PROBLEMS

The Enclosure Movement and the Supply of Labour During the Industrial Revolution *

Bennett D. Baack
Ohio State University

Robert Paul Thomas
University of Washington

That the English Industrial Revolution was characterized by economic transformation as well as economic growth has long been recognized by both economists and historians.[1] One of the major transformations which occurred during the period was a change in the tasks at which workers were occupied. Emerging from the seventeenth century when about two out of every three workers were employed in agriculture, the English economy had attained by the mid-nineteenth century a position whereby only one in five were making a living from the land.[2] A shift in the distribution of occupations of this magnitude suggests a fundamental revision took place in the economic relationships between the agricultural and industrial sectors. Those who study the causes and consequences of the Industrial Revolution have spent a great deal of effort examining in detail the impact of the metamorphosis of agriculture during that period.[3] Among the many issues confronted is the question of the role of the enclosure movement in the provision of the

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1 For a critical evaluation of the accumulated studies on the Industrial Revolution see R. M. HARTWELL, *The Industrial Revolution and Economic Growth* (London, 1971).

2 SIMON KUZNETS, *Underdeveloped Countries and the Pre-industrial Phase in the Advanced Countries: An Attempt at Comparison*, in A. N. AGARWALA and S. P. SINGH (eds.), « The Economics of Underdevelopment » (New York, 1963), p. 143; PHYLLIS DEANE and W. A. COLE, *British Economic Growth 1668-1959* (Cambridge, 1962), p. 142.

3 See, e. g., the select bibliographies of SIDNEY POLLARD and DAVID W. CROSSLEY, *The Wealth of Britain 1085-1966* (London, 1968) and PETER MATHIAS, *The First Industrial Nation* (London, 1969) as well as the many articles and books listed annually in the « Agricultural History Review ».

industrial labour force. The current interpretation of the relationship between enclosure and the origin of the industrial labour force was generated nearly a quarter of a century ago not out of theoretical considerations but rather to justify a peculiar empirical finding which conflicted with the then widely accepted traditional view. It is a curious fact that to date, despite the burgeoning accumulation of empirical evidence combined with the theoretical insights provided by the new quantitative historians, the current approach to the study of this issue has not been disputed as to whether it is an appropriate framework of analysis let alone systematically re-examined. This paper is such a reassessment.

The framework of analysis which we will employ is that provided by the theory of property rights now emerging in the literature. To a large extent economists have generally treated property rights as parameters in their studies. While such an approach may be entirely appropriate for the examination of issues constrained by the short run, as historians we are faced with the fact that in the long run property rights have been subject to fundamental change. Such was the case in England during the Industrial Revolution as the enclosure movement in essence respecified property rights to land. Historically land tenure had been subject to change in England and varied from clearly specified and enforced private property to ill-defined common ownership. Enclosure meant the elimination of existing common property rights associated with land by the establishment of private property, whether or not this involved the construction of physical barriers to entry such as fences or hedges.[4] In recent years an increasing number of attempts have been made at the theoretical level to deal systematically with the phenomenon of changing property rights in all of the basic factors of production. Furthermore, the application of property right theory to empirical research has resulted in a multitude of works covering a wide variety of issues.[5] Among them are some preliminary efforts to apply the approach to the study of European economic history.[6] A model has been generated, for example, to explain the rise and fall of the manorial system.[7] Consideration has been given to the question of variation in contractual arrange-

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[4] There are several excellent primers on property rights to land in England. See for example FREDERICK POLLOCK, *The Land Laws* (London, 1883) and A. W. B. SIMPSON, *An Introduction to the History of the Land Law* (Oxford, 1961).

[5] For an analysis at the theoretical level seen ARMEN ALCHIAN and HAROLD DEMSETZ, *The Property Rights Paradigm*, « Journal of Economic History », XXXIII (March, 1973). Regarding the empirical research see the recent review by ERIK FURUBOTN and SUETOZAR PEJOVICH, *Property Rights and Economic Theory: A Survey of Recent Literature*, « Journal of Economy Literature », Vol. V, No. 4 (December, 1972).

[6] DOUGLASS C. NORTH and ROBERT P. THOMAS, *An Economic Theory of the Growth of the Western World*, « Economic History Review », XXIII (April, 1970).

[7] DOUGLASS C. NORTH and ROBERT P. THOMAS, *The Rise and Fall of the Manorial System: A Theoretical Model*, « Journal of Economic History », XXXI (December, 1971).

ments regarding demesne farming during the twelfth and thirteenth centuries.[8] The behaviour of transactions costs, a critical component of property right theory, has been identified as a powerful explanatory variable in the determination of the particular growth patterns of the major countries in seventeenth century Western Europe.[9] By incorporating the theory of property rights in a re-examination of the impact of enclosure on the industrial labour force we hope to shed new light on the question with the new approach which has already demonstrated its potential. In the subsequent sections of this paper we shall briefly summarize the existing literature and analyze some of the major theoretical and empirical problems which remain unresolved. It is our belief that the whole question of the relationship between enclosure and the industrial labour force needs much more investigation and fitting into a more rigorous analytical framework than has been done to date.

I.

The question of how an increasing share of the English labour force came to be employed in industry has intrigued economic historians for generations. To many the observation that the parliamentary enclosure movement and the Industrial Revolution occurred contemporaneously suggested the possibility the enclosure played a part in the process. The quest to identify such a role led to a historiography which has ranged from consistency to near total contradiction between theory and evidence. With a better understanding of a wide variety of related issues at stake what emerged in the literature as a major focus of attention was the impact of enclosure upon the demand for agricultural labour. Once determined, presumably insights could be gained into the origin of the industrial labour force.

An early view, which was to attain the status of near unassailable dogma, assigned a critical role to enclosure. Often presented in Marxist terms, the argument was made that enclosure expropriated the agricultural labourer from the land.[10] Thus, families whose only working experience

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[8] Clyde G. Reed and Terry L. Anderson, *An Economic Explanation of English Agricultural Organization in the Twelfth and Thirteenth Centuries*, « Economic History Review », XXVI (February, 1973).

[9] Clyde G. Reed, *Transactions Costs and Differential Growth in Seventeenth Century Western Europe*, « Journal of Economic History », XXXIII (March, 1973).

[10] See Karl Marx, *Capital* (Everyman trans., ed. G. D. H. Cole, 1930), Barbara and J. L. Hammond, *The Village Labourer 1760-1832* (London, 1920), and Maurice Dobb, *Studies in the Development of Capitalism* (New York, 1947). In the words of E. P. Thompson, « Enclosure (when all the sophistications are allowed for) was a plain case of class robbery », *The Making of the English Working Class* (New York, 1963), p. 218.

had been in farming became unemployed and migratory.[11] In terms of classical economic theory, this interpretation viewed enclosure as resulting in a decrease in the demand for labour. At the same time, however, the rise of the factory system in England was increasing the demand for industrial labour. The sequence of events was now complete. Agricultural labour, unemployed by enclosure, became migratory and subsequently employed in industry.

One only has to turn to the classical works to appreciate the once pervasive acceptance of this interpretation. For example in a recent article R. M. Hartwell suggested that, « The most important general accounts of the industrial revolution have been those of Toynbee, Mantoux, and Ashton... ».[12] It is interesting to note that to a man these three scholars were proponents of the view that enclosure decreased the demand for labour. Referring to the late eighteenth and early nineteenth centuries Toynbee observed,

> The consolidation of farms reduced the number of farmers, while the enclosures drove the labourers off the land, as it became impossible for them to exist without their rights, of pasturage for sheep and geese on common lands.[13]

In reference to the effects of extinguishing common rights by enclosure Mantoux argued

> But a section of the rural population having been torn away from the land that nourished them, having lost their homes and seen their former ties broken, became unsettled and migratory; the small landowners and farmers on the one hand, the cottagers and journeymen on the other, were ready to leave the countryside if they could make a better, or indeed a plain living elsewhere.[14]

In the general framework of Mantoux's analysis a pivotal position was assigned to the enclosure movement.

> Thus the enclosures and the engrossing of farms ultimately resulted in placing at the disposal of industry resources in labour and energy which made it possible for the factory system to develop.[15]

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[11] As GILBERT SLATER once suggested, « The very word 'enclosure' to a historical student suggests 'depopulation' », *The English Peasantry and the Enclosure of Common Fields* (London, 1907), p. 91.

[12] R. M. HARTWELL, *The causes of the Industrial Revolution: An Essay in Methodology*, « The Economic History Review », XVIII, No. 1 (1965) reprinted in R. M. HARTWELL, *The Causes of the Industrial Revolution* (London, 1967), p. 57.

[13] ARNOLD TOYNBEE, *The Industrial Revolution* (Boston, 1968), p. 62. First published in 1884 as *Lectures on the Industrial Revolution in England* (London, 1884).

[14] PAUL MANTOUX, *The Industrial Revolution in the Eighteenth Century* (New York, 1962), p. 180. The first edition of this book was translated from the French and published in Great Britain in 1928.

[15] PAUL MANTOUX, *ibid.*, p. 183.

Finally we come to the work of T. S. Ashton. His view of the impact of enclosure on the demand for labour was essentially a reiteration of what by then had become the traditional interpretation.

> Many of those who were divorced from the soil (as the stereotyped phrase goes) were free to devote themselves to other activities: it was precisely because enclosure released (or drove) men from the land that it is to be counted among the processes that led to the industrial revolution, with the higher standards of consumption that this brought with it.[16]

For all of the academic status supporting the traditional view, however, there were those whose studies revealed certain empirical deviations which as it turned out offered a portent of things to come. While much of the recent work on enclosure and the demand for labour has relied on nineteenth century census material, data on the subject had been generated and analyzed as early as the eighteenth century. A case in point is the study by Rev. J. Howlett published in 1786. Using questionnaires and militia data Howlett examined the influence of enclosure upon population and found that there was strong evidence to suggest enclosure did not decrease population, but on the contrary, increased it.[17] In an intensive examination of census returns undertaken over a century later, E.C.K. Gonner conceded that he had not found evidence to justify that enclosure had led to depopulation in the countryside.[18] A reinvestigation of this question was subsequently made by Arthur Redford. His results in large measure substantiated Gonner's observations. Based upon available evidence it was Redford's contention « ... that the enclosures between 1760 and 1800 had not been an active force in lessening agricultural employment, or depleting the rural population. Local decreases in some parts of the country have been more than offset by increases in other districts ». Furthermore, Redford asserted, « ... it would appear that the enclosures of the next generation must have been even more favourable to the growth of population... ».[19] Despite the documented reservations of a few dissenting scholars a widespread acceptance of the traditional interpretation prevailed. The reasons why are not clear.[20] It is

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16 T. S. Ashton, *The Industrial Revolution* (New York, 1964), p. 20. The first edition of this book was published in 1948.

17 Rev. J. Howlett, *Enquiry Into the Influence which Enclosures Have Had Upon the Population of this Kingdom* (London, 1786).

18 E. C. K. Gonner, *Common Land and Inclosure* (London, 1912), Book III Effects of Inclosure, Section VI Employment and Population.

19 Arthur Redford, *Labour Migration in England, 1800-1850* (Manchester, 1926), p. 61.

20 Indeed, it would seem there is much to be said for the assertion of Dr R. M. Hartwell that, « It is, of course, easier to speculate than to do research, and although speculation is a good guide for research, too many insights established speculatively have tended to become dogma, and their acceptance as revealed truth often inhibited that very research which alone could establish their validity ». *Op. cit.*, p. 53.

clear, however, that some of the major scholars of the latter persuasion were aware of the quantitative work which had been done.[21] In any event it was not until the publication in 1953 of a regional population study that the intellectual hold of the traditional view was finally broken.

The study was by J. D. Chambers.[22] Being familiar with the literature which had indicated serious empirical problems with the traditional view, Chambers decided to incorporate the quantitative approach used in those previous works in a re-examination of enclosure and its impact on the demand for labour. His methodology was straight-forward. He took a sample of villages and categorized them as being either primarily agricultural or primarily industrial at a point in time. Chambers then defined various classifications of agricultural villages according to whether or not at specified dates they had been enclosed and if enclosed how this was accomplished. Finally, he traced the rate of population growth for the different group of villages over a period of time. His data was drawn from a sample of 119 villages in Nottinghamshire which covered the period 1801-1861. Chambers' results were that following enclosure rural population not only remained but in fact increased, « ... even where the opposite results might have been expected ».[23]

The article by Chambers is considered by many economic historians to have been a watershed in the historiography on enclosure and the origins of the industrial labour force. An important reason for this is due to the interpretation Chambers attached to his results. Whereas previous empirical work had revealed contradictions between accepted theory and available evidence, Chambers suggested an alternative interpretation which was consistent with what had seemed to be disparate observations. In his own words, « Since the rural population in general was unmistakably on the increase during this time, the contribution which the dispossessed made to the industrial labour force came, in the majority of cases, from the unabsorbed surplus, not from the main body ».[24] Accordingly, while enclosure actually increased the demand for labour and thereby expanded employment in agriculture, the natural increase of the rural population was sufficient to create a surplus of labour from which the industrial labour force grew. Chambers' articulation of a new role for enclosure in the provision of the industrial labour force had the effect of bringing to an end the widespread acceptance

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21 For example, in the second edition of his book, Mantoux while recognizing the work done by Gonner did not change the nature of his argument. See MANTOUX *op. cit.*, footnote on page 165, footnote 2 on page 180, and footnote 1 on page 183; ASHTON, *op. cit.*, Bibliography.

22 J. D. CHAMBERS, *Enclosure and Labour Supply in the Industrial Revolution*, « The Economic History Review », 2nd Series, Vol. V (1953).

23 J. D. CHAMBERS, *ibid.*, p. 332.

24 J. D. CHAMBERS, *ibid.*, p. 336.

of the traditional view. In the words of one scholar, « In recent years some very imposing intellectual empires have fallen ». One example is, « The relationship between enclosure and labour supply which had been traditionally explained in Marxist terms was severely undermined by J. D. Chambers' article... ».[25] Thus, it turns out, the analysis offered by Chambers was rapidly accepted by economic historians and has since become the current interpretation.[26].

From the vantage point of hindsight, the total turnabout in the interpretation of the part played by enclosure in the generation of the industrial labour force is indeed remarkable. Compare, for example, the scene painted by Mantoux of people by the thousand being torn from the soil, stripped of their possessions, and reduced to migratory labourers with that portrayed by E. L. Jones in a recent statement. « It is apparent that enclosure was not the creator of a labour force for industry. Enclosure itself tended to to mop up labour from the countryside ».[27] The question naturally arises of what it is about this subject which made such a complete reversal possible. One clue may be that many economic variables were undergoing change in agriculture during the Industrial Revolution. Enclosure after all was purely an alteration of the property rights to land. In addition to enclosure there was throughout this period a diffusion of a whole series of innovations in husbandry which to a large extent transformed English agriculture.[28] For the historian, these innovations have served to complicate the analysis of the specific impact of enclosure. A particularly difficult problem is the relationship between enclosure and the adoption of these innovations. At one extreme there are those who argue that enclosure was a necessary condition for the introduction of the new husbandry techniques.[29] At the same time there is available evidence which suggests these techniques were readily implemented in unenclosed areas.[30] On the other hand, agreement abounds in recent literature that all of these changes together, including enclosure, led to an increase in the productivity of agriculture while demanding more labour

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25 NEIL MCKENDRICK, *Josiah Wedgwood and Cost Accounting in the Industrial Revolution*, « The Economic History Review », XXIII, No. 1 (April, 1970), p. 45.

26 For an excellent account of the current view see E. L. JONES (ed.), *Agriculture and Economic Growth in England 1650-1815* (London, 1967), Editor's Introduction.

27 E. L. JONES, *ibid.*, pp. 23, 24.

28 A standard text on the subject is LORD ERNLE, *English Farming Past and Present*, ed. G. E. Fussell and O. R. McGregor (London, 6th edn., 1961). For a more up to date account see J. D. CHAMBERS and G. E. MINGAY, *The Agricultural Revolution 1750-1880* (New York, 1966).

29 PHYLLIS DEANE, *The First Industrial Revolution* (Cambridge, 1965), p. 40; PETER MATHIAS, *The First Industrial Nation* (London, 1969), pp. 57, 60, 62, 72, and 73; M. W. FLINN, *Origins of the Industrial Revolution* (New York, 1966), p. 95.

30 M. A. HAVINDEN, *Agricultural Progress in Open-field Oxfordshire*, « Agricultural History Review », Vol. IV (1961).

rather than less. In the paradigm of the current view these changes which increased the efficiency of English farmers were labour-intensive.[31] It is apparent that the notion of enclosure requiring more labour, not less, and the industrial labour force emerging from the expansion of population implies that without enclosure less labour would have been employed in agriculture. The logic of this argument suggests that without enclosure more of the growing labour force would have been available for industry if enclosure had not absorbed labour from the countryside. Thus, the thrust of the current interpretation raises the intriguing possibility that enclosure was inefficient. That is to say from the point of view of optional resource allocation, enclosure may have resulted in labour being in agriculture which would have been better employed in industry.

In short, the current view of the role of enclosure in the provision of the industrial labour force presents historians with some very complex issues which remain unresolved. Were the innovations in English husbandry, for example, in fact, labour-intensive? What effect did enclosure per se have upon the demand for labour? To what extent was there a relationship between enclosure and the adoption of the innovations in husbandry? Did enclosure lead to a more efficient allocation of labour? The present paper is directed at establishing a framework of analysis for the examination of these problems. It is to the first question that we now turn.

II.

Just as he had offered an alternative theoretical interpretation for what had historically been treated as disparate empirical findings regarding the impact of enclosure, Chambers also suggested a possible explanation for his observation of labour expansion in unenclosed as well as enclosed areas. His proposal was that during this period the introduction of improvements in husbandry on both unenclosed and enclosed land required additional quantities of labour.[32] It turns out the diffusion of improvements was extensive. Among the innovations were « new » crops including clover, sainfoin, ryegrass, mangels, swedes, and the much heralded turnip.[33] The proliferation of the drainage of wet low lands as well as the irrigation of pastures adjacent to streams by the floating of water meadows manifested

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31 J. D. CHAMBERS and G. E. MINGAY, *op. cit.*, p. 3; E. L. JONES, *op. cit.*, p. 21; PETER MATHIAS, *op. cit.*, p. 62.

32 J. D. CHAMBERS, *op. cit.*, p. 332.

33 For an excellent discussion tracing the introduction of new crops into English agriculture see E. L. JONES, *Agricultural Productivity and Economic Growth in England 1700-1760*, « Journal of Economic History », Vol. XXV (1965), reprinted in E. L. JONES, *op. cit.*, pp. 152-171.

an improvement in water management techniques. Field management underwent change with the incorporation of the four course rotation, the substitution of convertible leys for permanent pasture, and the use of natural fertilizers such as lime, marl, and night soil. Innovations were being made also in animal husbandry. All together the improvements had scanned nearly the entire array of agricultural activity. It is not our purpose, however, to review the many innovations in husbandry which were implemented in English agriculture during the Industrial Revolution. Excellent accounts in considerable detail are readily available in standard sources.[34] Rather our purpose in this section of the paper is to initiate at the theoretical level a re-examination of what has since become accepted in the literature as the labour-intensive nature of these innovations.

It is remarkable that for all of the studies which have been made on English agriculture, the nature of the factor intensive aspect of agricultural change remains to be demonstrated. Factor intensity, a characteristic of any technical change in a production function, could have been measured by the rate at which factor proportions changed had relative factor prices remained constant during the period. In that event, Chambers' finding would have been sufficient. From a methodological point of view, Chambers had been concerned about the possibility that the results of previous studies on enclosure indicating an increase of population might have been biased due to a redistribution of labour from non-sampled regions. He therefore drew his population sample from all types of villages.[35] Chambers found that for the given area covered by his sample, the quantity of labour increased. Accordingly, historians have subsequently characterized the improvements in agriculture as being labour-intensive. It can be shown, however, that with a given change in relative factor prices, such an increase in the labour-land ratio could have been the result of a labour-saving change in agricultural techniques. When technical change is labour-saving, the labour-land ratio will increase if the substitution of labour for land due to a relative factor price change is sufficient to outweigh the reduction in the labour-land ratio due to labour-saving technological change. The observation of a higher labour-land ratio following change does not necessarily mean the change was labour-intensive.

To examine the impact of the agricultural innovations we shall use a standard model of technological change.[36] The factor intensive or saving aspect of a change in the production function is measured by the rate at

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[34] Thorough discussions of these innovations may be found, for example, in the books already referred to in previous footnotes in this paper by J. D. Chambers and G. E. Mingay, Phyllis Deane, Lord Ernle, E. L. Jones, and Peter Mathias.

[35] J. D. CHAMBERS, *op. cit.*, pp. 319-324.

[36] W. E. G. SALTER, *Productivity and Technical Change* (Cambridge, 1966), Chapters II and III.

which factor proportions change when factor prices are constant. Consider Figure 1. Labour (L) and land (N) are used to produce a single output in period 1 (prior to technological change) and period 2. The isoquants (1) and (2) represent the amount of labour and land needed to produce a single unit of output in periods 1 and 2 respectively. The assumption is made that the production functions are linear homogeneous (i.e., no economies or diseconomies of scale) thereby enabling the unit isoquant to convey all the information regarding production.[37] The slope of the parallel lines $l_1 n_1$ and $l_2 n_2$ equal the ratio of the factor prices $\frac{P_n}{P_1}$, where P_n in the price of land and P_1 the wage of labour. The initial equilibrium is in period 1 at the tangency point A. At this point the labour-land ratio is given by OL_1/ON_1 or the slope of line OA. In period 2, following technological change, the new equilibrium is at the tangency point B. While relative factor prices have remained unchanged, the amount of labour required to produce a unit of output has decreased by $L_1 - L_2$ and the amount of land required has been reduced by $N_1 - N_2$. While the absolute amount of both labour and land required to produce a unit of output has been reduced due to technological change, the factor saving is biased towards land. As Professor Salter pointed out, « Such biases are reflected in a relatively greater reduction in labour per unit of output compared to capital (land) per unit of output, or visa versa ».[38] In the case of Figure 1, the technological change has been labour intensive or land-saving in that the new equilibrium point B the new L/N ratio, as given by OL_2/ON_2 or the slope of line OB, is greater than the L/N ratio used to produce a unit of output in period 1. As we have seen in Figure 1, given constant relative factor prices, such a technological change would have resulted in a higher labour to land ratio. At the same time, however, a higher labour-land ratio would have been observed had the technological change been « neutral » and the price of land risen relative to the price of labour.

This second case is shown in Figure 2. It is similar to Figure 1 except the new unit isoquant in period 2 is given by $2'$ and line $l_3 n_3$ has been added, the slope of which equals the new factor price ratio $\frac{P'_n}{P'_1}$ ratio. P'_n is the

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[37] This assumption conforms with the general view widely held by historians and articulated recently by G. E. MINGAY regarding economies of scale in English agriculture during the period. « While it is still generally accepted that technical changes in farming (including the labour-intensive new rotations, the laying down of arable to leys or temporary grass, introduction of better and more extensive breeds of livestock, and the gradual adoption of machinery) were more readily adopted by farmers of capital than by small men, it is doubtful how far the economies of scale in agriculture were important before the middle nineteenth century », *Enclosure and the Small Farmer in the Age of the Industrial Revolution* (London, 1968), pp. 12-13.

[38] W. E. G. SALTER, *op. cit.*, p. 31.

price of land and P'_1 is the wage of labour in period 2. Isoquant 2′ is the result of neutral technological change in that the labour-land ratio has remained constant at point *C*, where the relative factor prices have remained unchanged. Due to the change in the relative factor price ratio from P_n/P_l to P'_n/P'_1, however, labour has been substituted for land to the point where

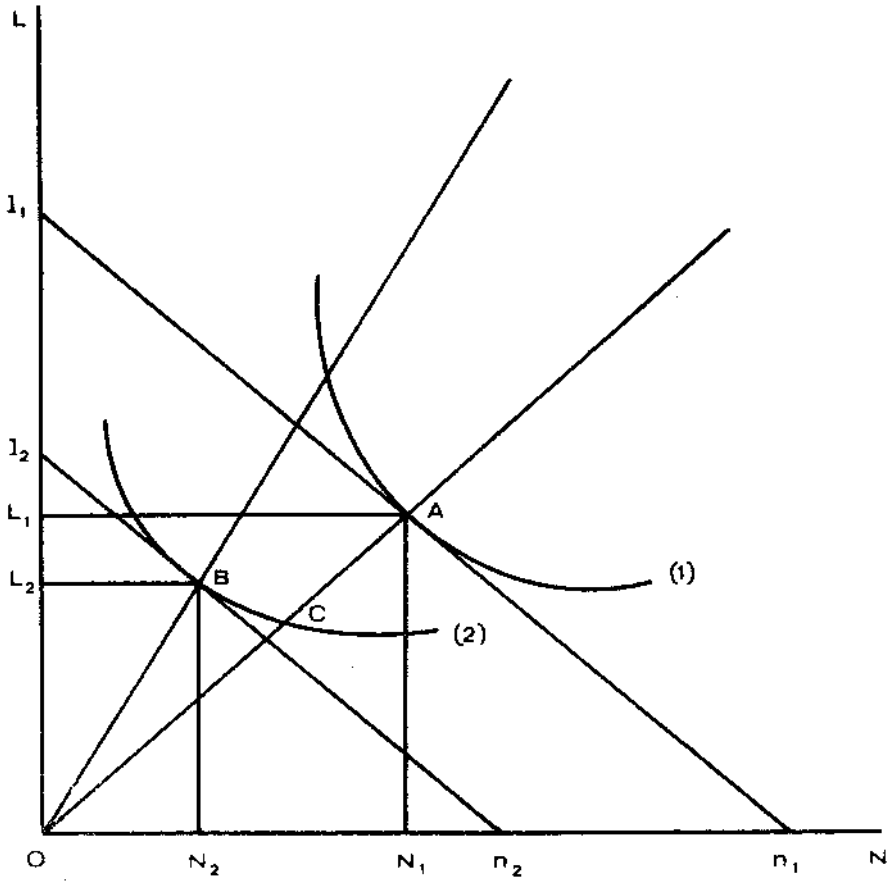

Figure 1

the ratio of factor prices equals the marginal rate of technical substitution at point *B* on the unit isoquant.

Accordingly, even though the technological change was neutral, the rise in the price of land relative to the wage of labour in period 2 accounted for an increase in the labour-land ratio. The neutral technological change shown

in Figure 2 accompanied by a change in the relative factor price ratio in equilibrium resulted in the same labour-land ratio in period 2 as in Figure 1 where the technological change was labour-intensive. Assuming convexity of the unit isoquant, any increase in the price of land relative to the wage of labour will increase the labour-land ratio.

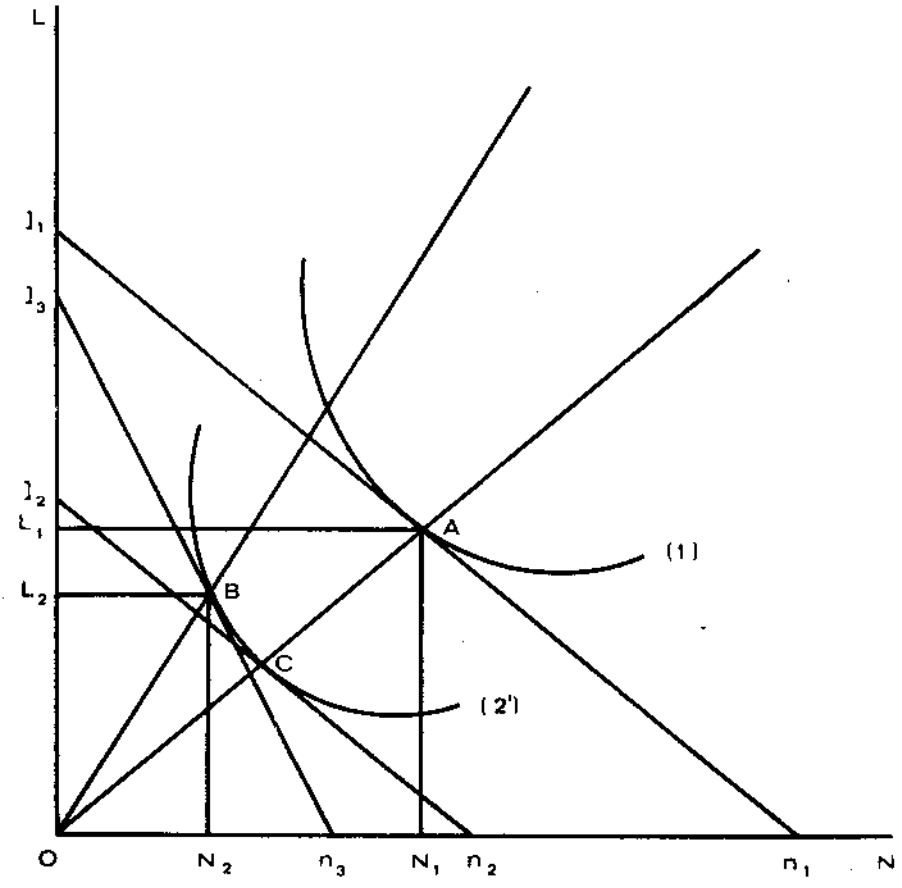

Figure 2

Surprisingly enough, and contrary to the notion that the new agricultural techniques must have been labour-intensive in that subsequently a higher labour-land ratio was observed, the same empirical result could have occurred had the techniques been, in fact, labour saving. Figure 3 shows this possibility. Again, this figure is similar to Figure 1 except the new unit isoquant in

period 2 is given by 2″ and the line $l'_3 n'_3$ has been added, the slope of which equals the new factor price ratio $\frac{P''_n}{P''_1}$ in period 2 which is greater than period 1 $\frac{P_n}{P_1}$ ratio. P''_n is the price of land and P''_1 is the wage of labour in period 2. In this case, the factor saving bias is towards labour. Had the

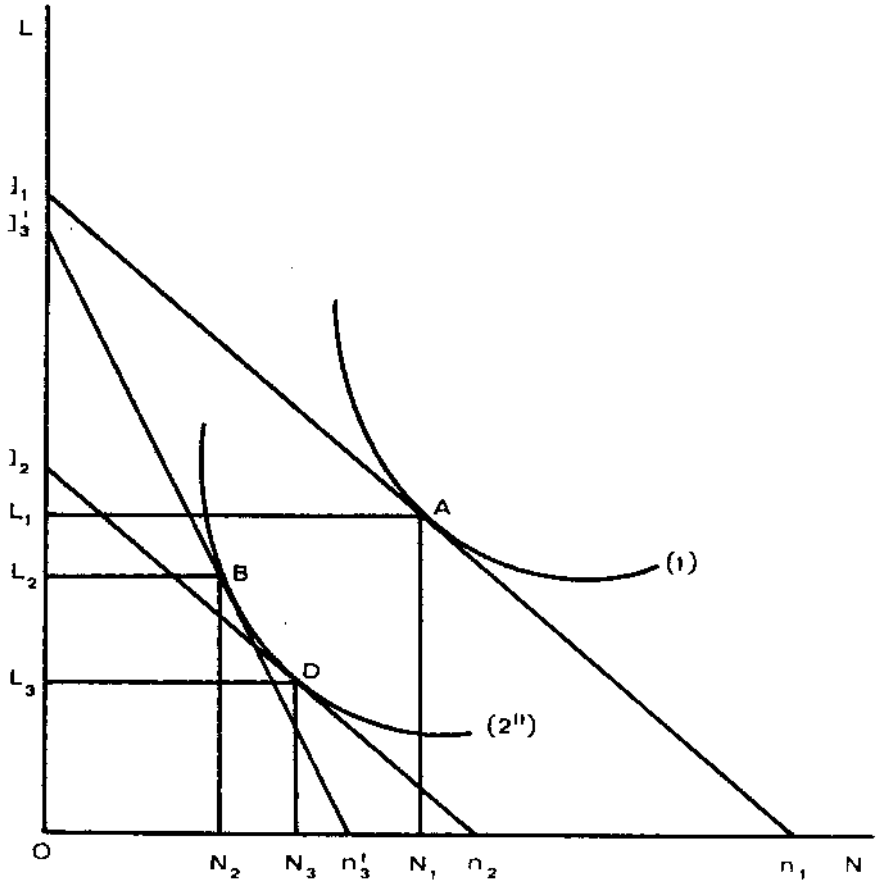

Figure 3

relative factor prices remained constant the labour-land ratio would have decreased from OL_1/ON_1 to OL_3/ON_3 in the production of a unit of output. In period 2, however, with the increase in the price of land relative to the wage of labour, labour is substituted for land until the factor price ratio

equals the marginal rate of technical substitution at point *B* on the unit isoquant.

The final labour-land ratio is the same in Figure 3 where the technological change is labour-saving in nature as it is in Figure 1 where the change is labour-intensive. (When technological change is labour-saving, the labour-land ratio will increase if the substitution of labour for land due to a relative factor price change is sufficient to outweigh the reduction in the labour-land ratio due to labour saving technological change). If the substitution of labour for land exactly offsets the effect of the technological change, the labour-land ratio will remain the same as in the initial period. As we have seen with Figure 2, any increase in the price of land relative to the price of labour in period 2 will result in an increased labour-land ratio if technological change is neutral.

On the basis of this analysis a determination of the factor intensity of the innovations in husbandry could be made. A critical factor, of course, is the behaviour of relative factor prices. Unfortunately a comprehensive and systematic account covering the entire period remains to be made. Empirical studies to date, however, do provide some intriguing clues. Regarding land prices, it is reasonably clear that the value of land increased significantly during the Industrial Revolution. In an article published in 1907 which has become a classic on rent movements, Robert J. Thompson found, for example, that « ...on certain estates in Lincoln, Essex, Hereford, and North Wales... » average rent per acre increased from 11s 8d in 1801 to 18s by 1860.[39] The total area of these estates had varied between sixty two thousand and seventy three thousand acres. Since Thompson's study, interested scholars have continued to accumulate material on the behaviour of rent.[40] In a meticulous study of the records of numerous estates, F. M. L. Thompson has documented what would appear to be at times an almost meteoric rise of rent. A case in point is that of one estate in Northampton and Huntington where a nearly three-fold increase of rent occurred in less than twenty five years.[41] Drawing upon the works of Robert J. Thompson and F. M. L. Thompson, as well as other sources, Chambers and Mingay generated a time series indicating rent more

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[39] ROBERT J. THOMPSON, *An Inquiry into the Rent of Agricultural Land in England and Wales during the Nineteenth Century*, « Journal of the Royal Statistical Society », LXX (December, 1907), p. 612.

[40] For some recent work see e. g., B. A. HOLDERNESS, *Landlord's Capital Formation in East Anglia, 1750-1870*, « Economic History Review », XXV (August, 1972); B. A. HOLDERNESS, *Capital Formation in Agricolture*, in J. P. P. HIGGINS and SIDNEY POLLARD (eds.), « Aspects of Capital Investment in Great Britain 1750-1850 » (London, 1971); H. J. HABAKKUK, *The English Land Market in the Eighteenth Century*, in J. S. BROMLEY and E. H. KOSSMAN (eds.), « Britain and the Netherlands » (London, 1960); and H. G. HUNT, *Agricultural Rent in South East England, 1788-1825*, « Agricultural History Review », VII (1959).

[41] F. M. L. THOMPSON, *English Landed Society in the Nineteenth Century* (London, 1963), p. 218.

than tripled over the one hundred years following 1750.[42] With regard to wages paid in agriculture during the same century, evidence reported in standard sources suggests that with the exception of the war years, rates less than doubled.[43] While the inference is clear, it should be pointed out that unqualified conclusions on relative factor prices are difficult to make at this time. In addition to the usual index problems the primary data have been drawn from different areas, often from a fluctuating group of estates.[44] Variations in human capital, land quality, and the location of resources have to be taken into account. The trends of relative factor prices will have to be examined along with those of the value of total output in the agricultural sector and the proportion of total costs attributable to capital and labour. The considerable expansion of land under cultivation during the period due to the suppression of the fallow and the creation of farms out of fens, moorlands, and wastelands serves to complicate empirical inquiry. Should the results of future studies, however, confirm that land prices were rising relative to wages in those local rural areas where the new techniques were implemented, then the possibility must be confronted of the substitution effect having offset what would have been a lower labour-land ratio due to a labour-saving change in the production function.

Accordingly, the question of the factor intensity of the innovations in husbandry during the Industrial Revolution is essentially an empirical one. Furthermore, the contention widely accepted in the literature that the innovations were labour-intensive in nature turns out to be unfounded. Until the necessary empirical work is done one cannot assert that the new techniques were labour-intensive on the basis of the observation of a higher labour-land ratio. As we have seen this could have been the result of a neutral or even a labour-saving change in production.

III.

If the volume of material written on a subject was to be construed as an index of historical significance surely enclosure would rank among the important occurrences during the Industrial Revolution. Unfortunately the sheer

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[42] J. D. CHAMBERS and G. E. MINGAY, *op. cit.*, p. 167. In addition to the works mentioned, Chambers and Mingay drew upon H. A. RHEE, *The Rent of Agricultural Land in England and Wales 1870-1943* (1949) and « private sources ».

[43] B. R. MITCHELL and PHYLLIS DEANE, *Abstract of British Historical Statistics* (Cambridge, 1962), pp. 348, 349; PHYLLIS DEANE and W. A. COLE, *British Economic Growth 1688-1959* (Cambridge, 1962, p. 23. Both of these works have made use of the material published by A. L. BOWLEY and G. H. WOOD in the « Journal of the Royal Statistical Society 1898 and 1899 ».

[44] See, e. g., Table 2, page 439, in the above artiche in the « Economic History Review » by B. A. HOLDERNESS. Note the method used to construct the index of wages in Table 6, PHYLLIS DEANE and W. A. COLE, *op. cit.*

cumulative weight of discourse does not necessarily enhance understanding of what is fundamentally an esoteric phenomenon. Insights are to be achieved by a more careful articulation and examination of specific aspects of an event than has been done in existing literature. As we have seen, there is widespread acceptance of the notion that both the enclosure of land and the diffusion of innovations in husbandry individually required more rather than less labour in agriculture. The combination of the two, comprising what is frequently termed an « agricultural revolution », therefore could not have generated the industrial labour force. That function, it is argued, was served by the expansion of population. An important distinction must be made, however. Unlike the innovations in husbandry which resulted in changes in the agrarian production functions, enclosure was solely an alteration of property rights to land. Thus, a separate theoretical analysis is called for to determine the impact of enclosure alone on the allocation of labour. Moreover on the basis of the theoretical analysis presented in the previous section of this paper, a thorough and systematic examination of relative factor prices will have to be made to determine the actual factor intensity of the innovations. In addition, further inquiry is in order into the nature of the relationship between enclosure and the adoption of the innovations. Once these aspects have been sorted out, assessed, and then pieced together a clearer picture should emerge of the role of enclosure in the provision of the industrial labour force.

As a general approach to this question it would seem more useful to think not in terms of whether enclosure required more rather than less labour, but in terms of whether the effect of enclosure was to increase labour productivity. The part played by enclosure could then be determined in light of the significance of changes in labour productivity upon the transfer of labour from agriculture to industry. From a theoretical point of view, the explanation of a fall in the share of the labour force engaged in agriculture involves a consideration of both domestic agricultural productivity and the effects on resource allocation as a consequence of foreign trade.[45] In a closed economy experiencing a rising (constant) per capita income over time, an increase in agricultural productivity would be required to enable a decreasing share of the labour force to provide a greater (constant) per capita quantity of agricultural commodities.[46] Alternatively, access to agricultural products from a

[45] For an extensive discussion of the array of theoretical alternatives open to a country in the process of industrialization see S. KUZNETS, *The Economic Requirements of Modern Industrialization*, « Economic Growth and Structure » (New York, 1965). An excellent review of the role of agriculture in the process of economic growth is provided in C. EICHER and L. WITT (eds.), *Agriculture in Economic Development* (New York, 1964).

[46] This assumes the income elasticity of demand for agricultural goods is positive. An attempt has been made to measure the income elasticity of demand for food in England during this period by COLIN CLARK and MARGARET HARWELL in their book

foreign country which enjoyed a comparative advantage in their production, would enable a reduction in the share of the labour force required to provide the increased quantity of agricultural commodities demanded. Presumably any evidence which suggested an increase in agricultural imports or a decrease in exports would support this contention.

In these terms then, what was the relative importance of agricultural productivity and foreign trade in explaining the change in the allocation of labour resources in England during the Industrial Revolution? It is readily apparent that the bulk of available evidence supports the preminence of agricultural productivity. Summarizing the results of previous empirical work Peter Mathias observed,

> ... in the first half of the eighteenth century corn exports became a welcome earner of foreign exchange, and until the second half of the nineteenth century only a small proportion of the population became dependent upon imported food supplies. Those left on the land, a declining proportion of the labour-force, produced enough to feed both the rising total numbers of the population and the rising proportion of that population not growing their own food. That is to say, productivity per man, output per head and total output rose in agriculture, and the industrial and trading sectors of the economy were not subject to strain from this source. Only in years of bad harvest were mass food imports necessary.[47]

The dominance of domestic agriculture over the foreign trade sector was recognized by scholars even during the Industrial Revolution. In a massive statistical study published in 1847, G. R. Porter reported results which in his words « show in how small a degree this country has hitherto been dependent upon foreigners ». Porter emphasized, « It is not, however, with this view that those calculations are brought forward, but rather to prove how exceedingly great the increase of agricultural production must have been to have thus effectively kept in a state of independence a population which has increased with so great a degree of rapidity.[48] Of more recent vintage is the classic study by M. K. Bennett of British wheat yields from 1200 to 1900 which reveals that the period of the highest rate of increase was between 1750 and 1850.[49] Reflecting upon the results of his previous study of wheat

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The Economics of Subsistence Agriculture (London, 1964), p. 146. Based upon family budget data they estimated the income elasticity of demand to be .92 in 1795. A second assumption is that of little or no unemployment or underemployment of labour. For a discussion of the employment conditions in the labour market see E. L. JONES, *The Agricultural Labour Market in England, 1793-1872*, « Economic History Review », XVII (1964).

47 PETER MATHIAS, *op. cit.*, pp. 67-68.

48 G. R. PORTER, *The Progress of the Nation* (London, 1847), pp. 138, 139.

49 M. K. BENNETT, *British Wheat Yields per Acre for Seven Centuries*, « Economic History », III, No. 10.

yields in England,[50] Eric Jones concluded, « Whereas the per acre yields of wheat, for instance, rose by 16 per cent from 1815/19 to 1832/36, the labour force in agriculture grew at most by 2.7 per cent ».[51] At the same time, « The total population of England and Wales, which had been 11,004,000 in 1815, reached 14,928,000 in 1836, and this enormous increase was fed ». Moreover, « It was fed from home supplies, with no sustained help from imports and clearly without the per capita consumption of foodstuffs falling much, if indeed, it fell at all ».[52] Thus it would appear that it was the increase in the productivity of English agriculture which was the more significant of the two factors considered in the explanation of the process whereby a rising share of the labour force in England during the Industrial Revolution became employed in non-agricultural activity.

Accordingly, the significance of enclosure in the provision of the industrial labour force lies in its impact, if any, upon agricultural productivity. The theoretical argument to be examined, in short, is the extent to which enclosure permitted a more efficient allocation of resources and thereby assisted in the shifting of a rising share of a growing labour force to non-agricultural employment. Before we proceed it is important to note that in the context of the history of English land tenure the movement to establish private property during this period was but the final chapter in a long story. Enclosure, after all, had been undertaken as early as the thirteenth century.[53] By the time of the Hanoverian Acts of Parliament, the enclosure of land had been accomplished by various means including private arrangements as well as decree from the Royal Courts of Chancery and Exchequer. Thus the onset of the Industrial Revolution witnessed a spectrum of property rights to land ranging from clearly specified and enforced private property, with its characteristics of the exclusive right to income and transferability, to ill-defined common ownership.

The theory of property rights upon which we shall base our analysis, while rapidly approaching a general form in the literature, is clearly still in the early stages of development. The thrust of the research has been directed at an explanation of the innovation of property rights in order to provide a better understanding of the relationship between the legal framework of an

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50 M. J. R. Healy and E. L. Jones, *Wheat Yields in England, 1815-59*, « The Journal *of the Royal Statistical Society*, 125, part 4 (1962).

51 E. L. Jones, *op. cit.*, p. 325.

52 E. L. Jones, *The Development of English Agriculture 1815-1873* (London, 1968), p. 13. For further discussion of the rising productivity of labour in agriculture during the Industrial Revolution see the excellent paper by Jones, *Agricultural Origin of Industry*, « Past and Present », No. 40 (1968).

53 The right of manorial lords to enclose was specified by the Statutes of Merton and Westminster in 1235 and 1285 respectively. For an extensive discussion of enclosure commencing from the earliest references see W. E. Tate, *The Enclosure Movement* (New York, 1967).

economy and the economic issues traditionally investigated by economists. The fundamental proposition which has emerged is that property right innovation occurs when an individual or group of individuals in society perceives that the benefits of innovation exceed the associated costs. The decision-making unit initiating the action may organize either through private contractual arrangements or employ the judicial power of the government to achieve its goals. The motivating factor for innovative action is to capture an increase in wealth not obtainable under the old arrangements. Therefore when the perceived present value of the expected stream of future benefits exceeds the present value of those costs incurred in innovative activity one would expect to find attempts being made to alter the structure of property rights.[54]

The particular aspect of the property rights approach appropriate for the issues addressed in this paper concerns the economic consequences of alterations in property rights and specifically those associated with land. In principle common or non-exclusive rights to land lead to the dissipation of rent while private or exclusive rights do not. Frequently the methodology employed in property right studies is to compare the characteristics of the equilibrium which emerge under the two property right arrangements. In very simple terms the argument takes the following form. Assume two homogeneous inputs, land and labour, the ownership rights to which are exclusive, are used to produce one output. Let the supply of the input land be fixed while that of labour be infinitely elastic. Assuming wealth maximization, labour will be paid the value of its marginal product and employed up to the point where this value is equated with marginal cost. A residual or rent will accrue to the owners of the fixed input land. When land is a non-exclusive resource, the equilibrium is characterized by the value of the total product accruing to the exclusive resource labour. Parenthetically this method of analysis suggests that the establishment of private property in land would enable the capture of rent not obtainable when land was a non-exclusive resource.

The analysis can be shown graphically as in Figure 4. Labour is measured along the horizontal axis and output per unit of labour along the vertical axis. Land is fixed. *AP* and *MP* are the average and marginal product curves of labour respectively. *W* is the wage rate or marginal factor cost of labour. If the property rights to land are exclusive, the land owner will employ L_1 amount of labour in equilibrium *A* where the value of the

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[54] LANCE E. DAVIS and DOUGLASS C. NORTH, *Institutional Change and American Economic Growth* (Cambridge, 1971); DAVIS and NORTH, *Institutional Change and American Economic Growth: A First Step Towards a Theory of Institutional Innovation*, « The Journal of Economic History » XXX (March, 1970). See also the works cited in this paper by Armen Alchian, Harold Demsetz, Douglass North, Erik Furubotn, Suetozar Pejovich, and Robert Thomas.

marginal product is equated with the wage rate. The area under the *MP* curve OL_1AW represents the total wage bill paid to labour while the remainder represents rent accruing to the land owner. If on the other hand the property rights to land are non-exclusive, equilibrium *B* is attained. At *B* rent to land has been dissipated. Since there is no private ownership of land the value of the total product, represented by the area OL_2BW, accrues to labour. Note that two additional consequences have resulted from the

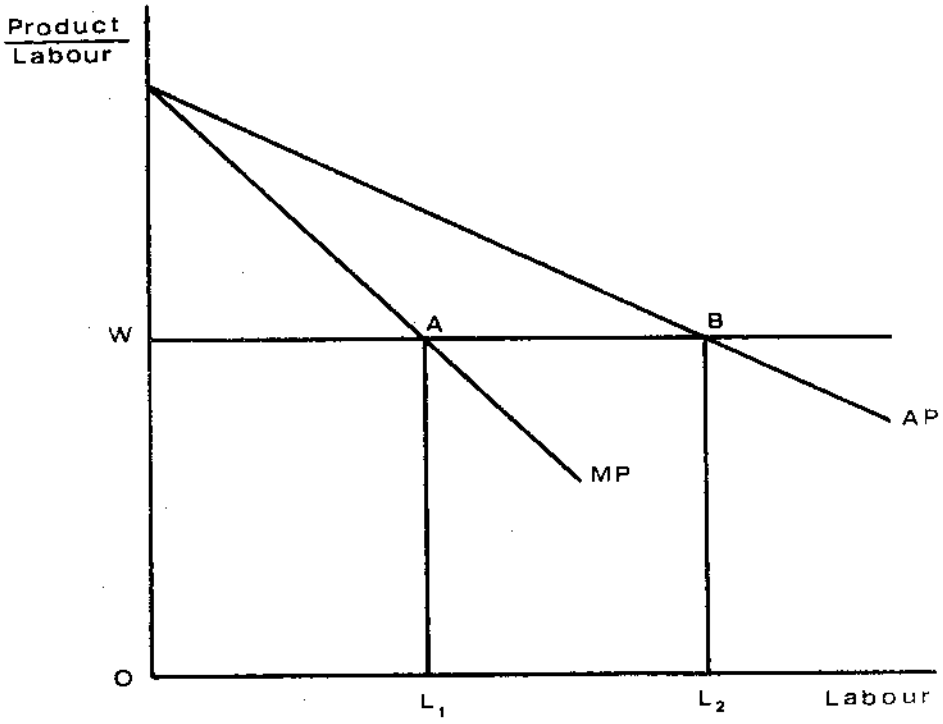

Figure 4

non-exclusive ownership of land. Labour employment has increased from L_1 to L_2 and the marginal product of labour in equilibrium *B* is less than the opportunity cost of labour.

While offering promising explanatory power in the examination of the economic impact of exclusivity in property rights, the above analysis requires modification to make it applicable to the enclosure movement. The underlying reason is that ownership rights to land in the common fields of England during the Industrial Revolution spanned a broad spectrum of degrees of exclusivity. The land tenure system was characterized by a wide variety of rights and privileges established by custom, oral as well as written

contracts and agreements.[55] The complexity of the property right system reflected the multi-dimensional arrangements involved in governing such factors as the restriction of entry, duration of rights, and regulation of land use. Regarding the conditions of entry, rights of common to a given field were claimed by a limited number of people and not the general public. The majority of farmers were tenants rather than owner-occupiers and the landowners received rental payments under several different types of tenancy.[56] Such arrangements limited the number who could use the common fields to those specified by contract. Therefore, what has been traditionally termed « common rights » were in essence partially exclusive rights. As we have seen in the previous section of this paper rental payments in English agriculture were pervasive and rapidly rising in value during the period. These payments testify to the partially exclusive nature of the ownership rights. In short, entry was restricted and rent accrued to landowners. In addition, the property right arrangements established the duration of common rights. For example a fundamental aspect of the tenure system was concerned with the grazing of livestock. There were common rights to permanent pastures on a year-round basis. Such rights were frequently held by those who had exclusive rights to the income generated from the production of grain on cultivated land. In the primarily arable areas of England the most prevalent form of husbandry was the three-field system. In rotation each field was subjected to an autumn planting, a spring planting and then fallow. As a general rule common grazing rights were available on the fallow and the remaining two cultivated fields following the harvest until spring ploughing. Moreover the rights to the meadow land reverted to common for the winter grazing of livestock following the last crop of hay for the season. Thus common rights ranged from year long to certain specified seasons of the year. Subject to the results obtained by a group decision-making process, usually at the parish level, farmers adhered to a host of regulations concerning what crops would be grown, when and where to plant them, when to harvest, and how much livestock could be raised. The latter was often determined by stinting agreements, the purpose of which was to prevent land from becoming overstocked. In sum, upon inspection of all of the restrictions and regulations making up the English land tenure system, it turns out that the exclusivity of the rights to common land varied from those to enclosed land only by a matter of degree.

In the context of this tenure system use of the analysis depicted in Figure 4 requires a modification at the theoretical level which deals with

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[55] The following discussion of the English field systems while drawing upon the factual accounts offered in the agricultural works previously cited also draws from the studies of D. R. DENMAN, *Origins of Ownership* (London, 1958) and THOMAS E. SCRUTTON, *Commons and Common Fields* (Cambridge, 1887).

[56] For a thorough account of the kinds of tenancies see ERNLE, *op. cit.*

land held under varying degrees of exclusivity. Fortunately the basis for just such a modification has already been articulated. In a recent article on the theory of a non-exclusive resource, Steven N. S. Cheung has demonstrated both geometrically and algebraically the mechanism of the dissipation of rent.[57] One implication of his model which is important for our analysis is that Cheung has shown rent is not dissipated if there exists any degree of exclusivity in property rights. Each competing user of a non-exclusive resource maximizes rent not already obtained by the others. With each additional entrant the quantity of the residual is reduced. Only with free entry as was assumed in the original model is rent completely dissipated. Accordingly, a theoretical basis for our observations on the English land tenure system has been established.

Our analysis which we have derived from the theory of property rights further suggests certain implications for the still unresolved issue of the relationship between enclosure and the diffusion of the new techniques in husbandry. Based on the assumption of wealth maximization any one individual farmer would be less inclined to implement new techniques in the unenclosed areas of the rural sector since the returns generated would accrue to all of those holding common rights to the land. This does not mean, however, enclosure would be a necessary condition for the introduction of agricultural innovations as some have argued. The reason is that the returns to this activity even on common land would clearly be positive. Rather the theory indicates that the individual decision-maker would have to compare the cost of the particular investment under consideration not with the total expected return but that portion he would receive. Given he would receive only a fraction of the benefits, it might not be in his interest to undertake the project. On the other hand, the present value of his share of the future returns might be of sufficient magnitude to justify the investment. In any event, any system of property rights which did not enable the individual to capture all of the benefits would result in a less than optimal rate of adoption. By establishing the exclusive right to all of the income, enclosure would enhance the rate of diffusion and thereby eliminate such a misallocation of resources. Furthermore, the owners of enclosed land would not bear any part of the positive transactions costs encountered by those holding common rights of reaching an agreement to implement innovations. Through lower transactions costs alone the establishment of exclusive rights to income by enclosure would enable a faster diffusion of new techniques in husbandry.

When re-examined in terms of the property right approach the historical significance of the enclosure movement varies fundamentally from that attributed to it in the current literature. The now widely accepted view is

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57 STEVEN N.S. CHEUNG, *The Structure of a Contract and the Theory of a Non-Exclusive Resource*, « Journal of Law and Economics » (April, 1970).

that enclosure could not have been the creator of the industrial labour force since it mopped up labour from the countryside. In contrast to the traditional interpretation it is argued enclosure required more rather than less labour. Our analysis suggests just the opposite. While for the wrong reasons, it turns out that the traditional view was closer to reality than the current view. Ceteris paribus, the enclosure of land would reduce the quantity of labour employed. The extent of the reduction would depend upon the property right conditions of restriction, duration, and regulation which we have discussed. In principle, the closer the property rights are to being non-exclusive in nature, the greater the reduction of labour due to enclosure. The historical fact of an absolute increase of labour in English agriculture contemporaneously with the enclosure movement is not inconsistent with the analysis. The system of property rights to land was not the only parameter undergoing change during the period. At the same time population and incomes were expanding so was the demand for agricultural produce. Against the reduction of labour must also be set the impact of enclosure on the implementation of the new agricultural techniques and the resulting increased productivity. Given the variety of events, however, one could reasonably expect to observe diversity rather than homogeneity in the rural sector. It is not surprising therefore that Chambers himself found this to be the case. In a study of Leicestershire Chambers observed that in the primarily pastoral areas, where common rights were held year round, population fell absolutely in nearly one half of the villages enclosed by parliamentary act. In the arable areas, which were more conducive to the implementation of the new agricultural techniques and where the duration of common rights was less, population increased. In Chambers' words,

> Of the twenty-one villages enclosed by act of parliament after 1790, the census returns show some evidence of decline in ten, but all of them seem to belong to the area of stiff clay which was too heavy for mixed agriculture based on turnips. Like the Vale of Evesham, they seem to fall into the category of deep rich grazing grounds which lent themselves to permanent pasture.[58]

It has been our contention in the course of this essay that a systematic re-examination is warranted of the current view of enclosure despite its widespread acceptance and aesthetic construction. We have argued that the significance of enclosure during the Industrial Revolution should be viewed in terms of its impact upon labour productivity. Of particular importance are those consequences arising from enclosure of increasing the efficiency of the allocation of resources in agriculture and creating incentives for productivity raising economic activity. In light of our analysis enclosure played an integral part in the provision of the industrial labour force.

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[58] Lord Ernle, *op. cit.*, p. 332.