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THE FLEXIBILITY OF FIRMS AND ITS EFFECT ON DISEQUILIBRIUM AND EMPLOYMENT

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I - INTRODUCTION

Keynesian macroeconomic theory indicates that state economic policy should support the demand increase, which promotes production and employment, and macro-econometric models of employment deal traditionally with demand on good market. But the analysis at disaggregated level requires more precaution, because the firms are more or less technically flexible to adjust (with profits) their production to demand fluctuations (MALINVAUD (1983)). The costs of labour adjustment by engagement/layoff or by making much use of existing labour may influence the firm's adaptability (ARTUS, LAROQUE, MICHEL (1984)). We shall neither discuss the reasons why firms do not adjust the employment to demand needs, nor analyse the consequences on firm's profitability. We will only analyse empirically if firms anticipate correctly the demand, and we will measure the extent of aggregated misadjustments of production and employment by comparison with perfect flexibility case.

We use qualitative panel data from quarterly business survey in industry (cf. FAYOLLE (1987)). The questions concerning demand and employment have a qualitative form. For example, "Manpower and weekly duration of work" : expected tendency during 3 or 4 next months : Manpower ↗ → ↘ , weekly hours of work ↗ → ↘ . Or, "Demand evolution during last 3 or 4 months" : ↗ → ↘ . These data are transformed into quantitative ones by some empirical , more or less accurate statistical technics. The most used one is the balance calculus : $s_t = p_{.,+,t} - p_{.,-,t}$ where s_t is the difference between the proportion of increase answers $p_{.,+,t}$ and of decrease answers $p_{.,-,t}$ associated with period t.

The demand, production and manpower curves of such data for France from 1980 to 1990 (cf figures I, in appendix) indicate that the predictions of demand are generally too optimistic because they overreach the realisations as if there exist systematic expectations'errors or as if decider take into account some external demand (from State for instance). Globally that is for all productive industrial activities, the predictions and observations of demand were decreasing till 1986 and the increase of predictions of demand precede the increase of real demand after this date. The same kind of comments apply for production curves, the predictions and realisations of production were also decreasing till 1986. But after 1987 the firms produce more than they expected, as if they want to stock for future demand movements. The uncertainty of firms is less about manpower use, the curves of predictions and real utilisations are similar. In both cases the trend is negative, with a slowing down after 1987. Such are the general observations of quarterly business survey data.

The aim of this paper is to analyse the expectation scheme used by firms to discuss the aggregation problems and to exhibit some relations between flexibility and disequilibrium on labour and good markets. The paper contains two independent parts. In section 2 we present the results of empirical tests relative to the rational expectation hypotheses. We try also to solve analytically the problem of impact of individual errors on prediction of demand on the exchanged quantity and, consequently, on global labour utilisation (labour value, in marxian terminology). In section 3 we discuss the disequilibrium and the adjustment of employment.

The analysis is performed along the principles specified by MUELLBAUER (1978), MALINVAUD (1982), GOURIEROUX and LAROQUE (1985) and used in some previous papers of the author GOURIEROUX-PEAUCELLE (1987), (1990).

II - EXPECTATIONS OF DEMAND BY FIRMS AS A MEASURE OF THEIR FLEXIBILITY

a) Empirical tests on the expectations of demand

An expectation is said to be rational if it coincides with the best possible prediction function of the available information : $\hat{d}_t = E(d_t/I_{t-1})$ where E(/) denotes the conditional expectation. When the available information of the firm is unknown, this rational expectation hypothesis is the conjonction of two conditions : the unbiasedness condition : $E\hat{d}_t = EE(d/I_{t-1}) = Ed_t$, (there is no systematic prediction error) and the orthogonality between prediction and prediction error :

$E\hat{d}_t(d_t - \hat{d}_t) = 0$.

These two conditions can be easily studied through the regression of the realisation on the expectations $d_t = \alpha + \beta \hat{d}_t + u_t$, where u_t is a zero mean error which is orthogonal to $\hat{d}_t$. The hypotheses of unbiasedness and of orthogonality are equivalent to the constraints : $\alpha = 0$ and $\beta = 1$. The regression estimated for all firms (from 1974 to 1982) gives :

$$d_t = - \underset{(0.02)}{0.05} + \underset{(0.17)}{1.03}\, \hat{d}_t$$

where $d_t = s_t$ and $\hat{d}_t = \hat{s}_t$ (are evaluated by their balance counterparts)

The probability to overrun the value of FISHER statistic associated with $\alpha=0$, $\beta=1$ is 3 % and the hypothesis of R.E. can be nearly accepted. The same approach applied to firms classified by activity and size (in number of wage-earners) show (see table I in appendix) that the acceptation or rejection of the R.E. hypothesis greatly depends on these characteristics. The hypothesis is accepted for textile and chemistry firms of every size and for big firms of metallurgy and equipment.

When R.E. hypothesis is rejected it is important to understand why and for instance to know if it is due to biasedness of predictions or to nonorthogonality between predictions and prediction errors. The test performed at disaggregated level indicates that the rejection is mainly a consequence of the unbiasedness condition (see table II). Only in one case (chemistery firms of 500-1000 wage-earners) the throwing out come from non acceptance of the orthogonality condition.

We also note that the rejection of the R.E. hypothesis at micro level can be compatible with its validity on aggregated level. One verifies it easily. Let us consider K different groups of firms with respective size $\mu_{k,t}$ $k=1 \dots k$; if for each group the R.E. hypothesis is satisfied :

$\hat{d}_{k,t} = E\,(d_{k,t}/I_{t-1})$ and if the structure $\mu_{k,t}$ is time independent, we have for aggregated level :

$$\sum_{k=1}^{K} \mu_k \hat{d}_{k,t} = E\,(\sum_{k=1}^{K} \mu_k d_{k,t} / I_{t-1}),$$

$$\hat{d}_t = E\,(d_t/I_{t-1})$$

But if the structure changes, the previous result is no more valid ; we got :

$$d_t = \sum_{k=1}^{k} \mu_{k,t}\, d_{k,t}$$

and $$\hat{d}_t = \sum_{k=1}^{k} \mu_{k,t-1}\, \hat{d}_{k,t} \neq E\,(d_t / I_{t-1})$$

At this stage we have implicitely assumed that all the firms use the same information. It is possible to extend the previous result to some cases of differentiated information. For instance we can assume that the managers of big firms dispose of better information and can make better predictions. In order to check it, we construct for each activity group table with double entries. The elements of the table $M_{k,e}$ represent empirical means of products of expectations of firms with size k and errors of prediction of firms with size e.

$$M_{k,e} = \frac{1}{T}\, \hat{d}_{k,t}(d_{e,t} - \hat{d}_{e,t})$$

That quantity is an approximation of theoretical moments $E\, \hat{d}_{k,t}(d_{e,t} - \hat{d}_{e,t})$. If the hypothesis of information increasing with size is satisfied, then the elements $M_{k,e}$ with e>k must be non significative. Empirical results confirm this supposition only for firms of metallurgy and equipment. The role of information (size of firm) for good prediction dicrease in agriculture and press. For other firms the difference in size has no importance for quality of predictions.

b) Expectations of demand by firms and their effect on disequilibrium

We consider a continuum of firms, indexed by ω. Each firm has a production function with K complementary factors $k = 1, \ldots, K$. This production function is characterized by the technical coefficients $A_k(\omega)$, $k = 1, \ldots, K$. A potential demand $D(\omega)$, is attached to each firm ; this demand is partly unknown when production decisions are made. The firm ω expects a demand equal to $\hat{D}(\omega)$ and chooses the input levels adequately ; these levels are :

$\hat{X}_k(\omega) = \hat{D}(\omega) / A_k(\omega), \qquad k = 1, \ldots, K.$

When the exchanges between suppliers and demanders take place, the resulting exchanged quantities at the microlevel will be :

$$(1) \qquad Q(\omega) = \mathrm{Min}\,(D(\omega), \hat{D}(\omega))$$

Among the firms some firms overpredicted the demand and are constrained by real demand ; some others underpredicted the demand and the corresponding demand cannot be entirely satisfied. Then two regimes are defined depending on the inequality $\hat{D}(\omega) > D(w)$ or $\hat{D}(\omega) < D(\omega)$, which is fulfilled.

When the distribution of the technical coefficients $A_k(\omega)$, $k = 1 \ldots K$ and of the real and expected demand $D(\omega)$, $\hat{D}(\omega)$ is given, it is possible to compute the aggregate counterparts of all the previous quantities, simply by taking the expectations. For example, the aggregate exchanged quantity is :

$$(2) \qquad \bar{Q} = E\,Q(\omega) = E\,\mathrm{Min}\,[\hat{D}(\omega), D(\omega)] \quad ;$$

the proportions of firms in each regime are :

$$(3) \qquad \begin{cases} \pi = P\,[\hat{D}(\omega) > D(\omega)], \\ 1 - \pi = P\,[D(\omega) > \hat{D}(\omega)]. \end{cases}$$

For purpose of tractability, we will assume a particular form for the distribution of $\{A_k(\omega),\ D(\omega),\ \hat{D}(\omega)\}$. In order to be compatible with the tendency surveys on firms, in which the questions are relative to the modification of demand, we assume that these variables are jointly log-normally distributed. Therefore it will be interesting to introduce the logarithm of the different variables, which are normally distributed. The logarithm will be denoted by lower-case letters ; that,
$d(\omega) = \text{Log}\ D(\omega),\ \hat{d}(\omega) = \text{Log}\ \hat{D}(\omega)\ \ldots$

If η^2 is the variance of demand $d(\omega)$, σ^2 the M.S.E. $\sigma^2 = V[\hat{d}(\omega) - d(\omega)]$ and m the average demand (i.e. the aggregate demand), the distribution is :

$$\begin{bmatrix} d \\ \hat{d} \end{bmatrix} \sim N \left(\begin{bmatrix} m \\ m \end{bmatrix} , \begin{bmatrix} \eta^2 & \eta^2 - \sigma^2 \\ \eta^2 - \sigma^2 & \eta^2 - \sigma^2 \end{bmatrix} \right)$$

Proportion of demand constrained firms

Under the R.E. hypothesis the probability of overpredicting equals the probability of underpredicting. Therefore it is natural to obtain : $\pi = 1-\pi = \frac{1}{2}$

This result is easily checked since :

$\pi = P[\hat{D}(\omega) > D(\omega)] = P[\hat{d}(\omega) > d(\omega)]$

$= P[\varepsilon(\omega) > 0]$, where $\varepsilon(\omega)$ is the prediction error. Thus $\pi = \frac{1}{2}$, since $\varepsilon(\omega)$ has a centered normal distribution.

Calculation of the exchanged quantity

The exchanged quantity at macro level is given by :

$$\bar{Q} = \exp m(p)\ \ E\{\exp \hat{u}(\omega)\ \ \text{Min}(\exp[u(\omega) - \hat{u}(\omega)],\ 1)\}$$

$$= \exp m(p)\ \ E\{\exp \hat{u}(\omega)\ \ \text{Min}(\exp \varepsilon(\omega),\ 1)]$$

The error $\varepsilon(\omega)$ and the prediction $\hat{u}(\omega)$ are uncorrelated, or independent in our gaussian case. Where p is the price of the output introduced through aggregate demand, i.e. through fonction m. Therefore we get:

$$\bar{Q} = \exp m(p) \quad E \exp \hat{u}(\omega) \quad E \operatorname{Min}(\exp \varepsilon(\omega), 1)$$

$$= \exp m(p) \quad \exp\left[\frac{\eta^2 - \sigma^2}{2}\right] \left\{ P(\exp \varepsilon(\omega) > 1) \right.$$

$$\left. + \int_{\exp \varepsilon(\omega) < 1} \frac{1}{\sigma\sqrt{2\pi}} \exp \varepsilon \exp\left(-\frac{\varepsilon^2}{2\sigma^2}\right) d\varepsilon \right\}$$

$$= \exp\left[m(p) + \frac{\eta^2}{2} - \frac{\sigma^2}{2} \right] \left\{ \frac{1}{2} + \Phi(-\sigma) \exp\left(\frac{\sigma^2}{2}\right) \right\},$$

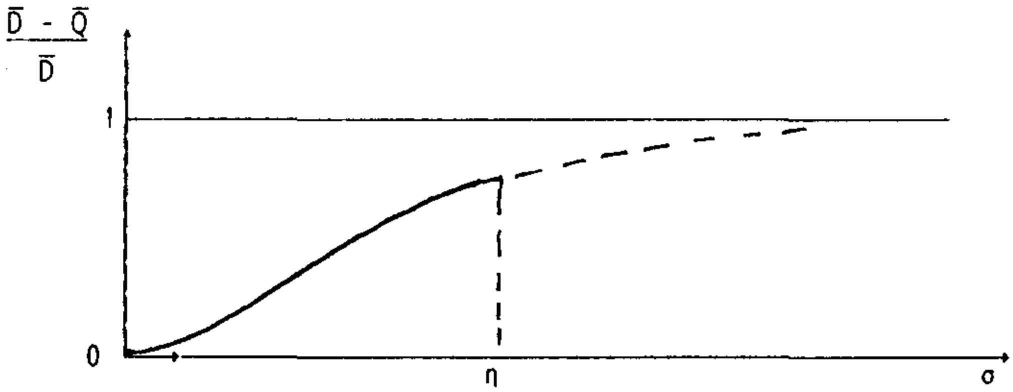
where Φ is the c.d.f. of the standard normal distribution. Noting that $\bar{D} = \exp\left(m(p) + \frac{\eta^2}{2}\right)$, we finally obtain the following expression

$$\bar{Q} = \bar{D} \left\{ \frac{1}{2} + \Phi(-\sigma) \exp\left(-\frac{\sigma^2}{2}\right) \right\}. \tag{4}$$

We may note that a relative measure of excess demand is given by the ratio :

$$\frac{\bar{D} - \bar{Q}}{\bar{D}} = -\frac{1}{2} \exp\left(-\frac{\sigma^2}{2}\right) + \Phi(\sigma). \tag{5}$$

This excess demand only depends on the variance of the prediction error σ^2, but it is not linked to the price p or to the heterogeneity of demand η^2. In the limit case $\sigma = 0$, no prediction error exists and this cause of disequilibrium disappears : we get $\frac{\bar{D} - \bar{Q}}{\bar{D}} = 0$. When σ increases, the disequilibrium is more and more important. The maximal disequilibrium is attained when σ^2 equals the variance of the demand η^2.



PREDICTION ERRORS

As seen in the previous subsection, the rational expectation hypothesis is the conjunction of two hypotheses : the unbiasedness and the orthogonality hypotheses.

<u>The parameterization</u>

Even if they are unbiased, the predictions may not be optimal when the prediction error is correlated with the prediction : Cov $(\hat{d}, d-\hat{d}) \neq 0$ (see table II). In such a case the available information has not been fully taken into account and the prediction might be improved by considering the linear regression of demand d on the prediction $\hat{d}$. This improved prediction is given by :

$$\hat{d} = m + \frac{\text{Cov}\ (d, \hat{d})}{V\ \hat{d}} (\hat{d} - m) \ .$$

It is natural to introduce a parametrization of the variance-covariance matrix in which the correcting factor $\lambda = \frac{\mathrm{Cov}\,(d, \hat{d})}{V\hat{d}}$ and the quality of improved prediction, i.e. $\sigma^2 = V\,(d-\hat{d})$ simultaneously appear with the variance η^2 of demand. With these notations the covariance matrix is given by :

$$V \begin{bmatrix} d \\ \hat{d} \end{bmatrix} = \begin{bmatrix} \eta^2 & \frac{\eta^2 - \sigma^2}{\lambda} \\ \frac{\eta^2 - \sigma^2}{\lambda} & \frac{\eta^2 - \sigma^2}{\lambda^2} \end{bmatrix},$$

assuming that the correcting coefficient λ is positive [This latter condition is generally satisfied in practice].

The uncorrelation case occurs when no correction is necessary, i.e. when the correcting factor equals one. $|\lambda-1|$ is a measure of the information not optimally used for predicting d.

It will be useful to present this parameterization in another equivalent way. Indeed if w denotes the centered reduced expected demand $w = \frac{\lambda}{\sqrt{\eta^2 - \sigma^2}}\,(\hat{d} - m)$, and v the reduced corrected prediction error, we get

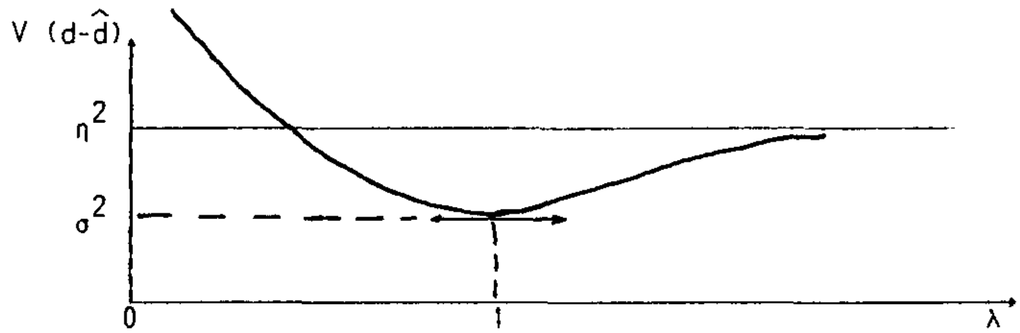
$$(6) \quad \begin{cases} \hat{d} - m = \frac{\sqrt{\eta^2 - \sigma^2}}{\lambda}\, w, \\ d - m = \sqrt{\eta^2 - \sigma^2}\; w + \sigma\, v, \end{cases} \qquad \text{where } \begin{pmatrix} w \\ v \end{pmatrix} \sim N \left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \right]$$

The parameters have to satisfy the constraints $\eta^2 > \sigma^2$, $\lambda > 0$. Under model (6) the uncorrected prediction error is given by :

$$(7) \quad V\,(d - \hat{d}) = V\,d + V\,\hat{d} - 2\,\mathrm{Cov}\,(d, \hat{d})$$

$$= \eta^2 + (\eta^2 - \sigma^2)\,\frac{1}{\lambda}\,(\frac{1}{\lambda} - 2).$$

The graph of this variance as a function of λ is given below and it attains its minimum value, when orthogonality holds, i.e. when $\lambda = 1$,



<u>Expression of the exchanged quantity</u>

Due to the correlation between the prediction and the prediction error, the exchanged quantity has an expression in terms of integrals. It may be proved that such an expression is :

$$(8) \qquad \bar{Q} = \exp m \left\{ E \left[\left(\exp \frac{\sqrt{\eta^2 - \sigma^2}}{\lambda} w \right) \left(1 - \Phi\left(\frac{1}{\sigma} \left(\frac{1}{\lambda} - 1 \right) \sqrt{\eta^2 - \sigma^2}\, w \right) \right) \right] \right.$$

$$\left. + \exp \frac{\sigma^2}{2} E \left[\left(\exp \sqrt{\eta^2 - \sigma^2}\, w \right) \Phi\left(\frac{1}{\sigma} \left(\frac{1}{\lambda} - 1 \right) \sqrt{\eta^2 - \sigma^2}\, w - \sigma \right) \right] \right\}$$

where Φ is the cdf of a standard normal and w a random variable with a standard normal distribution.

For the limit cases $\lambda = 0$ and $\lambda = +\infty$, it is easily seen that $\bar{Q} = \bar{D}$ and $\bar{Q} = E \text{ Min } (D, \exp m)$ respectively. In the case $\lambda = +\infty$, the variance of $\hat{d}$ is equal to zero or equivalently $\hat{d} = m$. This prediction coincides with the rational expectation in absence of information. In particular we know that the exchanged quantity associated with $\hat{d} = m$ is smaller than the exchanged quantity corresponding to $\lambda = 1$, since for $\lambda = 1$ the prediction is rational, but does not coincide with $m = Ed$.

Property

$$\begin{cases} \text{If } \lambda > 1, & \dfrac{\partial \operatorname{Log} \bar{Q}}{\partial \operatorname{Log} \lambda} < -(\eta^2 - \sigma^2)(1-P) \ ; \\ \text{If } \lambda < 1, & \dfrac{\partial \operatorname{Log} \bar{Q}}{\partial \operatorname{Log} \lambda} > -(\eta^2 - \sigma^2)(1-P). \end{cases}$$

This result gives some bounds for the elasticity.

III - DISEQUILIBRIUM ON LABOUR MARKET AND ADJUSTMENT OF EMPLOYMENT

In previous section we discussed the measure of efficiency of labour utilisation by mean of the flexibility of firms on the good market. We have considered the case where labour is a fixed production factor proportionally linked to the expected demand. Such an approach does not take into account possible quantity constraints existing on labour market. This is such an extension we want to discuss in this section.

a) Direct study of labour expectations

In a first approach we may simply consider that the flexibility of firms on labour market can be measured by comparing labour expectations to labour realizations. At each period (i.e. quaterly for the business survey) the manager predicts the evolution of manpower and of weekly hours of work in his firm. As for demand (see section 2) we can test the R.E. hypothesis. The regression of the realisations on the expectations estimated for all firms and for manpower is :

$$e_t = \underset{(0.01)}{-\,0.08} + \underset{(0.09)}{0.39}\, \hat{e}_t \qquad , \ t = 1974, \ldots, 1982$$

Therefore we reject the R.E. hypothesis. The similar regressions estimated for different sectors and sizes induce to reject the R.E. hypothesis in 50 % of cases [Tab. III]. These results may seem surprising compared to the result concerning demand expectations. Indeed the employment level might be considered in the short run as a decisional variable better known by the manager than the exogeneous demand and also less flexible.

b) <u>Expectations and disequilibrium on labour market</u>

To avoid the use of labour expectations for which the question of the survey seems to be misunderstood, an alternative approach consists in extending the disequilibrium model of section 2, taking into account the possibility of labour constraints. As before, we assume that we are structually in a regime of demand constraint on the good market. To choose the production level the manager takes into account its ideas on demand, i.e. the demand expectation, and the different constraints existing on labour market. As usual (see LAMBERT (1990), FRANZ-KONIG (1990) these constraints are defined through some maximal quantities of labour.

Let us denote by :

L_S the available labour supply

L_C the capacity employment, i.e. the amount of labour needed to produce up to full capacity

L_D and $L_{\hat{D}}$ the amount of labour needed to satisfy demand and expected demand respectively. The labour quantity naturally retained by the manager is :

$$L = \mathrm{Min}\ (L_{\hat{D}}, L_S, L_C)), \qquad (9)$$

and does not correspond in general to the demand determined employment L_D. Then the exchanged quantity corresponds to the labour level $L_Q = \mathrm{Min}\ (L, L_D)$.

To simplify the presentation we assume in the rest of the paper that the firms have over capacity of production, i.e. that the constraint associated with L_c is not binding. This assumption is compatible with the empirical results obtained by LAMBERT (1990) fig. II, showing that the probability that this constraint is binding is very small for all the periods.

Under this assumption, we get :

$$(10) \quad L = \text{Min}\ (L_{\hat{D}}, L_S),$$

$$L_Q = \text{Min}\ (L_D, L_{\hat{D}}, L_S).$$

The disequilibria on the labour market depends on the position of the desired labour demand $L_{\hat{D}}$ with respect to labour supply L_S. If $L_{\hat{D}} < L_S$ the labour market is demand constrained, it is supply constrained otherwise.

Similarily the disequilibria on the good market depend on the position of D with respect to $\hat{D}$ or equivalently of L_D with respect to L_D. If $L_{\hat{D}} < L_{\hat{D}}$ the good market is demand constrained, it is supply constrained otherwise.

The complete description of the different possible regimes is given in the table below.

INEQUALITIES	CONSTRAINT ON GOOD MARKET	CONSTRAINT ON LABOUR MARKET
$L_{\hat{D}} < L_S < L_D$	Supply constrained	Demand constrained
$L_{\hat{D}} < L_D < L_S$	Supply constrained	Demand constrained
$L_D < L_S < L_{\hat{D}}$	Demand constrained	Supply constrained
$L_D < L_{\hat{D}} < L_S$	Demand constrained	Demand constrained
$L_S < L_D < L_{\hat{D}}$	Demand constrained	Supply constrained
$L_S < L_{\hat{D}} < L_D$	Supply constrained	Supply constrained

Compared with the classical disequilibrium models on good and labour markets (see MALINVAUD (1982)), where the regime in which good is demand constrained and labour is supply constrained (called underconsumption in the literature) does not exist, we note that the introduction of a dynamic through the expectations allows the existence of this regime.

If we assume that the previous formulation is valid at the micro level,it would be possible as in section 2 to compute the aggregate quantities and to relate the magnitude of disequilibria to the quality of expectations. To precise the analogy we can consider the case in which in the short run the good quantities are proportional to labour quantities with a fix proportionality coefficient k. In such a case we get :

$$L_Q = \frac{Q}{k} = \frac{1}{k} \text{ Min } (D, \hat{D}, kL_S)$$

Then the aggregate labour quantity are :

$$\bar{L}_Q = \frac{1}{k} \text{ E Min } (D, \hat{D}, kL_S),$$

The precise expression of this variable can be deduced from the joint distribution of D, $\hat{D}$ and kL_S however the obtained expression is tedious and it is better to consider the aggregate level conditional to the magnitude of the supply labour constraint, i.e. to compute the conditional expectations :

$$\bar{L}_Q(s) = \frac{1}{k} \text{ E(Min}(D,\hat{D},kL_S) \;/\; kL_S = \exp s) \quad , \quad s \text{ varying.}$$

In such a case the result can be derived following the same lines as in section 2. Let us for instant consider the case of a normal distribution for the variables

$$d = \text{Log } D \quad , \quad \hat{d} = \log \hat{D} \quad , \quad s = \log kL_S \quad ,$$

with an unbiasedness condition of the prediction given s . We know that the conditional distribution of d, $\hat{d}$ given s is also a normal distribution with mean which is a linear function of s and a variance-covariance matrix independent on the conditioning variable. Therefore the analogue of condition (6) becomes :

$$(11)\quad \left\{ \begin{array}{l} \hat{d} - m_0 - m_1 s = \sqrt{\dfrac{\eta^2 - \sigma^2}{\lambda}}\, w , \\ \\ d - m_0 - m_1 s = \sqrt{\eta^2 - \sigma^2}\, w + \sigma v , \end{array} \right. \quad \text{where} \begin{pmatrix} w \\ v \end{pmatrix} \quad N\left[\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \right]$$

Under these assumptions it may be proved that the conditional aggregate quantity is :

$$(12)\quad \bar{L}_Q(s) = \frac{1}{k} \exp(m_0 + m_1 s) \left\{ E \left[\mathrm{Min} \left(\exp \frac{\sqrt{\eta^2 - \sigma^2}}{\lambda} w , \exp(s - m_0 - m_1 s) \right) \right. \right.$$

$$\left. \left. \times \left\{ 1 - \Phi \left[\frac{\mathrm{Min}\left(s - m_0 - m_1 s , \dfrac{\sqrt{\eta^2 - \sigma^2}}{\lambda} w \right)}{\sigma} - \frac{\sqrt{\eta^2 - \sigma^2}}{\sigma} w \right] \right\} \right] \right.$$

$$\left. + \exp \frac{\sigma^2}{2} E \left\{ \exp \sqrt{\eta^2 - \sigma^2}\, w\, \Phi \left[\frac{1}{\sigma} \mathrm{Min} \left(s - m_0 - m_1 s , \frac{\sqrt{\eta^2 - \sigma^2}}{\lambda} w \right) - \frac{1}{\sigma} \sqrt{\eta^2 - \sigma^2}\, w - \sigma \right] \right\} \right\} .$$

This expression generalizes equation (8), which is obtained for the limit case $m_1 = 0$ s tends to infinity for which there is no effect of the supply labour constraint. Compared to the results of section II, the curves have the same form, but the limits for λ tending to zero or to infinity are different and take into account the labour supply constraint. We get :

$$\text{for } \lambda = 0 \ : \ \bar{L}_Q^0(s) = \frac{1}{k} \quad \exp s \; E\left[1 - \Phi\left(\frac{s-m_0-m_1 s}{\sigma} - \frac{\sqrt{\eta^2-\sigma^2}}{\sigma} w\right)\right] + \bar{D}$$

$$\text{for } \lambda = +\infty \quad \bar{L}_Q^{\infty}(s) = \frac{1}{k} \; E \text{ Min } (D, \exp m, \exp s) \quad .$$

We can note that the behaviour of the first limit with s strongly depends on the position of coefficient m_1 with respect to one. If $m_1 < 1$, then $\bar{L}_Q^0(s)$ tends to $\bar{D}$, when s tends to infinity (the labour supply constraint has no effect). However when $m_1 > 1$, $\bar{L}_Q^0(s)$ tends to infinity ; in fact the behaviour of the exchanged quantity (labour value) does not only depend on the second order moment of the demand expectations, but also on the link between labour supply and labour demand. In effect the coefficient m_1 is nothing else than the regression coefficient of d on s, i.e. $m_1 = \frac{Cov(d,s)}{Vs}$, and the effect of labour supply constraint persist asymptotically if the correlation $corr(d,s) = \frac{Cov(d,s)}{\sqrt{Vd\ Vs}} = m_1 \sqrt{\frac{Vs}{Vd}}$ is too large.

c) <u>Adjustment of employment</u>

Different approaches may also be considered for discussing adjustment of employment for instance.

At the firm level the first equilibrium to reach is one on the good market, while labour and finance equilibria are, in a sense, secondary. That's why we privilege the demand expectations as principal factor of employment adjustment.

A very simple model will consists in a regression of labour modification on some lagged expectation errors on demand. Since the survey contains two different measure of labour : manpower and weekly hours of work. It is natural to perform such a regression for each of these variables :

$$\Delta e_t = \sum_{i=1}^{p} \lambda_i (D_{t-i} - \hat{D}_{t-i}) + u_t$$

$$\Delta h_t = \sum_{i=1}^{p} \mu_i (D_{t-i} - \hat{D}_{t-i}) + v_t$$

where e_t is manpower at time t, h_t weekly hours of work at time t and $\Delta e_t = e_t - e_{t-1}$

Moreover we may think that the adjustment on h_t will be easier in the short run that the adjustment on e_t . Therefore we can hope that the first coefficients $\mu_1, \mu_2 \dots$ are much larger than the first coefficients λ_1, λ_2 ... and at the opposite that the long run coefficient $\sum_{i=1}^{p} \lambda_i$ is much larger than $\sum_{i=1}^{p} \mu_i$.

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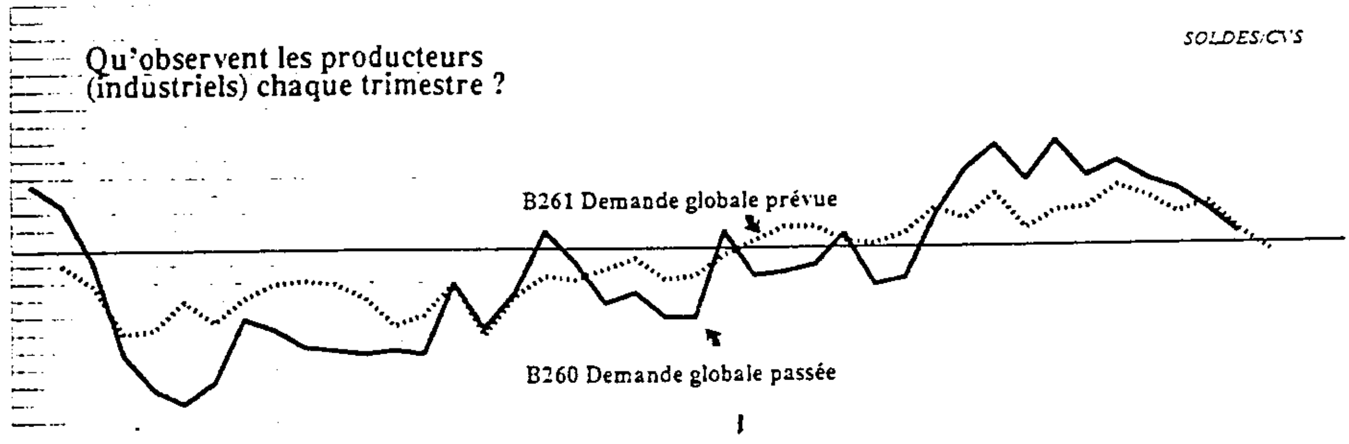
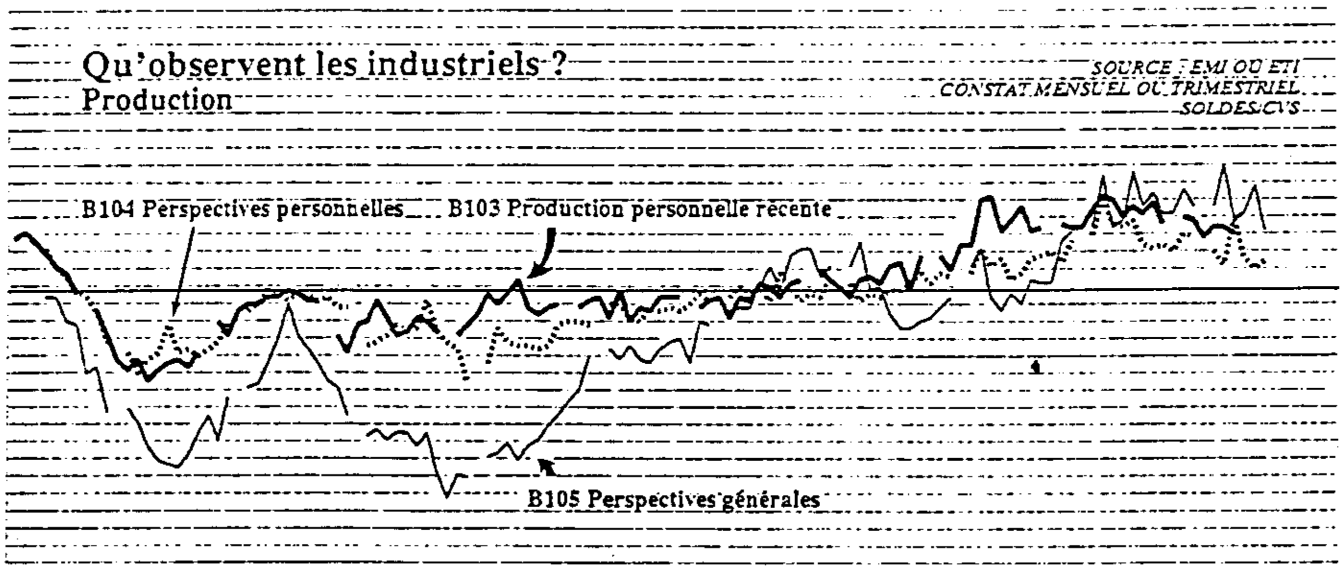
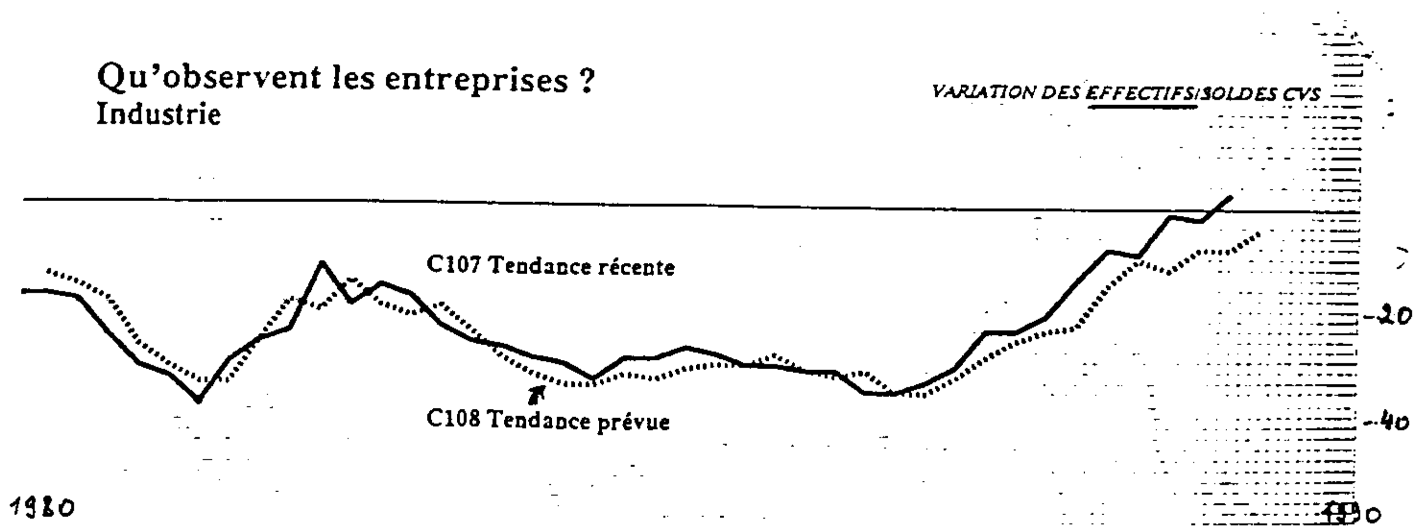
FIGURES I



Qu'observent les producteurs (industriels) chaque trimestre ?
SOLDES/CVS
60
40
20
0
-20
-40
B261 Demande globale prévue
B260 Demande globale passée



Qu'observent les industriels ?
Production
SOURCE : EMI OU ETI
CONSTAT MENSUEL OU TRIMESTRIEL
SOLDES/CVS
60
40
20
0
-20
-40
-60
B104 Perspectives personnelles
B103 Production personnelle récente
B105 Perspectives générales



Qu'observent les entreprises ?
Industrie
VARIATION DES EFFECTIFS/SOLDES CVS
C107 Tendance récente
C108 Tendance prévue
-20
-40
1980

TAB. I (EXPECTATION OF DEMAND)

Produit	Taille de l'entreprise	Probabilité de dépasser la valeur de la statistique de Fisher (en %)	Refus (R) ou acceptation (A) de l'hypothèse
Agricole et alimentaire	< 50	0.08	R
	50-100	0.02	R
	100-500	0.01	R
	500-1000	1.7	R
	> 1000	0.01	R
Métal	< 50	24.1	A
	50-100	4.7	R
	100-500	11.9	A
	500-1000	21.7	A
	> 1000	14.2	A
Chimique	< 50	27.7	A
	50-100	16.6	A
	100-500	66.9	A
	500-1000	12.1	A
	> 1000	35.5	A
Equipement professionnel	< 50	7.0	A
	50-100	0.01	R
	100-500	28.0	A
	500-1000	11.0	A
	> 1000	5.6	A
Pharmaceutique et parachimique	< 50	8.6	A
	50-100	1.0	R
	100-500	0.04	R
	500-1000	0.1	R
	> 1000	33.1	A
Textile	< 50	76.6	A
	50-100	10.0	A
	100-500	93.9	A
	500-1000	69.6	A
	> 1000	11.4	A
Presse et imprimerie	< 50	1.1	R
	50-100	15.7	A
	100-500	56.6	A

TAB. II (EXPECTATION OF DEMAND)

Test de la condition d'orthogonalité:
R (refus), A (acceptation)

Produit \ Taille	< 50	50-100	100-500	500-1000	> 1000
Agricole et alimentaire	A	R	R	R	R
Métal	A	A	A	A	A
Chimique	A	A	A	R	A
Equipement professionnel	A	A	A	A	A
Pharmaceutique et parachimique	A	A	R	A	A
Textile	A	A	A	A	A
Presse et imprimerie	R	A	A	A	R

TAB. III (EXPECTATION OF EMPLOYMENT)

Secteur	Taille	Probabilité de dépasser la valeur de la statistique de Fisher	Refus (R) ou acceptation (A) de l'hypothèse
I.A.A.	< 50	0.01%	R
	50-100	0.2 %	R
	100-500	0.3 %	R
	500-1000	1 %	R
	> 1000	0.01%	R
Biens intermédiaires	< 50	0.01%	R
	50-100	3 %	R
	100-500	19 %	A
	500-1000	31 %	A
	> 1000	15 %	A
Biens d'équipement	< 50	29 %	A
	50-100	0.05%	R
	100-500	2 %	R
	500-1000	12 %	A
	> 1000	8 %	A
Biens de consommation	< 50	0.01%	R
	50-100	15 %	A
	100-500	46 %	A
	500-1000	9 %	A
	> 1000	14 %	A

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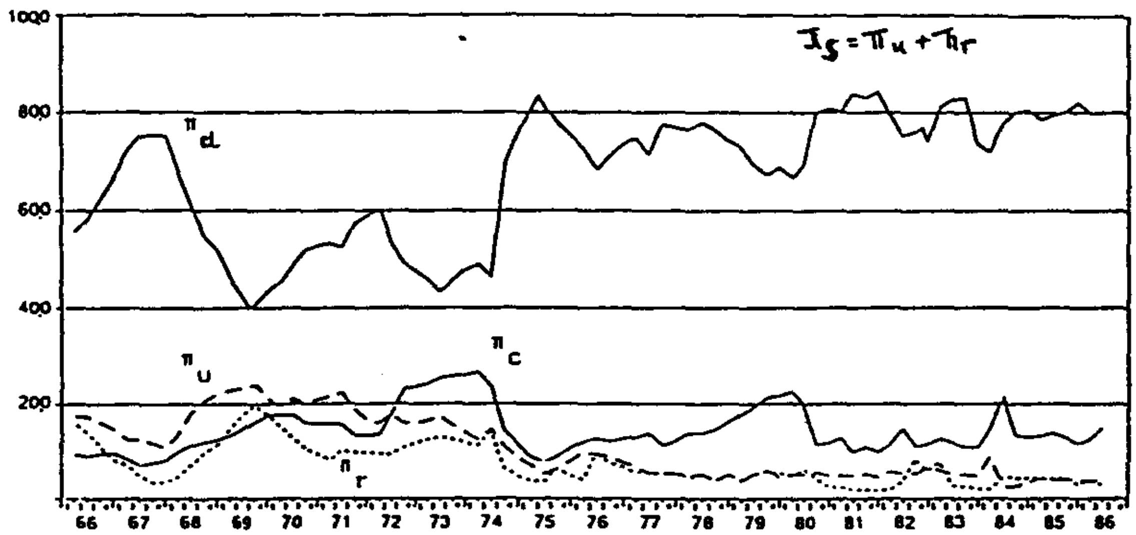
FIGURE II

(*J.-P. Lambert, The French unemployment problem*)



The proportion of firms experiencing various constraints.