

***THE PERCENTAGE UTILISATION OF LABOUR INDEX (PUL) REVISITED:
CONTEMPORARY RELEVANCE, THE “THATCHER EFFECT” CONTROVERSY & AN
ORGANISATIONAL POSTSCRIPT***

by

Alan Bennett

ABennett, c/o Aston Business School, Aston University, Birmingham, B4 7ET, UK

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Abstract

During the course of the conduct of the Index of Percentage Utilisation of Labour (PUL) from 1971 to 1993, and in subsequent concluding interviews carried out until 1997, a considerable quantity of information incidental to the statistical series, was acquired as to what might be described as the organisational behaviour of manufacturing business.

Relatively wide interest, not in PUL as a macroeconomic indicator - which was the original and, indeed, on-going intention of its authors - but in the Index as possible evidence for theories concerning the effect of political and cultural influences on labour intensity developed during the late 1980's.

This paper attempts to clear up some misunderstandings of the real nature, intentions and achievements of the Index and to report some of the information about organisation and culture change provided by factory management, particularly in the retrospective interviews of 1994 - 7.

It has to be emphasised that those discussions were undertaken mainly with a view to obtaining some idea of the direction in which PUL was going after the regular data-gathering exercise had been completed. Additional 'subjective' information was acquired incidentally and as a matter of general interest in the organisation of manufacturing activity. No attempt was made to carry out a structured study of this field.

However, what was learned, very much in an anecdotal context, has been thought worth recording for the possible benefit of those academic and business colleagues with a concern for manufacturing productivity - its causes and consequences.

Introduction

The Percentage Utilisation of Labour (PUL) Index (1) was devised by Sydney Smith-Gavine and Alan Bennett with the intention of providing an additional indicator of economic activity whose movements would precede - and possibly predict - changes in hours worked and numbers employed in manufacturing industry. The relationship over time, between these variables can be observed in Chart 1 (from ABS RP 9719) at the end of this paper.

Its application was restricted to that sector of the economy because only there were appropriate data available, as was also the case with respect to hours worked - an already existing official statistical series.

It should be remembered that, at the time of conception of the PUL Index, 1970, manufacturing accounted for almost half of total economic activity as measured by GDP and for a third of total employment and its experience was used generally as an implicit proxy for the condition of the overall economy.

In manufacturing industry productivity is commonly measured by output per person hour; a less precise, but almost as common definition is output per employee, but there the number of hours worked is a determining variable. Because detailed measurement of work is generally restricted to that category of employee traditionally known as operatives, the definition of productivity in the PUL context is output per operative hour, or, perhaps more accurately, though more restrictively, output per **direct** operative hour. Such a definition has strong historical association with Payment by Results, or piecework payment schemes, which have now been abandoned across wide areas of manufacturing industry, although work measurement has been very largely retained for performance control and cost estimation purposes.

It is undeniable that worker effort is a component part of productivity, but it is equally incontrovertible that the general upward movement of output per unit of labour input has been due to technological progress, a measure of which, calculated by 'deducting' month-on-month changes

in PUL from the official index of output per operative hour, is illustrated in Chart 2. Technological progress usually takes the form of the putting of more or improved capital equipment at the disposal of the human factor. In terms of standard hours (2) achieved such improvements would not theoretically raise their number. The productive effect of increased or improved capital equipment should increase unit output of any product to which it is applied, but if associated worker effort remains constant then standard hours achieved should remain similarly so (3).

It has been argued via the PUL Index that, in the short run there may be changes in productivity because of changes in the level of Standard Hours achievement - in other words because of worker effort change. Now it must be made clear that the Index of PUL was not entirely determined by changes in Standard Hour (per elapsed hour) achievement. The actual hours (attended hours) during which a worker is present and available for work are not all convertible into Standard Hours; potentially they may be, but there will inevitably be attended hours which do not become production hours. For one reason or another work may not be available to the operative employee - lack of orders, delay in provision of materials, breakdown of equipment are some reasons why an attended hour may not become an 'actual' or production hour and be subsequently converted into effort measured in Standard Hour form.

From this it can quite obviously be inferred that Standard Hours achieved per Attended Hour may vary, not because of varying effort inputs on the part of workers, but because of the effectiveness with which attended hours are converted into 'actual' hours - which is primarily a matter of organisation and hence a management responsibility.

One reason for the PUL Index using Standard Hours per Attended Hour as its basis was the lower availability of works statistics that differentiated between attended hours and production hours, although, more importantly, it was believed that this ratio was the proper measure of labour utilisation, including as it does, both 'effort' (standard hours achieved per production hour) and 'efficiency' (production hours as a proportion of attended hours) factors.

The particular variable whose movement was measured by the Index was one indicative of the intensity of labour utilisation - the ratio of standard hours achieved to attended hours put in by

direct operatives. The argument being that the initial response to business 'climate' change in a manufacturing plant would be an adjustment in work intensity, followed, if that were an insufficient corrective, by adjustments to hours worked and numbers employed. A reliable measure of intensity - or labour utilisation - change, might therefore act as an 'early warning' of change in hours worked and in the more visible, economically and politically, numbers employed. If government were attempting to pursue full employment policies, necessarily involving 'fine tuning' of the economy it seemed possible that the concept of PUL might make a useful contribution to their effectiveness.

The PUL Index, eventually based on a representative sample of approximately 200 factories (4) was first calculated for the month of March 1971 and thereafter was produced monthly until April 1993. Whilst not adopted or developed as either an official or semi-official indicative time series, the Index attracted considerable attention in business commentary, academic and government circles - in the last instance being the subject of two special surveys carried out for the Department of Employment. As will be discussed later, the Index was at the centre of, but not actively involved in, the mid-1980's controversy over the so-called "Thatcher Effect" on workplace performance.

The objectives of this working paper, which is essentially a complement to ABS RP 9719 (1997) describing the structure of the Index and its main macroeconomic findings, and in effect, a postscript to the whole PUL project, are threefold:-

- 1) to comment on recent trends in manufacturing industry productivity in the light of the previous experience of the Index.
- 2) to make a response to critical points that were raised concerning the Index and its use, at the time of the "Thatcher Effect" controversy.
- 3) to present information about the process of organisational and cultural change in manufacturing industry that was largely incidentally obtained during the years of basic data collection and from what might be termed exit, or post-data collection interviews with

managers of collaborating plants.

The last mentioned will be the subject of essentially discursive treatment, as it was never the intention of the author to conduct any structured investigation of the organisational

contexts within which PUL data arose - nor, of course, was he suitably qualified or resourced to do so.

It is however, felt that contact with up to 400 manufacturing establishments over a 22 year period might have yielded insights, albeit from within an informal and largely anecdotal framework, that were worth sharing with colleagues with interest in industrial organisational behaviour.

PUL and current concern about British manufacturing productivity

In mid-1998 the topic of British industrial productivity once again began to attract attention particularly when the Chancellor of the Exchequer responded to manufacturers' pleas concerning the related effects of high interest rates and the strong pound, by suggesting that they should look again at their own levels of productivity (5). Use of the phrase 'industrial productivity', which refers essentially to the "production" industries of manufacturing and energy, has to be interpreted with care, as the only sector of industry where productivity per person is measurable with what might be termed a reasonable degree of accuracy is that of manufacturing which currently contributes less than 22 per cent of GDP. Suspicion arises that all might not be well in other sectors - notably those of services of various kinds -and certainly, if there is valid reason to suspect the 'vitality' of UK economic activity, all shortcomings can hardly be attributed to what is now very much a minor sectoral contributor to national product (6).

Relatively recent data indicates that manufacturing productivity is increasing at around 0.5 per cent p.a., compared with over 1 per cent a year ago. In the absence of contemporary labour utilisation (PUL) information it is impossible to comment objectively as to the source of these increases and the decline in rate in recent months. However, some, it is hoped legitimate, speculation may be permitted on the basis of knowledge gained concerning manufacturing productivity and its sources during the period of PUL Index recording, from 1971 to 1993.

For various reasons British manufacturing activity has now been stagnant in terms of aggregate output for a period of over one year - management has attributed this to the strength of the pound and to the combined fall off in demand (and possible increase in supply) from the Far East. Some

commentators, including government, have suggested that lack of competitiveness arising from poor productivity has been to blame and that once again Britain is experiencing the effects of a complacent manufacturing sector congratulating itself by well over-inflation rate pay awards unmatched by productivity gains.

It is true that at various periods since the early 1980's manufacturing productivity has shown positive improvement, but nonetheless the achievements of America and Germany have failed to be matched in a consistent way. Critics make much of the fact that German manufacturers had to survive the effects of a very strong DM for most of the 'seventies and 'eighties and that they did this by concentration on 'excellence'. Of course, it may now be much more difficult for any country's manufacturing industry to gain further differential advantage in a world of businesses committed to the achievement of excellence in all its forms.

Returning to the theme of what PUL Index experience might have to say about the present situation it may be that PUL has in fact fallen in response to economic circumstances and that this accounts for the low rate of productivity growth. Technological progress, of course, does not cease even in such conditions, hence the continuing small, but positive increase in output per employee.

Looking back along the time series of PUL similar conditions may be found in the two year period 1984-5, in which output per operative hour (a general measure of productivity and over the short period unlikely to vary much from output per employee; the usual international comparator), increased at a rate of only 1.25 per cent p.a. Within that period quarterly changes varied from zero to 2.5 p.a. - possibly very like the experience of mid-1996 to mid-1998. In that same period PUL, the measure of work intensity, actually fell by 0.75 per cent p.a., but 'countervailing' technological productivity rose by approximately 2.0 per cent p.a.

1984-5 was a particularly interesting period in that it came immediately after the one-and-only recorded annual change in PUL which may be regarded as being of seminal, or even 'dramatic' magnitude. This period was also the end of a long period of unbroken decline in manufacturing employment, when in the space of four years over a million jobs were 'lost'.

Apart from these comments on the relationship of the current experience of manufacturing industry to the evidence of productivity behaviour revealed by the PUL Index, this paper is not concerned with the macroeconomic context of that index, but with the industrial organisation developments that accompanied and may have in part determined its movements and whose nature was incidentally revealed by the information gathering process. The macroeconomics of PUL have been described in various publications (1), most recently in Aston Business School Working Paper RP9716 of November 1997 to which readers interested in those aspects are referred.

PUL and "The Thatcher Effect" : a recapitulation and response to critics

Interest in what may here be called the organisational and behavioural context of PUL became acute in the mid and late 1980's when 'myth and counter-myth' arose concerning the effect of the policy ethos of the Thatcher government upon the behaviour and performance of British industry, particularly that sector about which most data was available - the manufacturing sector.

One myth had it that prior to 1980 those employed in manufacturing were not working 'hard' enough (7), particularly by comparison with their counterparts in most other developed industrial economies; America, Germany and Japan were especially identified as countries having superior manufacturing industry performance. The objects of the myth were frequently named as the operative workforce, particularly when unionised, although more perceptive and less politically partial observers might have included all levels of management as well. The usual expression of this particular myth was that the policy of the Conservative government, usually highly personalised as Mrs. Thatcher herself, in some way caused people to work 'harder' and that, whilst British manufacturing was very significantly diminished in scope and relative economic importance, the resulting increase in productivity enabled it to increase its competitiveness and to improve its long-term position. Indeed, it became an example of positive development to economies that had hitherto been regarded as the absolute leaders in the field of manufacturing.

Any reasoned acceptance of this account of things would attribute this 'success' to both negative and positive factors - negative in as much that employees at all levels became acutely in fear of losing their jobs unless their firms could become more competitive through increased productivity

(and hence lower unit costs); positive where all concerned pro-actively responded to the challenge that appeared to have been revealed by the mounting closures and unemployment of the period.

The 'counter myth' cannot perhaps, be put in such clear and unequivocal terms; it could not deny the observed aggregate circumstances of the time - the relatively low average productivity of British manufacturing businesses, the consequences of this in terms of the effects of uncompetitiveness - failure of firms and rapidly mounting unemployment - and the subsequent dramatic improvement in productivity (8) and in the general condition of those businesses that 'survived' the shake-out. The main elements in the content of this myth were that 'harder' work did not play a prominent part in the process; that management ruthlessness, supported by government attacks upon the power of organised labour and the weeding out of the less efficient firms by a form of industrial Darwinism (resulting in an improved 'batting average' for the survivors) were the effective engines of change.

Evidence in the form of data from the PUL Index was referred to by proponents of both these 'myths'; that the Index had shown a significant rise in the early 1980's was seized upon as proof of the 'harder' work approach. Reference to PUL by holders of the opposite opinion was less positive and took the form of doubting the validity of the Index and of the basis from which its measurement was derived (9, 10). An expression of most of these criticisms is perhaps best found in David Guest's 1990 paper (11) - apart from suspicions of the adequacy of the sample size and composition of the Index, doubts very much centred on the effectiveness of the concept of the Standard Hour (3) as a measure of worker effort and on the reliability of measurements made by those applying the methodology of work measurement of which the Standard Hour was an integral part.

Doubts have certainly been expressed concerning both the capability of those responsible for work measurement and the actual degree of 'thoroughness' with which the methodology, even if correctly administered, is applied. Resources were not available to the authors of PUL to investigate the quality and quantity of work measurement carried out in collaborating factories and the fact that errors of various sorts occur in what is a process involving millions of measurements annually would not be disputed. However, experience and observation suggest that considerable care goes

into both work measurement and the subsequent recording processes and surely the reason is not far to seek - the wages bill, the cost estimates and works performance control are all sensitive to the degree of application and accuracy of the measuring process. Firms in a competitive environment could not tolerate the adverse effects on profitability to which unreliable systems would give rise. Furthermore it might be assumed that workers themselves would be intolerant of the possible adverse effects for them of such unreliability.

Taking David Guest's article of November 1990 as the archetype of criticism of the PUL Index, his main conclusion on the wider issue of productivity was that "there is little support for the contention that workers' effort has been a significant factor in productivity increases".

Proponents of the 'working harder' hypothesis tended to draw quite heavily on the PUL data published during the '80's - hence the attention given to the Index and its supposed shortcomings by Guest and other critics . This was an argument into which the authors of PUL have not themselves entered, but as a preliminary to a discussion of organisational information derived from contact with the PUL sample, a view of their interpretation of the data in this respect should not be out of place.

The authors would maintain that the data input to the Index was 'accurate' in the sense that factory (4) performance was largely assessed by movement in indices derived from work measurement criteria and that profit -seeking (if not maximising) businesses would not trust vital decisions to information that was inherently flawed. It appears then, quite reasonable to stand by the assertion that manufacturing firms in general **do** possess adequate degrees of competence and determination to apply knowledge that will result in consistent behaviour, even if slightly variable in standard as between factories. Whilst instances of ignorance and sloppiness in the application of work measurement techniques undoubtedly occur, resulting in a decline from some absolute standard of accuracy , it is believed that actual practice attains as high a standard in relative terms as warrants the use of the PUL Index based on such data, as a reliable indicator of productivity change.

As to the composition of the Index population, it is obvious that larger size and greater stability would have been desirable characteristics, but, within the resource constraints applying to the PUL

project, it is believed that the sample was, in terms of composition, 'managed' as effectively as possible and that it was capable of the production of data of a highly useful kind, worthy of serious consideration, if not of absolutely unqualified confidence.

"Critical" PUL movements: the statistical evidence

Putting the information provided by the Index in the perspective of its whole 21 year life-span, the proposition that productivity increases were largely - or even, over long periods, significantly - the result of worker effort was hardly borne out by the behaviour of the Index. From 1971 to 1982, and again from 1984 to 1992, the PUL Index fluctuated only slightly around a horizontal trend line. This amounted to what might be called its 'expected' behaviour. After all, a hypothetical profit-maximising firm would assumedly endeavour to maintain labour effort input at a constant 'maximum' rate and in an economy composed of such firms one might expect to find notional PUL maintained at that level. Fluctuations below such a level would be due to necessary adjustment to external influences and constraints and 'frictions' inhibiting even theoretically maximising firms from making such adjustment immediately.

In the real world, of course, not only would adjustments be necessarily and, possibly, very much delayed because of a range of frictions and constraints, but no business would normally operate with constant maximum labour effort input. That some such maximum, or 'ceiling' does exist would seem a logical proposition, but the PUL project has not addressed the question of its determination and measurement; the 100 value of the PUL index does not refer to any such maximum, but was the Index value accorded to the actual PUL measurement determined on at the outset of the investigation.

Over the two above-mentioned 'plateau' periods, productivity did, of course, grow, but that growth was due to technological factors - the expected source of long-term development. Interest has, therefore, very much centred upon the remarkable phenomenon of 1983. During that year PUL rose by almost 5 percentage points and became the main contributor (that is, exceeding the effect of Technological Progress) to growth during that period; furthermore there was subsequently no significant decline from the level of PUL attained at the end of that year. The Index, however,

thenceforward behaved in much the same manner as had been observed over the years 1971 to 1982.

The effective population of the Index for 1983 was 166 - that is, the same 166 factories were present in the data for the fourth quarter of 1982, as were there in the first quarter of 1984. Of course, there were a number of factories in the sample for 1982:Q4 that had dropped out by 1984:Q1, and similarly factories in that for 1984:Q1 which were not present in the sample for 1982:Q4.

Of the 'continuing' factories 110 showed a PUL increase and 56 a decrease; 44 of those recording a rise, increased by 10 per cent or more; 18 of those showing a fall, decreased by 10 per cent or more.

As can be seen from the accompanying graphs no other PUL movement was of the same 'once-for-all' character as that of 1983; all others being of a 'cyclical' kind, identified as an up:down movement or v.v. For example, with individual factory plus and minus movements of 0.5 percentage points or less regarded as 'no change', the Index fall of 1980 was accounted for by 73 falls; 32 no changes and 25 rises and the subsequent rise of 1981 by 85 rises; 25 no changes and 24 falls..

The "Fall-Rise" 'blip' of December 1986 - April 1987 had a movement composition of:-

Fell and rose	106	
Rose throughout	26	
Fell throughout	16	
No change (+/-<0.5%)	12	
Rose and fell	9	n = 169

As a final example, during the relatively long and clearly observable downward movement of June 1988 to June 1991, with a total 'effective' population of 169 factories; 112 fell; 16 were 'no change' (on the above-mentioned basis) and 41 rose.

The above evidence shows that all significant movements of PUL were not due to exceptional behaviour on the part of some minority of participants; they, of course, reveal that there was always quite a wide range of movement and that it was never totally uni-directional.

It is suggested that this evidence tends to emphasise the validity of the 'findings' of 1983. A considerable once-for-all rise in PUL did occur and during that year the PUL factor accounted for almost all the rise in productivity.

Whilst interest centres upon the labour productivity of firms in the PUL Index, movements in employment in those firms is also worthy of attention. During the entire PUL period (1971 to 1993) employment in manufacturing industry - as defined by the 1980 census - fell from 7,856,000 to 4,270,000. It is not possible to state accurately the behaviour of employment in firms in the PUL index as almost half the firms within the sample did not provide reliably consistent data for numbers employed, but it is worthwhile to look at movements in employment over shorter periods of time for that proportion of firms supplying acceptable information. The following analysis will, of course, refer only to firms that were in the Index for the whole of the period concerned. It must, of course, be noted that the official aggregate figures refer to **all** employees in manufacturing, whilst the PUL figures refer only to the number of '**directs**' - that is mainly hourly-paid employees working 'directly' in the physical production process. Occasional investigations, one of which was carried out for the Department of Employment in 1980, revealed that approximately half the hourly-paid workforce was of the direct category, although there were wide variations as between individual firms and industries. The expected long-term trend would be that the proportion of directs would fall as increasingly capital-intensive technologies were installed, but whilst this might have been a valid underlying trend, there were clearly-documented variations in the pattern of direct:indirect proportions.

Definitional factors also affected the quality of available statistics; for instance, workers could still perform those tasks traditionally regarded as being 'direct', but be no longer differentiated in status or payment method from 'indirect' employees, or, increasingly, from 'staff'. It was in fact, an acceleration of such reorganisational processes that was a partial reason for the decision to discontinue the collection of data and bring the PUL Index to a close.

PERIOD		No. of Factories	PUL Factories % change in direct employment	All Manufacturing % change in all employment
from	to			
Q1 1980	Q1 1983	98	- 22.65	-19.33
Q1 1985	Q4 1986	103	- 8.39	- 4.00
Q1 1990	Q3 1992	100	-13.73	-14.32

In the first and third periods above, the changes in the PUL sample and the whole manufacturing population tally quite well; in fact the change in the direction of variation (PUL employment fall higher than all manufacturing in 1980-3 and lower in 1990-2) seems to reflect the anecdotally reported fact that it was directs that bore the burden of redundancy in the former period and indirects in the latter.

Unfortunately no adequate explanation can be offered for the deviation in 1985-6 of PUL factories' direct labour experience from the change in all manufacturing employment. It may suggest that directs were still being discarded at a disproportionate rate, although individual workers could have been reclassified as indirects. Certainly as time went by from the mid-eighties onwards, the distinction between direct and indirect operatives was becoming less well-defined. The hitherto accepted explanation for the decline in direct numbers; that they were being replaced by "machines" and by the indirect operatives necessary for the maintenance of a more capital-intensive infrastructure, was being superseded by one expressed in terms of their disappearance as strictly direct operators because of their assuming former indirect functions - maintenance, inspection, internal transport and 'housekeeping' - on either an individual or a team basis.

Organisation and Culture

It was during the final five or so years of PUL data collection that mention of culture change became explicit in the author's discussions with production management. Such reference did not however, mean that culture changes were purposively in progress, and certainly not that such changes had actually happened. In many cases it was referred to as something, not clearly defined, that would be attempted - or that management would like to attempt ! Even in post-data collection discussions, during 1994-7, emphasis was upon what was in progress and on obstacles to culture change that were being encountered. The impression (and nothing more definite) was gained from management that resistance by workers to change was greater where predominantly male workforces were involved, in areas of older trades and higher union participation.

As remarked upon in the introduction headline emphasis on productivity has made a come-back. This time (November 1998) particularly in the case of BMW-owned Rover (12). Adverse comment by the parent company on Rover performance has concentrated on the Longbridge plant (incidentally, a late entrant to the PUL Index; too late that is, for any reliable comment to be made on the course of labour productivity there). Its continued operation appears to depend upon employee acceptance of a deal involving increased investment in return for further changes in working practices and down-sizing by some 2500 jobs. (Workers accepted this proposition in December).

By contrast, the Cowley plant - which was a member of the PUL panel throughout - achieved the highest PUL increase of any participant and provided ample evidence of apparently successful, thorough-going culture change. The qualifying adverb is used because the PUL project was not directed towards an analysis of employee attitudes, which, in any case, the investigators were not themselves equipped to attempt.

In saying this it is recognised that distinction may be made between organisational change and culture change; the former can usually be 'seen' and to some extent measured; the latter is surely more subjective involving as it does concepts such as commitment. It is here suggested that labour productivity might increase as a result of organisational change, such as the introduction of 'cellular' manufacturing and the re-categorisation of workers, without there being a deeper,

underlying culture change. It is probable that many instances of claimed culture change have, in fact, been changes in work organisation without much in the way of development in managerial or workplace 'philosophy'. Of course, may it not be assumed that a culture change resulting in increased productivity could occur without there being any significant alteration to the organisational framework - a matter of change of heart, rather than of method ?

During the post-data collection period 105 firms, accounting for 132 PUL entries, were visited (visits were usually to factories and so the number actually exceeded 105); detailed 'useful' information was collected in 98 cases (121 entries). The latter number represented approximately 60 per cent of panel members in the final year - 1992 - of full-sample data collection. These firms were selected on the basis of perceived managerial willingness to co-operate in interviews and of accessibility, but the investigator has no reason to doubt that the information obtained was not unrepresentative of other panel members' experience. The interviews were informal and were primarily directed towards the respondents' views on the movement of PUL after the cessation of regular data submission. The opportunity was however, taken to investigate management's views on organisational and cultural change and, where possible, to develop a retrospect to the mid-1980's and the controversial topics of 'fear'; the 'working harder' contention and the "Thatcher Effect".

While in conversation most managers declared themselves in favour of culture change, or claimed that only successful achievement of such change would allow their business to survive, there were obvious differences in corporate outlook. This found its most extreme expression in the PUL panel when in 1996, a take-over took place involving a number of textile plants and the new owners insisted on the removal of cellular/team structures and accompanying payment arrangements and a reversion to an individual payment-by-results system. Incidentally, in November 1998, the company announced the closure of several of its factories - presumably as a consequence of its largest customer's (Marks & Spencer) decision to resource supplies increasingly from overseas.

In answer to the frequently asked question - "are direct employees working harder ?" - most managers interviewed between 1994 and 1997 gave guarded answers - some definitely 'no', others 'maybe' and a few 'yes', but most referred to work being 'more effective' or 'smarter'. The question

was always initially asked in a deliberately subjective context, without reference to previously provided numerical data. Most respondents also believed that, however they might describe it, the 'quality' of work performed had improved since 1990.

Just as firms and plants in the overall sample varied very much in size, so did those in the sub-set from which subjective information was obtained and managers of factories both large and small made a similar range of comments concerning work intensity and organisational change. It must however, be remembered that the Index was receiving very little data from factories employing less than 50 people - say around 20 -25 directs. There are, of course, very large numbers of manufacturing enterprises and establishments in the smallest size category of the Census of Production; it has to be admitted that the interviews obviously throw no specific light upon their productivity performance and related organisational thinking !

What was noticeable however, was that the language of contemporary management thinking was used by most of those interviewed - 'culture change', 'team-working', 'single-status' and so on were all used spontaneously (13). In fact, a strong impression was gained that many factories employing around 100 persons or less, were managed by professionally highly literate people; that had certainly not been the case 30 years earlier.

Although, as already suggested, both small and large enterprises not only talked about the same production and organisational concepts but actually applied them, it was only a few very large businesses (14) that seemed to be highly systematic in their approach, with detailed identification of the process of change and a positive timetable for its achievement. Based on information obtained from the relatively small sub-set of panel members in this category, the distinguishing characteristics of such businesses would seem to be narrow hierarchy, single-status employment, open information, 'team-working', selective entry to the workforce and 'continual' improvement - with dates set for the achievement of each organisational/cultural objective.

Not unexpectedly the term 'flexibility' was applied by almost every respondent to every aspect of employment, so that it applied not only to working time but to tasks, functions and responsibilities. Effectiveness of communication was also mentioned as a general pre-requisite to development - in

fact flexibility was realised to be largely dependent upon it.

The ease with which, and the extent to which, change can be achieved is obviously not independent of competitive environment and industrial relations climate. As already suggested the process is less easy in the context of a history of adversarial relations between management and unions, and it seems to be slower in industries operating under considerable competitive pressure, particularly that from abroad. In such cases management - rightly or wrongly - may think it impossible to devote significant human or financial resources to change; with regard to the latter they may endeavour to promote change by recognition rather than reward (which is not to say that in favourable circumstances the rewardless approach may not be appropriate). Greenfield-sited operations may of course, be particularly suited to the introduction of new and quite different organisational and cultural frameworks.

Work Measurement and Organisational Change

It may be thought that the whole process of culture change in manufacturing would be accompanied by, or even through, the abandonment of work measurement and associated payments schemes. The latter have certainly been very widely modified in form, with a marked tendency to replace individual piecework schemes by group or even company-wide incentives. Nevertheless a number of size-significant factories within the PUL panel did believe in the efficacy of individual piece-rates and, in some cases, actually reinstated them after experimentation with group bonuses.

At one stage it was believed that the number of factories abandoning piecework schemes or expressing the intention of so doing, would result in a consequent dispensing with work measurement. This would have meant the loss of such units to the Index and whilst it did not actually happen on a large scale, it was felt that, along with other factors, the consequent destabilisation of the panel (with the need for immediate further recruitment of possibly difficult-to-find substitutes) would reduce its integrity beyond acceptable limits. Hence the decision to cease the statistical series (full panel; October 1992; "50 per cent" panel; April 1993)

Strangely enough, during post-data collection interviews, it was found that support for work measurement seemed to have increased and that factories that had either abandoned it, or much

reduced its scope, for reasons of cost or perceived irrelevance, were returning to it. Rarely however, for remuneration purposes, but essentially for information and control. For instance, one large transnational business compared the performance of its widely-dispersed plants by reference to standard hours per attended hour data (no less than PUL itself !). Another very large IT systems manufacturing business took the view that cost is labour, hence control by work measurement is essential even if labour is only a small percentage of total cost".

In a number of larger plants where a senior manager was the Index contact, opposition to change was imputed to middle management, rather than to the operative workforce. It may be asked how and why such obstacles arose and evidence seems to point to some inadequacy in communications; 'top management' may in some cases have prided itself on its ability to communicate with the factory floor, but may have overlooked the need to get middle management on its side. Of course, such managers were inevitably the 'victims' of some of the hierarchy-squeezing aspects of culture change - destined to become facilitators and 'coaches' rather than givers of orders (a fate shared by front-line supervisors as well) and defensively unco-operative reaction is understandable. All the more need then, for improved communications by way of explanation and preparation from above.

Almost every one of the 121 factories whose managers were interviewed, had some particular characteristic and generalisation is therefore, difficult, as is classification into groups with very strongly defined common features. What will be attempted here is the drawing of a few "pictures", to the broad details of which significant numbers of factories may at least loosely, correspond. This broad brush approach will then be supplemented by some anecdotal information which, whilst referring to only individual firms, or at best small groups of, say, between two and five, in the PUL panel, could very well be typical of significant numbers in the total manufacturing population.

The 'No Change' Picture; where pre - 1980's approaches still held good at the time of interview. These would be typified by individual payment-by-results schemes; by relatively highly hierarchical structures and poor, restricted communications between 'management' and 'workers'.

Relatively few collaborators corresponded fully to this picture, but several were just realising their condition and seemed to be about to break away from it. Including the latter in this category, 24 of the 121 interviewed establishments more or less conformed to the 'No change' picture. They were generally small in size - under 50 direct operatives, with the exception of medium-sized operations in labour intensive sectors of the clothing and textiles industry.

The 'Change in Progress' Picture is of the factory that has abandoned payment-by-results but has retained work measurement for purposes of control. 'Team-working' in some form, including cellular manufacturing, will be in course of adoption, resulting in the removal of some levels of hierarchy and reduction in number of job grades.

A large number - about 65 per cent of the sample population were in this position, some more advanced in organisational change than others. In this category there will be cases of almost total abandonment of work measurement, followed - assumedly after careful consideration - by its reinstatement, wholly or in part. In general there will have been a reduction in indirect employment, with 'indirect' tasks being taken on by direct workers; service departments such as work study and personnel may have been eliminated, but then at least partially restored. Some factories will have been affected by relatively violent reaction to the conditions of 1982-3; in some the 'fear factor', acting upon both shop-floor and management, will have been responsible for organisational change, but by the time interviews took place at least some semblance of 'rational' development was apparent in all cases.

The 'Change Achieved' Picture is of factories that had either achieved the organisational change referred to in the second Picture, or had a definite strategic intention to do so - and, indeed, to go further. Examples of such extended development would be the elimination of overtime, extreme reduction of hierarchy (e.g. senior managers and multi-skilled operators), the insistence that suppliers should themselves adopt principles of organisation involving flexibility, single-status employment conditions and effective internal communications systems, the introduction of continuous measurable improvement, the contracting-out of 'house-keeping' functions, the payment of bonuses (if any) on a factory-wide basis and direct contact between shop-floor teams and customers/suppliers. (Most of which developments could presumably be 'encapsulated' in the popular term of 'empowerment').

Almost all factories - amounting to about 15 per cent of the sample population - conforming, or approximating to the 'Change achieved' Picture were either large in themselves or were the medium-sized subsidiaries of large or very large firms.

No definite relationship can be discovered between the PUL 'performance' of factories during the period 1983 - 1993 and the 'picture' with which they might descriptively be associated; many were, of course, in the process of shifting from conformity to a 'lower' picture to that with a 'higher'.

However, most of those factories best described by the final Picture did claim improvements in PUL - as well as other benefits largely associated with reliability and quality. It is interesting to note that the Index's top 'improver' was the factory that most closely conformed to a fully-developed version of that Picture.

A few factories did provide data relating to PUL performance between 1992/3 and 1996/7 - 20 showed an increase and 5 a fall . In most of the positive cases the movement was either numerically revealed to be in proportion 'A' of the PUL measurement, or anecdotally explained as being so. That is, a reduction in attended hours **not** converted into productive hours, rather than any increase in standard hours per productive hour. Crudely put, this would confirm the frequently referred-to notion of "working smarter rather than harder".

During the course of discussion with PUL collaborators a considerable number and range of ideas and opinions were put forward and it may be of interest to describe these in a deliberately unsystematic way:-

- a) two interviewees mentioned worker 'leisure preference'.
- b) a prominent co-partnership firm was experiencing considerable difficulty in achieving culture changes involving increased flexibility.
- c) a management representative of a very large firm spoke of 'value chain efficiency'
- d) there was a difference of opinion concerning the relative merits of appointing team leaders and letting them be 'elected'. Of the relatively large number of factories involved in team-working, a majority favoured the appointed alternative.

- e) a number of managers referred to a reduction in PUL performance during culture change - particularly when introducing team/cell-type organisation.
- f) there was a contrast of opinion (not in a large number of cases) as to the value of the worker contribution to the manufacturing process; some supporting the 'harnessing of worker intelligence'; others being quite sceptical about the 'workers know best' approach.
- g) marked adverse effect on productivity of company-imposed bans on smoking.
- h) several managers interviewed emphasised the dependence of culture upon CEO attitudes - especially in middle-sized businesses.
- i) contrasting attitudes on rewards and responsibilities; payments versus 'status'.
- j) several managers interpreted 'hardness' of work as 'hardness of adapting to changed conditions'. One respondent suggested that it lay in the fact that job content was now more than 'middling' demanding, but that most people were of 'middling' ability - the new jobs were 'hard' in that sense.
- k) there was a general view that, where standards had been retained or reintroduced, standards had been tightened.
- l) there was some mention of individual responsibility contracts as an alternative to team/cell -type arrangements.
- m) there was some emphasis on the 'removal' of opportunities for **not** working 'hard' or 'effectively'.
- n) several interviewees referred to the adverse effect on productivity of the 'non-visibility' of work waiting to be done. (The absence of such visibility being a feature of JIT and similar systems.)

o) there was frequent mention of the possible adverse effects of peer pressure upon team leaders.

In almost all cases some reference was made to what might conveniently be called the 'fear factor'. Whilst almost everyone in an employment situation - operative or manager - must have some lurking apprehension as to the effect that either specific performance or external influence might have on the continuity of that employment, the notion of such fear being a strongly motivating factor was much in prominence during the 1980's, and possibly later.

Whilst a number of managers definitely dismissed fear as an influence on worker response - with respect to working 'harder' or being more willing to accept change - the great majority recognised it as having had some sort of influence on workplace attitudes. Although no-one interviewed admitted to having **used** fear of job loss as a positive means of productivity improvement, it was clear that this possibility was managed differently from one factory to another. Even if played down, it must have been present in the form of 'awareness' of the threat to employment, and success in achieving organisational and cultural change must have been significantly dependent on how effectively that awareness was 'used' by management (management that was in almost all cases, aware of the reality of the threat to its own security)

Again and again it was evident that in changing the organisation of manufacturing - and perhaps, but not necessarily, the culture of the factory - the most common developmental form, that of the introduction of team-working, raised problems concerning the position, function and status of the team leader. Such individuals, typically responsible for the activity of 5 to 15 people, quite suddenly became key players in new scenarios requiring management decisions to be made as to their selection, responsibilities and remuneration - both psychic and financial. A number of alternative approaches were observed, involving election and appointment; unrewarded responsibility and payment - the latter rather like the purchase of supervisory services under a new name.

Unfortunately, this PUL post-data submission survey took place before a majority of firms had sufficient experience of team/cell working (although almost all had claimed to have introduced, or be about to introduce, it) to complete any worthwhile evaluation of results. Consequently no

conclusion about the relative success of alternative forms of organisation can be reached here. However, it is hoped that this information about what was happening in responding firms might be usefully interpreted by those with interests in both organisational and economic aspects of manufacturing. There should surely be scope for further research of a properly structured kind into both the forms of organisation currently being developed and their relationship to the productive outcome..

Returning to ideas and explanations put forward at the beginning of this paper, it must be emphasised that the PUL index was not established with an answer to the 'working harder' question in view. It was conceived as a supplementary macroeconomic indicator, drawn albeit from intensely micro data, and its possible movements were seen as preceding, and thereby predicting, shifts in hours worked and ultimately numbers employed. That the index might possibly indicate some upward secular trend was not at first contemplated - and indeed, the index has not done so, save for the established 'once-for-all' upward step (like a 'fault' between two plateaux) of 1982-3. Whilst there have been weak indications - some numerical; others subjective - of some further upward tendency between 1992 and 1996; it is essentially only the earlier movement that can have given rise to the use of PUL as evidence of 'harder' work being done by operatives in 'Thatcher's Britain' (or however else one might choose to refer to that period'.)

In the long-run, of course, any increase in productivity (defined as output per person hour) must be a consequence of technological progress - of new methods embodied in the equipment with which human resources are combined for the purpose of production; a fact to which many respondents referred in the course of discussion. It was however, clear that the maintenance at a high level of what might be termed the "PUL element" of productivity was important to firms, not least because labour was recognised as a directly controllable cost factor.(15)

We are dealing here with what has been after all, a very small annual increase in a numerically minor element in the overall productivity equation - perhaps 5 per cent over 25 years (0.2 per cent p.a.), of which at least 3 per cent occurred in one exceptional (?) year, and of that amount one portion derived from what might possibly be described as 'harder' work (standard hours per productive hour) and another from what might well be described - but not exclusively - as 'smarter'

work (productive hours per attended hour).

For what it is worth, the conclusion of this micro analysis of PUL findings must surely be that shop floor employees were certainly, by industry's own accepted measure of work, not working **less** hard in the mid -nineties than in the early-seventies and that they were certainly working **more** effectively (or 'smarter'). There were however, significant variations as between factories and in no way can it be ruled out that quite 'crude' harder working has not occurred in some significant number of instances. However, a sober evaluation of the evidence, both statistical and anecdotal would probably conclude that the non-technological element in overall manufacturing productivity has been the subject of increased commitment by operators and managers which has probably resulted in a consistently - if only slightly - higher level of effort/output per attended hour.

Chart 1: Average Weekly Hours Worked Per Operative, PUL & Employment (T)

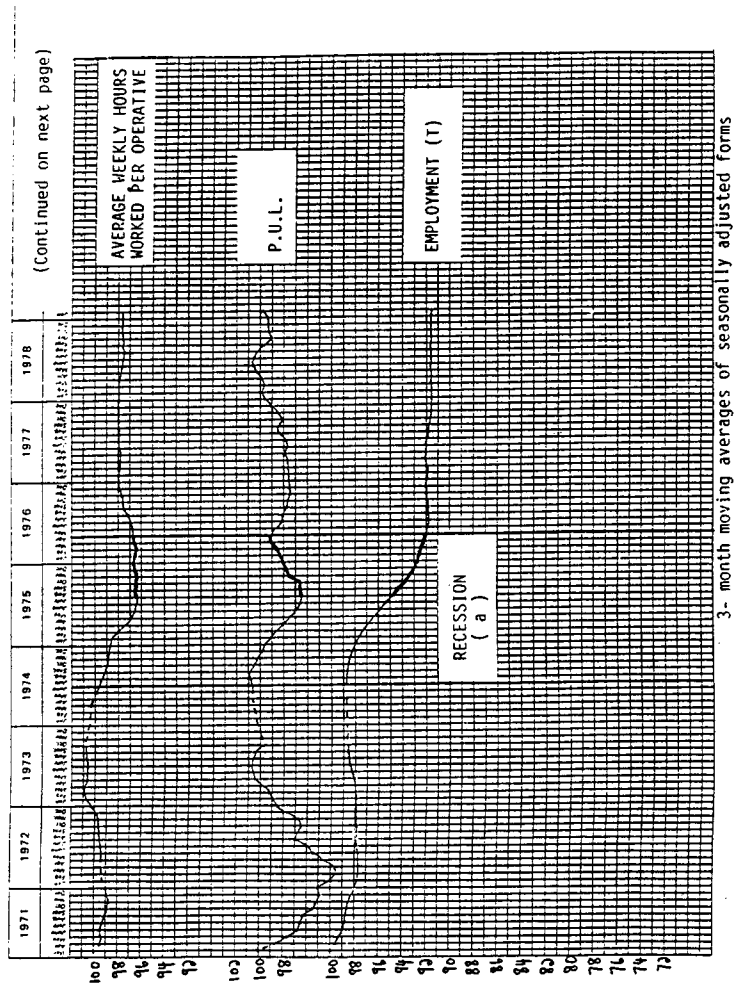


Chart 1 continued: Average Weekly Hours Worked Per Operative, PUL & Employment (T)

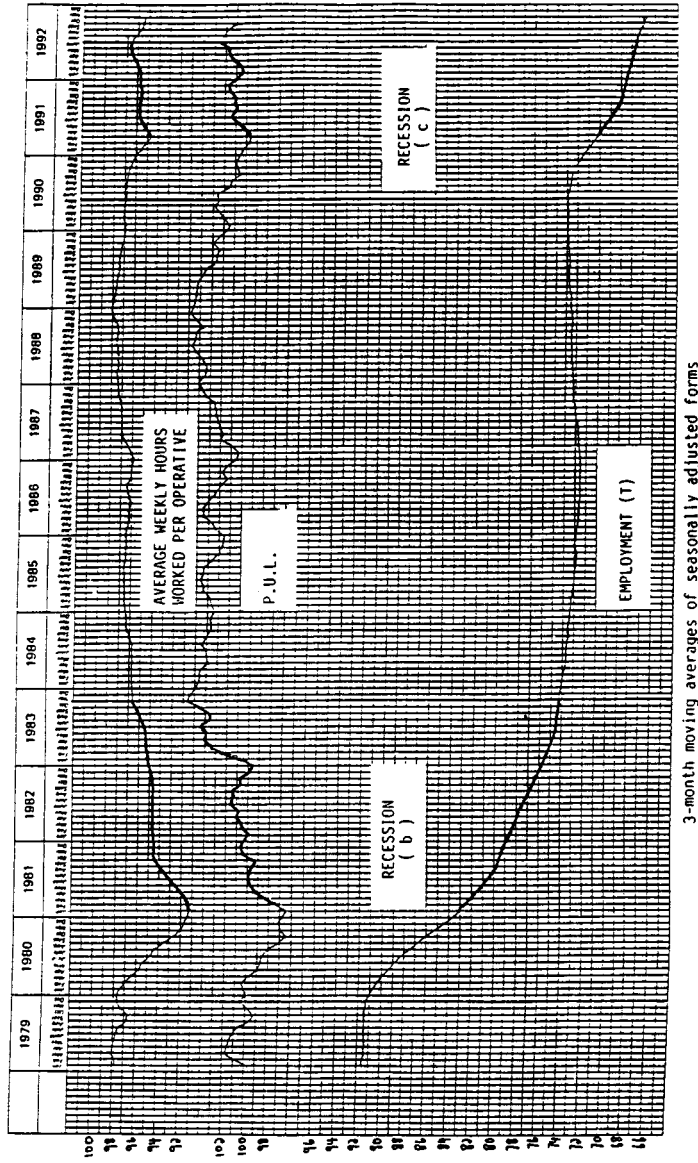


Chart 2: Output Per Operative Hour, PUL, 'Technological' Productivity & Gross Fixed Investment in Plant & Machinery Including Leased Assets

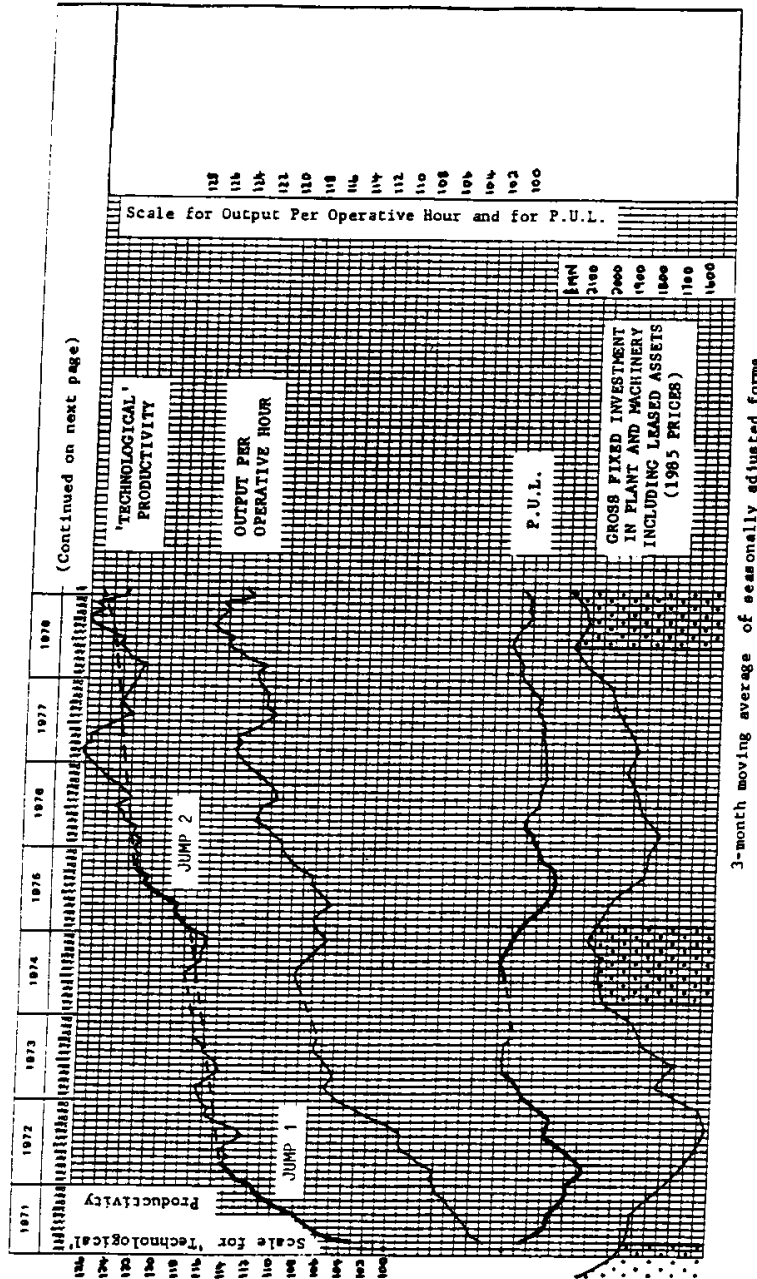


Chart 2 continued: Output Per Operative House, PUL, 'Technological' Productivity & Gross Fixed Investment in Plant & Machinery Including Leased Assets

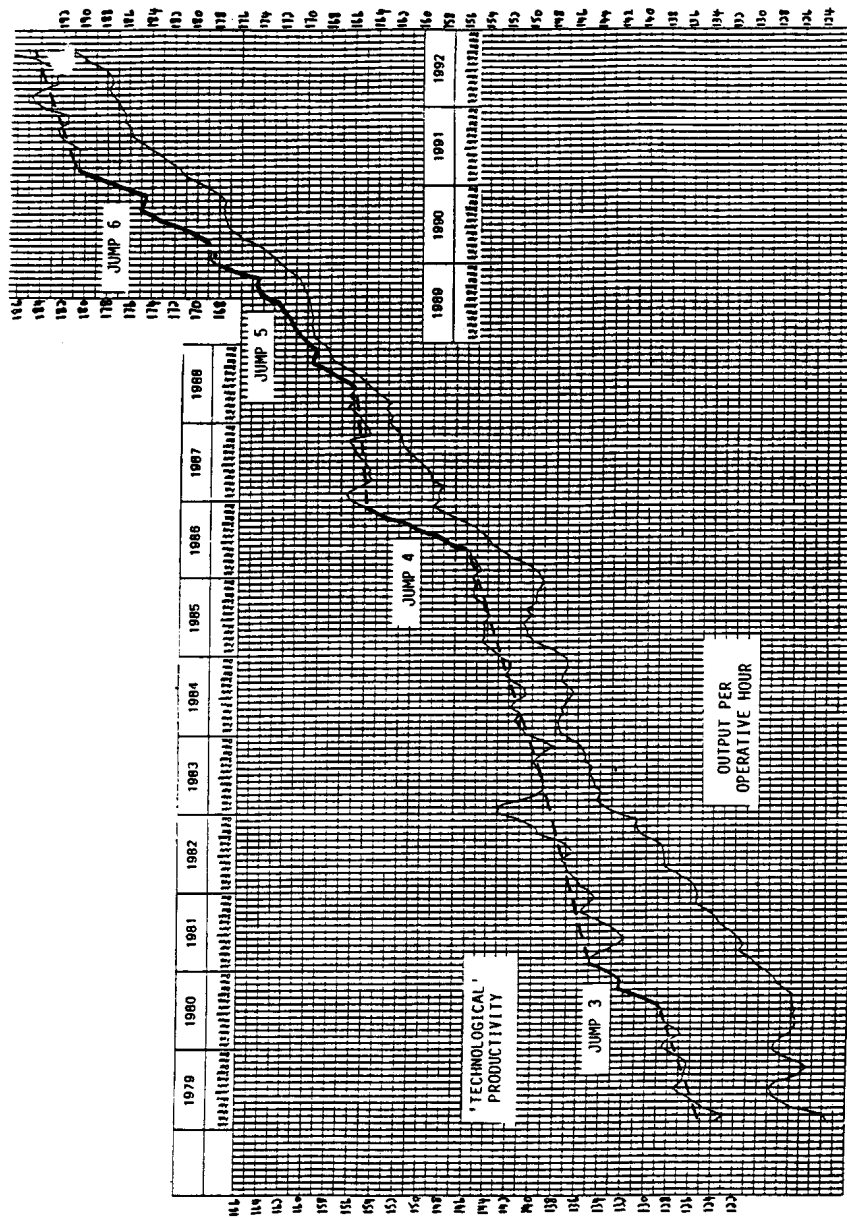
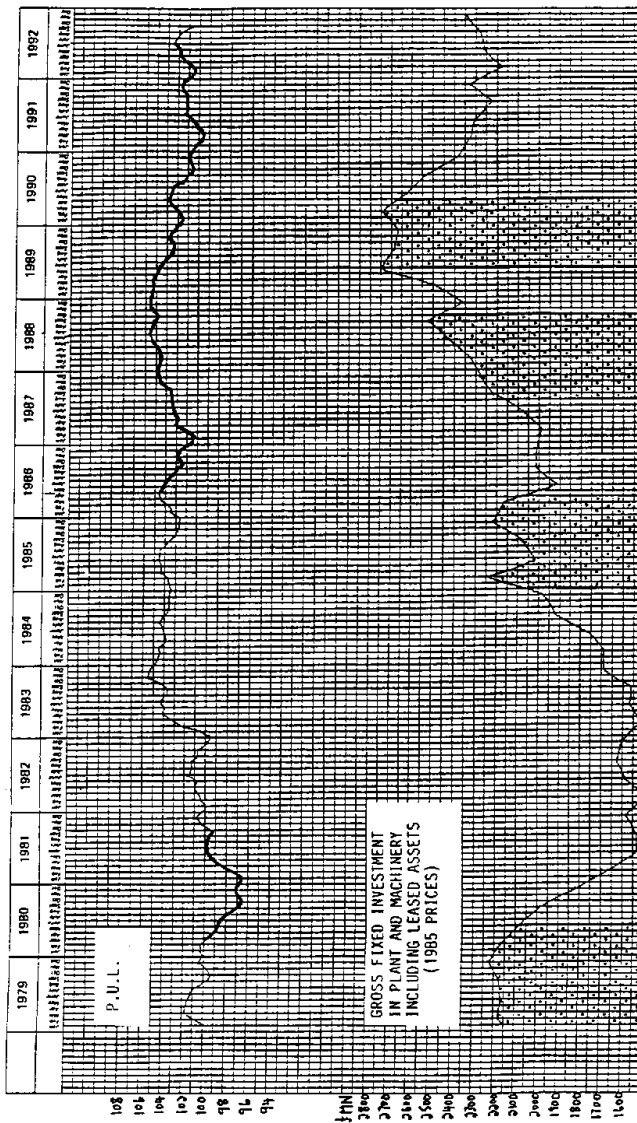


Chart 2 continued: Output Per Operative Hour, PUL, 'Technological' Productivity & Gross Fixed Investment in Plant & Machinery Including Leased Assets



References and Notes

1 The PUL Index has been described many times. Readers are referred particularly to **Bennett, A. and Smith-Gavine, S. (1987)** in D. Bosworth and D. Heathfield (eds.) *Working Below Capacity* London: Macmillan, **Bennett, A. and Smith-Gavine, S. (1993)** *Index of Percentage Utilisation of Labour: Bulletin to Co-operating Firms No. 57* Aston Business School Research Papers RP 9301 and **Smith-Gavine, S. and Bennett, A. (1997)** *The PUL Index* Aston Business School Research Papers RP 9719.

2 A key task of the work measurement function is the re-adjustment of 'standard times' to take account of the effects of technological progress.

3 The Standard Hour may be defined as "the psycho-physiological volume of work that an operative 'suffers' (or, as commonly said in the factory, 'achieves') in 60 minutes, when working at a reasonable speed". For a very detailed and useful discussion of the standard hour and the whole concept of effort, see **Kurosawa, K. (1991)** *Productivity Measurement and Management at the Company Level: the Japanese Experience*. Amsterdam: Elsevier..

4 The term 'factory' (SIC - 'establishment') has been adopted to describe the production unit from which PUL data was provided. In some cases a number of factories within the PUL panel had the same owner ('firm' or - SIC - 'enterprise') but they essentially operated as separate units - possibly in quite distinctly separate industries.

5 This assertion was probably prompted by the publication in July 1998 of the OECD's *Science, Technology and Industry Outlook*, which, as reported in the Economist, 22 August 1998, revealed Britain as the least "productive", in terms of GDP per person employed, of all major developed industrial economies with the exception of Spain.

6 For an interesting comment on the problem of productivity and its measurement, see Bootle, R (1999) *The Great UK Productivity Mystery*. The Times, 8 June.

7 This myth was essentially 'populist' in nature, and consequently widespread. Politicians and

commentators may have found some basis for their ideas from such sources as :- **Pratten, C. (1977)** *The Efficiency of British Industry* Lloyds Bank Review January; **Walters, A. (1986)** *Britain's Economic Renaissance: Margaret Thatcher's Reforms 1979 - 84*, Oxford University Press, and even the PUL Bulletin series (above).

8 For the progress of manufacturing productivity per person hour and of technological productivity see Chart G in PUL Bulletin No. 57 (June 1993)

9 **Nichols, T. (1991)** *Labour Intensification, Work Injuries and the Measurement of Percentage Utilisation of Labour (PUL)* British Journal of Industrial Relations 29.

10 **Procter, S.J. and Rowlinson, M. (1996)** *Re-asking the British Worker Question: Economists, Workers and Economic Performance* 14th. Annual International Labour Process Conference, Aston University.

11 **Guest, D.E. (1990)** *Have British Workers been Working Harder in Thatcher's Britain? A Re-consideration of the Concept of Effort* British Journal of Industrial Relations 28.

12 **Boyes, R. (1998)** *Straight Talking at the Table* The Times 30 November.

13 Interestingly on this subject of language the idea of 'leaner and fitter' productive organisation, much used in recent years by business people and media, was first heard by the writer in a series of interviews for a monograph on small business in the mid - 1950's. If the process had been on-going since then one might have expected the firm concerned to have become super-efficient; unfortunately the managing director who voiced the concept and his medium-sized metal pressings business disappeared a good ten years before the Thatcherism that supposedly decimated their kind !

14 For example, Unilever and its constituent companies and plants.

15 Concomitant with this recognition would be a great reduction in, or almost disappearance of,

labour hoarding as a common management practice. At the outset of the PUL project it was realised that PUL itself was in a sense, the converse of labour hoarding, which was a significant characteristic of manufacturing employment in 1971. By the late 1980's it had virtually disappeared, although post - 1993 interviews did reveal that it could still be practised where specific skill shortages were endemic.