LABOUR HOARDING IN THE INDIAN MANUFACTURING INDUSTRIES

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Labour hoarding stands for all the frictions involved in the lagged adjustment of labour inputs to short-run fluctuations in output [Bower et al (1982), Okun (1962); and Solow (1964)]. This concept has been variously described by different scholars, viz. "effort variation" [Mangan, (1983)] and "reserve labour force" [Miller, (1979)]. We are accepting the broad definition of Bower (1982), of labour hoarding, to avoid distinction between hoarded workers and hoarded working hours [Leslie (1979)] or between paid-for labour hoarding and unpaid-for labour hoarding [Taylor (1979)].

The estimates of the extent of labour hoarding are very important because they measure the magnitude of underutilization of inputs of labour. These estimates show that the under utilization of labour is not only the unemployed manpower, but also the extent of under employment of employed workers [(Taylor (1974)]. This measure is of immense importance for the labour surplus developing economies in general and for the Indian economy in particular, where the phenomenon of labour hoarding affects the extent of labour absorption.

In the present paper an attempt has been made to measure inter-temporal trends in the labour hoarding and its determinants in Indian manufacturing industries. For this purpose, this paper has been organized in four different Sections. In Section-I, we are providing the theoretical basis of the concept of labour hoarding and its determinants. In Section-II, we are presenting different methods of estimating labour hoarding. Section-III deals with estimates and determinants of labour hoarding in India. Finally in Section-IV, we have presented the main conclusions of the study.

I. THEORETICAL BASIS OF THE CONCEPT OF LABOUR HOARDING AND ITS DETERMINANTS: -

It is a basic explanation given in the standard micro-economic theory, that labour productivity would be less during boom than in recession. This explanation is based on the law of diminishing returns. It is because, it will be advisable on the part of a firm to use their least efficient workers at the time of boom and retain the workers with higher productivity during recession. This explanation is consistent with neo-classical production function. This is because, the amount of labour required to produce additional units of output from a fixed capital stock will increase (due to law of diminishing return to a variable input). If firm continues to produce output throughout the cycle, then labour productivity will increase when output falls. This explanation of micro-economic analysis is also consistent with fixed-co-efficient production function. It rules out the possibility of substitution between capital and labour. Under these conditions, the desired level of employment will vary in direct proportion to changes in the level of output.

However, in reality, it has been observed that changes in the employment are much smaller than the changes in output [Kendrick (1961), Kuh (1960), Okun (1962) and Pettengil (1980)]. The mid-1960s witnessed the beginning of more empirical work to understand the relationship between output and employment with the help of labour demand functions [Hamermesh (1993)]. Similar attempts were made to estimate employment function for the Indian manufacturing sector [Seth and Seth (1991), (1991a) and (1994)]. These empirical estimates showed that employer for certain reasons are not interested to reduce employment by as much as fall in demand for their product. This empirical observations was supported by another set of empirical observation that productivity of labour tended to fall during recession and rise during boom [Bower et al (1982), Kendrick (1961), Kuh (1960), Okun (1962) and Pettengil (1980)]. Not only this, it was observed that share of profit to total income declines during recession, that is share of wages to value added rises during recession. [Hultgren (1960) and (1965), Morrell (1981), Neild (1963) and Solow (1968).

These findings were totally inconsistent with the explanations given by micro-economic theory. Scholars observed that, the existence of the practice of labour hoarding can be considered as the single explanation for the co-existence of all above mentioned empirical observations. To understand the relationship between labour hoarding and above mentioned empirical observations one has to examine the process of adjustment of inputs of labour to the changes in the level of output. The labour market mechanism works through adjustment lags and expected sales [Fair (1969) and Taylor (1974)].

During the early phase of recession, employers will be reluctant to lay-off workers until they are confident that the fall in demand of their product is going to stay for longer duration. Their reluctance to demanning is related to the costs of demanning and remanning. Therefore, if fall in demand of their product is temporary and manning and demanning costs are high, instead of laying-off workers, employers may keep reserve labour force; which leads to labour hoarding. The existence of labour hoarding during recession results in lagged adjustment of employment to changes in the level of output. This causes the fall of productivity of workers during recession and increases the proportion of wages to the value-added.

On the contrary, during the phase of recovery, employers will be reluctant to employ more workers unless and until they expect that the growth in the demand for their product is going to last for a substantial period. Therefore, increases in the demand for labour input will be met initially by increasing the use of hoarded labour, which was kept during recession. It is the lagged adjustment of employment, which increases productivity of workers during recovery. This suggests that it is the lagged adjustment mechanism of employment, which makes average productivity of labour to move procyclically [Pettengil (1986), ch. 13]. Hence, the extent of labour hoarding depends on frictions, which exist in the lagged adjustment of inputs of labour to changes in the level of output.

Several reasons have been identified to explain the existence of friction in the labour market adjustment. The lags in the adjustment mechanism emerge because of, (a) technological constraints arising from the indivisibility in the production process, (b) the contractual commitments between employers and employees, (c) transaction costs of manning and demanning, and (d) employers may not like to lay-off strategic manpower which have skills that are firm specific or are not available in abundance in the labour market, even during worst of circumstances [Okun (1962) and Oi (1962)].

Technological inflexibility is considered to be an important determinant of labour hoarding. Technological inflexibility emerges when production is carried out within the workforce organized into discrete groups or gangs. The important characteristic of the gang type of operation is that the contribution of individual worker to output cannot be separated from the output of a gang so that changes in employment occur in jumps of whole gang. [(Alchian and Demsetz (1972)]. If the size of the gang is fixed, then it suggests that there exist some kind of division of labour within the gang. Therefore, constant labour productivity would result if labour force was reduced by the lowest common factor of the coefficient connecting successive gangs [Taylor (1974)]. This implies that for a greater range of output, variation in employment remains stable.

It has also been argued by some scholars, that labour hoarding on the part of a firm can be viewed as an alternative strategy to holding inventories of finished goods [Miller (1971)]. A firm with imperfect knowledge regarding fluctuations in demand for its products may choose between these two alternative strategies depending on the relative costs of each alternative. Therefore, it is believed that there is a positive relationship between cost of holding inventories of finished goods and labour hoarding. However, this positive relationship might be affected due to the existence of cost of manning and demanning because a firm wants to minimize labour cost over the cycle. Therefore a firm can save hiring and firing cost by hoarding labour during recession until an upturn is expected in the demand of its output. Hence, a firm must choose how much labour to hoard during down turn, because it faces the choice regarding incurring costs of demanning i.e. redundancy payments (DC) and have to incur manning cost (MC) when recovery starts. While making choice regarding labour hoarding, a firm may decide to hoard workers so long as $W_t \leq DC+MC$ [Clark (1973), Bower et al (1982) p.19]

In the existing literature on determinant of labour hoarding, most of the scholars have given importance to those variables, which create lags in the adjustment mechanism in the labour market. These factors can be studied in the micro studies or cross-section studies by collecting information about these variables through a survey. In a study which pertains to macro-level and intends to study inter-temporal trends in the labour hoarding, it is difficult to get time series date on these variables. Therefore, we have identified a set of proxy variables for which time series data are available. These variables are (a) size of the enterprise; (b) capital intensity of an enterprise; (c) composition of labour force in terms of production and non-production workers and (d) lagged employment. It is theorized that size of the organization provides hoarding capacity to an enterprise. Generally small enterprises have less hoarding capacity and also are not covered by labour legislation; therefore, it is believed that they can restructure their manpower with more flexibility.

The relationship between capital intensity and labour hoarding is anticipated to be negative because technological change is expected to increase redundancy. However, if due to strong labour legislation, and all the factors mentioned above which affect the process of adjustment of manpower, enterprises are unable to adjust their manpower, then relationship between hoarding and capital intensity can become positive.

The composition of workers in terms of production and non-production workers is also an important influence on labour hoarding. It is expected that as size of the enterprise increases, the proportion of non-production workers to production workers increase. It is because, with technological change and economies of scale, proportion of workers required at the shop-floor declines. However, earlier studies have found in the case of India, proportion of non-production workers either falls or remain constant. This happens because non-production workers are essentially products of bureaucratization in industry. Therefore, they are part of fixed-cost to the enterprise. Hence, as size grows, enterprise will either maintain their proportion or reduce their number in order to minimize fixed costs [Bhasin and Seth (1980), Goldar and Seth (1975)]. Studies conducted in the case of developed market economies on the other hand suggest that as proportion of non-production workers to workers increase, labour hoarding will also increase, because in these economies they constitute strategic manpower [Delhanty (1968)]

Finally, we have used lagged employment, as another determinant of labour hoarding. Most of the studies have given importance to this variable, because labour hoarding is defined "as all the frictions involved in the lagged adjustment of labour input to short run fluctuations in output". Higher the value of lagged employment variable, it is expected to increase labour hoarding.

Apart from these market related cost of manning and demanning, state also sometime imposes manning and demanning costs. These are largely associated with the policy regime adopted by the government. Since, independence Indian economy has experienced two distinct policy regimes. The first policy regime came into being immediately after independence in 1947 and continued up to 1984. This policy regime was characterized by state-led industrialization through investment in public enterprises. The government followed inward-looking approach of import-substitution through creations of high tariff and non-tariff walls. Indian economy experienced extreme form of government intervention through licensing of investment, regulation of commodity as well as capital and labour markets.

The labour market regulations have created prohibitory conditions regarding manning and demanning decisions of the firm. For the security of employment, government has conferred the status of "workman" under the Industrial Disputes Act 1974, which cannot be altered once given to a worker. The permanence of employment is further guaranteed by the government through Industrial Dispute (Amendment) Act of 1976 and 1984, which envisage that written permission is must from the relevant state government either to close the plant or to retrench workers. Government regulations have also imposed costs on demanning (firing costs) through legislation. According to Industrial Dispute Act, in the event of retrenchment, a factory worker with more than 240 days of work is entitled to one months notice in writing and 15 days salary as compensation for each year of completed service at fifty percent of basic pay plus dearness allowance. These regulations suggest that this policy regime created an economic environment where demanning of worker was made legally very difficult and financially very expensive. Therefore, it is expected that this policy regime encouraged labour hoarding.

Since 1985, new policy regime began to take roots and it received momentum after 1991 when government of India adopted the structural adjustment programme and also adopted WTO mandated policy regime. This new policy regime has intensified internal and external competition. These forces of competition are compelling manufacturing enterprises to restructure their organizational structure and technology to achieve competitiveness. Whatever strategy these enterprise adopt for restructuring, it is bound to have consequence for demanning. Despite the fact that government has not initiated any labour market reforms, but due to the changes in the stance of the government and weakening of trade unions, it is expected that the extent of labour hoarding might decline.

II. METHODS FOR MEASURING LABOUR HOARDING

Labour hoarding can be estimated through its impact on labour productivity. This requires comparison between the actual output per worker with the potential or full employment output per worker. If actual output per worker is less than potential output per worker, it shows that either more output could be obtained with current level of employment or less labour is required to produce the actual output than currently being used.

If we accept that at any point in time, an inelastic supply of labour will set a limit to production, then full employment output-labour ratio can be estimated by identifying peaks in a time series of output labour ratios. If we accept that a peak level of labour productivity is economy's short-run limit to production, then labour hoarding can be estimated by just comparing the actual output-labour ratio with its short-run peak. Thus, labour-hoarding (H) can be measured as

$$H = \left[1 - \left(\frac{Q_t}{L_t} \bigg/ \frac{Q_t^*}{L_t^*} \right) \right] \times 100 \qquad (i)$$

Where Q_t / L_t is actual labour productivity and Q_t^* / L_t^* represents potential labour productivity in period t. This measure is based on the assumption that there is zero labour hoarding at all the short–run peaks.

This method was used by Taylor (1974) to estimate labour hoarding. This method is like the Wharton Index of capacity utilization developed by Klein along with its modifications [Klein (1960); Klein and Summers (1966) and Klein and Preston (1967)]. Therefore, there are several possibilities to modify this measure of labour hoarding depending on how one measures the potential output [Seth (1999)].

This technique for measuring labour hoarding, mentioned above has certain serious drawbacks. In this method, it is assumed that there are constant short-run returns to labour. This suggest that decline in any output below short-run peak, that could be achieved by labour already employed, is identically matched by proportionate decline in labour utilization. If this assumption does not hold good an error will emerge in the estimates of labour hoarding [Leslie and Liang (1977)]. Therefore, if in the short-run production relations experience diminishing returns to scale, labour hoarding will be under estimated, and if increasing returns to scale prevails then labour hoarding will be over estimated.

The assumption of constant returns to scale also implies that labour and capital are not substitutable in the short-run. If labour and capital are perfect substitutes in the short-run, then output will be unaffected if changes in the inputs of labour are compensated by changes in the units of capital, which exactly offset each other. Hence when factor input are perfect substitutes, fluctuations in the labour productivity can not be used for measuring labour hoarding.

The other drawback, which is attributed to this measure, arises because it uses trend through peak method to estimate labour hoarding. This procedure assumes that the identified peaks from the time series of output labour ratios should be of equal strength. If peaks are of uneven strength, the estimates of labour hoarding will be inappropriate. To overcome this difficulty, we assume that the growth in labour productivity follows a trend that is devoid of any marked shift over a short period.

The other shortcoming that emerges when we use trend through peak measure is that if most recent output-labour ratio is not a peak value, then measures of labour hoarding for recent period will suffer from downward bias. Therefore, series might need extrapolation. In order to overcome the weakness associated with trend through peak measure, an alternative measure was suggested. Christano (1981) has described this measure in detail. In this method, entire time series of value added- labour ratios is used for fitting trend line. We obtain the differences between actual and observed values of value-added per worker. The maximum positive deviation from the trend line is added to the intercept. This procedure shifts the capacity line upward with the same slope. Therefore, capacity utilization rates are estimated from the modified capacity line. Some scholars have developed entirely new measure of labour hoarding based on employment function [Miller (1971) and Taylor (1974)]. In the present paper we are using both the methods, as developed by Taylor (1974) and modified Wharton measure (Christano,1981) mentioned above for measuring labour hoarding in India.

III. TRENDS AND DETERMINANTS OF LABOUR HOARDING IN INDIA.

Trends: To estimate trends and determinants of labour hoarding we have used time series of data of relevant variables reported in Annual Survey of Industries (ASI). To get the real values of different variables we have used, wholesale price index (WPI) of manufacturing sector as deflators. The data as reported in ASI has undergone changes in industrial classification in 1973 which has made it difficult to choose comparable industry level data. Due to this reason while estimating hoarding for the aggregate manufacturing we are using a time series from 1960-61 to 1997-98 (the year for which the latest data are available). For estimating inter-industry differences in labour hoarding, we are using a time series of data from 1973-74 to 1997-98.

The scholars (Seth, 1998 P 392) who have studied history of trends in output in Indian industries divide the entire post independence period into four sub-periods; - These sub-periods are 1950-1965; 1966 to 1975; 1976-1985 and 1986 to1997-98. Since hoarding of labour is largely related to industry's performance, it is expected that trends in labour hoarding may also follow the same pattern. For this reason, while estimating trends at the aggregate level we computed labour hoarding using Taylor Method, defined here as $H_{1,}$ by identifying peaks in each of these sub periods. To understand how far industrial performance affects labour hoarding, we have also estimated labour hoarding for each sub-period. We have also used modified Wharton Index, developed by

Christano (1984), to estimate labour hoarding, defined here as H_2. The results are reported in Table I and the graph is depicted in figure I. The analysis of table I shows that modified trend through peak method (H_2) provides systematically higher rates of labour hoarding in comparison to Taylor's method (H_1). These differences can be attributed to the difference in the method being used. In the case of H_1, we are using local peaks of each sub-period to estimate hoarding. Therefore the relative strength of each peak affects the rate of hoarding. Whereas, in the case of the H_2, we are using the global peak of the entire period. Hence it gives higher values of labour hoarding. But it should be noted that though the magnitudes given by these two methods are different, they follow the same time path.

Because of difference in methodology being used to calculate H_1 and H_2 it is quite apparent that H_1 estimates are not able to explain the relationship between industrial performance and labour hoarding. Whereas, industrial performance has been better in the first and the last sub-periods and relative stagnation and partial recovery during second and third period respectively, it is not getting reflected in the estimates of hoarding (H_1). On the other hand estimates based on modified method (H_2) clearly show the expected inverse relationship between industrial performance and labour hoarding. It is because of this relative advantage of H_2 over H_1 estimates, we are using H_2 estimates for further empirical analysis. The same pattern is visible when we plot these values in the graph, where the hoarding curve of H_2 clearly shows the expected changes in the labour hoarding in the four phase of industrial performance (figure I). The graph also shows the relationship between policy regime and the rate of labour hoarding in the Indian industry. As it is quite evident from the graph and table I that the rates of labour hoarding are consistently falling after 1985 and they are quite low in comparison to the other three phases of industrial performance (part of the first phase of policy regime). It establishes that liberalized policy regime has reduced the extent of labour hoarding in the Indian industry. The same is being supported by the statistical significance of the difference in the mean hoarding rates for two policy regimes (see Table I).

Inter industry differences in the trends of labour hoarding are reported in table-II. In order to make comparisons among the industries, we have computed average labour hoarding and coefficient of variation to know its relative stability during the period 1973-1998. The table shows that there is no apparent relationship between used- based classification of industries and the extent of labour hoarding. It has also been observed that industries which show lower average hoarding, generally have high coefficient of variation indicating that they suffer from wide fluctuations in labour hoarding.

Determinants

Hoarding is expected to be determined by capital intensity (K/E), composition of labour force (NP/P), size of the firm (E/F) and the last year level of employment (E_{t-1})

$H = f(K/E, NP/P, E/F, E_{t-1})$

H = rate of hoarding, NP = Total no. of non-production employees, K = Capital ,E = Total number of Employees,

P = Total number of workers, F = Total number of firms,

E_{t-1} = Last years number of employees.

The relationship between these variables has been estimated using the standard techniques applied to time series and panel data. For time series data in a multivariate framework, Cointegration [Enders (1995)] has been used. The panel data has been analyzed with the help of Kmenta's method (1986), fixed effect method and random effect method [Hsiao (1986)].

The correlation matrix of the variables is shown in table III. It shows very high negative correlation (-0.81536) between the rate of hoarding and capital-employees ratio; indicating that capital intensive industries did not have sufficient incentive and need for hoarding. Employment size of the firm is positively related to hoarding i.e. large firm had higher hoarding ratio. The relationship was also investigated using the Granger causality analysis (Aggarwal, 1999). The pair-wise analysis shows that each of these factors, K/E ratio, employment size, NP/P ratio and E_{t-1} does help in causing hoarding (table IV).

In order to find out the exact nature of the relationship between these variables, a time series analysis was also conducted. Unit roots performed on them showed that except E/F all other series are non-stationary in levels. We therefore repeated the tests after differencing the variables and found them to be stationary in first differences. To find out if the non- stationary time series may be cointegrated, as pointed out by Engle and Granger (1987), the test was performed on the residuals. The results indicated that hoarding is cointegrated with capital-employees ratio, non-production worker to production worker ratio and the lagged number of employees.

The Engle-Granger methodology is criticized on two counts (a) that the procedure is based on two steps; the first is to generate, the error series e_t and the second step uses these generated errors to estimate a regression of the form $\Delta e_{t-1} = a_1 \hat{e}_{t-1} + \ldots$ Hence, any error introduced in the first step enters into step 2, (b) the procedure of test of cointegration is based on the choice of the variable on the left hand side and depending on this choice we may have different cointegration results. Thus in a multivariate framework there may be more than one cointegrating vector.

Johansen's (1988) procedure of identifying cointegrating relationship is therefore applied. The lag length selection criterion of AIC and SC (table V) suggests the inclusion of one lag. To examine whether an intercept should be included, the likelihood ratio test has been carried out (table VI) which indicates that an intercept should be included in the model. The Johansen's procedure of identifying the number of cointegrating relations, based on Eigen values, implies the existence of one cointegrating relation among the variables at both 5% and 1% level. For at most one relation the results are:

Eigen value = 0.29848 LR =20. 4420 (29.68 at 5%).

The normalized cointegrating relation assuming one cointegrating relation is given by

$$H = 4.65e^{-7}\ K/E - 2.9781\ NP/P - 6.69e^{-9}\ E_{t-1} + 0.55347$$

$$t = (-0.5548) \qquad (-1.8474) \qquad (-0.2222)$$

The relationship implies that in the long run the rate of hoarding is negatively related with K/E, NP/P and E_{t-1} and NP/p is more significant in explaining the rate of hoarding in Indian manufacturing sector.

The estimation of the vector error correction model then yields the following.

$$\Delta H = 0.00524 - 0.0435ect + 0.02414\ \Delta H_{-1} - 1.66e^{-6}\ \Delta(K/E)_{-1} + 0.488\ \Delta(NP/P)_{-1}$$

$$t \quad (0.1841) \quad (-0.3143) \quad (.1316) \qquad (-0.7237) \qquad (0.4261)$$

$$+ 2.37e^{-8}\ \Delta\ (E_{t-1})_{-1}$$

$$(1.7091)$$

Since the t ratio of error correction term (ect) is not significant, it implies that the hypothesis of a long-term relationship does not get support and the model may not be one of error correction or cointegration. One possible reason is abundant evidence showing that ignoring structural breaks, that may exist in a long time series, leads to misleading inference on both units roots and tests for cointegrating relationships (Maddala, P 237). Not all-cointegrating relationships need have meaning in the sense of long term economic relationships. That the series of rate of hoarding shows some structural changes is evident from table I.

Maddala and Kim (1998) have highlighted some more problems associated with the Johansen's test. The main problem is the sensitivity to misspecification of the lag length (p.220). Another irritant is that if we obtain more than one cointegrating relation, then it is difficult to choose one of them. So one has to begin with economic theory and find justification of a particular relationship. The Johansen test is also based on assumptions, some of which may not be satisfied. It assumes no trend in the series and an intercept in the cointegrating relation and homoscedastic errors.

ESTIMATES USING POOLED-TIME SERIES CROSS SECTION DATA FOR 18 INDIAN INDUSTRIES BASED ON 2 DIGIT CLASSIFICATION.

When we estimated the relationship in the panel data, the following model was used:

$$H_{it} = \beta_0 + \beta_1 ({}^{K}/_{E})_{it} + \beta_2 ({}^{NP}/_{P})_{it} + \beta_3 (E)_{it-1} + U_{it}$$

i = 1, ... 18 t = 1, ... 24

Where i is the value for each industry and t is the time period, U_{it} is the normally distributed error term.

Since the panel data can be estimated by three different procedures; i.e. Kmenta's pooled method, fixed effect model (FE) and random effect model (RE) depending on the assumptions, we estimated all the three regressions [Hsiao (1986), Aggarwal and Goyal (2000)]. Testing the significance of the group effects and the Hausman test revealed that the Kmenta model is the most appropriate (Table VII). The model is based on the assumption of cross-sectional heteroscedasticity and timewise auto regression. Therefore, the estimation is free from autocorrelation and heteroscedasticity. Both D-W statistics and BPG and Glejser tests of heteroscedasticity confirmed the same. The relationship obtained from it is as follows:

$$H=0.3154 - 0.20872e^{-1}\,(^{K/E}) + 0.2285\,(^{Np}/_{P}) - 0.11098e^{-6}\,(E_{t-1})$$

t (10.39) (-3.823) (3.364) (-7.050)

DW = 1.9725, R^2(between observed and Predicted) = 0.5048

BPG (R^2) = 1.978 (p = 0.5769) ~ χ^2_3,

Glejser χ^2_3 = 0.112 (p =0. 9903)

The equation supports the relationship of rate of hoarding with K/E, NP/P and E_{t-1}. The results indicate that K/E and E_{t-1} are significantly and negatively related to the rate of hoarding and supports economic theory. On the other hand NP/P depicts a trend as shown by developed economies. This is because NP/P ratio altered significantly after 1980's which covers the major period of our time series of data.

IV. SUMMARY AND CONCLUSION:

The study clearly shows that there has been continuous existence of labour hoarding in the Indian manufacturing. However, its magnitude has been varying according to different phases of industrial performance experienced by the Indian economy during the time period of study i.e. 1960-61 to 1997-98. Measures also show that there are marked inter-industry variations in the labour hoarding to the extent of 14% to 32% according to H1 and 17% to 48% by H2. However, we did not observe any pattern in establishing relationship between used-based industrial classification and hoarding. A clear picture may emerge if one takes a study concentrating only on explaining inter-industry variations which would take much larger space (it is a focus of another paper of the authors).

A time series analysis of the determinants of the rate of hoarding by cointegration method and Kmenta's pooled method showed that it is related to the capital intensity, the composition of labour force and the lagged level of employment.

It is an eye opener for the policy makers that there have been consistently higher rates of labour hoarding in the Indian manufacturing sector. These high rates of hoarding substantially increased labour cost and could be one of the reasons for low competitiveness of the Indian industry. These high rates can partly be attributed to increased labour market imperfections, high rates of absenteeism among workers and perhaps some shortages in specific skill categories. However, substantial role can be ascribed to regulation of the labour market. Therefore it is suggested that government should amend labour regulations to make decisions regarding manning and demanning more flexible which helps the enterprises to adjust their manpower according to fluctuations in output.

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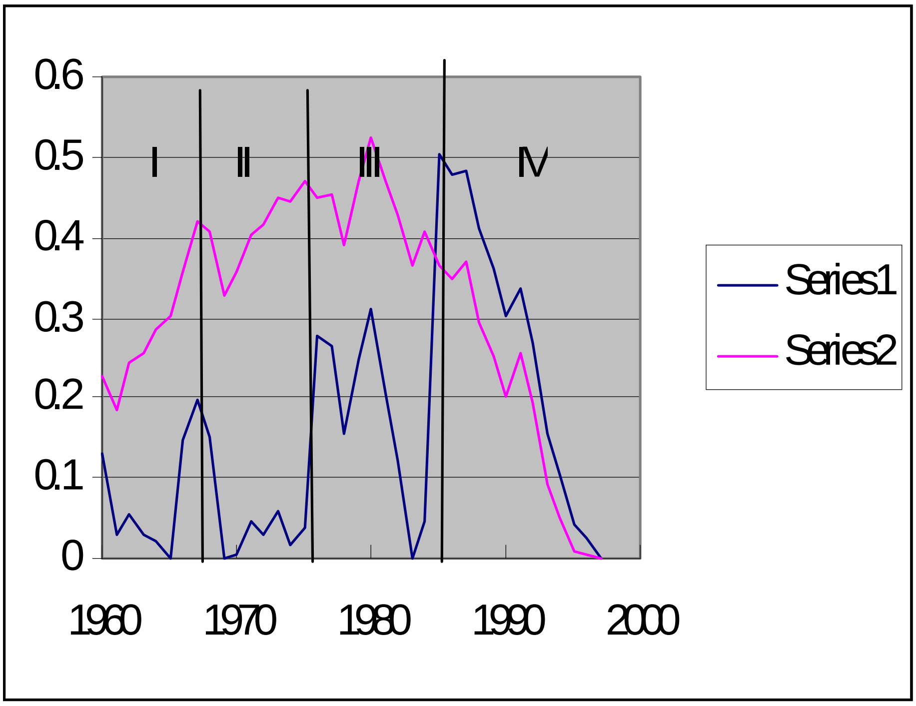
Figure I : The inter-temporal trends in labour hoarding.



Note: series 1 is for H1 and series 2 is for H2

TABLE I : LABOUR HOARDING IN INDIAN MANUFACTURING INDUSTRY					
year	Hoarding1	Hoarding2	mean of h1	mean of h2	
1960	0.12954065	0.22578111	0.04492331	0.2496144	
1961	0.03142438	0.18305507			
1962	0.05662344	0.24342696			
1963	0.02888059	0.25767196			
1964	0.0230708	0.286657			
1965	0	0.3010946			
1966	0.14872049	0.3582084	0.0693713	0.4049644	
1967	0.19849366	0.41957861			
1968	0.15121881	0.40867855			
1969	0	0.32880965			
1970	0.00428336	0.35526589			
1971	0.04762857	0.40434958			
1972	0.03004621	0.41334723			
1973	0.05899433	0.44901558			
1974	0.01848603	0.44306702			
1975	0.03584158	0.46932377			
1976	0.27874759	0.44697154	0.18084412	0.4384615	
1977	0.26528766	0.4525914			
1978	0.1560255	0.38848722			
1979	0.24641899	0.4686055			
1980	0.30932834	0.5256693			
1981	0.20522153	0.46804645			
1982	0.12106415	0.42630178			
1983	0	0.36306959			
1984	0.04550335	0.40641045			
1985	0.50295549	0.36533648	0.2664348	0.1872224	
1986	0.47756879	0.34796516			
1987	0.48228709	0.36810482			
1988	0.40976467	0.2951334			
1989	0.36153678	0.25364479			
1990	0.30110668	0.19990353			
1991	0.33518243	0.25433867		mean of h2	variance of h2
1992	0.26683526	0.19401529	policy regime I	0.37973937	0.00772592
1993	0.15613118	0.09038488	policy regime II	0.18722242	0.01992463
1994	0.1037169	0.05234506	Z for equality of means		4.48596329
1995	0.04317088	0.00729489	critical value		1.95996108
1996	0.02339629	0.0054245			
1997	0	0			

Table 2A

List Of Industries Based On ASI Classification

Industry code (2digit)	Industry
20-21	Manufacture of Food Product
22	Beverages ,Tobacoo And Related Products
23	Cotton Textile
24	Wool, Silk, Manmade Fibre Textiles
25	Jute And Other Vegetable Fibre Textiles
26	Textiles Products
27	Wood And Wood Products, Furniture And Fixtures
28	Paper And Paper Products , And Printing And Allied Industries
29	Leather And Products Of Leather, Fur And Substitutes Of Leather
30	Basic Chemical And Chemical Products (Except Petroleum Products And Coal)
31	Rubber, Plastic,Petroleum And Coal Products
32	Non-Metallic Mineral Products
33	Basic Metal And Alloy Industries
34	Metal Products And Parts Except Machinary And Equipment
35-36	Machianary And Equipment (Other Than Transport Equipment)
37	Transport Equipment And Parts
38	Other Manufacturing Industries
40	Electricity

Table II: Mean and variation in Labour Hoarding in different industries(ascending order)							
	h1			h2			
Industry	Mean	Standard Deviation	Coefficient of Variation	Industry	Mean	Standard Deviation	Coefficient of Variation
23	0.1440	0.1099	76.3043	35	0.1771	0.0970	54.7771
34	0.1799	0.1284	71.3674	23	0.2123	0.0973	45.8446
28	0.1839	0.1458	79.2675	25	0.2218	0.1230	55.4687
31	0.2179	0.1927	88.4539	34	0.2294	0.0795	34.6444
25	0.2230	0.1294	58.0341	20	0.2321	0.1528	65.8391
32	0.2252	0.1728	76.7058	28	0.2451	0.1038	42.3518
27	0.2258	0.1679	74.3638	31	0.2568	0.1756	68.3737
40	0.2315	0.1927	83.2157	32	0.2733	0.1284	46.9716
35	0.2323	0.1663	71.6031	30	0.3058	0.1731	56.5950
30	0.2402	0.1772	73.7509	40	0.3188	0.1355	42.4960
37	0.2554	0.2289	89.6256	27	0.3565	0.1320	37.0308
22	0.2657	0.1616	60.8240	22	0.3673	0.1422	38.7110
24	0.2725	0.1959	71.8947	37	0.3786	0.1417	37.4347
26	0.2825	0.1862	65.9171	26	0.3941	0.1542	39.1342
20	0.2920	0.2000	68.4726	29	0.4058	0.1332	32.8118
29	0.2939	0.1908	64.8980	24	0.4323	0.1477	34.1673
33	0.3215	0.2495	77.6264	38	0.4640	0.1776	38.2741
38	0.3234	0.2173	67.1826	33	0.4877	0.1532	31.4006

Table-III : Correlation Matrix					
	E(t-1)	hoarding2	K/E	E/F	NP/P
E(t-1)	1				
Hoarding2	-0.2886	1			
K/E	0.7322	-0.8154	1		
E/F	-0.7945	0.4174	-0.7069	1	
NP/P	0.8897	-0.3698	0.794	-0.829	1

Table IV : Granger Causality Tests			
Null Hypothesis	observations	F-statistics	Probability
Lags=2			
E(t-1) does not Granger cause Hoarding	36	4.5035	0.01919
K/E does not Granger cause Hoarding	36	6.3963	0.00472
E/F does not Granger cause Hoarding	36	5.59827	0.0084
NP/P does not Granger cause Hoarding	36	4.1633	0.02503

Table V : Optimal Lag Length Test				
LAGS	1	2	3	4
AIC	37.992*	39.308	39.987	39.522
SC	38.86*	40.188	40.876	40.42

Table VI: Likelihood ratio test for the inclusion of intercept in the VAR model with 1 lag.				
	VAR with intercept	VAR without intercept	LR	Critical value
Log Likelihood	-682.8604	-691.208	16.695	3.841

Table VII : Estimates of Panel Data			
Dependent Variable :Rate of Hoarding (H2)			
	Estimated coefficients		
Variables	Kmenta's Method	Fixed Effect Method	Random Effect Method
K/E NP/P	(-)0.02087 (-.823)* 0.22855 (3.364)*	(-).04249 (-.317)* (-).3172 (-1.467)	(-)0.04035 (-9.2)* 0.005488 (.1508)
E(t-1)	(-)0.1110e-6 (-7.050)*	2.20e-9 (0.035)	(-) 5.7e-8 (1.197)
constant	.3154 (10.39)*	0.4585 (7.789)*	0.39111(8.406)*
No. of observations	432	432	432
groups Time	18 24	18 24	18 24
R^2	-	0.2396	0.2346
R^2 oe	0.5048	-	9-
DW	1.9725	-	0.04035
Hausman's Test	-	-	X^2=39.51

Note:

1. The figures in the bracket are tabulated t - values.
2. R^2oe refers to R^2 between observed and estimated values.
3. * Denotes significance.
4. The F- test for the significance of Group effect based on R^2 and R^2oe implies that both intercepts and slopes are same. So Kmenta's Model is more appropriate.