaposlenja. Ti rizici su proračunati preko dnevnih kvota koje se logično akumuliraju iz čega rezultira moć povećavanja vrednosti.

Interakcija obeju snaga, jedne koja je konstantna i druge koja se povećava, dovodi do transfera moći u korist radnika unutar preduzeća, i to bez ikakvih ograničenja.

Kvota rizika prilikom rada je određena tako da zadovolji i ulagače (investitore) i radnike. Ona je istovremeno pod objektivnom kontrolom.

Svojina shvaćena kao pravo na korist predstavljena je tzv. hronovima koji se emituju u ritmu koji je u principu konstantan i koji se

distribuiraju u svakoj grupi, proporcionalno pravu na upravljanje ili snazi svakog pojedinca.

Između ekonomske moći, svojine, kamate i nadnica postoje kvantitativne relacije koje su kontrolisane i objektivno koordinirane, i koje omogućuju da se uspostave odgovarajući stabilni odnosi između investitora i radnika.

Preduzeće na ovaj način, nastoji da tokom vremena postane samofinansirajuće i da svoj kapital pretvori u neku vrstu permanentnog kredita za sopstvene potrebe sa sopstvenom kamatom, što je matematički povezano sa iznosom plata, a odatle usko povezano i sa prosperitetom firme.

Nikakav stav se ne može izvesti iz proučavanja ovakvog tipa preduzeća (plata, kamata, dobit), a da se svakom sektoru (kapital, rad) ne dodeli odgovarajuća uloga. Ono što je dobro za preduzeće biće dobro i za sve pojedine unutar njega (ulagače i radnike), i obrnuto, ono što nije dobro za firmu neće biti dobro ni za koga unutar nje.

Ovakva koncepcija preduzeća omogućuje da vrednost plata bude objektivno izračunata i obezbeđuje postojanje privrede sa različitim ekonomskim instrumentima za kontrolu na makroekonomskom planu.

Na isti način izbegnuta je i koncentracija ekonomske moći na jednom mestu i omogućena je efikasna kontrola akumulacije kapitala.