

The Rationality of 'Surplus' Agricultural Labour: Mechanization in English Agriculture in the Nineteenth Century

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PRIOR to the third quarter of the nineteenth century the impact of machinery in agriculture was slight compared with that in manufacturing industry. Some operations such as barn work and hay and corn harvesting had been largely mechanized by 1880 but, up to the Second World War, many were still performed by hand labour and large numbers of workers were still required for seasonal tasks such as hop- and fruit-picking and vegetable cultivations.

There are, of course, many technical and economic reasons why the pace of mechanization in agriculture was so relatively slow. Because of the small average size of farm workloads and the discontinuous nature of crop production many farmers could not realize the economies of scale needed to justify the substitution of fixed capital for labour. Unsuitable terrains were another obstruction to the use of machines in field work, as also, up to at any rate the 1930s, were the difficulties of applying inanimate power to direct haulage in place of the horse.

The failure to adopt machines of proven ability, especially where they appear to have had a clear cost advantage over older methods, is often attributed to rural conservatism, alias inertia. But there was another, arguably much more important brake on technical progress, namely, a belief that the social costs of mechanization, expressed in terms of wage rates, levels of employment and labour relations, might

outweigh the economic benefits. Indeed, the 'Machinery Question', one of the principal theoretical concerns of Classical Economics in the early nineteenth century,¹ in many parts of southern Britain remained an issue long after the Swing Riots, up to and beyond the Great War. The question as to choice of technique was throughout the period central not only to agricultural efficiency but to social welfare and the functioning of the cottage economy.

The root of the problem lay in the facts: one, that agriculture being a residual employer, the size of the population it had to support, directly or indirectly, either on the payroll or the parish, was governed not by the size of the labour requirement but by the numbers seeking work. And two, that in agriculture, in contrast to manufacturing, machines did not contribute directly to higher output and were essentially saving of labour. In the period up to 1850 urban and industrial employment did not expand fast enough to take off all the rural population increase.² Throughout, labour productivity and wage rates in agriculture were lower than in industry due to the relative immobility of agricultural labour and the failure of the agricultural resource structure to adjust to economic progress.³ Unquestionably, the problem of maintaining levels

I am grateful to Professor W N Parker for his most helpful comments on the original paper prepared for the Conference, 'Nineteenth century agrarian structures and performance', at the University of Montreal, June 1984.

¹ For an informed discussion on the 'machinery question' see, Maxine Berg, *The Machinery Question and the Making of Political Economy 1815-1848*, Cambridge, 1980.

² See, J Saville, *Rural Depopulation in England and Wales, 1851-1951*, 1957; W A Armstrong, 'The influence of demographic factors on the position of the agricultural labourer in England and Wales, c1750-1914', *Ag Hist Rev* 29, 1981.

³ For a theoretical discussion, see, E M Ojala, *Agriculture and Economic Progress*, Oxford, 1952; J R Bellerby, *Agriculture and Industry: Relative Income*, 1956.

of employment would have been most acute in the middle stages of industrialization when, for the first time, machines became widely available and the agricultural population was still expanding or but very slowly declining. In practice, it must often have been difficult to maximize profits, wages and employment, that is fully to utilize machines while at the same time find alternative well-paid jobs for all the workers thereby displaced.

The question is: how important was technological unemployment as a 'push' factor in rural migration? Marx regarded agricultural mechanization as a propellant in the creation of the industrial work force. Lenin thought the intensification of production might increase the demand for labour in the short run, but he too believed it would decline once agriculture became more fully organized on capitalist lines and mechanization became general. Hasbach, too, was convinced that in the Victorian period the increase in the use of machinery and in the size of farms had thrown large numbers of labourers out of work in southern districts.⁴

This paper will pose the alternative question of how, which is to say, by what combination of techniques – manual and mechanical – and with what implications for wages and labour productivity, farmers were able to reconcile profits and employment in the labour-flush, low-wage districts of southern Britain in the nineteenth century.

I

Farmers knew only too well the connection between the scale of techniques and the size of the labour requirement and, up to the mid-1860s, when individual parishes ceased to be responsible for maintaining their own

poor, between the level of employment and the size of the poor rate. The curious blend of economic self-interest and moral principle which characterized farmers' attitudes towards labour and employment throughout the nineteenth century was rooted in Marshall's dictum: 'the poor's rate of a village falls principally on the farmer, and if he does not employ the poor he must support them in idleness'.⁵ The Swing Riots dampened the enthusiasm for machines, and the memory of them served as a reminder that indiscriminate mechanization was a threat both to public order and the social good. Thus, as a rule, farmers preferred to give work rather than charity, sometimes at the cost of deliberately passing over opportunities to save labour. As Nassau Senior explained: 'A threshing machine would not cost the wages of one man for a year and would save the wages of two. But the two men are there and must be employed or relieved, so they are set to work with flails'.⁶ Prior to 1850 responsible opinion was hard set against the use of machines when they offended against the code of the countryside and the unwritten law that the onus of finding work should be spread as fairly as possible among all employers in the parish. Under the Old Poor Law the 'roundsman' and 'labour rate' systems were standard devices for work-spreading while, in some parts of England, husbandry covenants specifically prescribed labour-using methods so as to preserve employment.

On the other hand, and a major weakness of a system based so largely on voluntary restraint, sense of obligation often stopped at the parish boundary. 'The farmers are kind enough to their own folk, yet naturally care but little for the riff-raff of other parishes . . .' confessed C S Read in 1858.⁷ Prior to the Union Chargeability Act, the burden of

⁴ H Fukudome, 'Karl Marx on agricultural mechanization in England in the mid-nineteenth century', *Keizai-gaku Kenkyu*, Kyushu University, Japan, 48, 1983; W Hasbach, *A History of the English Agricultural Labourer*, 1908, pp 256, 264, 275.

⁵ W Marshall, *Rural Economy of Norfolk*, 2nd edn, 1795, p 44.

⁶ Nassau Senior, *Industrial Efficiency and Social Economy*, ed S Levy, 1928, II, p 242.

⁷ J C Morton, *Hand Book of Farm Labour*, 1868 edn, p 105.

the poor rate was unfairly distributed between 'open' and 'close' parishes, and between the towns and outlying villages. The social cost of mechanization was small where large numbers of 'foreigners' were employed, as it was the source not the host parish that was responsible for relieving any resultant unemployment. It was said of farmers on the thinly populated Berkshire Downs that they drew their additional workers from the workhouses of the valley towns and, after six weeks, cast them out. C S Read reckoned the greatest advantage of reaping machines was that he was now able to dispense with the services of 'strangers'.⁸

Employers felt the greatest obligation towards their regular workers. They would be expected to 'find a corner somewhere' for the old and infirm who sometimes received full wages, and sometimes were treated as 'three-quarter' or 'half' men, but were certainly overpaid compared with the work done by the other labourers. By the same token, farmers who purchased machines did not always use them to full advantage. There are innumerable examples of where, initially, threshing and harvesting machines were employed only for wheat leaving the barley and oats to be cut or beaten out by hand, and of farmers who allowed their 'harvest companies' to 'borrow' the reaper free of charge in order to safeguard their earnings. Some indeed, kept a machine simply *in terrorem*, to secure themselves against the difficulty of 'unreasonable' demands as to wages at times of pressure. Where hand-tool methods were kept up it was often with a view to providing employment, for which reason the flail was held in reserve on even the largest farms, just as up to the 1880s in Flora Thompson's part of Oxfordshire a small field of wheat used always to be set aside for the few women who still cared to go reaping though the Irish

had often to be called in to finish the job with scythes.⁹

As the labour market tightened so, from the 1850s, attitudes towards machines began to soften. Progressive agricultural opinion came round to the view that capital accumulation was beneficial in that savings re-invested constituted an increased demand for labour. After 1850 machines could be justified on the grounds that the labour supply was diminishing so that the labour saved need not be thrown out of work but could be redeployed elsewhere on the farm. This neo-classical view did not long survive the onset of the Great Depression, but whilst anxious to reduce their labour bills, farmers continued to adjust their method-mix so as to create employment in winter and at the same time allow their labourers to earn extra money in summer to compensate for low earnings at other seasons. Thus in the late nineteenth century the owner of a steam plough might still harvest his corn with a scythe and bagging hook and occasionally bring out the flail. In the 1840s it was remarked that a Manchester manufacturer would not be easily induced to employ men to impel his machinery – but 'a dogged farmer is capable of harbouring any stupidity. He offers a premium for a steam plough . . . and at the same time rejects threshing by machinery.' On the other hand, whereas in the towns the social cost could be widely spread over a large number of ratepayers, in an agricultural parish the men thrown out of employ had to be maintained by the very persons who had purchased threshing machines. As late as 1914 custom still required that farmers should pause before substituting machines, 'when men are available and wages not too high'. Conversely, the structure of the labour market in northern England and south Scotland, based on farm servants engaged on

⁸ A Redford, *Labour Migration in England 1800-1850*, 2nd edn, Manchester, 1967, p 90; C S Read, 'Improvements in Norfolk farming', *JRAS*, XIX, 1858, p 293.

⁹ Flora Thompson, *Larkrise to Candleford*, 1954 edn, pp 256-7; and for further discussion on farmers' attitudes towards machinery: E J T Collins, 'Harvest technology and labour supply, 1790-1870', *Econ Hist Rev*, 2nd ser, XXII, 1969; 'The diffusion of the threshing machine in Britain, 1790-1880', *Tools and Tillage*, II, 1972.

annual or six-monthly contracts, ruled out the possibility of work sharing which existed when labour was employed on a daily basis. As was pointed out, men who could not find work simply had to leave the parish, taking their bondager with them, thereby reducing the risk of labour surplus.¹⁰

II

On his part the labourer looked with an evil eye on what he regarded as infringements of the rights of labour. In return for low wages the farmer was expected to provide as much work as possible, and all innovations which threatened to reduce earnings and employment were viewed with suspicion. Opposition to labour-saving was levelled not just at machinery but also hand tools. In the early nineteenth century, for instance, new designs of flail were objected to on the grounds that, though 'a famous go' by the piece, their greater speed would 'spoil many a day's earnings'. Likewise, the substitution of the faster-working scythe and heavy 'bagging' hook for the sickle and reap-hook met with much opposition in the harvest field. Machine wrecking by no means ceased with the Swing Riots. Indeed, village folklore is far richer in tales of broken harvesting machines than of broken threshers. All manner of devices – files, iron bars and wooden spikes in the field and sand in the bearings – barred their progress. In one district of Hertfordshire, as late as the 1890s, it was 'no uncommon practice' for the labourers to burn reapers and binders in the middle of the night and, at Beenham in Berkshire, one farmer had to have his reaping machines guarded by the police from a gang of about twenty workmen who had formerly taken the harvest by hand.

Long after they had come into general use threshing machines were still despised in the low-wage districts to the extent of their having to be watched over with dog and gun, while the sheaves might still sometimes be packed with flint stones so as to smash the drum. But sabotage was often subtle; the labourers, it was said, pretending not to understand mechanical things and showing little willingness to overcome difficulties until, that is, convinced of their propriety.¹¹

Resistance to machines was most pronounced in those operations which were deemed most critically important to the functioning of the cottage economy. Though arduous in the extreme and 'downright slavery', in the early-mid-nineteenth century threshing by hand was a main source of income in the period November to March, so that the flail or 'poverty stick', came to symbolize the right to work and independence of the parish. The hay, corn and potato harvests, on the other hand, stood for full-employment and, for the labourer, assisted by his wife and children, the opportunity to maximize family earnings. 'The cottagers', wrote Walter Rose, 'regarded the work as their right. Cutting the corn was the big event of the year, a task anticipated and arranged for. It was their opportunity of earning a few extra pounds; and not to have this extra money meant something like chaos to their carefully planned lives.'¹² Richard Jefferies wrote of Wiltshire corn villages where, at harvest-time, 'scarcely anyone is left; every man, woman and child is out in the field'. In the West Country the hay harvest and in the Home Counties the potato and pea harvests were the 'labourers' gold mine'. In Kent and Surrey the hop-picking season was eagerly looked forward to as being the 'turning point in their means for the year; it interposes like a screen between them and the work-houses;

¹⁰ *Farmers Magazine*, August 1841, p 102; *Report and Minutes of Evidence of House of Lords Select Committee on the Poor Laws, 1830-31*, pp 254-5; E P White (ed), *The Standard Encyclopedia of Modern Agriculture* (nd), VII, pp 225-7; Alistair Orr, 'Farm servants and farm labour in the Forth Valley and South East Lowlands', in T A Devine (ed), *Farm Servants and Labour in Lowland Scotland 1770-1914*, Edinburgh, 1984, pp 29-54.

¹¹ Collins, 1969, *loc cit*; *Countryman*, vol II (1928), p 48; *ex inform* Prof E L Jones, La Trobe University; Thomas Williamson, *Agricultural Mechanism*, 1810, p 296.

¹² Walter Rose, *Good Neighbours*, Cambridge, 1942, p 27.

and if it fails them, they have, too frequently no alternative but to throw themselves on the Union for the winter . . .'¹³ Many households were sustained by migratory work, which was an important source of income in large 'open' villages where, even in summer, there was often a lack of employment early or late in the season or between the hay and corn harvests. A feature of the period 1850-1870 was the speed with which the threshing machine displaced the flail in precisely those areas where, a few years previous, following the Swing Riots, a virtual moratorium had been declared on the use of them in order to keep the peace. Labourers' attitudes are here very instructive. Hand-threshing was arguably the hardest and most punitive of all farm tasks and few would have submitted to its toil but for that it gave employment at times of the year when other work may not have been available. When, after 1850, the labour market tightened, and with greater prospect of alternative forms of winter work, the labourer gladly relinquished it. By the 60s it was commonly remarked how men would not go into a barn as formerly, preferring it seems almost any job, in the worst of weathers, to the drudgery of the threshing floor. For much the same reason, that it made for easier work, the harvesting machine was welcomed as long as earnings and employment were unaffected. In the early 1850s, at one of the first trials of reaping machines, though refusing to admit that it was superior to the scythe, the labourers denied it would injure them: the reaper would 'only do work which was at present done by the Irish'.¹⁴ By the 1880s, the most serious complaint was that the laid corn had to be cut by hand while the machine did the easy work!

III

That farmers may have had at their disposal more labourers than were strictly necessary

¹³ R Jefferies, *Hodge and his Masters*, 1949 edn, pp 287-94; *Morning Chronicle*, 13 Feb 1850, p 5.

¹⁴ Collins (1972), *loc cit*; *Farmers Magazine*, Sept 1853, p 199; J C Clutterbuck, *The Agriculture of Berkshire*, 1861, p 42.

had important implications for wage rates and labour productivity. Wages tended to fall as the supply of labour increased but only to the level of the 'social' or 'natural' wage - the acceptable minimum determined by the cost of subsistence and by custom - which may sometimes have exceeded the 'equilibrium' or 'market' wage. Whether the poor rates were a charge to the 'Wages Fund' was a moot point for economists, but farmers regarded wages and poor rates as alternative forms of remuneration paid for out of the same pocket. Yet, a large and elastic supply of labour did not mean necessarily that too much labour was being spent, only that perhaps too many labourers were spending it. A well-stocked labour market had certain compensations and it could be argued that there were positive economic benefits, at least to arable farmers, of a reservoir of labour-power. Because labour requirements fluctuated over the course of the year due to the seasonality of crop production, labour supply and demand on the individual farm were expressed not in terms of just two intersecting schedules and a single wage rate, but of a sequence of demand and supply schedules, one for each task. The division of the agricultural year into winter slack and summer rush meant that whereas there may have been a surplus of labour in the off-season there may have been labour shortages at the work peaks. What exactly was meant by 'surplus' and 'shortage' is a nice point, it being rather unclear from contemporary statements whether these refer to the physical supply - too many or too few workers in the absolute sense - or to the elasticity of supply around a given wage. It is clear, though, that labour was not subject to diminishing returns at every point, and that a zero or negative marginal productivity of labour in winter was more than fully compensated for by positive returns at other seasons. As was explained: just as it is wrong to call a soldier supernumerary when he is not fighting, 'if a man is actually necessary in harvest but not for the rest of the year, he

must be kept for the year for the sake of the harvest'.¹⁵

Arable farmers, particularly, were prepared to subsidize wages over the winter so as to be able to command a large supply of labour – men, women and children – and so be able to realize increasing returns in the summer. An important factor was that many key summer operations, such as hoeing, weeding, and harvesting, were normally paid for by the task or piece. In piecework, as against day work, the number of workers employed was a matter of indifference to the farmer as long as the work was done in an efficient manner within a certain period of time. Indeed, the greater the number of workers, the lower the wage rate, the quicker the job, the smaller the risk of crop losses, and the larger the output. The advantages of piecework were greater when the task was done by hand. A disadvantage of machines was that labour coefficients were more fixed whereas with hand tools variable quantities of labour could be employed at zero or negative cost to the employer. Thus, for as long as there existed a store of labour there may have been good economic reasons, as well as social, why farmers held back on mechanization, and why, after 1850, they should have viewed with such alarm the drying up of what they had come to regard as an inexhaustible resource. The great complaint in the 1860s and 1870s was that labourers' wives and children, and the young single men whom they had supported over the winter – who together comprised the bulk of the labour reserve – were increasingly reluctant to do farm work in the summer when their services were most in demand. A large supply of labour conferred also positional advantages: in farming communities the number of hands and of dependants was a measure not only of economic importance but also political influence and social prestige.

But for agriculture to be able to absorb such large numbers of workers meant that labourers had to be prepared to accept low wages, and employers likewise a low standard of work output. Low wages and low labour productivity ran together.¹⁶ As was explained, a certain number of labourers had to be employed and they, the farmers, 'do not find it in [their] interests to work them very hard'.¹⁷ Moderate work (and low wages) were preferred to hard work (and high wages) because the former made for more continuous employment. Labour productivity, therefore, varied with the numbers seeking work and, as James Caird pointed out, to raise the work output of the few and feed them well, could only 'diminish the employment of the many for whom work must be found'.¹⁸ Standards of labour productivity were kept artificially low in order to provide subsistence for as large a number of people as possible. The claim, in the 1820s, that low wages so dampened the efforts of day labourers that '4 or 5 of them amounted to one in task work' may not have been an exaggeration. Among progressive farmers there lurked the suspicion that cheap labour was inefficient and that the supply of effort was closely linked with the level of wages, a proposition which gained favour in the third quarter of the nineteenth century when comparisons began to be drawn between work outputs in the high-wage and low-wage regions of Britain. In 1874, the presumed superiority of the northern labourer was attributed by Francis Clifford to the rigorous resolve of employers 'to have money's worth for money (and) care in noting when labour has been rendered superfluous by machinery'.¹⁹ 'A superabundance of an inferior article', it was

¹⁵ *Baxters Library of Agricultural and Horticultural Knowledge*, 3rd edn, Lewes, 1834, pp 6–7.

¹⁶ For a more detailed discussion of wages and labour productivity, see, E H Hunt, *Regional Wage Variations in Britain 1850–1914*, Oxford, 1973; 'Labour productivity in English agriculture 1850–1914', *Econ Hist Rev*, 2nd ser, XX, 1967.

¹⁷ *Farmers Magazine*, April 1847, p 357.

¹⁸ James Caird, *English Agriculture in 1850–51*, 1852, p 515.

¹⁹ F Clifford, 'The labour bill in farming', *JRAS*, 2nd ser, XI, 1875, p 94.

argued, 'makes it unnaturally cheap.'²⁰ The wage-gap between north and south narrowed after 1870, but in many parts of southern and south-central England labour relations were soured by the belief on the one part that the labourer was incapable of 'improvement' and on the other that employers wanted only cheap labour and deliberately kept their men down. In the Great Depression, as after the Napoleonic Wars and again after 1920, farmers tended to link wages with profits, and low wages with low cost-low output methods of farming, a vicious circle which has been broken, and even then not completely, since the Second World War, when agricultural labour, hitherto cheap, became an expensive factor of production and higher wages were associated, as to an extent they had been in the 'high farming period' between 1850 and 1875, with rising output and mechanization.

IV

The agricultural labour market was a complex organism so structured that it was unlikely ever to have been in a state of equilibrium with supply and demand perfectly in balance. First and foremost, it was not one but a multiplicity of labour markets separated by space and time, frequently overlapping, and comprising many different categories of worker each with its own supply curve. Supply and demand tended in the short run to fluctuate and the convergence and divergence of the schedules was both a major source of disequilibrium and a factor which very much influenced the timing of mechanization. The major causes of discontinuity in agricultural labour markets were seasonality and the trade cycle.

Seasonality is a phenomenon central to the functioning of agricultural labour markets and contemporary data show that in the third quarter of the nineteenth century labour requirements in mixed-arable farming in the

summer period were at least 30 per cent and, at the work peaks, normally the corn harvest, upwards of 60 per cent larger than in the winter period.²¹ The labour requirement, however, fluctuated from year to year, in some tasks by as much as 30-50 per cent. The demand for hoe-labour, for instance, was much greater in a wet year than a dry. In the corn harvest, a heavy crop might require upwards of 20 per cent and when badly laid and twisted upwards of 50 per cent more labour than a light standing crop. Speed of ripening was of critical importance and, in hot dry seasons, when the entire crop might ripen simultaneously over a wide area, it could disrupt the flow of labour between different districts and lead to a loss of grain through shedding. Even with the machine, a badly laid crop might have to be cut by hand, thus increasing the demand for labour. Notwithstanding the now widespread use of machinery, weather conditions and the state of the crops could still be of consequence even in the late nineteenth century. In 1893, a notoriously dry year, there was little work and much unemployment because of the failure of the hay, corn and root harvests. In 1894 abundant crops and much laid corn led to labour shortages and strikes. Drought returned in 1895 and in some districts even regular hands could not get a harvest. The next two years were much more productive and the demand for labour exceptionally buoyant, especially in 1898 when the corn ripened too quickly and being heavy and badly laid had often to be cut by hand.²² And if demand for labour fluctuated sharply so also did supply. The most crucial factor on the supply side was the trade cycle. Short-term fluctuations in the level of industrial activity affected the rate of rural migration which ebbed and flowed with the expansion and contraction of employment

²⁰ H J Little, 'The agricultural labourer', *JRAS*, 2nd ser, XIV, 1878, p 505.

²¹ J C Morton, *Handbook of Farm Labour*, 1868 edn, *passim*; *Royal Commission on the Employment of Children, Young Persons and Women in Agriculture*, 1867, App. pt 2, Second Report, Evidence of the Assistant Commissioners, 1869, pp 327, 370, 430 and *passim*.

²² *Labour Gazette*, monthly agricultural reports.

in the non-agricultural sector. The rate of outflow increased during the upturns and in a major recession slowed down but may even have become negative due to large numbers of migrants returning to their home parishes. The effect of cyclical fluctuations was especially pronounced in industries such as building, brickmaking, dockwork and general labouring, a large proportion of whose workforce consisted of casual labourers, and which competed directly with agriculture at the work peaks.²³

The importance of 'pull' factors in rural migration is sometimes understated by social historians who emphasize the 'push' factors of low wages, poor working conditions and the displacement of workers by machinery. Rural migration is fundamental to economic progress and to the process whereby resources are reallocated between sectors. Studies of agricultural labour in post-war Britain show a positive relationship between the movement of labour out of agriculture and the level of industrial employment.²⁴ The decline of the agricultural workforce after 1850 was linked to the growth of employment in non-manufacturing industry – in trade, transport and building – and a shift of the centre of gravity of new investment southwards towards the Midlands, South Wales and London, all of which encouraged migration from the low-wage districts of southern Britain. There is evidence too of a two-way flow of population between the town and the countryside in broad sympathy with the movements of the trade cycle. Casual workers, who comprised a large proportion of the total workforce, were especially important to the functioning of agricultural labour markets. Occupationally and geographically very mobile, their work

rhythms were irregular and often seasonal. From the 1830s and 1840s, triggered off by the railway boom, ever increasing numbers of young farm labourers began to wander 'abroad' in search of temporary employment in the mines, quarries, brickworks and building sites. By the 1860s farmers were complaining bitterly about the loose-footedness of their younger workers, who eschewed regular employment, stayed at home in the winter when their services were of little use and migrated away in summer when they were most required. The casual labour market was exceptionally active during upswings of the trade cycle, when large numbers of farm workers were diverted into other outdoor trades only to drift back to agriculture in the downswings. Such counter-flows were much in evidence in the recession of the late 1860s.²⁵ In south-east England it was reported that, 'Since the last monetary panic [1865] the labour current has turned and workmen are now plentiful in the country.' In Norfolk, number of labourers having now returned, they were 'unusually abundant'. In Berkshire it was noticed that whereas previously there had been a great drain of young men from country districts, 'since the stoppage to a large extent of engineering works, the discharge of soldiers, and the railway companies being not very prosperous, there has been rather a reaction and this winter [1867–8] we have seen more young men out of employ than for some time past'. This trend was reflected in the poor law statistics which record a sharp increase in adult able-bodied males receiving relief in the rural unions. Yet, within two years those same workhouses and casual wards were virtually empty, and in the great labour panic of 1872–4, agriculture experienced its greatest crisis, heightened by a resurgence of trades unionism and

²³ For further discussion of the casual labour market, see S Pollard, 'Labour in Great Britain', in P Mathias and M M Postan (eds), *Cambridge Economic History of Europe*, VII, Cambridge, 1968, pp 97–979 *passim*; G Stedman-Jones, *Outcast London*, Penguin 1984 edn, chaps 2–6.

²⁴ K Cowling *et al*, *Resource Structure of Agriculture: An Economic Analysis*, Oxford, 1970, chap 3, and p 90 *fn*.

²⁵ *Ibid*, p 401; *Farmers Magazine*, Oct 1879, p 299; H Evershed, 'Report on the agriculture of Kent, Sussex and Surrey', *Journal of the Bath and West of England Society*, 3rd ser, III, 1871, p 17; C S Read, *The Education and Wages of the Agricultural Labourer*, Norwich, 1867, p 7.

culminating in the strike and lock-out in the eastern counties in 1874.

V

In his classic text on unemployment, published in 1907, William Beveridge stated that in agriculture the pressure on the labour market due to trade fluctuations was 'hardly noticeable', it being a relatively stable occupation.²⁶ Both agricultural output and the demand for food being relatively inelastic, agriculture was not subject to the same degree of business fluctuation as other industries. But as we have seen, in many key operations, especially in arable farming, the labour requirements fluctuated from year to year due to bio-climatic factors while labour supply tended to expand and contract with shifts of the trade cycle.

The implications for agricultural mechanization of autonomous shifts in labour supply and demand were not insignificant. A steady deterioration in the agricultural labour market due to rural migration or rising agricultural output could have been met by an orderly uptake of machines and a planned reduction in the size of the workforce commensurate with the growth in urban and industrial employment and movement of labour out of agriculture. Yet, because of the instability of labour markets mechanization was seldom a smooth and orderly process, but irregular and abrupt. Farmers did not as a rule view mechanization as part of a programme of agricultural improvement but rather as a response to shifts in the labour market. As was complained, they bought machines only when they had to, not to increase profits nor to change the pattern of production, but to save labour in perhaps just one farm operation. This is to say that mechanization was more often 'induced' and was essentially a response to changes in relative factor costs. Thus machines tended most often to be

purchased not when farm profits were highest and farmers could most easily afford them, but at times of labour shortage. Rising wages, strikes and labour shortages tended to coincide with cyclical peaks. There were widespread shortages of harvest workers in 1836, 1839, 1845 and 1846 and local shortages in 1834 and 1841 which accords remarkably well with the movement of the Gayer, Rostow & Schwarz index of industrial activity. In the third quarter of the nineteenth century shortages were reported in 1853, 1856, 1857, 1859, 1864, 1866, 1867 and 1872-4, showing the same coincidence. The relationship between labour supply and shifts of the trade cycle was uncannily precise even in the 1890s. An abundance in 1892-4 was followed by a contraction from 1895-6. In 1897 there was a scarcity even in the winter when in southern and eastern England it was difficult to find 'odd men' for threshing work. The years 1898-1900 were the most difficult since the great labour panic of the early 1870s and in terms of industrial activity the most buoyant, notably in the construction industry. There were reports too of the non-appearance of the Irish many of whom deserted agriculture for other work, and of the diversion elsewhere of numbers of other migrant workers.²⁷

A study of farm machinery in nineteenth-century Oxfordshire based on farm sale notices has demonstrated a marked rise in the number of machines in the mid-1840s, late 1850s and mid-1860s, and of reaping and mowing machines in the early 1870s. Trends in machinery sales show a similar pattern. In 1859-60, for example, Burgess and Key sold nearly 1800 reaping machines compared with only 1000 between 1851 and 1858. Three manufacturers sold between them 98

²⁶ W Beveridge, *Unemployment*, 3rd edn, 1912, p 64.

²⁷ For harvest labour supply, see, E J T Collins, *Harvest Technology and Labour Supply in Britain 1790-1870*, unpublished PhD thesis, University of Nottingham, 1970; *Labour Gazette*, monthly agricultural reports (1890s). For cyclical movements, see, A D Gayer, W W Rostow and A J Schwarz, *The Growth and Fluctuation of the British Economy 1790-1850*, Oxford, 1953; J R T Hughes, *Fluctuations in Trade, Industry and Finance*, 1960, pp 28-30; C H Feinstein, *National Income, Expenditure and Output of the United Kingdom, 1855-1965*, Cambridge, 1972, Tables 51 ff.

reaping machines in 1858, 495 in 1859, and 1310 in 1860. The total number of reaping machines in use increased from an estimated 4000 in 1859 to 80,000 in 1874 of which perhaps as many as half had been purchased since 1870. Other evidence suggests an upsurge in the use of self-binders and hay-sweeps in the later 1890s.²⁸ This chronology is confirmed by contemporary farm accounts. Clearly, there was a close correlation between the state of the labour market and the uptake of labour-saving machinery.

The sequence now becomes clear. Mechanization was both cause and effect of instability in agricultural labour markets. Machines were introduced as a reaction to shortages of labour at high points in the trade cycle with the result that in the troughs when the labour current turned there were now more workers chasing fewer jobs, and therefore more unemployment.

VI

Technological unemployment appears not to have been a major social problem in English agriculture in the nineteenth century, although, as has been argued, it was not always immediate and the effect of the lag may have been to understate its importance. The social costs of mechanization were minimized because machines were not always used to full advantage and because farmers were prepared to employ more hands than were strictly necessary in order to make work. Probably very few farmers could calculate exactly the effect on their budgets of substituting capital for labour and in their attempt to optimize profits and employment it is unlikely that either was used efficiently. Whether technical change

was 'autonomous' or 'induced' is a moot question, but empirical evidence suggests that in agriculture labour-saving innovation normally occurred as a direct response to changes in relative factor prices independent of changes in production.²⁹

Over much of rural England the essence of the employment problem in the nineteenth century was that labour was over-supplied, or at least abundant. There was no great inter-change of labour between the agricultural districts of southern and eastern England and the industrial north and midlands nor, compared with other occupational groups, did large numbers of agricultural labourers migrate overseas. After 1850 the rate of rural migration accelerated and the wage gap between regions began to narrow. Whilst in the main there was an inverse correlation between wage rates and migration, this was by no means perfect nor everywhere the case. Birth rates in rural areas were higher than in urban areas with the result that disproportionately large numbers of young males were obliged, prior to migration, to seek work in agriculture. And, also, as already explained, rather than discharge their surplus labourers, farmers in low-wage areas would often create work in order to retain them, thereby perpetuating the vicious circle of low productivity and low incomes.³⁰ In the face of what would seem to have been strong economic incentives to migrate away, agricultural labour was perversely immobile with the result that between 1850 and 1900 average agricultural wage rates rose by only 50 per cent, whereas national average wage rates rose by more than 80 per cent.³¹ Indeed, it could be that one of the main reasons why labour was slow

²⁸ J R Walton, 'A study in the diffusion of agricultural machinery in the nineteenth century', *Research Papers*, School of Geography, University of Oxford, 1973; J C Morton, 'Some lessons of recent agricultural experience', *Journal of the Bath and West of England Society*, 3rd ser, IX, 1861, p 228; J C Morton, 'On the forces used in agriculture', *Journal of the Society of Arts*, 1859, p 57; *Farmers Magazine*, Jan 1875, p 5.

²⁹ For a review of the theoretical problems, see C-A Olsson, 'Relative factor prices and technical change', in L Jörberg and N Rosenberg (eds), *Technical Change, Employment and Investment*, University of Lund, Sweden, 1982; W E G Salter, *Productivity and Technical Change*, Cambridge 1960, chaps 5, 10, 11, 12.

³⁰ Armstrong, *loc cit* p 73. For the connection between wages and migration see, E H Hunt, *Regional Wage Variations*, chap 7.

³¹ B R Mitchell and P A Deane, *Abstract of British Historical Statistics*, Cambridge, 1962, pp 343, 349-50.

to migrate was that instead of reaping the full cost-benefits of mechanization, farmers chose to maintain employment at an artificially high level in order not to deplete their 'labour store'.

To confirm the foregoing analysis one should, of course, establish from quantitative evidence within a formal model the point on the marginal costs curve where long run profit considerations fade into personal or social ones, a task which must be left to the cliometricians.³² This paper has suggested

³² I am grateful to Professor Parker for clarifying this point.

that in England agricultural mechanization did not result either in a mass exodus of labour from the countryside, nor in large-scale technological unemployment, at least not among regular farm workers. It is argued that over much of southern Britain, notably in the arable districts, there were good economic as well as social reasons why farmers may have eschewed machines in favour of more labour-using methods, and have hoarded a 'store of labour' which, surplus to requirements in the slack times, could be used to advantage at the work peaks.

Notes on Contributors

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RACHEL HELLIER was born into a Yorkshire farming family in 1930. She took a degree in agriculture at Oxford (MA 1952), followed by a DipEd (1961) and a BSc in Economics (London, 1975). She was an Agriculture Officer for the West Riding County Council until 1974, and for the last ten years of her sadly curtailed life a Senior Lecturer in Agriculture at Askham Bryan College, York. Her research into agricultural history was largely a spare-time activity and remained unpublished. Her papers came at her death to BARBARA HUTTON, FSA, President of the Vernacular Architecture Group, who was then Chairman of the North Yorkshire and Cleveland Vernacular Buildings Study Group, of which Miss Hellier had been a founder member and an enthusiastic supporter. Miss Hellier's studies of farmsteads and of individual farm buildings are filed at the Yorkshire Archaeological Society, Leeds, with the other records of the North Yorkshire Group.