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Monitoring Labour Market Developments in Central and
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LABOUR HOARDING IN INDUSTRIAL COUNTRIES:
CONCEPT AND MEASUREMENT

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The attached paper has been prepared by Mr. Christopher Pissarides, London School of Economics. This is one of the documents to be discussed in the second session on "Concept and Measurement of Labour-Hoarding".

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LABOUR HOARDING IN INDUSTRIAL COUNTRIES:
CONCEPT AND MEASUREMENT

by

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Introduction

..... Labour hoarding refers to a situation where an establishment is paying for more worker-hours than is necessary to produce current levels of output. The first and obvious question that arises in thinking about this issue is, why do firms do it? This question is not central to the current discussion but it is necessary to comment on it, because of its implications for the issues of interest. What is of interest here is more descriptive: first, what does the term "labour hoarding" mean, and second, how can it be measured? The statistical indicators needed for monitoring the problem are discussed, along with the main statistical methods for generating the necessary data.

..... The next section defines the concept and discusses the reasons that firms may find it worthwhile to hoard labour. Following this discussion two methods for measuring labour hoarding are evaluated, surveys done at the firm level and aggregate time series data. Finally, the usefulness of the concept in labour market analysis is briefly discussed and the data needs evaluated.

..... The discussion builds on the experience of Britain and the United States. It is likely to apply also to other mature industrial democracies, which experience some but not much government intervention.

The Concept of Labour Hoarding

..... Labour hoarding can be defined either in terms of hours of work or in terms of persons employed. In the discussion of the economics of the problem, it is best to think in terms of hours of work. It is not difficult, however, to imagine situations where the hoarding of persons, rather than that of working time, is of more relevance to policy. The issues that arise with regard to persons are similar to those discussed here, so in most of the discussion no explicit reference to persons needs to be made.

..... When a firm hoards labour it pays for more hours of work than strictly necessary to produce current levels of output, given the normal organization of production. The problem of labour hoarding in industrialized countries is intimately related to that of business fluctuations. Implicit in all discussions of labour hoarding is the view that labour hoarding does not take place when demand and production are high, and most likely also in normal times. But in recession firms do not reduce hours of work by as much as they can, given the fall in current sales.

..... Output normally falls with sales, so an implication of labour hoarding is that the productivity of labour in the downturn falls. This is a phenomenon that has traditionally been regarded as a puzzle. The received theory of production, built on the concept of the neoclassical production function, implies that labour productivity should increase in recession, or at least not fall. In terms of the aggregate production function, the productivity increase follows from the existence of diminishing returns to scale. At lower levels of output and employment, the marginal product of labour is higher. More intuitively, when firms experience a fall in demand, they first lay off their least productive workers. The skill composition of their workforce should therefore improve in the downturn, with a consequent rise in productivity, not a fall. If there are constant or near-constant returns, productivity should not depend on the state of the market, so it should neither fall nor rise in the downturn.

..... In reality productivity falls in recession and increases in the boom. This phenomenon, known as the productivity puzzle, has attracted a lot of attention since it was first noticed in the early 1960s. Labour hoarding is one of the explanations offered for the phenomenon. Indeed, the relation between labour hoarding and the productivity puzzle has become so close-knit that in a recent study of labour hoarding in British industry, by Bowers, Deaton and Turk (1982), a "prima facie case for labour hoarding" was "established" simply by demonstrating that at the industry level employment fluctuates less than output; i.e. that labour productivity is procyclical.

..... Although it is both correct and helpful to link labour hoarding to the productivity puzzle, it is less helpful to make the two one and the same thing. Of course, one could define labour hoarding in terms of productivity movements, along the lines pursued by Bowers et al. and others (discussed below). If this view were taken, the fact that firms "use" more labour to produce a unit of output when overall output is below trend is taken as evidence that labour is "hoarded". Procyclical productivity, however, could be due to a number of factors, some of which are unrelated to what is normally understood by the term "hoarding" -- the holding of labour not currently needed for future use.

..... Consider first some of the explanations offered for the productivity puzzle, besides labour hoarding. A first explanation criticizes the assumption of diminishing returns at all levels of output. It claims that at low levels of output there are increasing returns because of indivisibilities -- a minimal amount of labour needed to start up production. The firm will never find it optimal to operate in a region of increasing returns, unless it is restricted by demand, so on average the production function should exhibit diminishing or constant returns. But in temporary downturns the firm may move down to the region of increasing returns and so be led to reduce the labour input by less than the drop in output. In this case, the smaller fluctuations in employment than in output are due to the technology of production.

..... A second explanation, offered by Lucas (1970), claims that in order to induce workers to work longer hours when there is more work to be done, the firm has to pay a higher wage, such as an overtime premium. Then, if the production function exhibits diminishing returns in the usual way, the firm will employ the extra hours only if the marginal product of labour is higher than the wage. Since at the profit maximizing point the marginal wage must be equal to the marginal product of labour, the firm achieves this higher productivity by allocating a bigger fraction of its capital stock to the additional hours of work. Thus the variations in the capital-labour ratio during the working week, achieved through shiftwork, lead to a situation where increments in output are produced with less and less labour. In this case the smaller fluctuations in employment are due to the independent variations in wages over the business cycle.

Thirdly, as Fay and Medoff (1985) have pointed out, in each firm there

are two kinds of jobs that need to be done, direct production and supporting activities, such as routine maintenance of equipment, cleaning, learning new skills and so on. Although the latter group of tasks contributes to productivity, their contribution is not directly measurable, it accrues over a longer period of time and the tasks can be postponed. Thus in the downswing, when demand for production goods is low, the firm transfers some of its labour from direct production to the second type of task. Measured output falls by more than recorded employment but the diverted labour still contributes to the overall production effort of the firm.

If labour hoarding were made synonymous to procyclical productivity, the three reasons above would be reasons for labour hoarding. I regard labour hoarding, however, as an alternative explanation for the productivity puzzle, and define it more narrowly as the amount by which working time can be reduced without effect on current output. The reason firms hoard labour on this narrow definition must be sought in the existence of obstacles in the firing and hiring of workers. Such obstacles can usefully be classified into two groups, legal constraints and adjustment costs.

Legal restrictions are not important in the United States and the United Kingdom, though they might be in some other industrial countries. Where the law protects the worker, protection usually takes the form of legal compensation that has to be paid by the firm. In this case legal restrictions add to the adjustment cost, with similar implications for labour hoarding as those discussed next.

Adjustment costs can take several different forms. First, there may be legal costs, such as redundancy payments to dismissed workers. Second, the dismissal of one worker may require the movement of other workers to different tasks within the firm, especially in cases where the firm's production is rigidly organized. Such movements are likely to cause some disruption to the production routine. Third, workers may have skills that are acquired on the job or through initial training, and the firm may prefer to hold on to those workers during a temporary fall in demand than risk losing them through layoff. Fourth, frequent dismissals and rehires may undermine morale and goodwill and

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so have longer-term implications for productivity. If a firm realizes that there will be times when it may have to rely on its workers' goodwill to meet tight deadlines, it may respond by letting the workers relax on the job when times are bad. Finally, a firm may be uncertain of demand conditions at the onset of recession and may simply retain its labour force until prospects become clearer.

When labour hoarding is the result of an adjustment cost, it is a rational reaction by the firm to its economic environment. The productivity of labour in the downturn falls, simply because to do otherwise would reduce profit. It should be emphasized, however, that this is the case when the fall in demand is expected to be temporary. If the demand for the firm's product were to fall permanently, there would be no point keeping labour not needed for production. It would be to the firm's advantage to bear the adjustment cost and reduce paid working time. The present-discounted value of the gain from the reduction in the wage bill is likely to outweigh the adjustment cost.

Measurement Problems: Firm-Level Data

Labour hoarding is necessarily a vague notion. The preceding section pointed out that there are disagreements even amongst theorists of what it should exactly mean. When the discussion turns to measurement, the difficulties mount. The measurement difficulties arise because what needs to be measured is a hypothetical quantity: by how much could working time fall, without effect on current levels of output? If a company has never produced current levels of output with a different quantity of labour, it may not be in a position to give accurate information, even if it genuinely believed that it is over-employed. In some instances the answer may be easy, as for example when the firm pays workers to do nothing. But this will not generally be the case. The form labour hoarding usually takes is reduced work effort -- taking longer to produce something because the workers "take it easy". For this reason, the way working time is reported in official statistics is not usually helpful in the measurement of labour hoarding.

The most common classification of working time is into paid hours of work and actual hours. As the terms imply, paid hours are the hours for which the firm offers compensation and actual hours are the hours that the employee spends at work, excluding rest periods and lunch breaks. This distinction is helpful to the extent that labour hoarding refers to too many paid hours, but its use in the measurement of labour hoarding is limited. During any period of time, say a quarter, paid hours will typically exceed actual hours, because of holidays, paid sick leave and so on. The difference by which paid time exceeds actual time is not labour hoarding, it is part of the normal organization of production. If labour hoarding manifests itself as paid time with enforced idleness measurement would be easy, because the firm would be reporting a greater fall in actual hours of work than in paid hours. But this is not a common form of labour hoarding.

The classification of working time into direct production activities and other supporting activities would be more helpful but it is not generally available. The other activities are usually a necessary part of the operations of the firm. The fact that they are postponable may induce the firm to concentrate them in recession. Detailed data on the proportion of working time

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allocated to each kind of activity over the cycle would shed some light on the productivity puzzle and by extension on the likely extent of labour hoarding.

What is more relevant for labour hoarding, however, is working time that could be dispensed with, without effect on output. There are no regular surveys that record that, nor any large officially-sponsored surveys that were designed to get ad hoc estimates. For this reason, there are no generally accepted criteria on how to design this kind of survey. Two surveys done at about the same time in the United Kingdom and the United States addressed this issue. In the United Kingdom the survey was done by the Industrial Relations Research Unit at the University of Warwick and in the United States by Jon Fay and James Medoff.

The Industrial Relations Research Unit conducted a Workplace Survey in 1977-78, designed mainly to get information on industrial relations, but which also asked manufacturing employers, "If there was a reduction in demand of 5 per cent for your main product here, by what proportion could your direct production workers technically be reduced? And what effect would 10 per cent and 20 per cent reduction have?" The time of the survey was a boom year in Britain, so the question required employers to predict the possible reduction in production workers, following a fall in sales from above trend. Also, the survey asked about workers, not working time. The total number of respondents was 791.

The answers given to this question are a little surprising. On average, the reduction of employment that was thought to be possible for a 5 per cent reduction in demand was only 1.5 per cent, rising to 4.8 and 13.6 per cent for a 10 and 20 per cent reduction. This gives a clear indication of falling productivity in recession. Indeed, when these responses were used to simulate the path of employment following the observed changes in manufacturing output before 1977-78, the fluctuations obtained were a little less than the observed fluctuations. The authors concluded that the higher fluctuations observed were due to plant closures, which were not covered by their survey, and so claimed to have explained the degree of "labour hoarding" by the technical inflexibility of production.

The survey's question can provide only indirect evidence on labour hoarding. If the answers to the question are taken as a reliable indication of the technically possible reduction in employment, the difference between the simulated employment series and the actual series would show the extent of labour hoarding. On this basis, labour hoarding in the 1960s and 1970s in British manufacturing was zero. The answers to the question, however, should be interpreted with caution, because of their hypothetical nature. The wording of the question is such that an employer could easily take this to be a question of what he or she intended to do if demand fell. Two questions such as, "what is the maximum reduction technically possible if orders declined by x per cent", followed by "what do you anticipate your own reduction in employment to be", would have given richer information on the employers' perception of the survey. Also, some of the employers surveyed may never have experienced temporary falls in demand of this magnitude, so an accurate answer to the question would be difficult.

The survey was about persons employed, not about working time. If there are costs to firing and hiring workers but not to changing hours of work, the

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firm may keep the same number of workers but reduce hours. Whether employees are compensated or not for the fall in hours is then crucial for understanding labour hoarding. Such issues could not be addressed by the survey.

In the United States the survey by Fay and Medoff was specifically designed to get information on labour hoarding, so it contained more questions and in greater detail than the Warwick survey. The survey was done in 1981-82 and its frame was blue collar workers in manufacturing plants. Useable responses from 168 employers were received.

The survey asked detailed questions about the actual reduction in paid blue-collar hours in the most recent recession experienced by the company and also about the technically possible reduction, in the survey's words, "if the only consideration had been the technical requirements of your plant's production process ... and such concerns as employee morale, union contract restrictions, company image, the possibility that skilled workers would not return from layoff, the protection of senior workers, uncertainty about future demand, and so on were not considered; necessary (but not additional) maintenance and training were considered; blue-collar employees had worked at the same level of effort as in normal times". The survey also asked detailed questions about the other tasks assigned to blue-collar employees in recession, such as maintenance, cleaning and training, and also questions about how much of this other work was worth less to the company than in normal times; i.e. how much of it was worthwhile and how much was invented to keep hoarded employees busy.

This kind of survey is undoubtedly the best way to get information on labour hoarding at a particular point in time. Fay and Medoff chose to concentrate on the most recent recession experienced by the company (telling the company exactly what they meant by recession), which removes some of the uncertainty about the hypothetical nature of the response. Also, by asking about the actual fall in working time compared with the maximum possible, they avoided the confusion between what employers would do and what they could do. This kind of survey can, however, be expensive and difficult to administer, and it is clearly not feasible as a regular survey, or as one that could cover a large sample. Fay and Medoff sent out 1498 questionnaires, twice to most sampled units not responding the first time, and received only 242 properly completed questionnaires (68 of which were from managers who had never experienced a downturn and 6 from managers who did not cut production).

The results of the survey were more plausible than those of the more vague British survey. Just over half of respondents assigned other tasks to their blue-collar employees during a downturn. For those employers, the percentage of hours shifted from production to other tasks was 11, 6 of which were considered worthwhile. The employers that did not assign other tasks felt that they could reduce working time by approximately 4 per cent and still produce the same output. This gives an overall figure for labour hoarding of 4 per cent when worthwhile other tasks are excluded and 8 per cent when they are included in hoarded hours. Finally, although the authors did not formally test whether their estimates can explain the productivity puzzle, their estimates suggest that if hoarded labour is excluded, labour productivity is not procyclical.

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Measurement Problems: Aggregate Data

Getting reliable information from aggregate data about issues such as labour hoarding is a lot more difficult than it is to get it from a well designed survey. Good time series data exist only for some key variables, such as output, employment and earnings. Surveys contain far more detailed information than can ever be found in time series data. But a survey refers only to a single point in time, and what it can teach about the way that the labour market functions is necessarily limited by this fact. Although the results of time series analysis should always be regarded as approximate, to be confirmed by survey evidence where the two overlap, there are many problems for which aggregate data analysis is the only available method of analysis. The strength of time series data is that it provides information on change. I will argue later that knowing how labour hoarding changes over time is important, especially for economies in transition.

In time series analysis labour hoarding is measured under the assumption that the whole of the productivity drop in the downturn is due to labour hoarding. "Potential" productivity is obtained by linking up with straight lines the observed cyclical productivity peaks, which typically occur at the peak of the output cycle. The gap between potential and actual productivity is then attributed to labour hoarding. The underlying assumption about the production function is that it exhibits constant returns to scale in the short run, which, when combined with the assumption of fixed capital leads to a function with constant coefficients (linear in the labour input). Potential productivity is then used to calculate the maximum value that the coefficient of labour could take. If Q measures industry output and N the labour input, the short-run assumption is that $Q=aN$. At a cyclical peak a reaches a maximum, say a^* . Then $Q/a^*=N^*$ measures the minimum amount of labour needed to produce actual output Q . The amount of hoarded labour is measured by the difference $NVBBN^*$.

This method clearly attributes too much of the productivity change to labour hoarding, since there are factors unrelated to labour hoarding that could cause procyclical productivity. It is also likely exaggerate potential productivity, by assuming that productivity at a cyclical peak is sustainable in normal times. Workers may just exert above-normal effort at the peak, when there is more work to do, in the knowledge that normal times will return and their employer will let them relax. It is doubtful, for example, whether workers would agree to work the same amount of overtime on a regular basis as they do for short periods of time when work piles up.

In view of this it is perhaps surprising that Fair's (1985) estimates for the United States economy are, if anything, below those obtained by Fay and Medoff for the same period of time. Fair's estimates of labour hoarding for the whole of the private sector rarely exceed 5 per cent. Unless labour hoarding is much higher in manufacturing (from where Fay and Medoff derived their sample) than in services, the similarity between the two estimates is, to quote Fair (1985, p. 239), "one of the few examples in macroeconomics where a hypothesis has been so strongly confirmed using detailed micro data".

The estimates obtained for the United Kingdom by using this method are higher. In the 1971 recession the lowest estimate was in the manufacture of food, drink and tobacco and in other manufacturing, amounting to 4.3 per cent,

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and the highest in metal manufacture and in timber and furniture, 17.3 per cent. These estimates are obviously at variance with the survey findings of Bowers et al. but not implausible, given Fay and Medoff's more careful estimates. The comparable estimate from the Fay and Medoff study is 8 per cent for the whole of manufacturing (since only direct production is measured by the potential productivity method). The UK estimates are a little higher but, as argued above, they include all reasons for the productivity shortfall in recession, not just those due to labour hoarding. Indeed, these findings point to the conclusion that most of the productivity shortfall in the downturn must be due to labour hoarding, in contrast to the Bowers et al. study, which attributed it all to technical inflexibility.

Monitoring Labour Hoarding

Labour hoarding is one of the less frequently used concepts in labour economics. Unlike unemployment, wages, productivity and even job vacancies, which consistently attract a lot of attention both in public debate and in academic research, labour hoarding has its short ups and long downs. Measurement problems are not the only reason. A more important reason is the fact that in normal times labour hoarding is not a "problem"; it is part of a firm's normal operations, presumably exercised because it reduces costs, and not too different from the firm's "productive" employment. There are, however, exceptions, when labour hoarding becomes interesting in its own right. It is because of those exceptions that measuring and monitoring labour hoarding becomes useful. The methods used for that monitoring should partly be dictated by the needs of policy.

The interest in labour hoarding stems from two factors. First and more important, labour hoarding reduces the productivity of labour, since hoarded labour is supposed to be labour paid to produce nothing. On this count labour hoarding is not too different from unemployment: it represents under-utilized resources. Second, labour hoarding stands for a reserve that may at any time be released and add to unemployment. The latter problem is important only for economies in transition or when a major policy change is implemented.

The first argument against labour hoarding is only partly true. Even when true, it is misleading to talk of labour hoarding as the cause of the productivity decline: both labour hoarding and the productivity decline are caused by other things. Labour hoarding is a firm's rational reaction to its environment. Its environment includes the policy parameters, its technology and the state of the labour market. If a firm hoards labour in recession because of its technology, for example because it uses a lot of specific skills and so wants to protect itself from the risk of losing its skilled labour, or because it wants to use some of its labour for necessary maintenance, training and so on, then labour hoarding does not reduce productivity. In the longer term it adds to productivity. It reduces direct productivity as we measure it, but this is a deficiency of our measurement techniques, not a problem with the underlying productivity of the firm. In the long run, a firm that was, say, forced not to hoard labour even though it faced this kind of technology would make less profit than one that was left free to hoard labour. The same comments apply in situations where the labour hoarding is a response to the firm's market environment.

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But if labour hoarding is the result of policy restrictions that are unrelated to the efficiency of the firm's operations, then it might justifiably be said to reduce productivity. Even in this case, however, labour hoarding is not the reason for the productivity fall, it is the means through which a policy adversely affects labour productivity. So attention needs to turn to the overall effects of the policy, not to labour hoarding as the primary cause of low productivity. The study of labour hoarding in this case is worthwhile only because it helps quantify the effects of the policy.

The second reason that labour hoarding often attracts attention is related to the last point made above: when it is realized that a policy causes labour hoarding and it is decided to reform it, in order to increase productivity, a likely outcome in the short run is an increase in unemployment. To use a phrase often used in Britain since Harold Wilson introduced it into the language in 1966, industry "shakes out" labour. A similar problem is particularly acute for economies in transition, when laws that protect labour, or even force enterprises to over-employ, are abandoned. The direct outcome of such a change is an immediate increase in unemployment. This increase, however, is not bad, at least from the economic point of view, since it reduces labour costs without a sizeable effect on total output.

Both reasons for the concern about labour hoarding are related to policy, especially the effects of policy change. Given that policy has been shown to have an effect on hoarding, it is important to be well informed about the extent of labour hoarding when a policy change is planned. The only way this information can be obtained is with a detailed survey of employers, say along the lines of the Fay-Medoff study, but adapted for the problem in hand. Thus, the first and main statistical need is for detailed ad hoc surveys that can reveal the extent of the problem at times when major policy changes are under way. For example, if Britain conducted such a survey in 1966, before the "shake out" policy was implemented, debates such as those started by Taylor (1972) would not have taken place. The need for such a survey is even more acute in the economies of eastern Europe, where policy-induced labour hoarding is likely to be a much worse problem than it ever was in the economies of the west.

Such surveys, however, are expensive and unlikely to yield much new and useful information if done on a regular basis. But once the extent of the problem has been established, with reliable ad hoc estimates from firm-level data, easier monitoring techniques can be applied. With knowledge of labour hoarding, potential labour productivity at the industry level can be computed. The monitoring of changes in labour hoarding can then be done with one of the less accurate time series methods that build on the concept of potential productivity. The accuracy of this monitoring can be improved by making use of investment data, which add to potential productivity, and by occasional smaller surveys of employers to check progress. But in the short term apparently reliable estimates of labour hoarding can be obtained by making simple assumptions about the production function and by even ignoring capital accumulation.

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Conclusions

The main conclusions of this study are:

1. Labour hoarding is best defined narrowly, as the amount by which working time could fall without effect on output. It is intimately related to the "productivity puzzle" -- labour productivity increases in the boom and decreases in the slump -- but it is not the only explanation for it.

2. The best source of information about labour hoarding are firm-level surveys that ask employers about the technically possible reduction in employment, without effect on output, in specific situations. Such surveys are rare. A good survey of this kind was conducted in the United States by Jon Fay and James Medoff and revealed that manufacturing employers hoard about 4 per cent of labour (paid hours of work) in the slump.

3. Aggregate productivity data can also be used to calculate the extent of labour hoarding but the estimates are less reliable. Such estimates tend to attribute the whole of the productivity decline in the downturn to labour hoarding. They make use of the concept of potential productivity -- observed at the peaks of the business cycle -- and calculate the employment reduction needed to raise current productivity levels to potential. Calculations in the United States give about 5 per cent for the whole economy and in Britain about 10 per cent for manufacturing.

4. For normal situations without policy intervention labour hoarding should not be regarded as a "problem": it is the firm's rational response to its environment. But when policy interference alters the environment, labour hoarding becomes a key variable for monitoring the effects of policy change on productivity and unemployment. The best way to monitor labour hoarding is to conduct detailed ad hoc surveys at the firm level when the need to find out about the problem arises -- such as times of transition from policy dictated employment to the free market -- and follow up with potential productivity methods at the industry level.

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