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# Flexible Technology, Unemployment and Effort: The Role of the Organization of the Firm

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# Flexible Technology, Unemployment and Effort: The Role of the Organization of the Firm

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# Preface

This new research project at IIASA is concerned with modeling technological and organisational change; the broader economic developments that are associated with technological change, both as cause and effect; the processes by which economic agents — first of all, business firms — acquire and develop the capabilities to generate, imitate and adopt technological and organisational innovations; and the aggregate dynamics — at the levels of single industries and whole economies — engendered by the interactions among agents which are heterogeneous in their innovative abilities, behavioural rules and expectations. The central purpose is to develop stronger theory and better modeling techniques. However, the basic philosophy is that such theoretical and modeling work is most fruitful when attention is paid to the known empirical details of the phenomena the work aims to address: therefore, a considerable effort is put into a better understanding of the 'stylized facts' concerning corporate organisation routines and strategy; industrial evolution and the 'demography' of firms; patterns of macroeconomic growth and trade.

From a modeling perspective, over the last decade considerable progress has been made on various techniques of dynamic modeling. Some of this work has employed ordinary differential and difference equations, and some of it stochastic equations. A number of efforts have taken advantage of the growing power of simulation techniques. Others have employed more traditional mathematics. As a result of this theoretical work, the toolkit for modeling technological and economic dynamics is significantly richer than it was a decade ago.

During the same period, there have been major advances in the empirical understanding. There are now many more detailed technological histories available. Much more is known about the similarities and differencers of technical advance in different fields and industries and there is some understanding of the key variables that lie behind those differences. A number of studies have provided rich information about how industry structure co-evolves with technology. In addition to empirical work at the technology or sector level, the last decade has also seen a great deal of empirical research on productivity growth and measured technical advance at the level of whole economies. A considerable body of empirical research now exists on the facts that seem associated with different rates of productivity growth across the range of nations, with the dynamics of convergence and divergence in the levels and rates of growth of income in different countries, with the diverse national institutional arrangements in which technological change is embedded.

As a result of this recent empirical work, the questions that successful theory and useful modeling techniques ought to address now are much more clearly defined. The theoretical work described above often has been undertaken in appreciation of certain

stylized facts that needed to be explained. The list of these `facts' is indeed very long, ranging from the microeconomic evidence concerning for example dynamic increasing returns in learning activities or the persistence of particular sets of problem-solving routines within business firms; the industry-level evidence on entry, exit and size-distributions -- approximately log-normal; all the way to the evidence regarding the time-series properties of major economic aggregates. However, the connection between the theoretical work and the empirical phenomena has so far not been very close. The philosophy of this project is that the chances of developing powerful new theory and useful new analytical techniques can be greatly enhanced by performing the work in an environment where scholars who understand the empirical phenomena provide questions and challenges for the theorists and their work.

In particular, the project is meant to pursue an ‘evolutionary’ interpretation of technological and economic dynamics modeling, first, the processes by which individual agents and organisations learn, search, adapt; second, the economic analogues of ‘natural selection’ by which interactive environments — often markets — winnow out a population whose members have different attributes and behavioural traits; and, third, the collective emergence of statistical patterns, regularities and higher-level structures as the aggregate outcomes of the two former processes.

Together with a group of researchers located permanently at IIASA, the project coordinates multiple research efforts undertaken in several institutions around the world, organises workshops and provides a venue of scientific discussion among scholars working on evolutionary modeling, computer simulation and non-linear dynamical systems. The research will focus upon the following three major areas:

1. Learning Processes and Organisational Competence.

2. Technological and Industrial Dynamics

3. Innovation, Competition and Macrodynamics

# Table of Contents

# *Flexible Technology, Unemployment And Effort: The Role Of The Organization Of The FIRM*

Donatella Gatti

## Introduction

In the current economic debate, two major empirical issues are related to the impressive gap between Japan and US performances as far as productivity and employment are concerned.

Recent economic analysis has focused on differences concerning firms organization as a possible explanation for the former phenomenon (Accornero, 1990; Aoki, 1986, 1990, 1994b; Greenan-Guellec, 1994; Lazonic-West, 1995; Lorenz, 1992). In this perspective, the different (possibly opposite) nature of the prevailing model of firms organization in Japan and US could explain the greater efficiency of Japanese vs. American firms in dealing with increasing uncertainty and/or product diversification.

In the present work, I will propose a framework of analysis where both the issues of firms performance and of the aggregate employment outcome can be addressed. This allows us to clarify the existing link between the prevailing model of firms organization and the unemployment rate. To do this, it is necessary to define a wider notion of firms organization which must encompass both the aspects of work organization and knowledge distribution.

Though case studies and more empirical works underline the tight link between work organization and knowledge distribution inside the firm (Accornero, 1990; Lazonic-West, 1995; Lorenz, 1992; Marsden, 1996; but also Aoki, 1994b), most models only take into account knowledge formation and distribution, thus neglecting the role of work organization in the shaping of a firm's organizational structure (Aoki, 1986, 1990; Greenan-Guellec, 1994).

I will thus propose the notion of "mode of organization" (MoO) as a starting point of the analysis. A MoO consists of the whole set of procedures that a firm develops and uses in order to manage and control internal resources, and of the specific way all these devices and routines are made coherent. These procedures concern namely:

1. the necessity to control work intensity in order to obtain a satisfactory level of effort;
2. the necessity of managing information and communication flows inside the firm;
3. the necessity of determining the nature of competencies inside the firm.

In what follows, I will show that the notion of MoO can give an answer to the three issues stated above, appropriately combining the model of work organization and the form of knowledge distribution. This also allows me to distinguish through different (or even opposite) models of organization of the firm.

The plurality of the conceivable models also raises the question of the relative efficiency of those models in relation to different external conditions. The perspective taken up here focuses on the consequences in terms of the unemployment/wage relationship in order to compare the different MoOs. Following an approach proposed by the radical American economists (Bowles, 1985), the unemployment/wage relationship is derived through the definition of an optimal incentive scheme (that I will call a "system of control"), given the shape of the MoO of the firm. The definition of a "system of control" allows us to resolve the two related trade-off in the firm's incentives choice: the former opposing discipline vs. positive incentives, and the latter between internal and external discipline. This leads to the definition of an optimal unemployment/wage relationship which turns out to be specific to the nature of the MoO of the firm.

In a second part of the paper, I will focus on issues related to the effects of flexible technologies' implementation. In fact, as it is frequently stressed in the empirical literature, a crucial gap between Japan and US firms concerns the capacity of mastering new flexible technologies which are now arising as the best way to improve productivity and quality (Accornero, 1990; Lazonic-West, 1995; Lorenz, 1992). Therefore, contrary to other models (Aoki, 1986; Greenan-Guellec, 1994), my focus will not be on modifications of the relative MoO efficiency caused by rising uncertainty and/or product diversification, but rather on the conditions under which the matching between firm organization and production technology is actually realized: product diversification and uncertainty matter as far as they lead to the implementation of new technologies needed to master them.

This approach consents two important achievements. Since it integrates knowledge distribution and work organization it allows the analysis, in single framework, of both the issues of firms' performance and employment decisions. In fact, given their MoO, firms' choices upon production and wages provoke major consequences on their performance as well as on the global unemployment rate. In particular, we will try to explain the existing unemployment differential between Japan and the US on the basis of the opposite nature of their prevailing MoO.

This approach also permits to widen the scope of the opposition between Japan and US performances to a larger set of countries. In fact, by distinguishing on the basis of the nature of both work organization *and* knowledge distribution, it will be possible to identify three distinct models of organization of the firm, respectively characterized by a decentralized, centralized or mixed MoO.

The paper proceeds as follows: first I present a framework of analysis based upon the notion of "mode of organization". Then, I model the choice of the firm concerning its system of control upon effort, where a central role is played by the nature and shape of the prevailing MoO. In this part, I will show how differences in the MoO actually influence a firm's choice of wage and effort and how this affects the aggregate unemployment rate. Afterwards, I focus more directly on the determination of the equilibrium unemployment rate associated to a given MoO (either centralized or

decentralized). In a final section, the comparative efficiency of the firm's reaction to the implementation of "new production technologies" is studied. Some consequences of the implementation of new production technologies on unemployment rates are also explored.

## The «mode of organization» of the firm: a theoretical assessment

The role of organizational factors as important determinants of the "success" of firms strategies is a key-issue raised by the growing available literature on the comparative analysis of different productive systems ([1]). At the same time, international comparisons have shown a surprisingly strong persistence of varied national solutions to organizational questions. This points to a "special nature" of the organizational structure as compared to other features of the firm. This is the perspective that I will take up in this paper.

In order to apprehend this special nature of the organizational structure of the firm, the notion of "mode of organization" (MoO) is introduced. This notion has to be interpreted in the light of the recent developments of the economic analysis of institutional settings, either in a "conventionaliste" perspective ([2]) or in a more standard view (Pagano, 1993). It will allow me to capture an aspect: the persistence that characterizes structural factors, and to place them between the institutional features shaping a given economic system. In what follows, I will just take up this assumption without developing a formal explanation of the causes of the emergence of a given institutional framework ([3]).

The existence (and persistence) of different MoO enables us to distinguish the evolution of the firm behavior in different countries and/or epochs. It is possible to identify some important links between the organizational structure, the production form and the nature of employment and growth regimes (Boyer-Coriat, 1986; Bowles-Boyer, 1988; Greenan-Guellec, 1994). Consequently, taking into account firm diversity in the field of organizational structure could help explain some major differences in growth and employment performances throughout developed economies; and could lead to a deeper comprehension of the modifications observed in the dynamics and level of employment and growth since the second world war (Seidmann, 1995).

As we have seen, the definition of a given MoO should provide an answer to the three following issues:

1. the necessity to control work intensity and to obtain a satisfactory level of effort;

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[1] For a theoretical assessment of this problem, see: Coriat-Dosi, 1995; Everaere, 1995; Jones, 1990; Lazonic-West, 1995; Lorenz, 1992.; Marsden, 1996. For more analytical frameworks see: Milgrom-Roberts, 1990; Röller-Tombak, 1990; Seidmann, 1995.

[2] Here I refer to some recent developments in the literature on the evolution and modification of "conventions" (Aoki, 1994a; Boyer-Orléan, 1992; Orléan, 1994). The central point concerns the specific nature of conventional choices, including considerations such as social co-ordination and mimetism.

[3] This does not mean that an analysis of the evolutionary process leading to institutional diverges could not be useful. It is actually necessary and an important agenda for further research, but it is out of the scope of the present paper.

2. the necessity of managing information and communication flows inside the firm;
3. the necessity of determining the nature of competencies inside the firm.

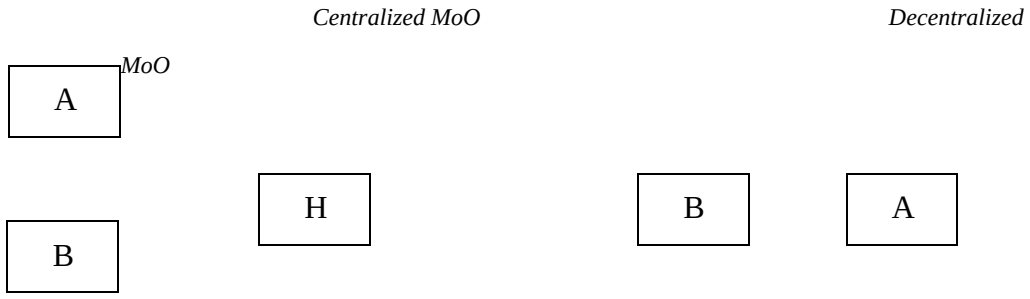
This can be done through a definition of the configuration taken by both:

1. work organization;
2. knowledge creation and distribution.

The importance of jointly analyzing these two issues is also stressed by Coriat and Dosi: "*more precisely, we have tried to show that the explanation of a particular set of routines can be traced back to the coevolution between corporate patterns of knowledge distribution and mechanism of coordination and governance*" (Coriat-Dosi, 1995). Let us start with an analysis of the possible configurations which can be taken respectively by work organization and knowledge distribution.

As far as *work organization* is concerned two polar solutions exist, namely vertical vs. horizontal organization of work. In the hierarchical (vertical) model, the "communication network" inside the firm is vertically oriented: central authority is in charge of all kinds of decisions and it guarantees coordination inside the firm. The reverse holds when the model of work organization is horizontal. In this case, decision-making inside the firm is often a matter of individual workers choices and decentralized coordination.

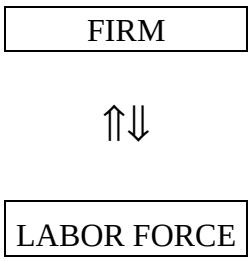
These two models can be illustrated through the following figure:



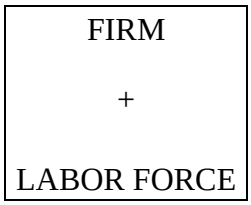

where: A, B = production units, H = hierarchy.

Regarding *knowledge distribution*, opposition is between a concentrated vs. shared distribution of knowledge. In the former model, the stock of knowledge owned by the firm is concentrated at the central authority (or experts) level. Workers do not share the firm's knowledge stock and their competence is determined outside the firm. In Aoki words: "*la hiérarchie informationnelle H (verticale) est bâtie sur une définition précise des tâches de production. On peut supposer que les compétences nécessaires à l'exercise de tâches bien définies et spécialisées, sont acquises avant l'entrée dans l'organisation par une formation organisée et/ou par un apprentissage sur le tas dans une autre entreprise*" (Aoki, 1986). This means that workers competence is "generic" in the sense that it is not transformed by the firm in order to make it firm-specific. Quoting Aoki once again: "*si des agents ne sont pas satisfaits par les contrats que leur propose l'organisation, ils peuvent choisir de la quitter sans être pénalisés puisqu'est reconnue*

*universallement la valeur de leurs compétences*" (Aoki, 1994b). A representation of the model could be the following:




In the case of a shared distribution of knowledge, know-how is spread all around inside the firm through a process that I will call "implication". Workers are led to share the firm's stock of knowledge and so to acquire a highly specific competence profile. As Aoki states: "*pour que la coordination non hiérarchique soit efficace, les participants doivent avoir des qualifications polyvalentes, dépassant la simple acquisition de certaines compétences spécifiques: il faut qu'ils aient internalisé les conventions définissant l'étendu de leur autonomie dans le traitementde l'information, qu'ils aient acquis d'importantes capacités de communication et une familiarité avec la technologie des unités voisines*" (Aoki 1994b). In this case, the representation of the model is quite different:




Thus,

the two basic elements of firm organization are: work organization and knowledge distribution. Work organization can be characterized either by a central authority coordination mechanism, or by a decentralized coordination through horizontal connections among workers. Knowledge distribution can either be concentrated at the central level or be shared at all levels of the firm: this also determines the nature of workers competence profile, which could be generic or specific.

We can apply the developed categories in order to define three different MoO (decentralized, centralized and mixed), as it is shown in the following figure:

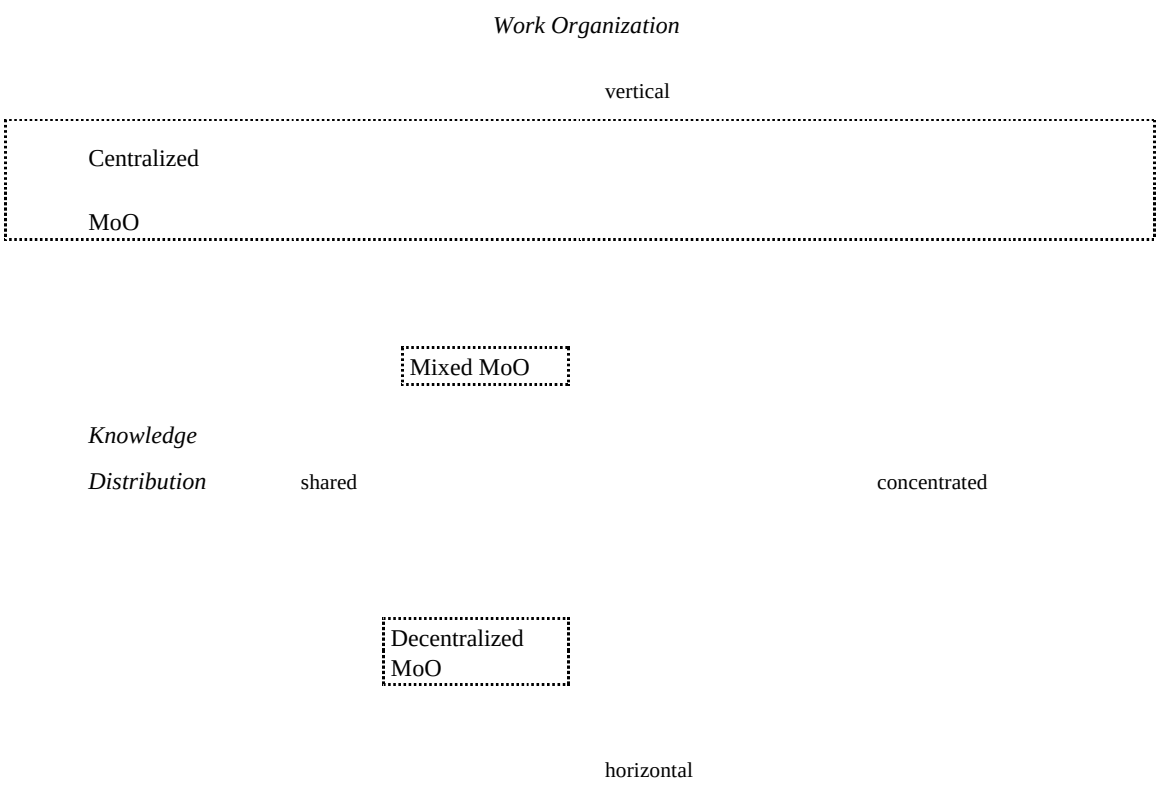



***Figure 1***

This typology allows us to give a (tentative) formal representation of the prevailing model of organization respectively in the United States (centralized MoO), German (mixed MoO) and Japan (decentralized MoO), if we admit — as I will do here — that the notion of "prevailing model" makes sense.

This kind of simplification has become quite widespread in recent economic literature, but still deserves some justification. First of all, simplifying the description of the organizational framework has the important advantage to allow me to focus more clearly on the relationship between work organization and knowledge distribution. And this kind of work seems to be a necessary step towards a better comprehension of the complex links existing inside a firm ([4]).

Moreover, in recent economic literature, the adoption of such a simplified framework of analysis has been generally justified on the basis of the overwhelming differences between the Japanese and the Western model of organization inside the firm. For

[4] This does not prevent me to state the necessity to look for a more realistic description of the economic system, taking into account the role of firm variety; and to acknowledge the importance of an issue such as the emergence of institutional divergence, notably as far as the organizational factors are concerned (see also footnote 3).

example, concerning Japanese firms, Carmichael and MacLeod state that "*in recent case studies .... multiskilling, lifetime employment and worker cooperation always seem to be present, and writers usually take this for granted*" (Carmichael-MacLeod, 1993). The opposite normally holds for Western firms (possibly with the exception of the German ones).

Once the configuration of the MoO defined, it is eventually possible to provide an answer to points (*ii*) and (*iii*) above, namely how information and communication flows are managed and the nature of competencies is determined, inside the firm. In fact, the answer is given by the prevailing combination of the model of work organization and the form of knowledge distribution. As far as the determination of the level of effort is concerned, this will be done through the definition of a suitable system of control for any given MoO. Therefore, the specification of the MoO of the firm provides also a solution to the problem of control upon work intensity (point (*i*) above).

Consequently,

although some major differences exist between the MoOs concerning the nature of work organization, this does not imply the complete absence of a hierarchical structure in a decentralized model. Even if the intervention of the authority is not needed to assure the coordination process, hierarchical control is still present as a part of the system of control over work. So, the actual weight of authority in the organization structure can be widespread (coordination and control) or somehow restricted (only control).

I will now turn to explore the way the organizational features characterizing a given MoO influence the choice made by the firm about the optimal system of control over work. In order to provide some clear cut results, I will focus only on the two opposite MoOs: centralized vs. decentralized MoO. Results for the mixed case can be drawn as an intermediate solution between the two polar cases analysis.

## The model

Let us consider the decision problem the firm faces when it has to determine the optimal level of production and wage. As in standard analyses the problem faced by the firm is to maximize its profit, which can be written as follows:

(1) $\pi = P\,Q - (w + p_s\ s)\ L_p$ ,

where: P = product price; Q = quantity produced; $L_p$ = amount of hours of work hired;

$s$ = quantity of supervising resources per hour of work; $p_s$ = cost of supervising resources.

The introduction of $s$ allows me to consider the twofold role played by the authority respectively in the domains of coordination between production units and control upon work intensity:

$s = t + m$

where: $t$ = coordination resources per hour of work; $m$ = monitoring resources per hour of work.

The production function is:

(2) $Q = F(h \cdot e \cdot L_p)$ ,

where: $h$ = average workers capability; $e$ = effort per hour of work.

Contrary to standard models, workers' capability and level of effort are determined here by the nature and efficiency of the control system implemented by the firm. And the nature of this control system is conditioned by the internal organizational structure of the firm. Let me clarify this, starting with an explicit modeling of the effort and capability functions.

## The process of competence formation

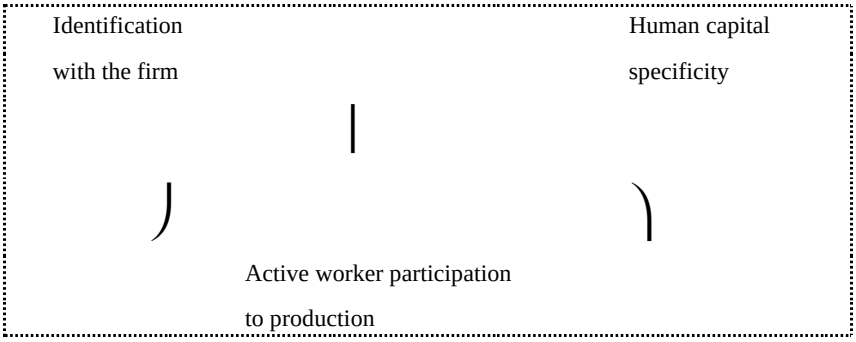
In this section I analyze the process through which the worker capability is determined, in order to understand how the nature of the MoO could actually influence it. There are clearly several channels through which firms could modify the capability of workers, the most known and studied being training. Here, I want to focus on a different aspect, which is the mechanism through which competences can be made firm-specific. This process can apply to all workers in spite of their skill level, thus it has no strong relationship to standard training activities.

As we have already seen, in a centralized MoO firm, worker competencies are exogenoulsy given to the firm. The capability function ($h$) can thus be represented as a constant:

(3) $h = h_0$

In the alternative case (decentralized MoO), the worker is made a part of the firm's culture and knowledge. Individual human capital is thus modified (through an implication process) and made specific to the firm. Here the capability function can no more be considered as a constant because it is actually defined through a "learning" process which is influenced by the internal organization of the firm.

The nature of the implication process is in fact a major issue here. It has some important effects on the control system prevailing inside the firm. Therefore, let us study in a bit more depth how the implication process actually works. This is a cumulative process which can be described as follows:




The basic idea is that the formation of a specific human capital is not a simple matter of training. The acquisition of a specific human capital is linked to a process of knowledge

sharing which can only take place through the diffusion of knowledge from worker to worker. To put it in another way, this process needs a kind of cooperation and "co-working" among workers which eventually leads to the acquisition of the same knowledge. This kind of process has frequently been observed in Japanese-style firms (see Okuno, 1984).

As Okuno puts it: " *workers contribute to the production in two ways. They either work directly to produce output or work to augment the stock of operational and organizational knowledge and the level of his and other workers' work skills* ". And: "*....helping other employees learn skills and/or making suggestions for increasing productivity can be interpreted as investing in firm-specific capitals which take the form of accumulated knowledge of work skills and stock of technical, organizational and managerial know-how* " (Okuno, 1984).

In general, the activities by which workers get to share their knowledge/experience with other workers have an informal nature, in the sense that they are not performed under the explicit control and direction of the authority. Quoting Okuno once again: "*a senior worker frequently helps junior workers in the same work line learn special skills needed for the job ..... Yet on-the-job-training is not assigned as a part of senior worker's job, nor does he receive any extra reward for his efforts*" (Okuno, 1984). My claim is that this kind of activity is negatively influenced by a system of direct monitoring which is too strong, direct monitoring forcing workers to perform the tasks they are strictly asked for. Quoting D. Marsden: *" under the low trust conditions which prevail in many firms, which are encouraged by tigh managerial control, and an insistence on contractual obligations, workers have little incentive to share this information.....if anything they have every incentive to use it to make their own job easier"* (Marsden, 1996). This negative effect on competence formation, which is related to the intensity of direct monitoring, does not exist in a centralized model where the implication process does not take place. To put it in more formal terms:

$$(3') \qquad h = h(m\ ; x)\ ,\ \text{with} \quad \frac{\partial h}{\partial m} < 0\ ,$$

where, $x$ = vector of the other variables influencing capability formation (training ...) which we are not considering here.

## The specification of the effort function

As far as work intensity is concerned, the problem faced by firms is how can they assure that the workers they have hired will provide a satisfactory level of effort ([5]). Given the conflicting nature of the labor/capital relationship, it is necessary to implement some devices in order to guarantee the actual realization of the desired level of effort (see Bowles, 1985).

[5] This problem has been put forwards and studied in a wide set of contributions focusing on the « efficiency wage » approach (see for example, Akerlof-Yellen, 1986; Perrot-Zylberberg, 1987). As it will be made clearer, I will take up here quite a different perspective.

In this respect, I will retain an approach developed by the American radical economists (see Bowles-Gordon-Weisskopf, 1983) who state that effort can be increased by two different means:

- by increasing the "direct monitoring" over workers ($m$);
- by increasing the "cost of job loss" ($w_c$) as it is perceived by the worker.

The implementation of these two means of control over work guarantees to the firm a level of effort which is positively related to the intensity of any of the two devices ([6]). We can thus propose a general specification of the effort function such as the following ([7]):

(4) $e$ = effort per hour of labor hired = $e(m\ ,\ w_c)$,

with $\frac{\partial e}{\partial m} > 0, \qquad \frac{\partial e}{\partial w_c} > 0.$

Following Bowles (Bowles, 1985), we can define the "cost of job loss" as the income loss a worker incurs when he looses his job. Conditional to the fact that he is fired, we can model the worker's income loss as the difference between the perceived wage ($w$) and his alternative expected income ($w_d$):

cost of job loss = $w_c = w - w_d$ ,

where: $w$ = worker's wage; $w_d$ = alternative income in case of firing.

The expression for $w_d$ is given by the average between the alternative wage the worker can earn if re-hired and the unemployment benefits he can get if he does not find a new job. This average is calculated on the basis of the probability the worker has to find a new job (if he is fired). This probability is measured by two variables:

$l$ = degree of specificity of human capital, $0 < l < 1$,

$u$ = unemployment rate, $0 < u < 1$.

The unemployment rate is supposed to grasp the global availability of job opportunities in the economic system. The higher the unemployment rate, the fewer the alternative job opportunities globally available. At the same time, for a given level of global job opportunities, the possibility that a worker actually matches a given available job lessens as the specificity of his human capital increases (see also Aoki 1986 and 1994b). So, the higher the degree of specificity of human capital, the lower the probability of a

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[6] It is important to underline that there is a strict complementary ex-ante between the two mentioned devices of control, since no monitoring can be efficacious if there is no cost in loosing their job; and no income loss can push workers to work if there is no possibility of being detected not working.

[7] The specification that I will take up here as far as the effort function is concerned has an "institutional" and sociological justification relying on the conflicting nature of labor/capital relationship. Under the same assumption Bowles has obtained a similar specification considering explicitly workers utility maximization (Bowles, 1985). What I want to underline here it is the crucial difference between the approach that I will retain and the more common "efficiency wage" models: contrary to the latter ones, in a radical economy view the problem of effort extraction comes from the institutionally determined nature of the labor/capital relationship.

successful match between a worker and a firm. The entire "search" process on the labor market (after being fired) is shown in the following picture (figure 2).

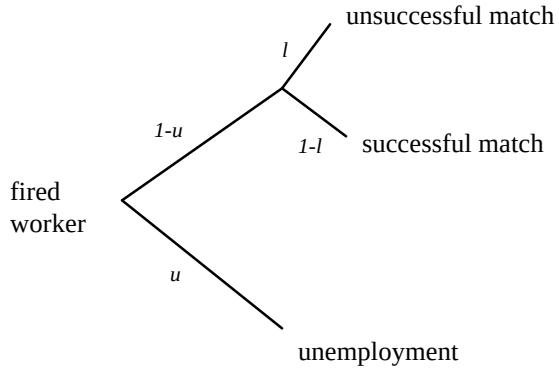


***Figure 2***

It should be stressed that this is not a dynamic process. The model being static, workers are given only one period to waver between available jobs, so that they are forced to accept the issue of the search process whatever it is.

We still have to explain which are the corresponding issues of the search process in the two cases of a successful and an unsuccessful match. In the former situation, the worker gets to find a new job which fits his own competencies; then he is paid a wage ($w_v$) that will be (ex-post) equal to his previous one. In the case of an unsuccessful match, the worker finds a job but this job does not fit his competencies. He will receive a lower (minimum) wage for this job ($\overline{w}$). In this generalized case, the labor market has a dual structure with a "upper" level where workers are paid a market wage and a "lower" level (a secondary labor market) where workers are paid an exogenous minimum wage ([8]).

From figure 2 we can deduce the expression for the alternative income ($w_d$) which turns out to be as follows:

(5) $\quad w_d = (1-u)(1-l)\ w_v + (1-u)\ l\ \overline{w} + u\,\underline{w}$ ,

where: $w_v$ = alternative wage in case of a successful match; $\overline{w}$ = minimum wage;

$\underline{w}$ = unemployment benefits.

Substituting for (5) in the definition of the cost of job loss we can easily find that:

(6) $\quad w_c = w - (1-u)(1-l)\ w_v - (1-u)\ l\ \overline{w} - u\ \underline{w}$ .

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[8] We could easily consider the minimum wage as endogenously determined by the employment level on the secondary market ($L_s = (1-u)lL_p$), $L_s$ being determined residually once defined the unemployment rate at the economy level. For the following analysis to hold, it would then be sufficient to make the assumption that marginal productivity of labor in the secondary labor market is always lower than $\overline{w}$. Since the results are not significantly affected by the hypothesis of exogeneity of the minimum wage, I will stick to this simplification in what is to follow.

However, in the specification of the cost of job loss a major distinction exists between the centralized and decentralized MoO. In fact, human capital is actually firm-specific only in a decentralized MoO, where the implication process does occur. Therefore:

$l = 0$ in the case of a centralized MoO;

$l \neq 0$ in the other case.

As we have already seen, this hypothesis is supposed to grasp the different features concerning the distribution of knowledge in the two MoOs. This implies that, in a centralized model (where $l = 0$), the final specification for the cost of job loss is the following:

(7) $w_c = w - (1-u)\, w_v - u\underline{w}$ ,

and no more duality exists on the labor market. This is clearly because, worker competencies being common to the entire economy, there is no reason for a worker to incur an unsuccessful match (and to move to the secondary labor market). The only two possibilities left are either to find a "good" job or to stay in an unemployed condition. This means that, for a given level of wage, the cost of job loss is always higher in a decentralized model than in a centralized one (eq. (6) and (7)): in the former case, the alternative wage (if fired) is lower than in the latter one (due to the possibility of "bad" matches).

This mechanism shows how a dual labor market is endogenously generated (through "bad" matches) in a context where human capital specificity matters (and workers re-training does not exist). This could interestingly be applied to the Japanese experience where: *"…..the stabilization of the employment of regular workers in large firms has been associated with the creation of a pool of temporary workers: basically, they are hired during booms and laid off during recessions or depressions"* (Boyer, 1995b). And: *"the stability of the employment of the core wage earners is partially allowed and complemented by the adjustment cost incurred by the workers at the periphery"* (Boyer, 1995b). So the diffusion in Japan of an employment relation based on human capital specificity seems to be strictly related to the emergence of a peripheral labor market, thus creating a strong duality on the labor market. The same does not hold in the Western countries experience. Therefore, the analysis in terms of human capital specificity allows for a first (tentative) distinction between Japanese and Western labor markets.

This approach implies that labor market structure actually changes in relation to the modification of the MoO of the firm. This seems to be an interesting consequence of the perspective taken up here. In fact, as Aoki puts it: "*there may be a close connection between labor market characteristics and the information systematic characteristic of the firm from a comparative perspective*" (Aoki, 1985). This connection goes clearly in both directions (from the firm to the labor market and the other way round). I obviously do not claim that the very simple effect taken into account here actually captures all of these complex interactions. However the previous analysis can offer a first insight on this kind of issues.

We have thus defined the first control device that firms can implement in order to obtain a given level of effort. The second control device which can be used is direct monitoring

which consists of actively supervising workers' behavior on the job. Direct monitoring can be implemented either by hiring foremen or through convenient technological equipment (think of some possible side-uses of information technologies). The efficacy of direct monitoring depends on the quantity of resources affected to this activity, namely:

$m$ = quantity of monitoring resources per hour of hired work.

We have seen that the crucial difference between centralized and decentralized models concerns the role of the central authority in the coordination process. In the centralized model, supervising resources have to be used for two different functions:

- direct monitoring ($m$);

- coordination between production units ($t$);

while, as we have seen, in a decentralized MoO workers (production units) have a capacity of autonomous decentralized coordination.

Therefore:

Centralized MoO $\Rightarrow$ $t > 0$ $\Rightarrow$ $m = s - t$ ,

Decentralized MoO $\Rightarrow$ $t = 0$ $\Rightarrow$ $s = m$ .

I will sum up the assumptions that I made concerning the parametric specification of the two MoO in the following table:

***Table 1***

| | Mode of Organization | |
|---|---|---|
| | Centralized | Decentralized |
| knowledge distribution (human capital specificity) | $l = 0$<br>$h = h_0$ | $l > 0$<br>$h = h(m;x)$ |
| work organization | $t > 0$<br>($s = m + t$) | $t = 0$<br>($s = m$) |

## The choice of a system of control under different MoOs

Let us now turn to the solution of the maximization problem faced by the firm. First, the firm has to determine the optimal combination of direct monitoring and cost of job loss in order to obtain a given level of effort. Once this combination determined, the firm has to find the optimal level of wage. As we have seen (eq. (1) and (2)), the firm's profits and production function are:

$\pi = P\,Q - (w + p_s\ s)\ L_p$ , with $Q = F(h \cdot e \cdot L_p)$ .

Assuming that the production function shows constant return to scale on labor, we can resolve the problem of profit maximization in two steps. This does not constitute a

major assumption and makes the following analysis much clearer. In fact, it allows to separate the definition of an optimal control scheme (arbitrating between cost of job loss and direct monitoring) from the determination of the optimal wage level.

In order to derive explicit results, I will also assume that the effort function (5) has the following specification ([9]):

(8) $\quad e = w_c^a \; m^b \;$ ,

with the standard assumptions on the coefficients *a* and *b*:

$0 < a < 1$ , $\qquad 0 < b < 1$,

which guarantee concavity of $e(m\,,\, w_c)$ on its arguments.

I will separately analyze the two cases of the centralized and decentralized MoO firm. Let me begin with the analysis of the centralized model (see table 1 above for the parametric specification of the model).

**A**) *The Centralized MoO*

The first step of our procedure consists of the minimization of the cost (C) of a unit of work done. The control variables here are the quantity of monitoring resources (*m*) and the wage (*w*). Controlling the wage is in fact the only way through which firms can modify the cost of job loss. The minimization problem stands as follows:

(9) $\quad \underset{w,m}{\text{Min}} \quad C = \dfrac{w + p_s\, s}{h \cdot e}$ ,

with: $\quad s = m + t$ , $\qquad e = w_c^a \; m^b$ , $\qquad h = h_0$ ,

$\qquad\quad w_c = w - (1-u)\, w_v - u\underline{w}$ , $\quad$ since $\quad l = 0$ .

Minimization leads to the following condition:

(10) $\quad \dfrac{\partial e}{\partial w_c} = \dfrac{\partial e}{\partial s} \; \dfrac{1}{p_s}$ ,

which allows to define the optimal relationship between the two control devices (monitoring and cost of job loss):

(11) $\quad \dfrac{m}{w_c} = \dfrac{b}{a \; p_s}$ .

Substituting into the effort function (8) we obtain:

(12) $\quad e^* = \left(\dfrac{b}{a \; p_s}\right)^b \; w_c^{a+b}$ .

This expression allows to define the level of effort as a function of the cost of job loss (and therefore of wage). In order to rule out any possibility of perverse results due to increasing returns to scale in the effort function, I will assume that: $a + b \leq 1$ .

---

[9] The specification taken up is a generalization of the functional form proposed in Bowles-Boyer, 1988.

We can now proceed with the second step, that is profit maximization. This will allow to determine the optimal wage level. The maximization problem stands as follows:

$$\underset{w,\ L_p}{\text{Max}} \quad \pi = P\,Q(h_0 \cdot e(\overline{m}^*, w_c) \cdot L_p) - (w + p_s\ \overline{s}^*)\ L_p \quad ,$$

which leads to the following condition:

$$(13) \qquad (e(\overline{m}^*, w_c) \,/\, \frac{\partial e(\overline{m}^*, w_c)}{\partial w}) = (w + p_s\ \overline{s}^*) \ .$$

Resolving and substituting for the expression of $w_c$, we obtain:

$$(14) \qquad w = \frac{a\ p_s\ t + u\ \underline{w}\ (1-b)}{(1-b)\ u - a} \ ,$$

which holds under the equilibrium assumption ([10]) that, ex-post: $w = w_v$ .

As we can see from the optimal wage expression (14), there is a minimum level of unemployment which is necessary to avoid wage explosion:

$$(15) \qquad u_{min} = a \,/\, (1 - b) \ .$$

**B**) *The Decentralized MoO*

We can now follow the same procedure to solve the model in the case of a decentralized MoO, the parametric specification still being defined as in table 1. Here the capability function has the non constant specification stated in equation (6′) due to the role of the implication process in the definition of the intrinsic effort. In order to have explicit results, I will assume the following functional form:

$$(16) \qquad h = h_0\ m^{-\lambda} \ .$$

This expression is supposed to capture the negative externality produced by direct monitoring on competence formation during the implication process. The coefficient $\lambda$ will be such as: $0 < \lambda$.

We also have:

$$(17) \qquad e = w_c^a\ m^b \ ,$$

$$m = s \ , \qquad \text{since} \quad t = 0,$$

$$w_c = w - (1-u)(1-l)\ w_v - (1-u)\ l\ \overline{w} - u\ \underline{w} \ , \qquad \text{since} \quad l > 0.$$

From equation (16) and the definition of the effort function, we obtain:

$$h \cdot e = h_0\ w_c^a\ m^{b-\lambda} = h_0\ w_c^a\ m^{b'} \ ,$$

where (to simplify notations) I introduce the coefficient $b' = b - \lambda$, such that:

---

[10] This assumption can be removed if we allow for a positive wage differential inside the firm, for example because new workers can not hope to earn as much as the older ones. In this case, the alternative wage for a worker who is fired is lower than the wage he is earning in his actual position. The introduction of such a consideration in the model allow to show how wage differentials can be an alternative "market control" device which can replace unemployment.

$0 < b' < b, \qquad \Rightarrow \qquad \lambda < b.$

This condition guarantees that direct monitoring still has a positive effect on the value of effort (i.e. on ($h \cdot e$)).

From the minimization of the cost for one unit of work done, we obtain:

$$(18) \qquad \frac{m}{w_c} = \frac{b'}{a\ p_s} \ .$$

We can substitute for (18) in the effort function (17) to obtain:

$$(19) \qquad e^* = \left(\frac{b'}{a\ p_s}\right)^b w_c^{a+b} \ .$$

As before, profit maximization allows to define the optimal wage level:

$$(20) \qquad w = \frac{(l\ (1-u)\ \overline{w} + u\ \underline{w})\ (1-b')}{(1-(1-l)(1-u))\ (1-b') - a} \ ,$$

where the minimum unemployment level is:

$$(21) \qquad u_{min} = \frac{a - l\ (1-b')}{(1-l)\ (1-b')} \ .$$

Comparing expressions (15) and (21) we can see that the minimum level of unemployment is always lower in a decentralized than in a centralized MoO. This is possible because human capital specificity offers an alternative "disciplinary" device which could replace the external market mechanism relying on the unemployment rate ([11]).

Before turning to the analisys of the equilibrium unemployment rate associated with the two different MoO, I will sum up the main results of this section:

*i*) in both MoOs, the optimal wage is a decreasing function of the unemployment rate, and a minimum level of unemployment is needed to avoid wage explosion (see figure 3 below);

*ii*) however the minimum unemployment level is higher in the centralized than in the decentralized model; in this latter case, the minimum unemployment level is a decreasing function of the human capital specificity (*l*). Therefore, in a decentralized MoO, the minimum unemployment constraint could actually be not compelling;

Dec. Mod. Cent. Mod.

w

[11] Another interesting element of comparison between the two MoOs concerns the level of unitary costs C. This could give important insights as far as comparative firms performance is concerned. Unfortunately, this is a too wide issue to be developed here.

$u_{min}$ u

***Figure 3***

*iii*) as we can see, for any given level of the unemployment rate the optimal wage is lower in a decentralized than in a centralized model;

*iv*) this implies (from the definition of the cost of job loss and comparing eq. (11) and (18)) that centralized MoO firms generally have an higher level of direct monitoring than decentralized ones ([12]).

# Some consequences on unemployment

## A general framework

The definition of an optimal wage function at the firm level has allowed me to define the nature of the relationship between the wage and the unemployment rate. In order to determine the actual unemployment rate, we have to consider a complementary relationship guaranteeing the equilibrium on the labor market. This will be done imposing a flows equilibrium condition requiring the equality of flows inside and outside the unemployment set. Let me define: $d$ = separation rate; $f$ = job finding rate.

Flows equilibrium condition is then:

(22) $L \cdot d = (N - L) \cdot f$ ,

where: $L$ = employed people, $N$ = active population.

From this we obtain:

(23) $u = \frac{N - L}{N} = \frac{d}{d + f}$ .

The job finding rate is normally defined as a function of vacancies and of the unemployment rate. Since all workers are identical and have the same probability of finding a job when entering the labor market (either for the first time or after being fired), the job finding rate could actually be understood as the probability of finding a job (when fired):

(24) $f$ = job finding rate = probability of finding a new job = (1-$u$) .

---

[12] For a given level of the cost of job loss, direct monitoring is always lower in the decentralized than in the centralized model. However for a given level of the unemployment rate, the cost of job loss could actually be higher in the former than in the latter case. In fact, as far as the cost of job loss is concerned, two opposite effects have to be considered: the optimal wage is lower in the D.M. than in the C.M., but in the former case the alternative wage (if fired) is reduced too because of the presence of a minimum wage. Taking into account all of these effects allows us to state that direct monitoring is actually lower (for any given level of the unemployment rate) in the D.M. only if the following condition on minimum wage holds:

$$\frac{w - \overline{w}}{w} < \frac{(b - b')u}{b'(1 - u)l}$$

In my perspective global matching between jobs and workers is only determined by the job opportunities globally available. When human capital specificity matters (decentralized model), this crucially influences the probability of finding a "good" job but not the total probability of finding a job.

From the analysis carried out in the previous section, we know that separations from the firm occur in our framework only when a worker is discovered not working ([13]). The probability of being discovered not working is likely to be a function of the quantity of resources affected to the monitoring activity. I will define:

(25) $p$ = probability of being discovered not working = $\gamma(m)$ ,

such that: $\gamma' > 0$, $\gamma(0) = 0$, $\gamma(\infty) = 1$.

The separation rate is then:

(26) $d$ = separation rate = probability of being fired = $p = \gamma(m)$ ,

which is endogenously determined inside the model by the optimal quantity of resources affected to monitoring activities.

Since the job finding rate still depends on the unemployment rate, substituting for (24) in the equilibrium condition (23) we obtain the following simple relationship between the unemployment and the separation rate ([14]):

(27) $u = d$ .

From (26), considering that the optimal level of ($m$) is such that (eq. (11) and (18)):

$m^* = m(w_c)$ , with $\frac{\partial m^*}{\partial w_c} > 0$ along the expansionary path, and $w_c = w_c(w, u; l)$ ,

we can deduce that labor market equilibrium condition (27) determines a relationship between the unemployment rate and the wage level:

(28) $u = u(w)$ , if $l = 0$ ,

$u = u(w\,;\, l)$ , if $l > 0$.

In order to give an idea of the general working of the model, we can represent it as in the following figure:

---

[13] Actually, it should be noticed that firing could be not so automatic even when a worker is discovered not working. Apart from considerations related to the institutional rules which influence firms' attitude concerning firing, firms' willingness of getting rid of a worker is likely to depend on the degree of specificity of his human capital. I will try to consider this latter point in the example that I will present below.

[14] There is actually a second root which is always equal to 1, so I will not consider it as a possible solution for the equilibrium unemployment rate.

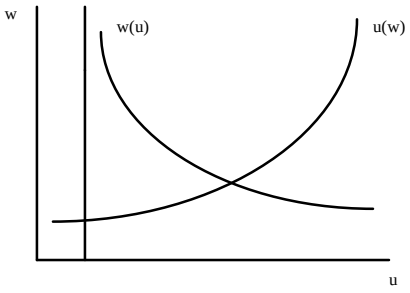


***Figure 4***

This allows to determine the optimal level of both wage and unemployment. However, this general specification does not allow us to obtain any explicit result as far as the two different organizational models are concerned. Therefore, in the following section I will consider an explicit functional form for the separation rate in order to study more precisely the unemployment gap between Japan and the US.

## An application: the unemployment gap between Japan and the US

Let us suppose that the probability of being discovered not working (and fired) has the following specification:

$$(29) \qquad p = \begin{cases} 0 & \text{if} \quad m < (1-q)M, \\ q - (M - m)/M & \text{if} \quad (1-q)M \le m \le M, \\ 1 & \text{otherwise.} \end{cases}$$

where $(1\text{-}q)M$ is an arbitrarily small constant. This specification allows me to take into account that for the model to be defined a positive level of monitoring is always needed. Otherwise, the effort would be set to zero.

Since $d = p$, substituting (29) for $p$ into condition (27) and then considering the expressions for the optimal level of direct monitoring (eq. (11) and (18)) and for the cost of job loss (eq. (6) and (7)), we can easily obtain an explicit formulation of the equilibrium relationship between unemployment and wage.

In order to to simplify the analysis, and with no loss of generality, I will put the unemployment benefits to zero: $\underline{w} = 0$. We finally have:

$$(30) \qquad u = \frac{M \cdot (1-q)}{(b/ap_S) \cdot w - M}, \qquad \text{for the centralized model,}$$

$$u = \frac{l \cdot (b'/ap_S) \cdot (w - \overline{w}) - M \cdot (1-q)}{M - (b'/ap_S) \cdot (w - l(w - \overline{w}))}, \qquad \text{for the decentralized model ([15]),}$$

which imply that a minimum level of wage exists for the centralized MoO preventing unemployment explosion; while for the decentralized MoO, wage is upper bounded.

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[15] These expressions hold under the following technical assumption: $\frac{b'}{ap_S}[(1-l)w + l\overline{w}] < M < \frac{b}{ap_S} w$

Then, we can show that:

$\frac{\partial u^*}{\partial w} < 0$ , for the centralized model,

$\frac{\partial u^*}{\partial w} > 0$ , for the decentralized model.

This allows me to find out two different equilibrium configurations of wage and unemployment for the centralized and decentralized MoO.

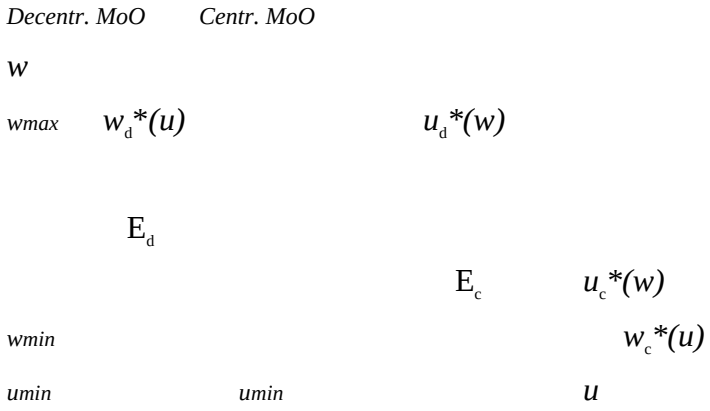


***Figure 5***

# The implementation of flexible production technologies

One major topic in the economic debate concerns the emergence of a new generation of production technologies (which I will call ″flexible″) which allows firms to overcome the limits of the dedicated equipment of classical mass production. Flexible technologies have been given increasing attention by economic literature due to their growing role inside the industrial structure; flexible technologies are generally seen as a strategic choice implemented by the firms to try to cope with more difficult ″environmental″ conditions. In this paragraph, I try to assess the factors influencing firms' ability to implement flexible production technologies. As we will see, the success of this productive choice is crucially related to the nature of the MoO prevailing inside the firm. To start with, I consider the consequences of the implementation of flexible production technologies upon the MoO of the firm.

Recent works on the subject (see in particular Lazonic-West, 1995) seem to agree on the crucial point that the implementation of flexible production technologies requires an improvement in the coordination between production units inside the firm. Better coordination can generally be achieved through an improvement of the firm's communication network. In my model this has to be specified with reference to the two different MoO considered. In the decentralized model, an improvement of the firm's

communication network can be obtained by increasing the degree of knowledge sharing among workers (decentralized coordination); in the centralized model, better coordination requires more supervising resources being affected to communication activities ([16]). In the literature on the subject, these two aspects are often supposed to proceed together. My claim is that in reality they are in a way substitutes, and they determine two different responses given by the firm (according to its internal structure) to the introduction of the flexible production technologies.

This is in fact a major assumption. The underlying idea is that, even if flexible production determines some modification in the mode of organization of the firm, these modifications do not alter the very nature of this mode of organization. To put it in another way, and give an example, knowledge sharing is not needed in a centralized model because it is possible to cope with coordination problems through a variation in the quantity of resources affected to communication/coordination.

This hypothesis can be translated into the following parametric assumptions:

$t' > t$ , $\qquad l' > l$ ,

where $t'$ and $l'$ are the value taken by the parameters, when flexible production is implemented, respectively in the centralized and in the decentralized model. These parameters are supposed to grasp the modification induced in the mode of organization of the firm. The necessity for a more stringent coordination between production units determines either a need for higher knowledge sharing among workers (and so a more specific human capital), or an increase in the quantity of supervising resources affected to communication activities.

To evaluate the consequences on a firm's performance of the implementation of flexible technologies, we must distinguish between the two cases of a centralized and a decentralized MoO. Then we can measure the firm's performance by means of the cost of one unit of work done.

In the case of a centralized MoO firm, we can obtain the final expression for unitary costs of production by substituting the optimal values of supervising resources, the optimal wage and the effort function to the unitary costs definition (9). Then, we can easily see that unitary costs are increasing in the quantity of communication/coordination resources ($t$) needed inside the firm. According to our parametric assumptions, this means that the implementation of flexible technologies involves a competitiveness loss for centralized MoO firms.

As regards decentralized MoO firms, we can substitute the equations (16), (18), (19) and (20) to the expression for unitary costs (9). In this case, the effect of the implementation of flexible technologies on unitary costs is not completely clear. As we have seen, flexible production involves an increase of the degree of human capital specificity ($l$). We can show that:

---

[16] In other theoretical works on the subject (see Milgrom-Roberts, 1990) these two factors are supposed to be complementary. Our claim is that in reality they are a kind of substitutes, and they determine two different responses given by the firm (according to its internal structure) to the introduction of the flexible production technologies.

(32) $\frac{\partial w}{\partial l} < 0$ , if the unemployment level is low ([17]);

$\frac{\partial w_c}{\partial l} < 0$ , $\frac{\partial e}{\partial l} < 0$.

I expect that for a wide range of parameter values the overall effect on unitary costs of increasing human capital specificity will be negative, the effect on wage being largely dominant. Simulations actually support our expectation.

As far as firms performance is concerned, the main results that I have obtained are thus the following:

*i*) in a decentralized MoO, the implementation of flexible technologies leads to a decrease in the quantity of control per hour of work. This finding confirms what is generally stated in the theoretical literature about new production technologies and firms organization (see for example Marsden, 1996). But it should be stressed that this only holds for a decentralized MoO: in a centralized firm the contrary holds and control actually rises when flexible technologies are introduced;

*ii*) as a consequence, the implementation of flexible production technologies is 'effort-intensive' when the MoO is centralized and 'effort-saving' in the other case ([18]);

*iii*) however, the introduction of flexible production technologies in a centralized model leads to an increase of the cost for one unit of work done, while the reverse holds in a decentralized model. The cost for one unit of work done is to be understood as a measure of firm's efficiency. Therefore, the analysis points out that the advantages linked to flexible technologies can actually be exploited only under a decentralized MoO, the implementation of these technologies being detrimental to centralized MoO firms;

As far as the effort is concerned, the results obtained here are somehow coherent to the perspective proposed by Bowles, who states: *"I will say that the capitalist has chosen an inefficient technology when there exists some other method of production that, per unit of output, uses less of at least some input and not more of any..... a technology that is inefficient in the above sense may nonetheless be cost minimizing if it allows to lower the cost of some input. This is possible because the firm ..... may alter this cost [of labor] through the selection of various labor extraction strategies"*. The main idea is that the efficiency of a given technology has to be evaluated in relation to the use of all the production inputs, including effort. So that effort-saving could actually be a way to improve efficiency. This intuition seems to be confirmed by the previous results.

As regards the effects of the implementation of flexible technologies on the equilibrium unemployment rate, some considerations can be provided on the basis of the analytical framework developed in the previous section.

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[17] This notion can of course be made more precise, the unemployment rate having to be lower than: $\frac{a\overline{w}}{1-b'}$

[18] This does not necessarily mean that productivity is reduced in decentralized MoO firms when flexible technologies are implemented. Productivity is in fact measured by: $e/(1+s)$ and monitoring resources are actually saved up under flexible production.

We know that for the centralized MoO the following holds (see eq. (14)):

$w^* = w(u\,;\,t)$ , with $\frac{\partial w^*}{\partial t} > 0$ ,

which produces an external shift of the wage/employment locus, when flexible technologies are chosen:

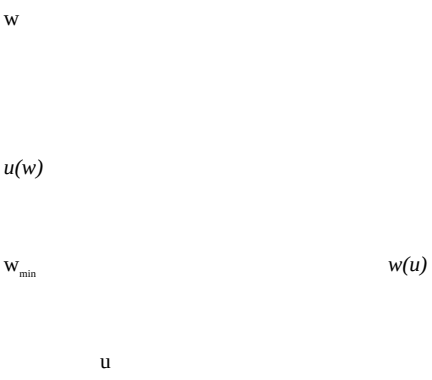


***Figure 6***

the final result being an augmentation of unemployment and a reduction of wage.

As far as the decentralized MoO is concerned, we have (see eq. (20)):

$w^* = w(u\,;\,l)$ , with $\frac{\partial w^*}{\partial l} < 0$ , and from equation (30):

$u^* = u(w\,;\,l)$ , with $\frac{\partial u^*}{\partial l} > 0$ .

So, both curbs will move when flexible production is chosen. This allows a reduction of wages, the effect on unemployment actually depending on which of the two shifts will prevail. However, for *M* sufficiently large, a reduction of the unemployment rate will be allowed:

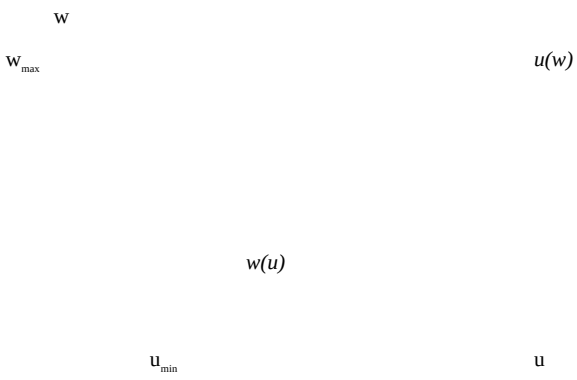


***Figure 7***

As far as the effort and employment level are concerned, we can finally sum up our claims in the following table:

***Table 2***

| | high effort | low effort |
|---|---|---|
| high employment | | Scm<br>Fdm |
| low employment | Fcm Sdm | |

where: S = standardized production , dm = decentralized model , F = flexible production , and cm = centralized model .

### *6. Conclusions*

The paper proposes an analytical framework to model firms choice of wage and effort as an "institutionally-biased" decision. To do this, the notion of "mode of organization" is introduced, which allows us to take into account the influence of the organizational structure on firms behavior through the definition of the nature of work organization and of the form of knowledge distribution.

Based on this approach, a model has been proposed which explains the unemployment gap between Japan and the US as a consequence of the major differences in their prevailing MoO of the firm. In particular, it has been stressed that a crucial role is played by the firm-specific nature of human capital, characterizing the "Japanese-style" MoO. In fact, in a truly “radical” process of effort extraction, the specificity of the workers competence offers an alternative internal discipline device to the external mechanism based on the unemployment threat.

This is a strong result which fits reasonably well the stylized facts widely available on the Japanese-style organization of work and labor market. However, more work is needed, namely to evaluate empirically the actual strength of the main results provided by the model. In particular, it would be interesting to obtain an empirical distinction between the two opposite MoOs (decentralized vs. centralized) and then try to estimate a reduced form of the main relationships yielded by the model.

The paper has of course some limitations, the main one being probably the static perspective adopted throughout the analysis. Several features of the model could actually be turned into a dynamic approach (think of the search process on the labor market, for instance).

On the same line as that, it would be interesting to remove my assumption of an exogenous determination of the organizational variables $t$ and $l$ (respectively, the hierarchical coordination resources in a centralized MoO, and the human capital specificity in a decentralized MoO). An analysis of the endogenous factors influencing these crucial variables is to be carried out, which would lead us to study the very process of the emergence of a given MoO. This is actually a major issue which constitutes my main agenda for future research.

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