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LABOUR ADJUSTMENT IN THE JAPANESE MANUFACURING INDUSTRY AFTER THE FIRST OIL SHOCK: A RECONSIDERATION†

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Abstract: Estimation of the relation between the slow rate of growth which followed the first oil shock and the speed of labour adjustment in Japanese manufacturing has produced some contradictory results. This paper argues that the discrepancy is basically due to different data sets being used; in order then to produce a consistent choice of the data set a criterium is brought forward which emphatizes the relevance of qualitative adjustments; estimation based on related data shows how the adjustment speed has generally increased after the shock, and that a negative relation does exist between an index of performance and the adjustment speed itself.

INTRODUCTION

Recent research done by Muramatsu[1] and Shimada and his associates[2] has dealt with the relation between the slower growth which has followed the first oil shock and the patterns of labour adjustment in the Japanese manufacturing industry. The topic is strongly connected with the nature and evolution of Japanese labour relations and is then worth careful consideration.

Indeed, the practices of lifetime employment in a subset of Japanese firms are implicit long term contracts which generally trade job security in exchange for wage flexibility.[3] As a consequence a strong incentive to hoard labour seems to be a typical behaviour shared by the companies belonging to the subset when they are faced with cyclical fluctuations of the level of economic activity.

This incentive is however correlated with the structural features of the economic environment and is then directly or indirectly sensible to substantial changes of the

† I wish to thank Professors Nakatani, I., Ban, K., and Inoki, T. for frequent helpful comments and suggestions; without the help of Mrs. Akao, E., hardly any result would have been delivered to me by the computer. As usual, responsabilities for errors and omissions are only mine.

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[1] See Muramatsu (1983).

[2] See Shimada-Hosokawa and Seike (1982).

[3] Different papers of Masahiro Aoki have been looking in this direction. See Aoki (1979), (1980), (1983).

same, as in the case here considered of a reduction in the long term rate of growth of the economy in the years following the first oil shock.

One may ask in fact if, as a consequence of the supply shocks ignited by the Kippur War, labour has become, in an overall meaning, more or less flexible a factor of production; which is to say if lifetime employment practices have further reduced or increased their scope among the available labour contracts.[4]

Muramatsu uses a simple partial adjustment model to handle labour as a quasi-fixed factor of production and a set of quarterly data on manufacturing; he finds that the speed of labour adjustment, and then implicitely its overall flexibility, has risen after the first oil shock; the principal reason is held by Muramatsu to lay in the looser conditions of the labour market prevailing after the shock, which have
reduced or increased their scope among the available labour contracts.[4]
trained employees while creating a pool of workers ready to be employed. A substantial difference indeed with respect to the late sixties and beginning of the seventies, when a diffuse condition of labour shortage kept the cost of dismissing or losing employees pretty high comparatively.[5]

Shimada and his associates, on the other hand, use a similar model and monthly data for several sectors of the manufacturing industry. They find that the speed of labour adjustment has decreased after the oil shock, a result they try to explain by stating that it costs less to adjust employment upwards than downwards[6] and that while the period before the shock saw a predominant upward adjustment, the period following the shock was dominated by downward adjustments.

The striking discrepancy in the results may be related either to differences in the model used or to different data sets being taken into consideration.

The models employed are however fairly similar derivations from a basic one-equation partial adjustment framework; it must be then the case that data selection plays quite an important role.[7]

The consequence is that, unless a criterium or some criteria may be established in the data selection, it is impossible to discriminate between results. The purpose of this paper is to present one of these criteria and then to choose a consistent data set to be estimated; some important variations to the basic model are also introduced in order to improve the realism of the assumptions.

Section 1 will introduce the criterium and the data, while Section 2 will deal with the model; results are presented in Section 3. Conclusions follow. The paper is completed by an Appendix.

[4] It is well known that few "lifetime employees" have been outrightly dismissed after the oil shock; flexibility has then to be intended in an overall meaning, and it is bound to rise if more flexible contracts increase their weight with respect to the lifetime employment ones. See for instance Koshiro (1983).

[5] Hiring costs, screening costs and severance payments are all related to the conditions of the labour market in the theory of human capital and internal markets. See Becker (1964) and Doeringer-Piore (1971).

[6] In other words severance payments are higher than hiring expences.

[7] This point has been confirmed to me during a personal conversation with Professor Shimada at Keio University.

1. CHOOSING THE DATA

In order to shed some light on the criterium needed for data selection, it is necessary to look at the set of measures of labour adjustment actually employed by many Japanese firms, and in particular the large ones, in the wake of the first oil shock. These practices may be classified into two categories:

a) *quantitative practices*, including the adjustment of working hours, the reduction of turnover, anticipated retirement, dismissal of temporary workers, reduction of subcontracting and finally dismissal of regular employees.

b) *qualitative practices*, including internal reallocation of surplus labour (haichi tenkan) and dispatchment of workers to different firms (shukko).[8]

To grasp the relative importance of the mentioned methods, the following except from a White Paper of the Economic Planning Agency seems to be worth quoting:

> "In Japan... the direct effect of employment adjustment on regular employees is relatively limited because employment practices in this country are based largely (namely in most big corporations) on the lifetime employment system. It is necessary, therefore, to pay attention to marginal aspects of employment adjustment, such as the reassignment of redundant personnel to subsidiaries and affiliates... The number of transferees increased more rapidly in the period up to 1976... in connection with workforce reductions at parent companies, separation of unprofitable divisions, and sales promotions through subsidiaries. In other words... they represented one of the *wide-ranging* measures taken by parent companies to prevent the erosion of their profit position."[9]

Moreover, a survey conducted by MITI on 485 big companies for the years immediately following the first oil shock allows for an evaluation of the popularity of different measures by giving the frequency of recourse to each of them[10]:

	1974	1975	1976
Reduction of overtime	42.1%	66.0%	52.8%
Internal transfer	39.9%	60.8%	54.4%
Dispatchment outside the firm	26.6%	40.4%	36.1%
Anticipated retirement	4.3%	8.7%	6.6%
Outright dismissal	0.8%	1.4%	0.8%

[8] For a more extensive treatment of the classification, see the survey by the Section on Industrial Behaviour of the Division on Industrial Policy, MITI (1981). Note that the practice of external dispatchment (shukko) is not limited to firms that are in particularly close relations, like the ones belonging to the same keiretsu or being in a parent-affiliate relation; it extends indeed quite often to firms that have no relation whatsoever but the one of sharing employment risks. See for instance Nakatani (1984).

[9] See p. 33 of the White Paper on the Status of the Japanese Economy by the Economic Planning Agency (1976–77).

[10] See Kobayashi (1979); analogous evidence is presented by Shinotsuka (1977).

As a matter of fact, quantitative measures often include steps that make them resemble qualitative adjustments. For instance, incentives to anticipated retirement have been often accompanied by refunding search costs and by good offices played by the management in order to facilitate re-employment.[11] As a consequence patterns of anticipated retirement and re-employment have come to resemble permanent transfers to other firms for the reduction of the risks and the costs of staying out of work and searching.

The relevance of qualitative adjustments bears some important consequence on the process of data selection: let us define indeed, for any period of time t

d_{ij} = quantitative variations of labour inputs in the firm j of sector i

ITR_{ij} = net transfers of employees between firm j and any other firm in sector i

ETR_{ij} = net transfer of employees between firm j and any other firm in sector i

n_{ij} = total variation of labour inputs for firm j in sector i

When data at the firm level are used, our basic information is given by

$$n_{ij} = d_{ij} + ITR_{ij} + ETR_{ij} \tag{2.1}$$

where no account is taken of internal transfers. When instead sector by sector data are used, we have

$$\textstyle\sum_j n_{ij} = \sum_j d_{ij} + \sum_j ETR_{ij} \tag{2.2}$$

being that transfers inside a sector cancel out. Finally, when macrodata are used, we have

(2.3) $\sum_i \sum_j n_{ij} = \sum_i \sum_j d_{ij}$ being that external transfers as well does cancel out.

Now, the study of labour adjustment deals with the relation between actual and desired variations in the labour input. It then requires the choice of the data set which describes these variations in the most complete fashion available.

Clearly it is formulation (2.1) to be the most complete description, because it only overlooks internal transfers. Formulation (2.3) is on the other hand the most incomplete one, because no flow of employees among firms is explicitely allowed for. Formulation (2.2) may be very close to (2.1) if qualitative adjustments inside a sector are not significant; the previous discussion has shown, I hope, that this is not necessarily the case. Both formulations (2.2) and (2.3) are then bound to underestimate the real adjustment process in the wake of the first oil shock by

[11] See Kajihara (1983).

overlooking qualitative measures in different degrees.

An indirect test of this proposition may indeed be developed: let us assume that, as in Muramatsu, the use of macrodata lead to the result that labour adjustment speed has increased after the oil shock. The expectation is that the use of microeconomic data, while eventually confirming the increase in the speed, will produce a much stronger variation by taking into account not only quantitative but also qualitative measures.

Following the criterium developed above, I have then chosen the NEEDS microeconomic data bank, which includes annual financial records from 1965 to 1981 of all the companies enlisted in one of the country's Stock Exchange Markets. Being that most previous considerations apply to a core of big companies in manufacturing,[12] I have selected a sample of these corporations in the fashion explained by the Appendix; I have thus obtained a cross section-time series data set which is the ingredient of the estimations performed.

2. THE MODEL

Both Muramatsu and Shimada use a version of the standard Oi's model of labour as a quasi-fixed factor of production. If then L^* is the desired demand for labour and L the actual level of labour being utilized, the model boils down to

$$L_t - L_{t-1} = \lambda(L_t^* - L_{t-1}) \qquad \text{where} \quad 0 < \lambda < 1 \tag{3.1}$$

A value of λ inside the unit circle implies that the representative firm cannot adjust instantaneously its demand for labour to the desired level, because of the existence of actual or prospective sunk costs like specific training, screening activities, severance payments and so on.[13] λ in other words stands roughly for the implicit labour adjustment cost function; the model (3.1) is indeed an approximation to the solution of an intertemporal deterministic cost minimization program.[14]

Let us now define

$X' = [x_w \, x_k \, x_m]$ as the vector of actual demands for labour, capital and materials

X^* = vector of desired demands for the same factors

B = matrix of adjustment parameters

u = vector of errors

(3.1) may then be generalized as

$$X - X_{-1} = B(X^* - X_{-1}) + u \tag{3.2}$$

where B is a diagonal matrix and

[12] In the vast literature on labour relations, the related essays in the book recently edited by Aoki (1983), in particular the ones by Koike and Tachibanaki, are worth mentioning. See also Koike (1981).

[13] See Oi (1962).

[14] For a proof see Berndt-Wavermann-Fuss (1978) and Muramatsu (1983).

(3.3) $$E(uu')=\sigma^2 I$$

The generalization reveals some properties of (3.1): particularly it shows how no relation, be it structural or stochastic, is allowed for among production factors. When a relevant time interval is considered, however, it becomes difficult to avoid interrelation, being that fixed factors like the capital stock in the long run are flexible.[15]

Interrelation may be introduced here very simply by replacing (3.3) with

(3.4) $E(uu')=\Sigma$ where σ_{ij} is nonzero if $i=j$

σ_{ij} is nonzero for some i different from j

namely, by the introduction of stochastic relations among the three factors.[16]

In order to estimate (3.2)–(3.4), the optimal demands have to be specified. Assuming then a three factor production function

(3.5) $Q=Q(K, L, E)$ where K is the capital stock

L is employment

E stays for materials

the corresponding cost function is

(3.6) $C=C(p_k, p_w, p_m, Q)$ where p_k is the price of capital

p_w is the price of labour

p_m is the price of materials

An explicit formulation of (3.6) may be obtained by using the translog approximation,[17] so that (3.2)–(3.4) becomes

(3.7) $M=BM^*+(I-B)M_{-1}+u$ where M is the vector of factor shares out of total cost C

and M^* is defined by[18]

[15] This critique was first produced by Nadiri and Rosen (1973).

[16] Truly, a more consistent introduction of interrelation among factors would require dropping the assumption of B being diagonal. The reason why this has not been done here is mainly computational, becuase of the difficulty of handling large amounts of data with standard processing packages like TSP when the model becomes too complicated.

[17] See Jorgenson-Christensen-Law (1973) and Berndt-Christensen (1973) for the general properties of the translog approximation.

[18] The formulation does not include any term related to technical change as a consequence of the assumption of Hicks' neutral innovations; adding up properties for factor shares and the need for well behaved cost functions imply the following restrictions

$$\textstyle\sum_i a_1=1 \quad \sum_i d_{ij}=0 \quad \sum_i d_{iq}=0 \quad d_{ij}=d_{ji}$$

$$M_i^* = a_i + \sum d_{ij} \ln P_j + d_{iq} \ln Q \tag{3.8}$$

Restrictions induced by the use of shares imply that the diagonal elements of B are all equal[19]

$$\lambda_i = \lambda \qquad \text{for all} \quad i \tag{3.9}$$

the consequence being that factor shares adjust at the same speed; however the same does not hold for the implicit factor demands, unless some stringent conditions are imposed on the dynamics of factor prices.[20]

In order to obtain estimates on a sector basis without using aggregation, the data are pooled sector by sector; for this purpose I have used the standard LSDV technique[21] which consists of allowing for a firm-related constant term in each equation while pooling the slope coefficients. If N is then the number of firms to be pooled in a generic industrial sector and T is the number of observations available for each firm, let us define the generic dummy variable as a column vector of dimension NT such that

$$\begin{aligned} D_i &= 0 \quad \text{if} \quad N \quad \text{is different from} \quad i \\ &= 1 \quad \text{if} \quad N \quad \text{is equal to} \quad i \end{aligned}$$

For sake of notation simplicity, let

$$P' = [d \ln p'_w \; d \ln p'_m \; d \ln p'_k \; d \ln Q']$$

be a matrix $NTx4$,

$$\begin{aligned} a_{w'} &= [a_{w1'} \cdots a_{wN'}] \\ a_{e'} &= [a_{e1'} \cdots a_{eN'}] \end{aligned}$$

be two vectors of constants

$$\begin{aligned} d_{w'} &= [d'_{ww} \; d'_{we} \; -(d_{ww} + d_{we})' \; d'_{wq}] \\ d_{e'} &= [d'_{we} \; d'_{ee} \; -(d_{ee} + d_{we})' \; d'_{eq}] \end{aligned}$$

[19] See Berndt-Savin (1975).

[20] In order to show the point let us take the labour share equation where C is assumed to be about the same as C_{-1} and C^*

$$wL = \lambda w L^* + (1 - \lambda) w_{-1} L_{-1}$$

and let us set $a = w/w_{-1}$ to have

$$L_t = \lambda \sum_{i=0}^{\infty} (1 - \lambda)^i \left(\frac{1}{a}\right)^i L_{t-i}$$

Unless we assume that $w/w_{-1} = p_m/p_{m-1} = p_k/p_{k-1}$, in other words a steady state condition for relative prices, factor demands do not adjust at the same pace.

[21] See Maddala (1977).

be two vectors of coefficients of dimension 4.

(3.8) may be then properly written by using the partitioned matrix notation:

$$\begin{vmatrix} M_w \\ M_e \end{vmatrix} = \begin{vmatrix} D_1 \cdots D_N & 0 & P & 0 \\ 0 & D_1 \cdots D_N & 0 & P \end{vmatrix} * \begin{vmatrix} a_w \\ a_e \\ d_w \\ d_e \end{vmatrix} + \begin{vmatrix} u_w \\ u_e \end{vmatrix} \tag{3.10}$$

The model belongs to the SURE class and may be estimated by using Zellner's technique; in order to avoid estimates that are related to the choice of the dependent equation, I have used an iterative procedure which consists of re-estimating the model with the "last step" values of the matrix of variances and covariances until convergence[22]; the method guarantees asymptotic convergence to Maximum Likelihood estimates.

As for testing, pooling is tested as follows: if SSE^0 is the sum of squares of residuals for each equation of the pooled model, SSE_i is the same sum related to each equation and to firm i belonging to sector j, k^* is the number of pooled parameters and k the total number of parameters, the test is

$$F = \frac{(SSE_0 - \sum SSE_i)/k^*(N-1)}{\sum SSE_i/N(T-k)} \tag{3.11}$$

In order to test for structural change in the parameters before and after the oil shock, the standard Chow test, namely, an F-test with $(k, T_1 + T_2 - 2k)$ degrees of freedom, has been replaced, for computational convenience, by a likelihood ratio test: if $L(H_0)$ is the value of maximum likelihood under the null hypothesis of no structural change and $L(H_1)$ that same value under the alternative hypothesis, then the test is given by

$$2[\ln L(H_1) - \ln L(H_0)] = \chi_r^2 \tag{3.11}$$ where r is the number of parameters tested for structural change

3. THE RESULTS

The possibility of pooling the data is crucial to the results and it is then tested in advance. I have first of all estimated the models (3.7) and (3.8), the second being a version of the first, obtained by setting $B = I$, where I is the identity matrix. Next I have computed the Chow test for structural change (3.11) between the two subperiods (1965–1973) and (1974–1981) in both versions to find that the null hypothesis of no structural change was always rejected,[23] Table 1 gives some

[22] The TSP program contains options for the iterative Zellner technique based on the optimazation of the likelihood function. Experiments conducted by the author show that results are independent of the equation chosen. Identification problems can be avoided in this formulation by assuming exogeneity of real output.

[23] Details may be obtained from the author on request.

TABLE 1. VALUES OF ASYMPTOTIC χ^2 IN SOME SECTORS*

Sector	χ^2 value	Critical value of χ^2 at 5% level of confidence
Automobiles	98.5	21.0
Steel	191.4	31.4
Heavy Chemicals	114.2	21.0
Transp. Machinery	116.6	28.8

* The other sectors include: Chemical Machinery, Oxygen, Shipbuilding, Pulp & Paper, Cement, Aluminium, Cotton Textiles, Metallurgic, Electric Appliances.

TABLE 2. SOME EXAMPLES OF POOLING TEST

Sector	Sample width	Critical F at 5% level of confid.	Labour share	Materials share
Metallurgic	Full sample	$F(30, 77)=1.602$	0.6711	0.9758
			Pooled accepted	
Transp. Machin.	Full sample	$F(25, 66)=1.654$	1.4871	0.6332
			Pooling accepted	
Chem. Machin.	Full sample	$F(33, 88)=1.545$	1.272	1.2914
			Pooling accepted	
Oxygen	Full sample	$F(30, 77)=1.602$	3.532	2.6070
			Pooling not accepted	
	1965–1973	$F(30, 24)=1.934$	1.397	1.115
	1974–1981	$F(30, 28)=1.869$	0.714	0.583
			Pooling accepted in the subsamples.	

TABLE 3. LIST OF POOLING TEST RESULTS

Sector	Labour share equation	Materials share equation
Pulp & Paper	Never accepted	Never accepted
Steel	Accepted in subsamples	Accepted in subsamples
Heavy Chemicals	Always accepted	Always accepted
Oxygen	Accepted in subsamples	Accepted in subsamples
Metallurgic	Always accepted	Always accepted
Aluminium	Always accepted	Always accepted
Cement	Always accepted	Always accepted
Transp. Machinery	Always accepted	Always accepted
Chemic. Machinery	Always accepted	Always accepted
Shipbuilding	Always accepted	Always accepted
Automobiles	Always accepted	Accepted in subsamples
Cotton Textiles	Always accepted	Always accepted
Electric Appl.	Always accepted	Always accepted

examples for model (3.8). The implication is that pooling has to hold in the two subsamples to start with, and then eventually hold in the full sample. While computing the F-test for pooling in different sectors, I have found indeed that

TABLE 4. SOME SAMPLES OF TESTING FOR DIAGONALITY

Sector	Value of χ^2	Critical value of χ^2 at 5% level of confidence
Automobiles	70.6	
Steel	142.2	
Cement	69.0	
Heavy Chemicals	47.4	3.8
Transp. Machinery	80.1	
Chemical Machin.	18.2	
Metallurgic	38.8	

TABLE 5. ESTIMATED VALUES OF λ IN BOTH SUBSAMPLES AND ALL SECTORS

1964–1973		1974–1981	
Cotton Textiles	0.699	Shipbuilding	0.954
Automobiles	0.686	Oxygen	0.862
Shipbuilding	0.651	Metallurgic	0.771
Aluminium	0.585	Transp. Machinery	0.769
Transp. Machinery	0.542	Electric Appl.	0.617
Electric Appl.	0.415	Cement	0.611
Metallurgic	0.395	Aluminium	0.563
Oxygen	0.386	Heavy Chem.	0.520
Chemical Machin.	0.374	Chemical Machin.	0.491
Steel	0.301	Cotton Text.	0.475
Cement	0.206	Steel	0.338
Heavy Chemicals	0.158	Automobiles	0.178

significance in the full sample always implies significance in the two subsamples, while the opposite does not generally hold; this fact should confirm the existence of structural change in an indirect way. Table 2 gives some examples of the pooling test and Table 3 lists the results in a convenient way: if F is the value of the F-test and F_c is the critical value, pooling is accepted when $F<F_c$; otherwise it is not accepted. Only in the case of Pulp & Paper is pooling rejected; the sector is then dropped from the analysis.

To complete the testing procedures, the diagonal model (3.7) is tested against the instantaneous version (3.8) with a likelihood ratio test. Table 4 gives again some samples of the asymptotic χ^2 values: All the sectors do indeed reject the null hypothesis of B being an identity matrix.[24]

[24] As above.

The main result of this paper is contained in Table 5, which presents the estimated values of λ in the two subperiods and in a sector by sector framework; the Table shows how 9 sectors out of 12 have experienced in the period following the first oil shock an increase in the adjustment speed of labour and other factors of production. These findings are quite different from the ones obtained by Shimada and associates and agree instead with the macroeconomic estimates derived by Muramatsu. This is not to say, however, that Shimada's remarks are to be rejected. Let us indeed assume a quadratic labour adjustment cost function such that negative variations of employment cost more than equivalent positive variations; in order to draw such a function, however, a standard coeteris paribus clause is needed in order to keep the economic environment uniform. (See Diagram 1) For instance, the general conditions of the labour market and the quality of labour employed must be assumed to be constant. When however a comparison between different periods is considered, like in the case of structural change in the wake of the first oil shock, variations in the economic environment and related variables must be taken into account.

In particular, the period after the first oil shock has been qualified by a sharp loosening of the labour market, which has induced, as pointed out by Muramatsu, a reduction in the adjustment cost of labour, namely, a shift on the left side of the function as shown in Diagram 1. Moreover, the rapid increase of part-timers and female employees, in other words labour at low adjustment cost, in the years following the shock has altered the composition of labour towards more flexible elements, which may be interpreted by a further shift on the left of the function in Diagram 1.[25] The use of microdata allows as well for a clear consideration of qualitative adjustments, in particular temporary loans of employees, which have been widely used after the shock because they permit a reduction of labour costs

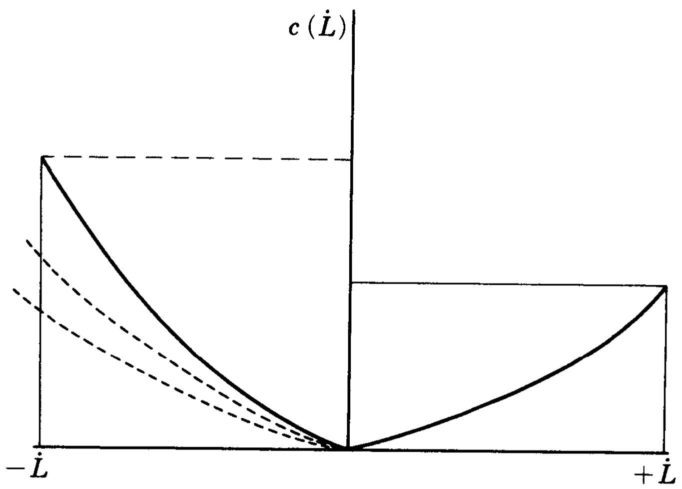

Diagram 1.
——, adjustment cost function; ----, shifts induced by changes in the economic environment.

[25] This point is often mentioned in the White Papers of the E.P.A.

without requiring the same adjustment burdens as in the case of dismissal. This fact too may be interpreted by a shift on the left of the function. Indeed, all the mentioned changes have reduced the cost of adjusting labour downwards, labour being here intended as the aggregate of all different types of implicit or explicit contracts being utilized.

Again, being that, as Shimada points out, negative adjustments are typical of the period after the oil shock while positive ones characterize more the period before, the mentioned shifts bear their impact mainly on the negative axis of the Diagram; now, the effect of changed conditions in the environment may be such for many sectors as to generate relatively low costs of downward adjustment and therefore a relatively higher speed in the adjustment itself.

Still, the performance among different industries is not completely uniform, as shown by 3 sectors (underlined in Table 5) out of 12, where the adjustment coefficient drops after the oil shock; is there then any relation between the difference in the dimension and dynamics of λ exhibited by the various sectors and their economic performance? In order to investigate the question I have fitted a simple model relating the value of λ of a generic sector with the average rate of growth of its industrial production (GIP) in both subsamples; using ordinary least squares as the fitting technique, I have obtained:

(1965–1973)

$$\lambda = 0.639 - 1.837 \text{ GIP}$$
$$(1.57) \quad (-1.5)$$

t-values in brackets
$F = 2.26$
$DW = 1.46$
$R^2 = 0.102$

(1974–1981)

$$\lambda = 0.640 - 1.147 \text{ GIP}$$
$$(4.37) \quad (-1.37)$$

t-values in brackets
$F = 1.9$
$DW = 0.416$
$R^2 = 0.091$

These poor results are without doubt a consequence of the peculiar behaviour of some sectors, Steel and Heavy Chemicals in the first subperiod and Steel, Cotton Textiles and Electric Appliances in the second one. If these sectors are dropped from the sample, I obtain:

(1965–1973)

$$\lambda = 0.7794 - 1.599 \text{ GIP}$$
$$(11.5) \quad (-4.34)$$

t-values in brackets
$F = 18.9$
$DW = 1.75$
$R^2 = 0.718$

(1974–1981)

$$\lambda = 0.731 - 5.452 \text{ GIP}$$
$$(17.7) \quad (-5.33) \qquad t\text{-values in brackets}$$
$$F = 28.5$$
$$DW = 1.74$$
$$R^2 = 0.774$$

The outcome improves strongly so that a general negative relation cannot be rejected between speed of adjustment and average performance in both subperiods at least in the majority (but not all) of the considered sectors.

Different interpretations may be brought forward to explain why generally sectors that perform better than average (at least in the sense that they produce more than average) adjust labour in a manner which is more sluggish than average.

For instance, an high relative average performance means that in case of cyclical fluctuations of the level of economic activity, expectations about future growth remain high and as a consequence there is a stronger incentive to develop implicit long term labour contracts that offer extensive job security.[26] At the same time, high growth generates relatively strong requirements of labour from the market, which are often more difficult and costly to be completely and rapidly satisfied than the requirements stemming from poor performance.

Results in Table 5 may be aggregated and then compared with estimates derived from a macroeconomic data set, in order to appreciate the eventual underestimation induced by the use of the latter. To do so I have estimated model (3.7) by using the data from the quarterly survey conducted by the Ministry of Finance[27] on incorporated enterprises in manufacturing with more than 10 millions yen of paid in capital. The presence in this survey of small and medium-sized enterprises may effect the absolute value of the adjustment coefficient, because smaller institutions tend to adjust labour more quickly than others.[28] However, being that the interest focuses more on the variation than on the absolute amount

TABLE 6. COMPARISON OF DIFFERENT METHODS TO OBTAIN AGGREGATE λ

Method used	Value of λ		Variation
	(1965–1973)	(1974–1981)	
Macrodata used	0.634	0.673	+0.061%
Microdata used	0.395	0.595	+0.506%

[26] See for instance suggestions by Shimada and Nishikawa (1980) who, in an international framework context, mention the high level of average Japanese performance as a reason for its sluggish factor adjustment.

[27] See Ministry of Finance, several issues from 1965 to 1983.

[28] See Shinotsuka (1977).

of the coefficient λ, these differences are less relevant.

Model (3.7) has been estimated by IV3SLS, following the suggestions of Berndt and Wood[29] about endogeneity of relative prices in a macroeconomic context; Table 6 is then obtained: While the value derived from microdata doubles after the first oil shock, the value estimated from macrodata increases only marginally. We have then an indirect test of the importance of qualitative measures of adjustment and the consequent relevance of microdata as a correct data set; indeed, the use of macrodata leads, as expected, to substantial underestimation of the variation of the speed of adjustment coefficient λ.

4. CONCLUSIONS

This paper has been stimulated by some contradictory results on the pattern of labour adjustment in the Japanese economy after the first oil shock and argues that these contradictory results stem from different data sets being used. It then furnishes a criterium to select the data, which is based on the appreciation of employment flows among firms and sectors.

The consequent choice of microeconomic data and some necessary adjustments of the model being used generate the following results:

a) labour adjustment did increase its speed after the first oil shock in most sectors both as a consequence of looser labour market conditions and of changes in the composition of labour toward more flexible components; the result does not imply however that Shimada's considerations about labour adjustment costs have to be dropped.

b) sectors performing better than average generally adjust more sluggishly than average because of either the relatively large amounts of upward adjustment or the high expectations when facing cyclical fluctuations.

c) if the results obtained through microeconomic data are compared with those obtained from macroeconomic information, a direct appreciation of the degree of underestimation implied by the latter may be obtained.

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[29] See Berndt-Wood (1975).

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APPENDIX

In order to select among the large number of firms, I have chosen firms belonging to the first section of the Tokyo Exchange Market, which includes the largest corporations and firms. Some of these firms have then been discarded because of their data being too difficult to handle when utilized for computing simple and basic indicators (like the ratio of cost to output). The industrial sectors have been chosen by picking up those sectors whose share in the total sales were superior to a defined threshold (1.5% of the total sales in the economy). Some other sectors have then been added for their particular interest. Adopting a partition between basic and final goods industry, the list of the sectors is (in brackets appears the number of firms pooled in the sector):

Basic Industry	Final Goods Industry
Pulp & Paper (5)	Electric Appliances (8)
Steel (8)	Automobiles (4)
Heavy Chemicals (5)	Transportation Machinery (7)
Oxygen (7)	Shipbuilding (6)
Cotton Textiles (4)	Chemical Machinery (8)
Metallurgic (7)	
Aluminium (4)	
Cement (5)	

As for the variables used, they have been computed as follows:

p_i = output deflator of sector i
s_{ij} = sales of firm j of sector i
Inv_{ij} = inventories of firm j in i
p_{mb} = raw materials deflator
p_{mf} = raw materials and intermediate goods deflator
I_{ij} = interests paid by firm j in i
D_{ij} = devidends paid by firm j in i
R_{ij} = rents paid by firm j in i
Dep_{ij} = depreciation allowance of firm j in i
K_{ij} = capital of firm j in i
L_{ij} = labour of firm j in i
RM_{ij} = raw materials j in i
W_{ij} = wages
p_I = investment goods deflator

Then

$Q_{ij} = (S_{ij} + Dinv_{ij})/p_i$
$p_{wij} = W_{ij}/L_{ij}$
$p_{kij} = [(I_{ij} + D_{ij} + R_{ij} + Dep_{ij})/K_{ij}]p_I$ user cost of capital
$C_{ij} = p_{wij}L_{ij} + RM_{ij} + (p_{kij}/p_I)K_{ij}$ total cost for firm j in i
$p_m = p_{mb}$ for basic industries
$p_m = p_{mf}$ for final goods industries

Data on prices and deflators are all available at a sector by sector level.