The Heterogeneity of Employment Adjustment Across Japanese Firms. A Study Using Panel Data*

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Abstract

Since the beginning of the 1990s, there has been a sharp debate in Japan on the end of lifetime employment. On one side, case studies show the intensity of restructuring and downsizing. On the other side, most of the studies on the employment adjustment at a macro level conclude to the absence of change. This article contributes to this debate, using an original micro database. The first specificity of this paper is to focus on the electrical machinery sector in a panel framework. The current restructuring in this sector is indeed often analyzed as the sign of the changing employment adjustment and, more generally, of the employment system. The second specificity is to consider a long enough period to make a comparison between the 1990s and the 1970s. The first major result is the increasing heterogeneity of the speed of employment adjustment at the level of the firms. Thus, we can explain the contradictory evaluation of the change of the mean speed and disentangle the micro-macro paradox. The second main result concerns the analysis of the characteristics of the firms affecting the speed of adjustment and the factors at the root of the increasing heterogeneity. The model of adjustment seems to have changed: the size tends to play a decreasing role, while the financial characteristics, like the intensity of the link with the Main Bank, are more and more important. Last but not least, the role of these financial factors may be the main explanation of the increasing heterogeneity of the employment adjustment. This last result has however to be confirmed and specified by future studies.

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1 Introduction

The end of the "Japanese employment system" (JES) has recently become a widely shared idea, in a context of increasing pressures. Indeed, whereas firms responded slowly to macroeconomic and institutional changes since the beginning of the 1990s, an accelerating adjustment seems to take place since 1998, as the crisis is lasting and maybe worsening. The two pillars of the so-called Japanese employment system are concerned: the seniority wage system and, above all, the compromise on employment security. However, there is an increasing gap between the statements pronounced by the case studies at the micro level, which conclude to dramatic changes, and the macro level analyses, which insist on the global stability of the wage labor nexus. This micro-macro paradox is one of the main results of Boyer and Juillard (1998). The 2001 massive restructuring in the electrical machinery sector is one example of these changes. This is all the more important from the point of view of the analysis of the Japanese employment system that firms belonging to this sector, like Matsushita, are considered to have implemented the so-called lifetime employment in the most accomplished way. Moreover, the electrical machinery sector is particularly affected by contemporary pressures on the employment system, such as the impact of technologies of information and communication or globalization.

In this context, the study of the employment adjustment in Japanese firms is a good way to measure the current changes in the Japanese employment system and their determinants . It gives us the opportunity to empirically specify the two alternatives of the preceding debate. More precisely, the issue at stake is to check if the characteristics of the adjustment model, especially the speed, have changed since the beginning of the 1990s. In fact, this question has already been the focus of many empirical works. A first type of study has been conducted at the industry and macro levels (Abraham and Houseman, 1989, Hashimoto, 1993). The basic results can be summarized as follows. First, the adjustment speed in Japan is slower than in the US, whatever the type of estimates we consider. Second, in Japan, the adjustment speed

in the first part of the 1990s is slower than in the 1970s. Then it appears that these studies do not confirm the alleged end of life-employment system during the 1990s.

More recently, many studies have used firm based micro-data and partially questioned the results obtained at the macro level (Chuma 2002, Abe 2002, Suruga 1998, Hildreth and Ohtake 1998). The main findings are the following. First, if the path of employment adjustment appears to be continuous and linear at the macro level, it rather seems to be discontinuous and non linear at the micro level. This statement could explain why the adjustments are very rapid and intense under certain conditions, which have to be defined. This may also be at the origin of the micro-macro paradox as defined above: the fact that some firms are restructuring heavily must not be automatically interpreted as the sign of the end of long term employment practices. Second, for certain firms, the rule of employment adjustment is influenced by the occurrence of negative profits. Finally, non negligible differences in the mode of adjustment are observed across firms, in terms of speed of adjustment, factors at the origin of the employment adjustment or in qualitative instruments used to adjust employment. This last result leads to put into question the idea of the uniqueness of human resources management model in Japan. Then, the questions are to relate these differences of employment adjustment to fundamental characteristics of the firms, to ask whether this heterogeneity across firms has recently increased or not, and finally, in any case, to explain these evolutions.

The heterogeneity of the employment adjustment across firms is precisely at the center of our own contribution, which consists in deepening the micro type studies. More precisely, we propose to test two conflicting hypotheses: the end of lifetime employment, which can be observed through an identical acceleration of the adjustment speed for all firms, versus an increasing heterogeneity of the employment adjustment across firms. Moreover, is this heterogeneity a purely statistical artifact, due to the resort of micro-data? Conversely, if the heterogeneity is real, what are its causes?

For this purpose, we use an original sectorial database, the NEEDS-FQ database (*Nikkei Economic Electronic Databank System - Financial Quest*). It gives micro-data from a sample of 126 firms of the electrical machinery sector on an annual basis from 1970 to 2001. Thus, our study is at an intermediate level by comparison with the majority of existing micro studies, some focusing on a few firms (Chuma, 2002, Suruga 1998, Hildreth and Ohtake 1998), and the others using huge samples of more than 1000 firms, but strictly limited in the temporal dimension and/or in the number of the tested explanatory variables (Abe 2002). We believe that this intermediate level provides an opportunity to overcome these limits. More precisely, our study has the following features. First, we use a panel framework to test and analyze the heterogeneity of employment adjustment patterns across firms. Contrary to the majority of empirical studies we do not limit our analysis to the introduction of individual effects. Rather, we resort to a Bayesian estimation procedure, which yields to (firm-specific) individual forecasts of the parameters of the adjustment process. Second, we make a comparison between the 1970s and the 1990s. Third, we try to identify the factors at the roots of both the level of employment adjustment and the heterogeneity of this adjustment; we especially focus on the financial factors by controlling firms' characteristics like the size or the industry.

The two main findings of this paper could be summarized as follows. First, the increasing heterogeneity of firms in the 1990s is confirmed from the point of view of their speed of employment adjustment. Moreover, no evidence can be provided about the increase of the average speed of the employment adjustment in the 1990s by comparison with the 1970s, which is clearly in opposition with the idea of the end of "lifetime employment". Second, the factors of the adjustment speed and of the heterogeneity have changed during the period under review. Furthermore, we suggest that the increasing heterogeneity is mainly related to financial factors (Boyer and Yamada 2000), and especially to the intensity of the links with the Main Bank. These factors seem to play a more and more discriminating role, at the expense of very classical

factors like the size of the firm or the sector.

This paper is built as follows. In the first part, we present some stylized facts on the employment adjustment in the 1990s. In a second part, we introduce our database. In the third part, we describe the different specifications to be estimated. In the fourth part, we present the results of the estimations. A last part is devoted to concluding remarks.

2 The employment adjustment in Japan

It is generally recognized that the employment adjustment in the Japanese firm is more sensible to economic cycles since the beginning of the 90s. Indeed, several macroeconomic studies show an increase of the speed of employment adjustment[1] and a higher sensitivity to operating losses (Ministry of Labor 1999). Besides, these evolutions must be related to the increasing heterogeneity of the Japanese human resources management model observed on the same period. This is indeed a common result of many studies. Nevertheless, this is rarely proved or even systematically analyzed. For instance, as for the resort to lay-offs or the use of non-regular workforce, an increasing trend at the macro level indeed coexists with an increasing heterogeneity at the micro level. The remaining questions concern the nature of this heterogeneity. How can we specify this heterogeneity of the employment adjustment? Did it pre-exist or has it only been revealed by the crisis? How many categories does it encompass: is it a pure diversity or does it correspond to a kind of bipolarization? Finally, what are the underlying factors? Among the potential explanatory factors of the increasing heterogeneity of the Japanese human resources management model, it may be practical to distinguish between the financial and the non financial ones.

[1] The "optimal speed" is to be understood by reference to a long term target. See Hamermesh (1993) and our section 3 for a more precise explanation.

Among the latter, the most commonly acknowledged are the industry and the size. Many studies have already found significant differences of speed of employment adjustment across industries (Abraham and Houseman 1989, Abe 2002). In our study, we control the sector and look for other explanatory variables. However, within the electrical machinery sector, which is heteroclite by nature, we can expect to observe different models of adjustment according to the main activity of the firm (white electronic, hardware, software, etc.). Regarding the size, it a priori slows down the speed of adjustment (Hashimoto 1993). Indeed, the bigger a firm is, the more it can resort to internal transfers of a part of the workforce, which is not accounted in our study. This is due to our definition of the employment speed, which focuses on the external mobility.

Other non financial factors may affect the employment dynamics. First of all, the share of export in the total sales captures the impact of the globalization of product markets on the employment from the point of view of the firms. This export ratio is expected to contribute to a more rapid adjustment. Second, the innovation effort (as captured by the ratio of R&D expenses in our study) and the capital intensity should have a negative impact on the speed. This is the main result of a "labor as a quasi fixed factor" type of analysis (Oï 1962): the more the firm is oriented toward innovation and the more it is capital intensive, the more the human capital is integrated to the physical capital and is the object of specific investments. Two other non technological factors are the union rate, with an expected negative impact on the speed (Hashimoto 1993), and the average age of the employees, which is an indication of the job tenure, when there are few mid-career recruitments and when the growth rate is moderate (Tachibanaki and Taki 2000).

Another group of variables allows us to characterize what could be called the "history of the firm". This is basically the duration of the existence of the firm, which has a negative impact on the speed of adjustment: the older the firm is, the slower it adjusts the employment. We add two

variables, which are taken from the typology established by Chuma (2002): they indicate if the firms have already experienced in the past (that is before the current restructuring) operating losses and/or downsizing. These experiences may have an influence on the current practices: two firms, with equivalent losses in the current period, are expected to react differently according to their past experiences.

In addition to the above mentioned non financial factors, our study will bring a closer focus on the financial factors. We justify this perspective by the fact that our theoretical approach is inspired by the ideas of complementarity between financial and employment contracts (Garvey and Swan 1992). Moreover, the corporate finance has experienced drastic changes for more than 20 years, if we consider the long process of deregulation, the Bubble and the consequences of its burst, which are still lasting (Hoshi and Kashyap 2001). In this paper, we propose to test if there exists a potential transmission channel of the changes, which occurred in the Japanese financial sphere, to the employment system. Then, we propose to test if the financial factors induce an increasing in the heterogeneity of the employment adjustment, which may be compared to the differentiated use of foreign technologies in the 1910-1920s, recognized as one of the roots of the dual structure, 30 years later (Lechevalier 2003). In this paper, one of our goals is to check, among the financial factors, which one had the most important impact on the employment adjustment.

We will investigate the impact of different categories of financial variables: those "traditionally" considered as representative of the Japanese style of corporate governance as analyzed by Aoki (the Main Bank , the financing structure, with the opposition between markets and banks, the stockholding structure), and those relative to the performance (return on assets) and the financial status. We first consider the impact of the Main Bank. The empirical literature questions the classical theoretical analysis of its role (Miwa 1996). Indeed, the intervention of the Main Bank may accelerate the speed of adjustment in a firm, whose investment in human

capital is weak, whereas it can slow it down in a firm, which puts the accent on its human resources . Another important variable is the financing structure in itself. The reality is much more complicated than the theoretical opposition between market-led and bank-led financing. A bank itself facing difficulties (as has been common since the beginning of the 1990s) and impatient market investors will have the same impact on the adjustment speed. In these conditions, the most appropriate criterion may be the degree of dependence on the main financing source. In this case, the firms, whose financing is more balanced between market and bank, may have an employment situation, which is less sensitive to the financial status, and thus a slower speed of adjustment.

The last "classical" variable is the stockholding structure, which can be sub-divided itself into at least four aspects (Abe 2002). One is the cross-shareholding, which is expected to have a negative influence on the employment adjustment, according to a classical argument related to the Japanese style of corporate governance (Aoki 1990). Another one is the concentration of the shareholding, which may also slow down the speed, according to an argument of stability and long term perspective of the shareholders. As for the foreign owners, it is interesting to introduce an indicator of their share to catch the degree of internationalization of the firm. Potentially less important but of interest is the listing market (or the absence of listing): for a given size, a listed firm (particularly on the first market) will face a stronger pressure than a firm, which is non listed or listed on the second market (Horiuchi 1995).

To these "classical" factors, we may add two sets of variables, partly ignored by most of the empirical studies on the link between finance and employment. The first one is the performance, for which we have many indicators. Even if it is difficult to evaluate the direction of the causality, convergent results indicate a significant and negative sign: in other words, good performances go hand in hand with a slow employment adjustment. The second one concerns the financial status, that is, mainly, the debt, which has to be distinguished from the financing structure. The Bubble period, which can be specifically extended to the 1990s for one part of the electrical

machinery sector in the context of the so-called "New Economy", lead to over-investment and over debt behaviors for some firms. After the burst of the Bubble, the consequences of such strategies have been dramatic, especially in a deflationary context, which increased the burden of the debt. In fact, according to a study realized by the Development Bank of Japan, the debt equity ratio accelerated significantly the process of job destructions in Japan between 1978 and 1998. This study concludes that the influence of the financial status of the firms on the employment adjustment decisions had certainly increased since the 1970s.

To sum it up, conditionally to a specification of the dynamics of employment adjustment at the micro level, we test a set of three hypotheses. The first is the increase of the average speed of employment adjustment since the 70's. The second hypothesis is the bipolarization of the individual speeds of employment adjustment in the 1990s. It must be related to the issue of the increase of the variance of the speed of employment adjustment across firms. Then, does is it possible to discriminate between different groups of firms (and, at the extreme, between two polarized groups) in the 1990s from the point of view of the dynamics of adjustment? The third hypothesis tested is the link between the employment dynamic and the financial factors. What are the financial and non-financial variables, which could explain the differences of adjustment speed across firms? Has the impact of financial and non financial variables varied over time? These three points are tested from an original sectorial database.

3 An original sectorial database

In this paper we use an original database based on a panel of 126 firms, classified in the electrical machinery sector and observed over the period 1970-2001. This sample is get from the NEEDS-FQ database which is built from the annual reports of firms listed at the Tokyo Stock Exchange. Although NEEDS-FQ is a financial oriented database, without precise information about the

workforce, except the number of regular employees in the mother-firm, it is increasingly used to study the patterns of employment adjustment and the characteristics of the corporate governance. Our sample has been obtained after eliminating 152 firms from the initial sample (278 firms classified in the electrical machinery sector in 2001). It does not include firms listed before 2001, and which are no longer listed in 2001. Consequently we face a classical problem of survival bias. This problem is aggravated by the fact that firms with missing data during the period 1970 - 2001 have been excluded from our panel. As a consequence we do not consider the job creations and destructions through the birth and death of firms. The definition of the variables are specified in tables 1 and 2.

The annual database does not contain any information about the number of non-regular employees, nor about the worked hours, which are however two important features of the Japanese mode of employment adjustment. Consequently, our results concern uniquely the number of regular employees. A price index for the electrical machinery sector, taken from the Bank of Japan database, has been chosen to value production, understood as sales per annum rather than the value added . Finally, we use the real average wage, constructed by dividing the payroll by the number of employees and deflating by the same price index as the one used for production. In order to introduce two vectors of variables of corporate (CG) and non corporate (NCG) governance, respectively built with financial and non financial variables, to explain the heterogeneity of employment adjustment across firms, we merge a supplementary database with the original one. In addition to the NEEDS-FQ, we resort to the following sources: the Spring issue of the *Japan Handbook Company* (JCH), *Keiretsu no Kenkyu* (KNK) and the database of *Denki Rengo*, the main umbrella organization for the electrical machinery sector enterprise-based unions.

As for the electrical machinery sector, we refer to the usual classification made by the Tokyo Stock Exchange. This is not without ambiguity because the scope of the production of the firms

classified in this sector is very wide, from devices to software or white electronics. Another point is that the main activity could have changed during the 31 year long period. That is why our benchmark is the year 2001. We found equivalent classifications by the Japanese Ministry of Labor and by the Denki Rengo. The basic features of our data are summed up in table 3. It is possible to highlight the following points. First of all, an increasing heterogeneity of the performances in the 1990s, both in terms of productivity and profitability, can be observed. The average productivity (*PRODUCTI*) is multiplied by almost 3 between the 1970s and the 1980s but by only 2 between the 1980s and the 1990s, while the average operating profit (*ROA*) declines in the 1990s after having more than doubled between the 1970s and the 1980s. As for the other profitability indicators, we observe a continuously decreasing trend from the 1970s to the 1990s. Concerning other financial variables, the average debt, as measured by the variable *DER*, increased slightly in the 1990s, while the ratio of the bank debt owned by the Main Bank (*MB1*) surprisingly slightly increased from the 1970s to the 1990s. As for the shareholding structure, we can note decreasing trends for the concentration ratio (*SHARECON*), the cross-shareholding (*CROSSHAR*), and increasing trends for the shares owned by financial institutions (*INSTIFI*) and foreign firms (*FORE1*). Finally, two important non financial variables can be analyzed as follows: the average exports ratio (*XPROD*) increased from 18,8% in the 1970s to 25,5% in the 1990s, while the average age of employees (*AGEMOY*) increased slightly from the 1970s to the 1990s (+ 7 years).

We now specify the evolution of employment. The average size of the firms (*SIZE1*) was 5,206 employees in 1970 and is 4,800 in 2001. This change is the result of an evolution in three stages: between 1970 and 1979 the average size decreased. Then, until 1992 it increased, before decreasing again (table 3). On average, during the whole period, the sample covers 600,000 employees. Most of the firms are very large. This is not a problem for our purpose, which is to show an increasing heterogeneity for firms of similar size and within a same sector. Finally,

some typical patterns of employment adjustment are reproduced in appendix (figure 1). First, one can observe a huge variety of adjustment patterns by comparison with the average industry pattern. Moreover, the profile of adjustment is very much more discontinuous at the micro level (with the exception of very big firms like Hitachi), with annual variations of more than 20% (e.g. Togami between 1975 and 1976). Finally, the sensitivity of employment to losses varies during the period and across firms: for example, it is less important for Yasukawa in the 1970s by comparison with the 1990s, while it is always lower for Nihon Inter Electronics.

4 Specifications of employment adjustment

The choice of the specification is determined by the answers given to two problems: the form of the employment adjustment (continuous versus discrete) and the modelling of the heterogeneity. Our contribution focuses on the second problem. However, here we successively consider these two points.

The form of dynamic labor demand depends on the specification of the adjustment costs. A first way to specify these costs is to consider a quadratic and symmetric function defined as:

$$C\left(\Delta L_t\right) = \frac{c}{2}\left(L_t - L_{t-1}\right) \quad c > 0$$

where L_t denotes labor and $\Delta L_t = L_t - L_{t-1}$. This far from perfect specification however allows us to easily derive the analytical form of labor demand. Indeed, assuming a quadratic form for the production function,

$$F\left(X_t, L_t\right) = X_t L_t - \frac{b}{2} L_t^2 \quad b > 0$$

where X_t denotes a vector of inputs, we can show that in an uncertain environment, under the assumption of rational expectations, the maximization of an expected stream of discounted profits leads to the following form of employment dynamics (see appendix 1).

$$L_t = \lambda L_{t-1} + \sum_{i=0}^{\infty} \gamma_i E_t\left(X_{t+i} - w_{t+i}\right) \tag{1}$$

where w_t is the real wage at time t and where the autoregressive parameter λ is a non linear combination of the structural parameters.

$$\lambda = \left[\frac{c + (1+r)(b+c)}{2c}\right] - \frac{1}{2c}\left\{[c + (1+r)(b+c)]^2 - (1+r)c^2\right\}^{\frac{1}{2}}$$

Adding the assumption of a first-order autoregressive form for the exogenous factors and for the real wage, the conditional expectations of these variables are then proportional to the current observed level. We can deduce a labor dynamic demand shown by:

$$L_t = \lambda L_{t-1} + \beta X_t + \phi w_t \tag{2}$$

where the parameters β and ϕ are non linear combinations of the autoregressive parameters of exogenous processes and the parameters γ_i. In this case, we get the same specification as Hamermesh (1993):

$$L_t = \lambda L_{t-1} + \beta Z_t + \varepsilon_t$$

where ε_t is an *i.i.d.* process and Z_t designs a vector of variables influencing the long-run labor demand, including the real wage. In such a specification, all the explanatory variables are observable; moreover, the estimation of the parameter gives a measure of the speed of employment adjustment, through the median lag defined by $-\log(2)/\log(\lambda)$. Then we can show that the speed of employment adjustment is inversely proportional to the level of adjustment costs represented by the parameter c. From this general specification, it is possible to derive several models based on alternative assumptions on the adjustment cost structure, the nature of expectations and the form of the production function. Here, we adopt a framework with one production factor, labor, which is not split into workforce and work hours, because of a lack of data. Finally, we use a log linear approximation (denoted as model 1) of the model:

$$\Delta \log(L_t) = a_0 + a_1 \log(Q_t) + a_2 \log(w_t) + a_3 \log(L_{t-1}) + \mu_t \tag{3}$$

where Q_t and w_t denote respectively the level of production and the real wage.

Nevertheless, it is now commonly admitted that the adjustment costs are non symmetrical and non convex (Hamermersh and Pfann 1996). That is why we will consider alternative assumptions to generate non linearity and asymmetry in the employment dynamics. However, in the frame of this article, we won't explicitly specify the adjustment costs structure. More particularly, we consider switching models in using as the switching variable either lagged variables of employment growth rate or exogenous variables. The first non linear model (denoted as model 2) is very similar to a SETAR model where the labor adjustment is conditional to the direction of employment adjustment.

$$\Delta \log (L_t) = \begin{cases} a_0 + a_1 \log (Q_t) + a_2 \log (w_t) + a_3 \log (L_{t-1}) + \mu_t & \text{if } L_t \geq L_{t-1} \\ \beta_0 + \beta_1 \log (Q_t) + \beta_2 \log (w_t) + \beta_3 \log (L_{t-1}) + \mu_t & \text{if } L_t < L_{t-1} \end{cases} \tag{4}$$

The second non linear model (denoted as model 3) is derived from the negative profit model of Suruga (1998).

$$\Delta \log (L_t) = \begin{cases} a_0 + a_1 \log (Q_t) + a_2 \log (w_t) + a_3 \log (L_{t-1}) + \mu_t & \text{if } PR_{t-1} \geq k \\ \beta_0 + \beta_1 \log (Q_t) + \beta_2 \log (w_t) + \beta_3 \log (L_{t-1}) + \mu_t & \text{if } PR_{t-1} < k \end{cases} \tag{5}$$

where PR_t denotes the profit (operating or current) and k is a positive constant.

Now, let us consider the preceding specifications in a panel framework including N firms observed on T periods. For firm i and year t, the simplest model is the following:

$$\Delta \log (L_{i,t}) = a_0 + a_1 \log (Q_{i,t}) + a_2 \log (w_{i,t}) + a_3 \log (L_{i,t-1}) + \mu_{i,t} \tag{6}$$

In this specification, we assume that the dynamics of employment is strictly identical for all the firms of the sample. Implicitly, it is equivalent to assume the homogeneity of the production structure and of the adjustment costs function (b and c parameters in the above specifications). In this case, the average median lag is identical for all firms. Such an assumption is in fact very restrictive and has to be tested (Hsiao 1986). On the contrary, we can assume that the structure of production and the functions of adjustment costs vary across firms, so that there is nothing common between them, except the general specification of the functions. In that case,

the model is:

$$\Delta \log (L_{i,t}) = a_{0,i} + a_{1,i} \log (Q_{i,t}) + a_{2,i} \log (w_{i,t}) + a_{3,i} \log (L_{i,t-1}) + \mu_{i,t} \tag{7}$$

where the parameters $a_{j,i}$, $j = 0, 1, 2, 3$ are a priori different across the firms and residual $\mu_{i,t}$ are independently distributed across firms. As a result, these parameters have to be estimated firm by firm.

Between these two extreme assumptions, some specifications provide a better and more general modelling of the heterogeneity of the employment adjustment paths. First of all, we shall consider that the introduction of individual effects is sufficient to take into account the heterogeneity of the dynamics:

$$\Delta \log (L_{i,t}) = a_{0,i} + a_1 \log (Q_{i,t}) + a_2 \log (w_{i,t}) + a_3 \log (L_{i,t-1}) + \mu_{i,t} \tag{8}$$

In this case, we assume the heterogeneity across firms of the structural rate of growth of employment $a_{0,i}$, under the restrictive assumption that the speeds of adjustment and the long term parameters are homogenous. In this case, the specification, fixed or random, of individual effects has to be tested by an usual Hausman's test. However, such assumption is *ad hoc* because we have seen above that the constants and the coefficients of this specification are non linear combinations of the same structural parameters, if we assume the existence of quadratic adjustment costs and rational expectations. Under these last two assumptions, it is difficult or even impossible to identify an heterogeneity concerning the average levels, without this heterogeneity affecting the autoregressive parameter of the conditioning variables. In the former example, with quadratic production and adjustment costs functions, the constant and the autoregressive parameter are functions of the parameters b and c (see equation 1): if one of these two structural parameters varies across firms, we cannot derive a specific constant for each firm, while keeping the assumption of the same adjustment speed a_3.

In these conditions, a panel specification providing an effective capture of the heterogene-

ity of the employment dynamics (coming either from the production structure or from the adjustment costs) consists in assuming the existence of random coefficients as in Swamy (1970).

$$\Delta \log (L_{i,t}) = a_{0,i} + a_1 \log (Q_{i,t}) + a_2 \log (w_{i,t}) + a_3 \log (L_{i,t-1}) + \mu_{i,t} \tag{9}$$

$$a_i = (a_{0,i}\, a_{1,i}\ a_{2,i}\ a_{3,i}) \ \ i.i.d.\ (\overline{a}, \Omega) \tag{10}$$

where the parameters $a_{j,i}$ and in particular the adjustment speed $a_{3,i}$ are assumed to be real random variables with $cov\left(a_{j,i}\mu_{i,t}\right) = 0, \forall i, j, t$. Since this specification is not restricted by assuming the equality of the parameters, it allows taking into account the heterogeneity of the adjustment dynamics. However, we assume that these variables have a common distribution, or, at least, two identical first moments. We then have to estimate the expected value and the second order moments associated to these distributions. Here appears the second advantage of this approach: it gives the possibility to make the estimation on the basis of a distribution of adjustment speeds. For example, it is possible to evaluate the mean and the variance of the distribution from the sample. Doing so, we can precisely measure the increasing or decreasing trends of the heterogeneity of the adjustment median lag across firms.

Nevertheless, this specification with random coefficients raises several problems. First of all, it is necessary to justify the stochastic nature of the parameters of the reduced form. If we come back to the initial model, this hypothesis is equivalent to the *ad hoc* assumption of adjustment costs or production functions with stochastic parameters. However, it is important to note that the general solution for such kinds of functions is no more defined by the equation (1). The second issue with this specification is that we do not have an a priori forecast of the adjustment speed for one particular firm. We can just estimate the first two moments of its distribution. We will solve this problem in proposing a Bayesian estimator of the individual parameters (Hsiao 1996). We will a priori assume a distribution on these parameters, by using the GLS estimators of the two first moments. The Bayesian predictor we then obtain is a combination of the information specific to each firm i (time series information) and of the prior information on the first two moments $\overline{a}$ and Ω of a distribution, which is assumed to be homogenous for

the set of N firms. These moments are estimated by using the Swamy (1970) GLS two steps procedure.

Thus, for a given firm, the less precise the individual information on the adjustment speed is (that is the higher the variance of the individual estimator is), the closer the individual predictor will be to the mean of the common distribution, estimated by GLS given the whole sample. On the contrary, in the case of a firm, on whose adjustment speed we have precise individual information, the individual predictor will give a small weight to the information given a priori on the expected value of the distribution common to the firms. More formally, if we note $\widehat{a}_i$ the Bayesian individual predictor of the vector of parameters a_i for the i^{th} firm we have:

$$\widehat{a}_i = \left(\widehat{\Omega}^{-1} + \frac{1}{\widehat{\sigma}_i^2} X_i' X_i\right)^{-1} \left(\widehat{\Omega}^{-1}\widehat{a} + \frac{1}{\widehat{\sigma}_i^2} X_i' Y_i\right) \tag{11}$$

In this definition, $\widehat{a}$ corresponds to the GLS estimate of the mean of the distribution of parameters a_i, and $\widehat{\sigma}_i$ denotes the estimate of the variance of residuals for the firm i. The Swamy's estimate of the matrix of variance covariance of the parameters a_i, denoted $\widehat{\Omega}$, is defined as:

$$\widehat{\Omega} = \frac{1}{N} \sum_{i=1}^{N} (\widetilde{a}_i - \widetilde{a})' (\widetilde{a}_i - \widetilde{a}) \tag{12}$$

where $\widetilde{a}_i$ is the OLS estimate of individual parameters a_i and $\widetilde{a} = (1/N) \sum_{i=1}^{N} \widetilde{a}_i$.

These Bayesian predictors will be particularly useful in the second step of the study, when we try to explain the differences of the adjustment speed by financial and non financial variables characterizing the firms. Two alternative methods are then possible. The first one is to introduce directly the vectors of financial and non financial variables in the equation of employment adjustment. This is the route followed by Abe (2002) for instance. In this specification, it is necessary to identify ex ante all the explanatory variables of the heterogeneity of the adjustment speed $a_{3,i}$ and to know the functional form linking this speed to the explanatory variables. Consequently this method is sensitive to the specification mistakes. This limit is overcome when we consider a second method, whose principle is to regress the Bayesian predictors on the financial

and non financial variables vectors, respectively denotes CG_i and NCG_i:

$$\widehat{a}_i = \theta_{0,i} + \theta_{1,i} CG_i + \theta_{2,i} NCG_i + \xi_i \tag{13}$$

where $\widehat{a}_i$ denotes an individual predictor of the parameter a_i and where $\theta_{1,i}$ and $\theta_{1,i}$ are two vectors of real parameters. The advantage of this method is to get results on the influence of financial and non financial variables not only on the adjustment speed but also on the heterogeneity of this speed and of the underlying model. It is then possible to distinguish different groups of firms.

5 Results

As it was previously mentioned, conditionally to our specifications of the dynamics of employment adjustment at the micro level, we test a set of three hypotheses. The first is the increase of the average speed of employment adjustment since the 70's. For that, we consider several estimates of the autoregressive parameter a_3 (or $a_{3,i}$) based on the log-linear model 1, for the complete sample 1971-2001 and two sub-periods 1971-1980 and 1992-2001. This choice can be justified as follows. First, we exclude the Bubble period, which is exceptional especially as concerned financial variables. Second, both periods correspond to a decrease in the average size as seen in table 3. Furthermore, they both include the same number of years. Given these sub-samples, we propose five estimates of the autoregressive parameter of employment (table 5) to point out the importance of the heterogeneity specification. As a benchmark, we propose a comparison between two extreme assumptions: the pooled specification (same model for all the firms) and the mean of the estimates get form individual data, firm by firm (*Indi*). Between these two extreme assumptions on the heterogeneity, we consider OLS estimates in an homogenous model with individual fixed[2] effects (*Within*) and GLS estimates in a completely heterogenous model with random coefficients (Swamy 1970).

[2]It is well known that, the introduction of fixed individual effects in a dynamic specification induces a small sample bias (Nickell 1981) however these estimates are presented here for comparison.

Whatever the assumption made on the homogeneity of the underlying data generating process, we observe that the adjustment speed, which is an increasing function of parameter a_3, is constant or slightly decreasing on the two sub-periods. The GLS estimates of the mean of the distribution of individual parameters $a_{3,i}$ in the random coefficient specification is 0.48 in the 70's and 0.47 in the 90's. Such results do not confirm the standard view of the end of the "Japanese employment system". It seems that firms responded to macroeconomic and institutional changes at the same speed in the 90's than in the 70's. Besides, these more contre-intuitive results are more pronounced if we consider rolling estimates of the employment adjustment speed (figure 2). With a fixed 15 year long Bartlett, we can observe a decrease in the average speed even we have an acceleration at the end of the 90's. From these results, we can conclude that the adjustment speed is basically lower in the 1990s by comparison with the 1970s despite an acceleration at the end of the 90's.

The second hypothesis is the bipolarization of the individual speeds of employment adjustment in the 1990s. It must be related to the issue of the increase of the variance of the speed of employment adjustment across firms. Then, does is it possible to discriminate between different groups of firms (and, at the extreme, between two polarized groups) in the 1990s from the point of view of the dynamics of adjustment? The third hypothesis tested is the link between the employment dynamic and the financial factors. What are the financial and non-financial variables, which could explain the differences of adjustment speed across firms? Has the impact of financial and non financial variables varied over time? The first point is that the labor dynamics is heterogenous across firms in our sectorial database. For the complete sample and for sub-periods, the standard homogeneity tests (Hsiao 1986) largely reject the homogeneity hypothesis even if we consider individual effects. For instance, the value of the fisher test associated to the central hypothesis that all parameters a_i are equal for all individual (under the assumption of fixed individual effect) is 4.39. The asymptotic distribution of this statistic for

our sample is a $F(375, 3402)$. Then, for a 5% risk level, the null hypothesis of homogeneity of parameters a_i given fixed individual effects is strongly rejected. The same results can be get for the two sub-periods used in our study. As we can observe in table 5, the better heterogeneity is modelled, the closer to the expected value are the estimated coefficients. Indeed, according to several studies (Suruga 1998), in this linear specification, the estimated value of parameter a_3 is around 0,3 in Japan (with a continuous specification and annual data). We can observe that such values are only get when we take into account the heterogeneity across firms of the speed of adjustment

Then, the issue is then to test if this heterogeneity, and particularly the heterogeneity of the autoregressive parameters $a_{3,i}$, has increased with the presuming end of the "Japanese employment system". For that, we can consider individual estimates firm by firm. However, it raises unsolvable problems for estimations by sub-periods, because of a lack of observations. This is the main reason to justify the choice of a panel frame with random coefficients, which is the less restrictive assumption from the point of view of the heterogeneity. The parameters of the random coefficients specifications (mean and variance-covariance matrix of the distribution of the coefficients) are estimated by following the method proposed by Swamy (1970). An estimator of the variance-covariance matrix of the coefficients is first built based on N individual estimators of the parameters obtained equation by equation. Then, by using this estimator of the variance-covariance matrix of the parameters, we build a variance-covariance matrix of the residuals, thanks to which we construct a GLS estimator of the expectation of the distribution of the parameters. In table 5, we can observe that the variance of the distribution of the individual parameters $a_{3,i}$ is increasing between the 70's and the 90's. From this, we can conclude that an increasing heterogeneity of the adjustment speed across the firms in the 1990s is observed, by comparison with the 1970s.

Does this increasing heterogeneity correspond to a diversification or to a bipolarization? In the frame of the random coefficients specification, we propose here to study the deformation of

the distribution of the individual estimated coefficients over time. For this purpose, we estimate the individual predictors in Bayesian framework (Hsiao, 1996) and given these estimate, we propose to compute an empirical estimate of the true density of the random coefficients of the models. More precisely, in figures 4 and 3 are reproduced the kernel density estimates of the true distribution of the autoregressive parameters $a_{3,i}$ get on sub-periods 1971-1980 and 1992-2001. The results do not confirm our initial intuition. First, the kernel density tends to prove that the distribution is bi-modal in the 1970s and this result seems to be less pronounced in the 1990's. Second, we find a significant skewness for the two sub-periods - which is the sign of an asymmetric distribution - but less important in the 1990s (0.16 and 0.11); moreover, the kurtosis (2.41 in the 70's against 3.22 in the 90's) is closer to 3, which shows that the distribution of the individual speeds in the 1990s is closer to a normal one.

Next we focus on the evolution of the individual adjustment speeds. After having ordered the firms according to their estimated speed for the two sub-periods, we show the absence of correlation between the two orderings through a Spearman test . In other words, for a given firm, we cannot a priori deduce its relative speed in the 1990s from the observation of its speed in the 1970. Therefore, we need complementary information. This point is confirmed by a simple exercise. If we divide our sample into three groups according to the change of the speed in the 1990s by comparison (stable, increasing, decreasing speed), we find that only 22% firms have a stable speed (in defining the stability by the following criterion: the individual speed in the 1990s is less than 20% lower or greater by comparison with the one in the 1970s), while respectively 47% and 31% experience a decrease and an increase of their speed.

To conclude, the increasing heterogeneity is confirmed, but the hypothesis of bipolarization is rejected at this stage. We now turn to the study of the determinants of the adjustment speed and of the increasing heterogeneity.

The last assumption that we want to test in our sectorial database is the influence of financial

environment on the labor adjustment of Japanese firms. For that, we regress the estimated individual firms' speeds (individual Bayesian predictors issued from the random coefficient model) on the set of explanatory variables (NCG and CG vectors) for different periods (tables 5, 6 and 7). For each period, we present the results for four alternative models. For the whole period (1971-2001), we get the following results. Concerning the non financial variables, we find significant results, with the expected sign for the size (*SIZE1*), the R&D expenses ratio (*RDRATIO*), the export ratio (*XPROD*): this sign is negative for the two former and positive for the latter. As far as the average age of employees (*AGEMOY*) is concerned, its effect is significant and contributes to a higher speed. Finally, the capital ratio (*INTENSK1*) has a positive impact on the speed, which was not expected. Concerning the non financial variables, we find the good signs and significant results for the performance (*PERFO5*), which has a negative impact, and for three among four variables characterizing the shareholding structure: the share of foreign owners (*FORE1*), which accelerates the speed; the share of the financial institutions (*INSTIFI*) and the cross-sharing (*CROSSHAR*), which contribute to a lower speed. As far as the impact of the Main bank (*MB1*) is concerned, we find a negative sign: the more effective the link with the main Bank is, the lower the adjustment speed is. Finally, results concerning the debt are ambiguous: the interest rate paid by the firm (*DER* and *DEBPAST*) have a negative impact on the speed, while the debt as a percentage of the sales (*DHK*) induces a higher speed. Globally, the results are satisfactory and improve, when we introduce the financial variables, as it is shown through the comparison between model 1 and the three other models. The next question is to check if these results are robust when we consider sub-periods, basically the 1970s and the 1990s.

Our main finding is that the above results are modified significantly, when we estimate sub-period by sub-period. Our interpretation is that the determinants of the adjustment speed changed over time. First of all, the most striking result for the sub-period 1971-1980 is that the variable Main Bank (*MB1*) is no longer significant, whatever the specification we estimate: in

the 1970s, the link with the Main bank is not discriminating across firms, from the point of view of employment adjustment. If we consider the non financial variables, the following findings can be highlighted. The size (*SIZE1*) and the export ratio (*XPROD*) are still significant with the expected signs (respectively negative and positive). It is interesting to notice that the sign of the average age of the employees (*AGEMOY*) has now become significantly negative: "lifetime employment" is not yet a problem at that time and a high average age will not accelerate the restructuring. The variables characterizing the "history" of the firms (*SINCE1* and *SINCE2*) are non significant. The ratio of R&D expenses (*RDRATIO*), is not introduced in the 1970s because of a lack of data. Finally, concerning the capital ratio (*INTENSK1*) we find the same unexpected result as that for the whole period. We turn now to the analysis of the financial variables. We have already mentioned the interesting result concerning the Main bank. The following variables are significant with a negative sign: the performance (*PERFO5*), the ratio of debt to the sales (*DHK*), the share of the financial institutions (*INSTIFI*) and the degree of concentration of the shareholding (*SHARECON*). The *DER* variable now has a significant positive impact, while the ratio of foreign shareholders (*FORE1*) is no longer significant. This is not surprising because this is very low in the 1970s and not discriminating across firms.

Basically, the results are less robust for the sub-period 1992-2001. Moreover, the explanatory factors are different. The changes to be highlighted are the followings. The Main bank has again a significantly negative impact (the Main bank which kept a strong link with the firms contributes to a lower adjustment speed). This important and non intuitive result is in fact a confirmation of a previous study on the link between the performance and the existence of a Main Bank. As far as the size (*SIZE1*) is concerned, the results are no longer significant. We have here the confirmation of previous results, according to which the size is no more a major factor of the heterogeneity of employment adjustment across firms in the 1990s (Lechevalier 2003). We have to be more precise on this point: in the models 1 and 2, where we have not introduced all the financial variables (e.g. the Main bank), the size is significant, but

the introduction of more financial variables (and, among others, the Main bank) improves the results of the estimation, whereas the size becomes non significant. Concerning the non financial variables, another noticeable finding is the fact that the average age of the employees now accelerates significantly the adjustment speed. One possible interpretation is the increasing pressures on the lifetime employment system, in a context of the aging of the workforce in some firms and the increasing wage-related costs. Moreover the creation date and the ratio of R&D expenses are now significant, with the good sign (respectively positive and negative). However, surprisingly the export ratio is no more significant. If we now turn to the analysis of financial variables, the performance and the DER have both a significantly negative impact. As for the shareholding structure, the share of foreign owners (*FORE1*) has a significantly positive impact, while the cross-sharing (*CROSSHARE*) has an unexpected sign.

In a next step we test two models in splitting the sample into two groups of firms according to the individual speeds of adjustment (high versus low). The results, which are not reproduced here , tend to prove that the models are different, depending on the speed. This result has to be related to the fact that, in the 1990s, the results are much less good, when we do not distinguish between at least two groups of firms, according to their speed of adjustment, and much better when we do this distinction. This is not the case in the 1970s. We interpret this fact as a sign of bipolarization, which did not appear, when we focused on the only speeds of adjustment without studying the underlying model .

Finally, among the results we just analyzed, we distinguish between those which are robust on the whole period (with the same significant sign) and those, which might be at the centre of the changes that occurred since the beginning of the 1990s. They potentially are an explanation of the increasing heterogeneity. Among the former, the performance has always a significantly negative impact on the adjustment speed. The impact of the variables characterizing the shareholding structure is also stable, even if we noticed some changes in the details, especially

the share owned by foreign firms. Among the latter, the most important are the age (negative and then positive impact), the size (significantly negative and then no more significant), the Main Bank (non significant impact and then significantly negative) and, to a less extent, the debt, whose impact becomes negative after having been positive, if one considers the DER.

6 Conclusion

The present study, based on the NEEDS-FQ database, questions what has been called "the end of the Japanese style lifetime employment system", through an analysis of the employment adjustment at the level of firms during the period 1970-2001 in a panel framework. We have obtained the two main following findings. First, the average speed of employment adjustment is lower during the current crisis than in the 1970s, while an increasing heterogeneity across firms is observed in the 1990s. This heterogeneity is not a bipolarization of the individual speeds of adjustment, but rather a bipolarization of the underlying characteristics of the employment model. Thus, we have here, in the case of Japan, a confirmation of what Katz and Darbishire (2000) found for other countries, using another methodology than ours. However, the kind of bipolarization we found could be specific to Japan.

This last remark is related to our second main finding. The financial structure of the firms seems to play a major role in this trend of increasing heterogeneity. More precisely, we found it is necessary to take into account both non financial and financial variables to explain the path of the employment adjustment at the level of the firms. But the most determining factors differ in the 1970s and in the 1990s, except for the performance (which always contributes to a lower speed) and for most of the variables characterizing the shareholding structure. Indeed, as for the financial factors, the impact of the Main Bank become significant (and negative) in the 1990 whereas it was not significant in the 1970s; the DER turns from significantly positive in the 1970s to significantly negative in the 1990s; the percentage of share owned by foreign

firms becomes significantly positive in the 1990s. As for the non financial factors, the most striking results concern the size and the export ratio, which had a significant impact in the 1970s (respectively negative and positive), but no more in the 1990s. Besides, the impact of the average age of the employees, from negative, becomes positive. Finally, our model is less robust in the 1990s if it is estimated for all the firms, whereas it is quite better (both in absolute and by comparison with the results obtained for the 1970s) if we split the sample into at least two groups according to their speed. This is indeed interpreted as a sign of bipolarization of the employment adjustment process in the 1990s.

From a technical point of view, it is important to note that the quality and the hoped originality of these results mainly come from the adoption of a panel framework and above all from the choice of the estimation method. Indeed, this method produced individual coefficients as for a firm by firm estimation, improved by correcting abnormal values using all the information. It allowed analyzing rigorously the deformation of these coefficients' distribution and of the determinants of the individual speeds. Another point to be underlined is the confirmation that the speed is only one aspect of the adjustment model and it is necessary to consider the underlying structure to get a better understanding. In our view, this point is at least as much important as the discussion on the discrete / continuous nature of the adjustment process, for which we did not propose any improvement.

It is now possible to turn back to the general issues at stake, as pointed out in the beginning of this paper. As we have already mentioned, the present study questions the interpretation of the current evolution on the labor market in term of the end of the Japanese style lifetime employment system, and contributes to solve the micro - macro paradox. This is precisely the message of the findings concerning the stability of the average speed of adjustment and the increasing heterogeneity across firms. Besides, we have to be more specific about this last point. This is not the result of a statistical artefact, due to the resort of the micro data, as shown by the comparison between the 1970s and the 1990s. This heterogeneity takes the form of a

bipolarization between the firms, whose underlying model of adjustment remains approximately stable and those, whose model changes toward a more financial logic of the adjustment, and sometimes a higher speed. By controlling the sector and finding a less important role of the size, we indeed highlighted that the factors of the increasing heterogeneity are mainly financial. This is a confirmation that the financial dynamics since the 1980s had a strong impact on the whole system and that the current crisis does not only reveal a pre-existing heterogeneity. Among these financial factors, we found that the Main bank plays a discriminating role in the 1990s and contributes to lower speed. This result is one more piece in the debate on the effective role of the Main bank in the Japanese-style corporate governance and employment system. However, our study also pointed out that we cannot limit the analysis to the financial dynamics and that some employment practices are increasingly raising problem, as it can be stated from the analysis of the positive correlation between the average age of employees and the speed of adjustment in the 1990s. Moreover, our result concerning the impact of financial factors has to be confirmed and specified by future studies.

Finally, the limits of this empirical work are as many routes for further research. This study is first limited by an important survival bias, because we focused on firms in activity between 1970 and 2001. This is all the more a problem that the 1990s are characterized by an increasing number of bankruptcies, which have an important impact on employment security. This bias in fact probably leads to an underestimation of the firms' actual heterogeneity. In addition, we took into account only one aspect of the firms' employment policies, i.e. the management of regular employees, and, due to lack of data, were not able to analyze practices related to non-regular workers – which are also probably another source of heterogeneity.

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Table 1: Definition of Corporate Governance Variables

Category	Name	Source	Definition
Performance	ROA	NEEDS	Operating profit plus interest and dividend received divised by total assets
	PERFO4	NEEDS	Current profit divised by total capital
	PERFO5	NEEDS	Ordinary profit divised by sales
Debt	DEBPAST	NEEDS	Interest expense and discount premium divised by total fixed liability
	DER	NEEDS	Total fixed liabilities / (total capital + total reserve)
	DHK	NEEDS	Total debt as a percentage of sales defined as total fixed liability and total current liability divised by sales and operating revenues
Shareholding Structure	SHARECON	NEEDS	% of shares owned by the 10 principal shareholders
	SHAREMOY	NEEDS	Average shares owned by the shareholders
	CROSSHAR	NEEDS	% of shares owned by other firms
	INSTIFI	NEEDS	% of shares owned by financial institutions
	INDIVFI	NEEDS	% of shares owned by individual shareholders
	FORE1	NEEDS	% of shares owned by foreign firms
	FORE2	JCH	% of shares owned by foreign firms
Listing Market	MARKET	JCH	Dummy taking the value 1 or 2 according the listing market and 0 if not listed
Main Bank	INDICMB1	KNK	Dummy taking the value 1 if the firm has an identified Main Bank and 0 if not
	MB1	KNK	Ratio of the bank debt owned by the Main bank
	MB2	KNK	% of shares owned by the Main Bank
	RGMB2	JCH	Rank of the Main Bank among the main shareholders

Notes: NEEDS corresponds to the Nikkei Economic Electronic Databank System - Financial Quest database . JCH denotes the Japan Handbook Company database and KNK the Keiretsu no Kenkyu. For the variables build from JCH and KNK, we considered only 4 years: 1977, 1987, 1991, 1999.

Table 2: Definition of Non Corporate Governance Variables

Category	**Name**	**Source**	**Definition**
Activities	SSECTOR	JCH	Dummy taking the values 1 to 7 according to the main activity of the firm
Size	SIZE1	NEEDS	Number of employees
	SIZE2	NEEDS	Total assets
History	SINCE1	JCH	Creation date of the firm
	SINCE2	JCH	Date of the first listing
	EXPDONSIZ	NEEDS	Cumulative variable : one adds 1 every year when the employment decrease of more than 10% and 0 if not
	EXPNEGPROF	NEEDS	Cumulative variable : one adds 1 every year in case of loss and 0 if not
Export	XPROD	JCH	Exports as a percentage of total sales
Others	RDRATIO	NEEDS	R&D expenses divised by sales
	PRODUCTI	NEEDS	Real average sales per employee
	INTENSK1	NEEDS	Tangible fixed assets total plus intangible fixed asset divised by the number of employees
	INTENSK2	NEEDS	Tangible fixed assets total divised by the number of employees
	AGEMOY	JCH	Average age of employees
	LAND	NEEDS	Factory sites, offices and other non-depreciable properties as a percentage of total assets
	DR	DENKI	Dummy taking the value 1 if the firm is affiliated to denki rengo and 0 if not

Notes: NEEDS corresponds to the Nikkei Economic Electronic Databank System - Financial Quest database. JCH denotes the Japan Handbook Company database and DENKI the Denki Rego database.

Table 3: Basic Features of the Variables

	1971-2001		1971-1980		1981-1991		1992-2001	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
SIZE1	5318	11 899	4810	11 466	5504	12 152	5671	12 076
AGEMOY	35.2	4.0	31.5	2.9	35.3	3.4	38.6	2.8
PRODUCTI	30.4	26.9	10.8	7.1	27.7	13.1	55.1	32.1
ROA	6.7	5.4	9.6	5.3	7.1	4.9	3.1	3.7
DER	49.0	163	49.5	253	44.2	46.5	53.5	111
SHARECON	45.6	14.0	48.1	15.4	45.9	13.5	44.0	13.4
CROSSHAR	25.3	19.6	25.6	20.6	25.6	18.3	24.8	20.3
FORE1	6.6	12.3	3.4	6.7	6.9	8.8	8.7	17.2
INSTIFI	32.7	21.1	26.5	15.8	33.5	14.6	36.7	28.3
MB1	0.27	0.13	0.26	0.13	0.28	0.12	0.28	0.15
XPROD	21.6	18.8	18.7	17.9	20.9	18.1	15.5	20.3

Notes: Indiv. denotes the average of individual OLS estimates and Pond denotes the corresponding weighted average, where the weights are defined as the inverse of individual variance. The t-stats are in parenthesis except for GLS and Indiv where we indicate only the realizations of the estimators of the mean and of the variance of the coefficients distribution.

Table 4: Estimated Speed of Employment Adjustement

	Pooled	Within	Indiv	Pond	GLS
		Model 1			
1971-2001	0.07	0.22	0.31	0.30	0.30
	(19.88)	(34.88)	(2.02)		(1.96)
1971-1980	0.10	0.36	0.50	0.49	0.48
	(15.31)	(26.74)	(1.27)		(1.20)
1992-2001	0.03	0.36	0.49	0.48	0.47
	(4.57)	(22.51)	(1.16)		(1.09)
		Model 2			
$\Delta PR_t \geq 0$	0.06	0.20	0.33	0.29	—
	(16.11)	(29.98)	(1.71)		
$\Delta PR_t < 0$	0.12	0.16	0.07	0.54	—
	(11.31)	(13.76)	(0.016)		
1971-1980					
$\Delta PR_t \geq 0$	0.09	0.32	0.79	0.20	—
	(13.85)	(27.65)	(0.80)		
$\Delta PR_t < 0$	0.10	0.12	0.58	1.02	—
	(4.25)	(5.15)	(0.85)		
1992-2001					
$\Delta PR_t \geq 0$	0.007	0.20	0.62	0.51	—
	(0.97)	(12.46)	(0.66)		
$\Delta PR_t < 0$	0.10	0.20	0.52	0.47	—
	(6.85)	(12.05)	(0.80)		
		Model 3			
$\Delta L_t \geq 0$	0.08	0.14	0.20	0.19	—
	(16.21)	(21.47)	(1.00)		
$\Delta L_t < 0$	0.02	0.09	0.21	0.20	—
	(4.15)	(13.65)	(1.00)		
1971-1980					
$\Delta L_t \geq 0$	0.09	0.18	0.32	0.18	—
	(11.64)	(15.84)	(0.31)		
$\Delta L_t < 0$	0.02	0.13	0.45	0.54	—
	(3.75)	(10.73)	(0.26)		
1992-2001					
$\Delta L_t \geq 0$	0.04	0.09	0.23	0.34	—
	(3.64)	(7.54)	(0.25)		
$\Delta L_t < 0$	0.01	0.18	0.37	0.311	—
	(1.54)	(13.47)	(0.23)		

Notes: The t-statistics are into brackets. All estimated parameters, except the constant, are divised by 100. * indicates that the global Fisher statistic is significatively different from zero at a risk level of 5%.

Table 5: The Factors of the Hetrogeneity of the Adjustement Speed: 1971-2001

	Model 1	Model 2	Model 3	Model 4
SINCE1	0.04 (3.78)	0.07 (4.57)	−0.002 (−0.14)	—
SIZE1	$-1.9e^{-4}$ (−14.03)	$-2.4e^{-4}$ (−15.02)	$-2.5e^{-4}$ (−13.24)	$-2.5e^{-4}$ (−14.36)
AGEMOY	0.42 (6.08)	0.49 (5.59)	0.32 (3.35)	0.32 (3.36)
INTENSK1	0.13 (2.56)	0.31 (4.24)	0.41 (4.53)	0.38 (4.72)
RDRATIO	−0.34 (−7.16)	−0.61 (−9.84)	−0.83 (−11.47)	−0.86 (−11.94)
XPROD	0.12 (12.29)	0.20 (14.59)	0.19 (11.56)	0.19 (12.13)
ROA	—	−0.45 (−4.08)	−0.25 (−1.81)	—
PERFO5	—	—	—	−0.26 (−2.38)
DEBPAST	—	—	—	−0.03 (−2.62)
DER	—	−0.01 (−3.55)	−0.02 (−4.18)	−0.02 (−4.73)
DHK	—	—	5.78 (3.68)	7.26 (4.53)
SHARECON	—	—	0.26 (8.02)	0.28 (8.33)
CROSSHAR	—	—	−0.21 (−7.94)	−0.21 (−8.64)
INSTIFI	—	—	−0.11 (−4.98)	−0.10 (−5.46)
FORE1	—	—	0.17 (4.75)	0.17 (4.79)
LAND	—	—	−0.09 (−0.86)	—
MB1	—	−16.99 (−9.38)	−17.98 (−8.52)	−16.30 (−7.76)
Cste	−0.77 (−3.08)	−1.16 (−9.38)	0.23 (0.67)	0.16 (4.03)
Adj-R^2	0.12	0.21	0.27	0.27
Fisher	93.5	90.7*	62.6*	67.4*
RSS	32.90	22.80	17.79	17.77

Notes: The t-statistics are into brackets. All estimated parameters, except the constant, are divised by 100. * indicates that the global Fisher statistic is significatively different from zero at a risk level of 5%.

Table 6: The Factors of the Hetrogeneity of the Adjustement Speed: 1971-1980

	Model 1	Model 2	Model 3	Model 4
SINCE1	0.04 (1.12)	—	—	—
SIZE1	$-1.8e^{-4}$ (−4.77)	$-2.3e^{-4}$ (−5.38)	$-1.7e^{-4}$ (−4.47)	$-2.3e^{-4}$ (−5.55)
AGEMOY	−1.00 (−5.13)	−1.16 (−6.08)	−1.25 (−7.41)	−1.21 (−6.34)
INTENSK1	3.38 (7.34)	3.33 (7.38)	3.62 (8.96)	3.55 (7.73)
XPROD	0.15 (5.10)	0.15 (5.07)	0.15 (5.43)	0.15 (4.98)
ROA	−0.77 (−4.30)	−0.74 (−4.49)	−0.62 (−4.19)	—
PERFO5	—	—	—	−0.92 (−5.42)
DEBPAST	0.04 (1.33)	—	0.08 (2.80)	—
DER	0.04 (3.67)	0.02 (4.70)	0.02 (5.56)	0.02 (4.51)
DHK	−2.32 (−7.32)	−1.46 (−4.82)	−1.43 (−5.43)	−1.50 (−5.12)
SHARECON	—	−0.13 (−3.97)	—	−0.01 (−4.60)
INSTIFI	—	−0.12 (−3.64)	−0.09 (−3.23)	−0.12 (−3.40)
FORE1	—	—	−0.18 (−2.68)	—
MB1	−4.73 (−1.28)	—	—	—
Cste	−0.09 (−0.10)	0.89 (11.90)	0.81 (12.91)	0.16 (4.03)
Adj-R^2	0.26	0.31	0.31	0.32
Fisher	35.4*	36.01*	43.84*	37.48.4*
RSS	16.42	10.39	13.76	10.26

Notes: The t-statistics are into brackets. All estimated parameters, except the constant, are divised by 100. * indicates that the global Fisher statistic is significatively different from zero at a risk level of 5%.

Table 7: The Factors of the Hetrogeneity of the Adjustement Speed: 1992-2001

	Model 1	Model 2	Model 3	Model 4
SINCE1	0.05 (1.15)	0.16 (3.52)	0.22 (4.06)	0.24 (4.85)
SIZE1	$-2.7e^{-4}$ (−4.90)	$-1.7e^{-4}$ (−3.16)	$-7.6e^{-4}$ (−1.14)	—
AGEMOY	1.51 (6.90)	0.78 (3.49)	1.17 (5.09)	1.40 (5.91)
INTENSK1	0.52 (5.09)	—	—	—
RDRATIO	−1.02 (−5.37)	−1.33 (−7.10)	−2.22 (−9.01)	−2.19 (−8.99)
XPROD	−0.01 (−0.52)	—	—	—
ROA	—	−1.14 (−4.40)	−0.96 (−3.16)	—
PERFO5	—	—	—	−0.26 (−2.47)
DER	—	—	—	−0.04 (−4.61)
DHK	—	1.10 (4.37)	—	—
CROSSHAR	—	0.24 (7.46)	0.38 (9.24)	0.45 (10.46)
FORE1	—	0.17 (2.75)	0.68 (7.59)	0.52 (5.35)
MB1	—	—	−1.27 (−2.37)	−1.72 (−3.18)
Cste	−1.33 (−1.41)	−3.22 (−3.51)	−4.37 (−4.15)	−4.83 (−5.05)
Adj-R^2	0.12	0.17	0.22	0.23
Fisher	29.4	34.6*	33.1*	35.4*
RSS	50.97	47.58	31.02	30.54

Figure 1: Profiles of employment adjustment and profit

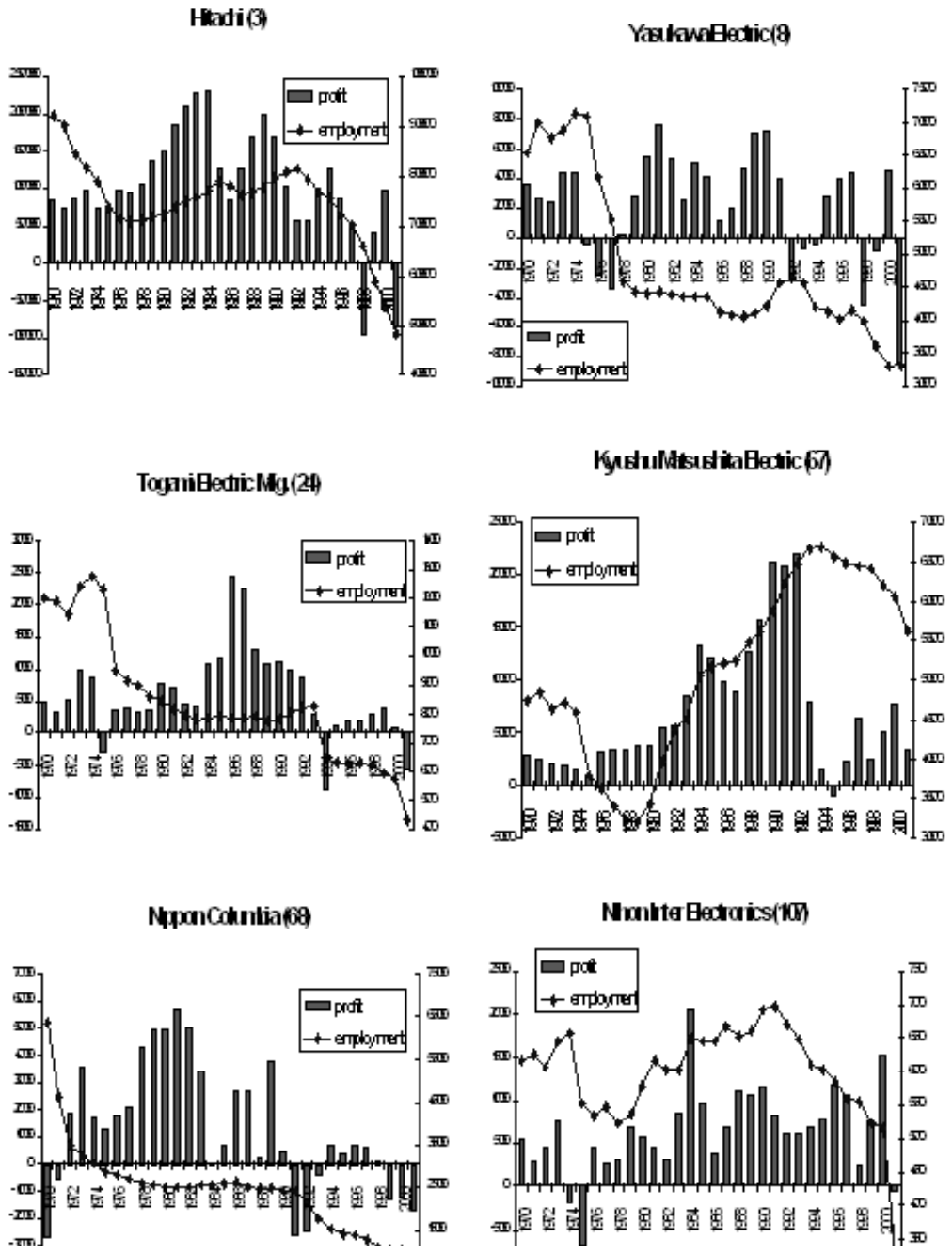

Figure 2: Evolution of the Speed of Employment Adjustment : Bartlett Estimates

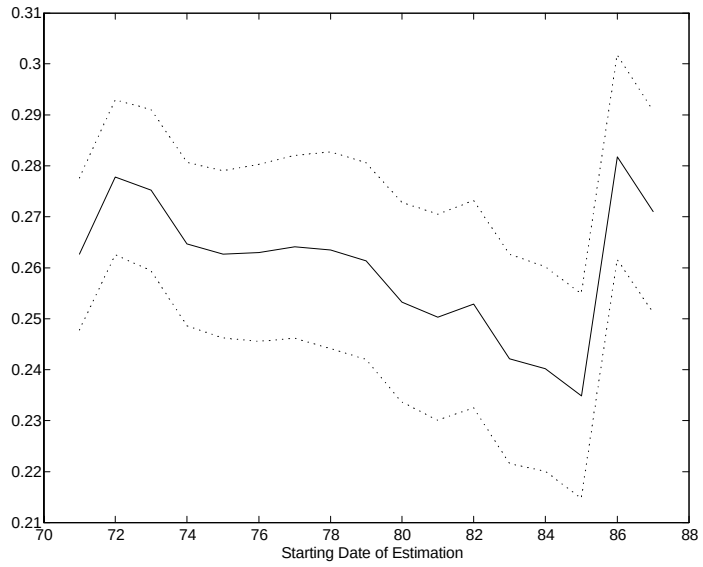

Figure 3: Estimated Density of Individual Adjustment Speeds: 1971-1980

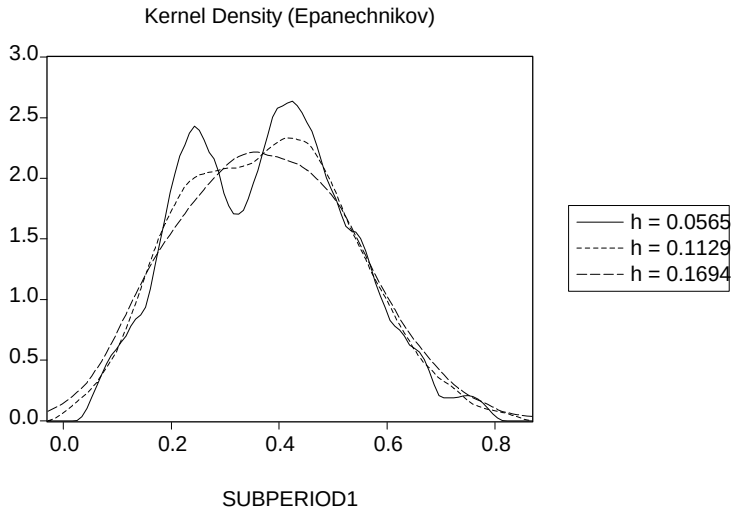

Figure 4: Estimated Density of Individual Adjustment Speeds: 1992-2001