

FORDIST TECHNOLOGY AND BRITAIN: THE DIFFUSION OF LABOUR  
SPEED-UP

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# FORDIST TECHNOLOGY AND BRITAIN: THE DIFFUSION OF LABOUR SPEED-UP<sup>1</sup>

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## INTRODUCTION:

The term Fordism today stands for a system of production which has come to symbolize factory technology in the twentieth century. It is usually associated with unskilled labour and mechanical innovations such as the moving assembly line, well suited to producing large numbers of standardized commodities. However, Fordism also had important social implications. It involved a major reordering of authority relations on the shop floor and an increase in managerial control of production decisions including how hard labour would work.<sup>2</sup> This paper will examine the rise of Fordism in the United States and its diffusion to the British motor vehicle industry. It will suggest

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- 1 This paper was written while the author was attending the 1989 Summer Workshop hosted by the Department of Economics at the University of Warwick. My thanks to the organizers of the conference and the participants for useful discussions.
2. This perspective of technical change in the motor vehicle industry has been the theme of some of my previous work including, W.Lewchuk, American Technology and the British Vehicle Industry (Cambridge, 1987). On a similar approach to this questions which focuses on the American industry see, D.Gartman, Auto Slavery: The Labor Process in the American Automobile Industry 1897-1950 (New Brunswick, 1986). The relationship between authority, technical change and effort norms has been explored in a series of papers by Clark. See, G.Clark, 'Authority and Efficiency: The Labor Market and the Managerial Revolution of the Late Nineteenth Century', Journal of Economic History, 44, (1984), pp. 1069-83; G.Clark, 'Why Isn't the Whole World Developed? Lessons from the Cotton Mills', Journal of Economic History, 47, (1987), pp. 141-73; G.Clark, 'Productivity Growth without Technical Change in European Agriculture before 1850', Journal of Economic History, 47, (1987), pp. 419-32. For a discussion of technical change and authority in the American canning industry see, M.Brown and P.Philips, 'Craft Labor and Mechanization in Nineteenth-Century American Canning', Journal of Economic History, 46, (1986), pp. 743-756.

that diffusion was incomplete because British management was unwilling, as distinct from unable, to reorder authority relations on the American model, making other aspects of Fordism less attractive.

Attempts to explain the diffusion of Fordism have focussed on relative factor prices, the supply of skilled labour, the size of product markets in the host country and the structure of firm ownership.<sup>3</sup> It has been argued that European markets were too small and that skilled labour was too abundant and cheap to make the new system of production cost effective. We do not wish to suggest that these factors were unimportant. However, given the magnitude of the productivity increases associated with the shift to Fordism, often in the vicinity of 100 per cent, it seems that more than an adjustment to relative factor prices or scale economies was behind the new system of production. Such a conclusion is reinforced by our analysis that changes in authority patterns and the resulting speed-up of the work pace were key components of the new technology.

This paper will look at how differences in institutions, customs, beliefs and attitudes, the legacy of an economy's past, influenced the diffusion of technology.<sup>4</sup> The suggestion that diffusion is path

3. See H.J.Habakkuk, American and British Technology in the Nineteenth Century (Cambridge, 1967); J. Foreman-Peck, 'The American Challenge of the Twenties: Multinationals and the European Motor Industry', Journal of Economic History, 42, (1982), pp. 865-81; See also, S.Tolliday, 'Management and Labour in Britain, 1896-1939', in S.Tolliday and J.Zeitlin, eds., The Automobile Industry and its Workers (Oxford, 1986), pp. 29-56; R.Church, 'Family Firms and Managerial Capitalism: The Case of the International Motor Industry', Business History, 28, (1986), pp. 165-80.

4. For studies which touch on some of these themes see, D.C.Coleman and C.MacLeod, 'Attitudes to New Techniques: British Businessmen, 1800-1950', Economic History Review, 2nd ser., 39, (1986), pp. 588-611; D.F.Davis, 'The Price of Conspicuous Production: The Detroit Elite and the Automobile Industry, 1900-1933', Journal of Social History, 16, (1982), pp. 21-46. On attempts to explain the diffusion of major production systems see, T.Veblen, Imperial Germany and the Industrial Revolution (Ann Arbor, 1968); P.O'Brien and C.Keyder, Economic Growth in Britain and France, 1780-1914 (London, 1978); D.Jeremy, Transatlantic Industrial Revolution: The Diffusion of Textile Technologies Between Britain and America, 1790-1830 (Oxford,

dependent, in the sense that an economy's past shapes the context in which technology is examined and adopted, is in keeping with recent trends in economic thought criticizing mainstream post-war economic analysis and the project of placing economics on a scientific footing. Solow, one of the champions of mainstream economic analysis, recently voiced his suspicion that, ' . . . the attempt to construct economics as an axiomatically based hard science is doomed to fail.'<sup>5</sup> He went on to suggest that the reason for this was that, ' . . . all narrowly economic activity is entangled in a web of social institutions, customs, beliefs and attitudes.'<sup>6</sup>

There have been a number of attempts by economists to model technical change as more than an economic process.<sup>7</sup> However, the non-economics literature provides a richer source of guidance on how socio/political factors influence technical change. Contemporary social critics stressed the links between Fordism's success in the United States and the socio/political context. Gramsci, in his classic essays on 'Americanism and Fordism' pointed to the absence of a large non-productive class which distorted consumption patterns in Europe away from mass produced goods. He also pointed to unique American social characteristics including the early rise of

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1981); G.Tweeddale, Sheffield Steel and America: A Century of Commercial and Technological Interdependence, 1830-1930 (Cambridge, 1987).

5. R.E.Solow, 'Economics: Is Something Missing' in W.N.Parker, ed. Economic History and the Modern Economist (Oxford, 1986), p. 21.

6. Solow, 'Economics', p. 22; On the role of institutional and structural variables on economic development see, B.Elbaum and W.Lazonick, eds., The Decline of the British Economy (Oxford, 1986). On path dependent economic analysis see, P.A.David, 'The Future of Path-Dependent Equilibrium Economics: From the Economics of Technology to the Economics of Almost Everything?', (unpublished paper, 1988).

7. See, J.E.Sawyer, 'The Social Basis of the American System of Manufacturing', Journal of Economic History, 14, (1954); E.S.Ferguson, 'The American-ness of American Technology', Technology and Culture, 20, (1979).

consumerism, the strengthening of the nuclear family and new views on sexual behavior and the consumption of alcohol.<sup>8</sup> To Kate Richards O'Hare, Fordism was viewed not only as an efficient way of producing cars, but also as a means of spreading middle class American values to unskilled and immigrant workers who needed to be 'Americanized'. To O'Hare, efficiency meant, 'plenty of grub . . . plenty of hot water and a bathtub . . . and a contented, happy wife at home.'<sup>9</sup>

Burrage has provided a particularly illuminating thesis of how socio/political factors influenced trends in American and British work organization. He argued that early reforms of American productive organizations were justified not on the basis of their efficiency, but rather on moral grounds and their consistency with democratic principles. He wrote:

Americans did not respond to Jackson's reforms [of the civil service] as to a useful, labor-saving administrative reorganization; on the contrary, they were emphatically, vociferously moral about them. It was believed that they would make America more democratic, and they were defended on the grounds that they were consistent with American democratic ideals.<sup>10</sup>

Burrage extended his analysis of work patterns in the civil service to other organizational features of the British and American economies. Of critical importance to his thesis was the different attitudes of the British and the Americans to the role of individuals and groups in society. In Britain, loyalty to groups remained an important feature of social and economic life, a response to the

8 A.Gramsci, Selections from the Prison Notebooks of Antonio Gramsci (London, 1971), pp. 304-5.

9. D.Roediger, 'Americanism and Fordism-American Style', Labor History, 29, (1988), p. 247-8.

10. M.Burrage, 'Democracy and the Mystery of the Crafts: Observations on Work Relationships in America and Britain', Daedalus, 101, (1972), p. 155. On the related question of the evolution of British unions and the role of democratic impulses see, C.Behagg, 'The Democracy of Work, 1820-1850', in J.Rule, ed., British Trade Unionism 1750-1850 (London, 1988), pp. 162-77.

limited shifts toward democracy in the nineteenth century and reinforced by the persistence of social stratification and the class organization of society. It was argued that in such a social context, individual behavior would be influenced by internally generated group norms enforced by the individual's desire to maintain his/her standing in the group and not offend its members.<sup>11</sup> In Britain, craft unions, the civil service, lawyers and doctors all relied on internally generated group norms and self-regulation. In the United States, on the other hand, eighteenth century political reforms created the appearance, if not the reality, of a more democratic society, while less rigid social stratification blurred class distinctions and weakened individual adherence and loyalty to groups. American employers were forced to contend with a more individualistic ethos, hence closing the door to self-regulation based on group norms. In its place was substituted governance by rules enforced by a central authority, the model of power which would ultimately be captured by the Fordist system.<sup>12</sup>

Burrage used this model to suggest why both British workers and employers might resist American organizational methods.

Why have the Americans legitimated more rational, individualistic, and bureaucratic work relationships than the British? The only plausible answer to this question at the present time is the one suggested by Tocqueville: the democratic ethic of the Americans. . . The British have tended to explain their relatively inefficient industry as resulting from complacency, amateurism, and conservatism. However, any attempt to change existing work arrangements would threaten obligations and loyalties-to one's fellows, obviously, but also to one's predecessors and successors; in other words, there are moral grounds for British industrial conservatism. . . The weaker group loyalties characteristic of American organizations appear to permit them to innovate at a faster rate than the British.<sup>13</sup>

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11. On a similar theme see S.Jones, The Economics of Conformism (Oxford, 1984).

12. Burrage, 'Democracy', pp. 144-5.

13. Burrage, 'Democracy', p.156.

An alternative, but complementary approach to the question of Fordist technology and the role of socio/political factors can be found in the work of the French regulationist school.<sup>14</sup> Here, Fordism is analyzed as both a physical system of production and a mode of regulation, ie. a set of rules and social procedures which guide individual behavior.<sup>15</sup> While the regulationist see the willingness of American workers, particularly immigrants, to accept the deal of higher wages for higher effort as important, they also stress the ability of employers to enforce this deal where labour was reluctant. According to Aglietta, 'The norms that the immigrants had to internalize to accomplish their cultural assimilation were individualism, stable family life, and monetary gain as the mark of social success and the spur to labour discipline.'<sup>16</sup>

Social and labour historians have shown that when the promised improvement in living standards failed to materialize in the 1890s, the immigrants rebelled. However, the form the rebellion took was shaped by the unique American socio/political context. To Aglietta, it was the fact that America was a more democratic society than Europe, while Gerber and Haydu have focussed on the disparity in power between organized American capital and labour.<sup>17</sup> The end result was a rebellion focussing less on political reform and more on the winning of improved standards of living. Economism became the central focus

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14. See, M.Aglietta, A Theory of Capitalist Regulation: The US Experience (London, 1979); A.Lipietz, Mirages and Miracles: The Crisis of Global Fordism (London, 1987); C.Palloix, 'The Labour Process: From Fordism to Neo-Fordism', C.S.E. Pamphlet # 1-The Labour Process and Class Strategies.

15. Lipietz, Mirages and Miracles, p. 15.

16. Aglietta, Theory of Capitalist Regulation, p. 83.

17. Aglietta, Theory of Capitalist Regulation, p. 83; L.G.Gerber, 'Corporatism in Comparative Perspective: The Impact of the First World War on American and British Labor Relations', Business History Review, (1988), pp. 93-127.

of the emerging American trade unions, a shift which was particularly well suited to Fordism and its promise of delivering the goods-lots of them.<sup>18</sup>

In Europe, the late nineteenth century labour rebellions took more of a political tone and demands for greater workers control were heard alongside of demands for improved standards of living. Numerous contemporary commentators suggested that the British state had been too soft on labour in the first decades of the century and that the working class had developed the idea that labour was the only source of wealth and hence labour should have a greater, if not dominant, say in how that wealth was to be produced and allocated.<sup>19</sup> As will be shown below, Fordism was especially ill suited to satisfying these political demands. Fordist labour regulation was moving in the opposite direction of giving labour less say over shop floor decisions.

The above suggests that American and British economic agents did have different histories and that socio/political factors were extremely important to the evolution of American technology and we will argue to its diffusion to Britain. In the United States, the broader opportunities available to nineteenth century workers, unique political institutions, the relative power of capital and labour, and the process by which immigrants acquired 'American' values were critical. American technology exploited this unique socio/political context. A very different story took place in Britain. In the

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18. See, D.T.Rodgers, The Work Ethic in Industrial America; 1850-1920 (Chicago, 1974), pp. 35; Merrit Roe Smith, Harpers Ferry and the New Technologies: The Challenge of Change (Ithaca, 1977); D.Montgomery, Workers Control in America; Studies in the History of Work, Technology, and Labour Struggles (Cambridge, 1979).

19. As an example see, 'Labour Problems and Methods of Production', Engineering and Industrial Management, (6 March 1919), pp. 101-2.

remainder of this paper we will examine in detail the different experiences of Fordism in the United States and Britain.

#### THE BIRTH OF FORDISM IN THE UNITED STATES<sup>20</sup>

We have argued so far that major shifts in technology are a product of both economic and socio/political factors. In this section we will focus on how Fordism was shaped by the American context. Our objective is to show that Fordism represented more than a response to relative factor prices or scale economies. In the final section we will look at why this American technology was ill suited to British conditions.

Hounshell has argued that Fordism was the first true system of mass production. It brought together the technology of interchangeable production perfected in the American armories and cycle industry and the organizational advances pioneered by F.W.Taylor.<sup>21</sup> Ford failed twice before successfully establishing the Ford Motor Company in 1903. Following the strategy pioneered by Olds, he initially depended on outside suppliers such as Dodge to undertake the more complex and capital intensive aspects of the production process. This was a strategy open to American producers who were well served by a network of job shops and who seemed less concerned about fitting standard components to their vehicles than was the case in Britain where early firms insisted on making the entire vehicle in their works.

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20. On the history of Fordism in Detroit see, S.Meyer, The Five Dollar Day (Albany, 1981); A.Nevins, Ford: The Times, the Man, the Company (New York, 1954); D.Hounshell, From the American System to Mass Production, 1800-1932 (Baltimore, 1984); J.Russell, 'The Coming of the Line: The Ford Highland Park Plant, 1910-1914', Radical America, 12, (1978), pp. 29-45; Gartman, Auto Slavery.

21. Hounshell, American System, p. 215.

At first, Ford kept close to European practices. Assembly was done mainly by hand at stationary assembly benches by skilled workers. A paternalistic labour strategy was adopted to encourage the independent skilled workers to produce at levels acceptable to management. Ford visited the shops regularly and knew most of the 100 or so workers by name. The workers knew Ford as Henry or Hank.<sup>22</sup>

Of all the factors influencing the process of innovation at Fords between 1906 and early 1913, one alone seems to stand out: the need to co-ordinate thousands of workers and the need to transport the thousands of components used to produce a motor vehicle. Stationary assembly and the functional organization of machine departments, which grouped similar machines in the same area of the plant, required the extensive movement of components throughout the shops. Initial attempts to ease these transportation problems included the shift to moving teams of specialized assemblers and the sequential organization of machinery according to the component being produced. Table One tracks the level of output and the level of employment at each stage in the innovation process at the Ford Motor Company.<sup>23</sup> It shows that many of the changes in production methods and organization took place at output levels numbering in the tens of thousands.

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22. Nevins, Ford, pp. 211-13 and 271; O.E. Barthel, Biography, Detroit Public Library, Automotive History Collection, p. 30; Rockelman, Ford Archives, Reminiscences, p. 9-11; Wandersee, Ford Archives, Reminiscences, p. 9; W.J.Abernathy, The Productivity Dilemma (Baltimore, 1978), p. 89.

23. On Ford production methods see, F.L. Faurote, 'Ford Methods', The Engineer, (May-Aug. 1914); Abernathy, Productivity, p.89 and 158; Dickett, Ford Archives, Reminiscences, p. 11-4; Wollering, Ford Archives, Reminiscences, p.6-13; Wibel, Ford Archives, Reminiscences, p. 58; Rockelman, Ford Archives, Reminiscences, p. 9; S.Meyer, 'The Persistence of Fordism: Workers and Technology in the American Automobile Industry, 1900-1960', in N.Lichtenstein and S.Meyer, eds., On the Line: Essays in the History of Auto Work (Urbana, 1989), pp. 72-99.

TABLE ONE: CHRONOLOGY OF FORD INNOVATIONS

YEAR	OUTPUT	EMPLOYMENT	ASSETS PER WORKER (\$)	INNOVATION
1903/04	1,700	100	1,460	Paternalistic labour relations, skilled labour, stationary assembly.
1904/05	1,745	-	-	Functional organization of machines, general purpose machines.
1905/06	1,599	-	-	
1906/07	8,423	700	700	Beginnings of shift to jig and fixture production, introduction of production on an interchangeable basis, enhanced authority for foremen, crude time and motion studies, first labour spy recorded
1907/08	6,398	575	2,436	First gravity slides, sequential lay-out of machinery, Model T launched, average task duration 514 minutes.
1908/09	10,607	450	-	First reports of experiments in line assembly, assembly by specialized teams, profit sharing.
1909/10	18,664	1,655	1,732	Highland Park plant opens, introduction of single purpose and special machines, 54 per cent of work force skilled.
1910/11	34,528	2,773	1,909	
1911/12	78,440	3,976	3,361	
1912/13	168,304	6,867	2,975	Average task duration before first line 2.3 minutes, First moving assembly lines, profit sharing abandoned, transfer of authority to hire and fire to employment office, new pay system reduces discretion of foremen over wages, 26 per cent of work force skilled.
1913/14	248,307	14,366	2,439	First mechanized moving assembly lines, Five Dollar Day, Ford Sociology Department.

SOURCES: A.Nevins, Ford: The Times, The Man, The Company, (New York, 1954).  
See references in text for innovations.

Although transportation problems stimulated the search for a new production system, the social implications of these changes soon became the dominating factor shaping further technical change. As long as Ford operated a small shop, employing mainly skilled labour, there appeared to be neither the need nor the potential for managerial control of labour effort. As output and the size of the work force expanded, and as more expensive machinery was adopted, control of the pace of work became a greater managerial concern. Between 1906 and 1913, Ford groped for a new managerial system of labour control. The initial strategy was to allocate labour supervision and the enforcement of effort standards to low level supervisors who were given responsibility for hiring, firing and setting wage rates in their departments. In 1907, as an aid to these supervisors, crude time studies were performed. Wollering described the system at Ford Manufacturing in 1907 as follows:

I had studies made on the various manufacturing operations. . . We would get a man whom we had confidence in and who knew what he was doing as to whether it was a lathe or a screw machine or a grinder. He knew the fundamentals of it and he would take a stop-watch and operate the machine himself to get a fair idea of what could be done.<sup>24</sup>

In 1906, Ford hired the first of his infamous labour spies whose report left little doubt as to the limitations of managerial authority on the shop floor.<sup>25</sup> In 1908 profit sharing was introduced to overcome the growing social tension between labour and management.<sup>26</sup> Throughout this period, Ford was substituting less skilled labour for skilled labour. This shift was not simply a move from more costly to less costly labour. It was also a shift to a type of worker who was

24. Wollering, Ford Archives, Reminiscences, p. 26.

25. Gartman, Auto Slavery, p. 33.

26. G.Heliker, Detroit Labor: 1900-1916, (Ford Archives), p. 25.

vulnerable to the centralized regime of labour control Ford was moving towards.

These early changes created as many problems as they solved. The continued pressure for more output clashed with the growing labour disenchantment generated by the new working conditions. The deskilling of labour generalized labour skills and, when combined with the tight Detroit labour market, gave Ford workers a significant degree of mobility. Annual labour turnover of 200 per cent was common in Detroit. At Fords this figure approached 400 per cent in 1913, while daily absenteeism reached ten per cent. The situation was aggravated by the extreme division of labour and autocratic foremen which gave workers new reasons to move. In the words of one contemporary spokesperson, 'They (labour) are conducting a continuous, unorganized strike.'<sup>27</sup> Under these conditions the objective of the final elements of the Fordist system introduced in 1913/14 was not to substitute less expensive for expensive labour, but rather to increase managerial control of labour time.<sup>28</sup>

The final stage in the transition to Fordism began in mid-1913 when responsibility for hiring, firing and setting wage rates was centralized under the control of a new employment office directed by J.R. Lee. Evidence suggests that this eroded the ability of low level supervisors to enforce labour effort norms. According to Meyer, productivity growth was falling at the same time that managerial responsibilities were being reorganized. In 1911, productivity rose 41 per cent, in 1912 it rose 15 per cent, while in 1913 it rose only 4.7 per cent.<sup>29</sup>

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27. Meyer, Five Dollar Day, pp. 82-5.

28. Gartman, Auto Slavery, examines this point in detail p. 55.

29. Meyer, Five Dollar Day, p. 72 and chapter 5.

The moving assembly line resolved many of the remaining technical and social constraints facing Ford. The first Ford line was introduced in late 1913, some months after the responsibilities of the supervisors had been reorganized. It was unmechanized, 150 feet long and employed 140 assemblers.<sup>30</sup> Mechanization followed in 1914. As late as 1922, the entire capital outlay in the chassis department was less than \$40,000.<sup>31</sup> The new system was more efficient as components could now be delivered to a single station. Equally important, the line held great potential as a mechanism of labour control. It was argued by a contemporary Ford manager that:

If the idea is good for one thing, it takes a lot of people that want to be paced. . . You take the slant that we are trying to make you do things with a mechanical pace setter; that is my own version of this thing. I never thought that would take too kindly with the average working man. He didn't like to be put on a tread mill, you know, that was the idea.<sup>32</sup>

Another contemporary observer argued, 'Speed up the electric motors a notch and presto! Ford production has increased another hundred cars per day without the necessity of hiring a single workman.'<sup>33</sup> Within months of the adoption of the assembly line, the labour time needed to produce a Model T chassis fell from 134 to 67 hours and the time needed to produce an engine fell from 36.6 to 23.07 hours.<sup>34</sup>

The role of foremen in converting labour time into effort was not completely eliminated. Foremen remained the front line supervisors and hence higher level management was reluctant to undermine their authority by over-ruling their decisions. While foremen had lost direct control of hiring and firing, making it somewhat more difficult

30. Litogot, Ford Archives, Reminiscences, p. 7; Arnold and Faurote, Ford Methods, p. 673.

31. Department Appraisals 1919, Ford Archives, Acc. 73; Plant Accounts, Highland Park, Ford Archives, Acc. 571.

32. Wibel, Ford Archives, Reminiscences, p. 18.

33. H.W.Slauson, cited in Meyer, Five Dollar Day, pp. 60-1.

34. Ford Archive, Acc. 125, Model T Cost Books.

to run their shops as personal empires, they still had significant influence over employment. In an era when seniority had little bearing, shop floor foremen could still influence who got laid-off, the allocation of the 'good' jobs within their department and the allocation of minor tasks, and the perks associated with them, such as crew chief, set-up man, lead man, pusher, gang boss and straw boss. The ability of Ford foremen to find workers willing to break solidarity with their mates and to act as pushers and straw bosses is another element in the American socio/political context.<sup>35</sup>

The simplicity of the early assembly lines is of significant importance to our interpretation of Fordism's success in Detroit and its diffusion Britain. The lack of major new investment associated with line production and the ease with which a plant could be converted to the new principle led contemporary observers to argue that the mere reorganization of assembly tasks allowed one to double productivity.<sup>36</sup> Ford officials would later write, 'Costs fell two-thirds in a single period of six months, with the same machines, the same tools, the same men - seemingly nothing done to decrease costs.'<sup>37</sup> Of course something drastic had changed, management had taken direct control over the setting of effort norms and was using machine pacing to speed-up the work pace.

In order to realize the potential of Fordism and direct labour control to convert labour time into effort, labour still had to be

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35. For a detailed study of the automobile foreman see, N.Lichtenstein, 'The Man in the Middle': A Social History of Automobile Industry Foremen', in Lichtenstein and Meyer, eds. On the Line, pp. 153-89.

36. 'The Manufacturer Much to be Admired', Automobile Topics, 45, (Feb. 24, 1917).

37. Ford Publicity Flyer, Ford Methods and Ford Shops, Detroit Public Library, Company Publications, pre-1950.

brought on side.<sup>38</sup> This was done by a dramatic doubling of wages in 1914, which caused a riot outside the Ford gates, and the introduction of the Ford Sociology Department to guide workers toward a new style of life. The latter not only shifted social values and labour's shop floor efficiency, as Gramsci argued, but also encouraged changes in consumption patterns such as home ownership and the elimination of alternative sources of income such as boarders, all of which made Ford workers more dependent on Ford employment and the high wages offered.

The ability of Ford to implement this package of high wages in return for high effort should be viewed as one of the critical components of the entire system. It marked the final chapter in the reform of time discipline which had begun in Britain in the late eighteenth century with the rise of the first factories.<sup>39</sup> Under Fordism, the frontier of control shifted dramatically in management's favor. Increasingly, the terrain of conflict between labour and management shifted from how to use time, to how much time to use. Here more than anywhere else, the role of history and the socio/political context looms large. The balance of power between capital and labour, attitudes toward mechanization and centralization of authority, labour's acceptance of economism and the willingness to trade-off control for higher wages, Ford's ability to spread middle class consumer values amongst his workers and the ability to break work group cohesion were central to the success of the new regime.

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38. D.M.G.Raff, 'Wage Determination Theory and the Five-Dollar Day at Ford', Journal of Economic History, 48, (1988), pp. 387-400, has argued that labour peace was the direct motivation behind the Five Dollar day which was only indirectly related to effort norms.

39. The classic article on this subject is E.P.Thompson, 'Time, Work-discipline and Industrial Capitalism', Past and Present, 38, (1967), pp. 56-97. This topic has recently been re-examined by R. Whipp in, 'A Time to Every Purpose: An Essay on Time and Work', in P.Joyce, ed., The Historical Meanings of Work (Cambridge, 1987), pp. 210-36.

What little we know of production methods at other American firms suggests that news of the advances made at Fords spread rapidly through the engineering press and that most other American producers adopted elements of the Ford system.<sup>40</sup> According to Hounshell, even firms producing one or two thousand vehicles adopted moving assembly lines.<sup>41</sup> However, the degree to which management was able to control labour effort norms seems to have varied. Neither Chrysler nor Studebaker appear to have been as successful as Ford in centralizing managerial control.<sup>42</sup> Most American producers also resisted the shift to high fixed day wages, although there was a general movement toward less individualized payment systems such as the group bonus schemes with bonus rates of between five and 20 per cent.<sup>43</sup> The less than complete diffusion of Fordism to other American vehicle producers suggests that Ford's decision to supply the low end of the American market, a niche which Ford virtually monopolized until the 1920s, contributed to the final shape of Fordism.

#### THE DIFFUSION OF FORDISM TO BRITAIN

As was the case in Detroit, the period prior to World War I was one of rapid technical change in the British motor vehicle industry.<sup>44</sup>

40. See, 'Factory Transportation', Machinery, (1 Nov. 1917) pp. 117-19 and Machinery, (27 Dec. 1917), p. 347; Automobile Engineer, Oct. 1917, p.299; 'Motor Car Assembly at Hudson Plant', Iron Age, (29 April 1920); 'Assembly of Cars in Packard Plant', Iron Age, (14 Oct. 1915); 'Shop Methods at the Packard Motor Company', Automobile Engineer, (Jan 1916), p.13.

41. Hounshell, American System, p. 261.

42. See, S.Amberg, 'The Triumph of Industrial Orthodoxy: The Collapse of Studebaker-Packard', in Lichtenstein and Meyer, eds., On the Line, pp. 190-218. See also, S.Jefferys, Management and Managed; Fifty Years of Crisis at Chrysler (Cambridge,1986).

43. See, K.Wennerlund, 'The Group-Bonus Wage-Incentive Plan', Journal of the Society of Automobile Engineers, (Nov. 1922); H.G.Perkins, 'The Group Wage-Payment Plan', J.S.A.E., (Nov. 1924); J.Lanner, 'How the Group Bonus Operates', J.S.A.E., (Feb. 1926).

44. On the history of the British motor vehicle industry see, G. Maxcy and A. Silberston, The Motor Industry (London, 1959); S.Saul, 'The Motor Industry in Britain to 1914', Business History, 5, (1962); R.

In the British case, the arrival of cheap American imports acted as a spur to innovation. However, it would be untrue to argue that this was the only factor leading to change. British firms were also looking in the pre-war period for new production techniques to allow them to produce better vehicles and new systems of organization to manage their relatively large work forces in a period of heightened social unrest.

Ford's early models did not sell well in Britain and the Model N's sales of 102 in 1907 marked a pre-Model T high point. The introduction of the Model T in November of 1908 dramatically shifted the fortunes of Ford. Improvements in machine techniques, such as grinding, meant that American firms could now manufacture to within a 1/1000 of an inch allowing product quality to match or exceed that of the skilled craft worker. The Model T sold well in 1913 and 1914 capturing one quarter of the British market.<sup>45</sup> British producers responded quickly to the American challenge by introducing their own small cars beginning in 1912 when Singer and Standard offered new models followed by the Morris Oxford in 1913. These cars were priced at between £165 and £195 compared to £135 for the Model T.<sup>46</sup>

By 1910, the growing sales of the Model T convinced Ford's Detroit management to begin assembly in Britain. Ford's British operations were completely owned by the parent firm, a situation which ----- (cont'd)

Church, Herbert Austin: The British Motor Car Industry to 1941 (London, 1979); D.Lyddon, 'Workplace Organisation in the British Car Industry; A Critique of J.Zeitlin', History Workshop Journal, 15, (1983), and J.Zeitlin, 'Workplace Militancy: A Rejoinder', History Workshop Journal, 16, (1983); Tolliday, 'Management and Labour'; S.Tolliday, 'Government, Employers and Shop Floor Organisation in the British Motor Industry', in S.Tolliday and J.Zeitlin, eds., Shop Floor Bargaining and the State: Historical and Comparative Perspectives (Cambridge, 1985); Lewchuk, American Technology.

45. M.Wilkins and F.E.Hill, American Business Abroad; Ford on Six Continents (Detroit, 1964), pp. 9-25, 51.

46. W.C.Bersey, The Motor Car Red Book (London, nd.).

would persist until the 1930s. Product design was dictated by the parent firm, an arrangement which worked poorly. American management also played a major role in dictating production methods. Visits by American managers such as Couzens in 1907 and 1909 and Ford in 1912 paved the way for the first British manufacturing operation.<sup>47</sup>

British born P.Perry was hired as managing director and the Ford Manchester plant began operations in November of 1911. Initially, knocked-down kits were shipped from Detroit and re-assembled in Manchester. The difficulty of shipping bulky components such as bodies, mufflers and gasoline tanks led Ford to begin manufacturing them in Britain in 1912. It was proposed to manufacture these components under conditions similar to those found in plants in Detroit. New employees were hired as handymen and were expected to perform any task which management felt to be necessary. Descriptions of the plant in 1915 confirm that many of the jobs had been made suitable for unskilled labour.

All parts are machine cut to templates and jigs, and little indeed is left to be done by hand, except actual putting together. The processes in the department of this factory are almost automatic, little being left for hand work beyond the insertion of screws.<sup>48</sup>

The attempt to reorganize the work place along American lines resulted in numerous small strikes during early 1912. Towards the end of the year, the United Kingdom Society of Coachmakers shut down the body plant for 22 weeks. The union claimed to be striking against the pernicious 'American System' which they argued ignored the rights of unions.<sup>49</sup> This strike received only the moral support of the other unions in Manchester. Chassis assembly continued during the strike

47. Wilkins, American Business p. 31, 39, 48-9.

48. Automobile Engineer, (1915), p. 189. Ford Motor Company, Historical Notes, 1912, (Ford Archives, Warley).

49. UKS Quarterly Journal, July 1913.

using bodies imported from Detroit. The reluctance of the other workers to support the body shop reflected the vulnerability of less skilled workers, even in the more highly organized British context, and Ford's policy of allowing wages to rise during the strike.

When Perry first came to Manchester, he viewed the existing hourly wage of four and one-half pence per hour a starvation wage. Before the strike began, the minimum hourly rate was still only five pence per hour, rising to six pence when the strike began and over the next few months drifting up to ten pence per hour. These increases all took place before Ford introduced the Five Dollar Day in Detroit after which a further five pence per hour profit sharing bonus was added to the Manchester wage.<sup>50</sup> Perry was also allowed to depart from American practice by offering elements of a more paternalistic employment relation through the Ford Sports Club and the Ford 'Employees' Pension and Benefit Scheme.<sup>51</sup> The Coachmakers strike ended in defeat for the union and for the next thirty years Ford operated as a non-union shop. Having eliminated union resistance, Ford installed the first British mechanized assembly line in September of 1914, less than a year after it was adopted in Detroit. Initial capacity was between 50 and 150 per day.

Reminiscences of former workers and the lack of organized labour agitation in the Ford plants for thirty years suggests that shop floor British labour was at least sympathetic to the high wage/high effort deal which Ford offered. This was certainly true of their leaders. During national negotiations in 1925, union officials noted that while British labour initially resisted the Ford system they had come to

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50. Wage rates supplied by the Ford Motor Company, Dagenham. See also, Special Edition of the Ford Times, 1914 and the Automobile Engineer 1915.

51. E.N.Duffield, Ford Through European Eye Glasses (Chelmsford, 1947), pp. 38-9.

accept it.<sup>52</sup> The strong criticism of British style management by labour leaders and their support of American techniques further suggests that the primary block to the diffusion of Fordism was not labour. In 1919, Brownlie, the leader of the Amalgamated Society of Engineers, the strongest union in the vehicle industry, at the time, advocated the modernization of British industry on the American model. He argued, 'The individual or the organization that stands in the way of utilizing the improvement of the machine tool, or the improvements brought into being by the application of science to industry, is standing in its own light.'<sup>53</sup> In 1921, the Trades Union Congress condemned British factory organization and pointed to American factories as a model.<sup>54</sup>

Although Ford succeeded in Americanizing the production process in Manchester and transferring control over effort norms to management, all was not well. Ford's British management showed some preference for granting workers minor privileges such as smoking and was reluctant to exercise draconian hiring and firing practices in the face of irregular British output.<sup>55</sup> More serious however, was Ford's reluctance to introduce new models tailored to the British market. Ford cars were too expensive, too heavily taxed to compete against products from Morris and Austin and until 1923 still had left hand drive. The inappropriateness of the Ford model design created serious problems for Ford's new plant in Dagenham which opened in 1931 with a

52. EEF Archives, Special Conference, 1 May 1925. On British labour attitude toward the Ford operation see, Manchester Evening News, June 1978.

53. EEF Archives, Conference EEF and ASE, 24 July 1919, p. 29.

54. TUC Archives, Comments on the Present Economic Position of the Engineering and Allied Industries, pp. 23-4. See also, 'Payment by Results', Machinery, (11 March, 1926); 'The Correlation Between Wages and Profits', Engineering and Industrial Management, (4 Sept. 1919), p. 2.

55. See Tolliday, 'Management and Labour', p. 35.

capacity of 200,000 vehicles. In 1929, Ford sold less than 8,000 cars which represented less than five per cent of the British market.<sup>56</sup>

The imbalance between model design, sales and plant capacity would only begin to be resolved with the introduction of the Model Y in 1932. Ford captured 22 per cent of Big Six sales in 1937, but by 1939 had slipped back to 15 per cent and it was only after 1945 that Ford returned to the dominating position the firm held in 1914.<sup>57</sup> Despite these difficulties, there is little evidence of a retreat from American style management techniques. A Ford line worker in the 1930s recalled, 'Discipline was very strong. . . if you didn't do your job properly and for example, keep up with the line as they used to say, you would obviously lose the job.'<sup>58</sup>

Ford was the only American producer to undertake large scale British manufacture prior to the late-1920s. General Motors had done some assembly in Britain in the early twenties and decided to enter the market in a more serious way in 1925.<sup>59</sup> Attempts to first invest in and then purchase Austin failed and instead they purchased Vauxhall.<sup>60</sup> Vauxhall had just set-up their first assembly line earlier that year and weekly output was about 30 chassis. The new American management set about reorganizing the Vauxhall works, raising output to 130 per week and increasing managerial control of shop floor

56. G.Maxcy, 'The Motor Industry', in P.L.Cook and R.Cohen, eds., The Effects of Mergers (London, 1958), p. 367.

57. See, R.Church and M.Miller, 'The Big Three: Competition, Management, and Marketing in the British Motor Industry, 1922-1939', in B.Supple, ed., Essays in British Business History (Oxford, 1977), pp. 163-86.

58. BBC Interviews, Fred Harrop, p. 3.

59. On Vauxhall see, E.W.Hancock, 'The Trend of Modern Production Methods', Proceedings Institute of Production Engineers, 7, (1928), pp. 69-83; 'The Works of Vauxhall Motors', Automobile Engineer, (Aug. 1930), p. 384; L.Holden, 'Think of me Simply as the Skipper; Industrial Relations at Vauxhalls, 1920-1950', Oral History, 9, (1981).

60. Minute Books, Austin Motor Car Company, 17 Feb. 1920.

decisions. Hancock, the works manager was sent to Detroit for a crash course in American methods, and on his return oversaw the introduction of flow production techniques, machine pacing and a shift from individual piece work to a group bonus system. Bonus rates averaged about 25 per cent, half of the recognized rate and perhaps one-quarter of the actual rate in many British vehicle shops. Model policy was also changed and soon General Motors products were coming off the lines. This was not a successful strategy. Again, the American cars were too expensive and heavily taxed to compete with British models. It was not until the mid 1930s that this policy changed with the introduction of a light six in 1933 and a low-horsepower four in 1937.<sup>61</sup>

General Motors stopped well short of completely Americanizing Vauxhall's labour relations. Fearing a nationalistic back lash against American domination, the board of directors remained relatively independent of Detroit and retained its British character until the 1950s. This allowed Bartlett, who became the managing director in the 1930s, to practice a form of paternalism in an attempt to create loyalty. Profit sharing, group bonus payment systems, a grievance system, even attempts to ease lay-offs during the seasonal swings in the industry were instituted. The intention was to get workers to practice a form of loyalty to the firm and self-regulate their activities. One worker recalled that during the Bartlett years, workers helped each other out when they got behind, and disciplined fellow workers who didn't pull their weight or spent too much time on breaks or in the toilet, no doubt motivated by the incentive structure of group bonus payment systems. However, it is clear that a different

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61. A.P.Sloan Jr., My Years With General Motors (London, 1965), p. 328.

labour culture was nurtured on the shop floor at Vauxhall. The workers felt that Bartlett was trying to create an environment where everybody should cooperate with each other.<sup>62</sup> He was described as a manager who, 'never lost his simple and sturdily democratic approach to industrial management. . .he seemed to have an innate respect for physical toil and a complementary lack of appreciation for the brain worker.'<sup>63</sup> These deviations from American practice were tolerated until the 1950s when the plant was placed on straight day work and management took greater direct control of operations and effort norms.

#### FORDISM AND THE BRITISH MOTOR VEHICLE PRODUCERS

Amongst the independent British firms, the diffusion of Fordism was even less complete<sup>64</sup> and instead a distinctly different system of production emerged. By 1914, many of the machine advances adopted in Detroit were in use by leading British producers. British producers had been exposed to the advances of the American System of production as early as 1851 at the Crystal Palace Exhibition which led directly to Colt producing guns in London with American methods and the purchase of a set of American machines for the armory at Enfield. American firms such as Singer were also using best American practice in their British branch plants.<sup>65</sup> The wide availability of American machines from specialist suppliers and the fact that the advances in

62. Holden, 'Think of Me', p. 62.

63. J.Wood, Wheels of Fortune (London, 1988), pp. 67-8.

64. See, P.Fridenson, 'The Coming of the Assembly Line to Europe', in Krohn, Layton and Weingart, eds., The Dynamics of Science and Technology (Dordrecht, 1978), pp. 159-75.

65. See, E.Ames and N.Rosenberg, 'The Enfield Arsenal in Theory and History', Economic Journal, 78, (1968); D.L.Burn, 'The Genesis of American Engineering Competition: 1850-1870', Economic History Review, 2, (1931); H.L.Blackmore, 'Colt's London Armoury', reprinted in S.B.Saul, ed., Technological Change: The United States and Britain in the Nineteenth Century (London, 1970); Hounshell, American System, pp. 93-6.

metal working machine techniques after 1850 depended less on fundamental advances in machine technology and more on incremental improvements to existing machine types, also eased their diffusion.<sup>66</sup>

An important mode of diffusion of American technology was extensive descriptions of the new methods in various trade journals and numerous visits to Detroit by British managers. Not only did American firms bring their own British managers to Detroit, they also welcomed other British managers to inspect their plants. One has the sense that American industrialists such as Ford viewed their work places as monuments to their success and something to be displayed to the entire world. The Institute of Automobile Engineers organized a tour of Detroit and Cleveland, including a visit to the Ford works, in 1913.<sup>67</sup> Morris visited Detroit twice in 1914, searching for a firm willing to supply him with components and at the same time examining local production techniques. Hans Landstad, who accompanied Morris to Detroit, remained for six months watching over Morris's order and observing American practice before returning to take up a position with Morris in December of 1914.<sup>68</sup> The secretary and business manager of Associated Equipment Company visited the United States in 1916.<sup>69</sup> In 1922, Austin and Payton visited Detroit and the Ford and General Motors plants. Austin was sufficiently impressed with Ford that an autographed photo of Henry was hung on the stark walls of Austin's Longbridge office.<sup>70</sup> Engelbach, visited Detroit in 1927 before reorganizing the Austin shops. He suggested to the board that

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66. On the evolution of machinery see, B. Carlsson, 'The Development and Use of Machine Tools in Historical Perspective', Journal of Economic Behavior and Organization, 5, (1984), pp. 91-114.

67. Proceedings of the Institute of Automobile Engineers, (1912/13).

68. R. Jackson, The Nuffield Story (London, 1964), pp. 59-65.

69. Minute Books, Associated Equipment Company, 9 March, 1916.

70. Church, Herbert Austin, p. 70.

they should follow a regular practice of sending someone to Detroit every other year.<sup>71</sup>

The link between the British cycle trade and the motor vehicle trade also encouraged the diffusion of modern machine technology. The cycle trade had been slow to adopt the repetition methods pioneered by the American firms in the 1880's, but the 1890's witnessed a rapid conversion.<sup>72</sup> The cycle trade's experience was quickly absorbed by the young vehicle industry. As early as 1897, reports suggest that in the Midlands, the area in which many vehicle makers were located, employers had made rapid progress in the use of new machine techniques and the employment of unskilled labour.<sup>73</sup> Reports of the first Daimler factory indicate that careful attention was paid to machine organization so as to minimize transportation and that a large stock of American machines had been installed. By 1899 additions to the machine stock included self-sequencing lathes, multiple head boring machines and milling machines. The latter are of interest as they became the work horses in many repetition machine shops, replacing lathes.<sup>74</sup> Similar advances in machine technology could be found at Humber, Belsize and at Hozier, where it was claimed in 1903 that the extensive use of jigs, fixtures and limit gauges had provided complete interchangeability and had eliminated the 'personal element'.<sup>75</sup>

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71. Minutes, Austin Board of Directors, 25 May, 1927.

72. The Engineer, (18 June 1897), p. 620; J. Newton, 'Looking Backward', Rudge Record, (1909); 'Repetition Bicycle Plant', The Cycle Referee, (16 Feb. 1899, supplement); 'The Firms You Do Business With', The Cycle and Motor Trades Review, (7 June 1906), p. 541.

73. 'The Engineering Strike', The Engineer, (27 Aug. 1897), p. 207.

74. Simms Papers, University of London, 16/33; 'The English Motor Industry: Description of the Plant and Practice of the Daimler Company Works', The Cycle Referee, (19 Jan. 1899).

75. 'Direct Assembly', The Autocar, (4 July 1903), p.24; 'The Humber Works(Beeston)', The Engineer, (4 Sept. 1903); Motor Trader, (8 Oct. 1913), p. 101, (7 Sept. 1910), p. 1036, (7 Aug. 1912 and 10 Dec. 1911).

By 1911, Legros, the president of the Institute of Automobile Engineers, noted that, 'the tendency in the bigger factories is to diminish the amount of responsibility left to the individual worker in respect to the employment of . . . shop knowledge.'<sup>76</sup> In 1914, a management consultant argued that, 'In the motor trade . . . a large portion of the workers were either turret hands who do not do much more than pull certain handles, or milling machine hands who only put work in a fixture and let it go, having the speed and feed set for them, and jig drillers'.<sup>77</sup> These changes in machine practice were taking place in part because the high speed/high compression automobile engine required a degree of precision fit which only new types of machines could deliver.<sup>78</sup> This explains why at firms such as Daimler, engine production was on an interchangeable basis by 1907 while the chassis department was still dependent on the skilled fitter and the file.<sup>79</sup> Even firms such as Vauxhall and Rolls Royce made extensive use of potentially deskilling machine techniques on their luxury chassis and engines.<sup>80</sup>

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76. L.A. Legros, 'Influence of Detail in the Development of the Automobile', Proceedings Institute of Automobile Engineers, (11 Oct. 1911).

77. Owen Linley, 'Manufacturing on a Medium Scale', Motor Trader, (8 July 1914); A.A. Remington, 'Some Possible Effects of the War on the Automobile Industry', Presidential Address, Proceedings Institute of Automobile Engineers, (1918), p.7.

78. See Gartman, Auto Slavery, pp. 41 on development of Norton Grinders. See Hounshell, American System, on accuracy of new machine techniques. R. Lumley, 'The American System of Manufactures in Birmingham: Production Methods at the Birmingham Small Arms Co. in the Nineteenth Century' Business History, 31, (1989), pp. 29-43 argues that new machine techniques were adopted because they provided more accurate finish than hand techniques.

79. 'Erecting Shop Methods', The Automobile Engineer, (1912), p. 216.

80. 'Quality Production', Engineering Production, (Aug. 1923); 'The Works of Rolls Royce', The Automobile Review, (Feb. 1927); 'An Interesting Visit', Engineering Production, (4 Jan. 1923); Engineering Production, (8 June 1922); Automobile Engineer, (June 1920); 'The Works of Vauxhall', Automobile Engineer, (Oct. 1925).

Despite the advances in machine techniques and a substantial reduction in the demand for skilled labour, the critical labour control methods employed by Ford did not receive widespread support in Britain.<sup>81</sup> Pullinger, manager of the Arrol Johnston plant, which was built in 1913 and modeled after Packard, argued against American labour practices and rigid managerial control and in favor of 'kindly and sympathetic' treatment of labour.<sup>82</sup> A.W. Reeves from Crossley argued:

An important factor to the author's mind, and one which appears to be entirely ignored in the wonderful systems on the other side of the Atlantic, and among many idealists on this side, is that of the personal or human element. Anyone with any knowledge of the independent and, it must be confessed, awkward spirit, characterising the workers of say the Northern Midlands, would hesitate before applying the extreme methods of the latest American Scientific Management, well knowing the futility of the task.<sup>83</sup>

Bayley, before the British Institute of Automobile Engineers argued:

In America, I understand, the labour available is much more amenable to systematised working. In England there is difficulty in getting a man to do exactly what he is told, because he is apt to think a great deal more for himself than do his fellows in America. Therefore, a system in this country has to be more elastic and less precise than many American systems are said to be.<sup>84</sup>

Perry Keene, from Austin had the following observation on American labour management methods:

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81. For a recent study of scientific management in Britain see, M.Rowlinson, 'The Early Application of Scientific Management by Cadbury', Business History, 30, (1988), pp. 377-95.

82. T.C.Pullinger, 'Opening Address', Proceedings Institute of Automobile Engineers, (1917/1918), p. 432; For a generally unfavorable review of Scientific Management see, H.Briggs, 'Repetition Work in the Engineering Industry', Proceedings Institute of Production Engineers, (1922), pp. 377-89. Other criticisms of American practice can be found in, 'Mass Production', Machinery, (27 Nov. 1919); 'Robert Hadfield's Toast to the London Association of Foremen', Managing Engineer, (May 1916), p. 7; 'Applied Time Studies', Automobile Engineer, (Dec. 1920), p. 502.

83. A.W.Reeves and C.Kimber, 'Works Organisation', Proceedings Institute of Automobile Engineers, (1916/1917), p. 375.

84. Comments on a paper titled, 'Works Organisation', Proceedings Institute of Automobile Engineers, 11, (1916/17), p. 396,  
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In America you have to employ methods which a crowd can carry out, but the British individual will not have that. . . the Britisher will not have 'herd' methods. He has the individualistic tendency, and it is a British tendency that you have to allow for.<sup>85</sup>

Having rejected direct control of labour on the model of Henry Ford, largely due to perceived differences in the socio/political context, British management still needed a strategy to convert labour time into effort. Many British employers were sympathetic to welfarism, paternalism or co-partnership as a means of winning labour's confidence and increasing productivity.<sup>86</sup> Central to the British post-war labour control strategy in the motor vehicle industry, was the spread of incentive payment systems with much larger bonus rates than in the pre-war period. Much as the decision by Ford to take direct control of effort norms encouraged further investment in capital whose productivity could now be assured, the British preference for indirect control of labour effort norms through incentive payment systems made capital investment a riskier strategy, slowed the rate at which the managerial function evolved in Britain, and slowed the rate of growth of wages which was critical to the expansion of the market for mass produced goods.<sup>87</sup>

After World War I, the Coventry employers resisted labour's demand to move to fixed day rates on the grounds that they could neither depend on labour to voluntarily produce at a given level nor directly enforce the desired level of effort.<sup>88</sup> Negotiations between

85. A. Perry Keene, 'Production - A Dream Come True', Journal of the Institute of Production Engineers, 7, (1928), p. 31.

86. 'Labour Problems and Methods of Production', Engineering and Industrial Management, (6 March 1919), pp. 101-2.

87. On the long run effects of this strategy see Lewchuk, American Technology, especially chapter 9, 'The Collapse of the British System of Mass Production, 1930-1984'.

88. EEF Archives, P(5)27, Local Conference, CDEEA and CEJC, 6 March 1919 and 13 March 1919; ASE Coventry, Minute Books, 14 Dec. 1918, 21 Jan. 1919; EEF Archives, P(5)27, Local Conference, 18 Dec. 1918; EEF Archives, Letter CDEEA to EEF 11 Feb. 1919 and 30 March 1919; EEF Archives, M(17)6, Fifty Per Cent Agreement, 26 June 1919.

the unions and the Employers Association resulted in the Humber Agreement which was particularly important in the motor vehicle trade. The workers agreed to continue working on systems of payment by results with the understanding that the recognized bonus level would be 50 per cent of base wages. These higher bonus rates tied labour earnings even more directly to effort and in this way, the Coventry employers could control effort norms indirectly. Similar strategies were used in many American firms however the extent to which British management relied on British labour to co-ordinate shop floor activity under incentive payment systems seems extraordinary.<sup>89</sup>

The justification for making incentive payment systems such an important component of post-war managerial strategies was based in part on managerial perceptions of the British socio/political context. Howe, chair of the Higher Productivity Council, wrote in 1919, 'The whole point is that workmen now say that they want a share of the control of business and this scheme [payment by results] gives them the share that they want.'<sup>90</sup> A similar argument can be found in an editorial in the British journal Machinery, 'Employers and the heads of departments are inclined to suggest that our industrial troubles would at any rate be considerably reduced if we could have a general payment-by-results scheme, and that confidence would thereby be established between employers and men.'<sup>91</sup> In an extensive examination of 'What the British Worker is Thinking', another author argued that the Fordist system of direct control was incompatible with trends in labour thinking. 'He [labour] wants to be admitted into the

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89. On incentive payment systems in the American electrical industry see, R.W.Schatz, The Electrical Workers: A History of Labor at General Electric and Westinghouse, 1923-60 (Urbana, 1983).

90. EEF Archive, P(13)5, Letter from Howe to EEF, 29 Oct. 1919.

91. 'Payment by Results', Machinery, (11 March, 1926), p. 768.

management of industry. . . What he is really resenting therein is the exercise of almost unbridled power which modern industry associates with management.<sup>92</sup>

It would be false to suggest that similar pressures were not exerted by labour in the United States during this period. However, it seems safe to conclude that the weakly organized American workers were unable to forcefully make their case, while American managers appear to have been better organized. Recent work by Harris and Tomlins suggests that powerful American employers intervened in the political process to make sure that a set of labour institutions emerged after the depression which would insure capital's authority at the work place.<sup>93</sup>

While undoubtedly the size of the British market produced an environment which did not force British producers to alter their strategy, our reading of changes at Fords and the statements of contemporary British observers suggests that market size was not the critical factor shaping decisions on technology in Britain. During Austin's visit to Detroit in 1927, he marveled at the size of the Ford works and the impossibility of achieving such a level of output in Britain. However he also reported that an output of around 15,000 per year allowed a good return on investment under the American system and at 50,000 per year most economies of scale were exhausted.<sup>94</sup> Another observer argued that after the War there would need to be some

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92. C.H.Northcott, 'What the British Worker in Thinking', Industrial Management, (Aug. 1920), p. 96.

93. See, H.J.Harris, The Right to Manage: Industrial Relations Policies of American Business in the 1940s, (Madison, 1982); C.L.Tomlins, The State and the Unions: Labor Relations, Law, and the Organized Labor Movement in America, 1880-1960, (Cambridge, 1985).

94. 'Visit of the Chairman and Mr. E.L.Payton to the U.S.A.', Austin Archive, Modern Records Centre, MSS 226/AU/1/1/1.ii, p. 5 and 14.

increase in scale from pre-World War I levels, 'but not by any means to an amount numbing to the intelligence, and certainly not beyond the capacity of the markets of the British Empire.'<sup>95</sup>

This suggests that the average cost curve of the Fordist system of production fell rapidly initially and that many of the scale economies were exhausted at surprisingly low levels of output. Further expansion did lead to minor cost reductions, however, Fordism's great advantage in the American context was that average costs remained at this relatively low level of output until very large levels of production were reached. Fordism was capable of supplying massive markets. Whether massive markets were necessary for Fordism seems doubtful. The same arguments cannot be made for the post-1945 era. The introduction of automatic transfer machines dramatically increased minimum efficient scale leading to the eventual decline of the British motor vehicle industry in the 1970s.

Although we have argued that in the 1920s, British workers escaped direct managerial control of effort norms and hence the extreme forms of labour speed-up practiced in Detroit, it is not at all clear that by the 1960s the work load per hour worked was still lighter in Britain. In the United States, the rise of industrial unionism had checked some of the power of management to speed-up the work pace. In Britain, the combination of self-discipline via incentive payment systems and the failure of British firms to invest in new technology created an atmosphere where labour had to work very hard to maintain pay levels and insure the survival of their jobs.

While stoppages due to both managerial incompetence and sectional

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95. A.H.C., 'Economy in Relation to Efficiency in the British Automobile Industry', Automobile Engineer, (Aug. 1915), p. 231; A.H.C., 'Notes Regarding American Production Methods' Automobile Engineer, (Oct. 1915), p. 305. See also, F.Woollard, The Principles of Flow Production (London, 1954).

labour strikes reduced the number of working hours it is less clear that hours worked were less intense in Britain than in the United States.<sup>96</sup>

Of all the British firms, the entry of Morris Motors was most directly a response to Ford's success in the British market. From the start, Morris intended to build a limited range of vehicles and to appeal to the same segment of the market as Ford. The first Morris product, the Oxford, was placed on the market in 1913.<sup>97</sup> Morris closely followed the policy of buying as many components as possible from job shops, reserving for himself the task of design and assembly. Frustration with the conservatism of British job shops led him to seek supplies in Detroit in 1914 and eventually led to Morris buying many British suppliers to insure the scale of output he desired.

After the war, Morris adopted a crude assembly line when output levels were still only a few thousand. The reliance on a hand powered line remained until 1934 by which time output exceed 60,000. Woollard, production manager at Morris Motors, was known to be a strong supporter of incentive payment systems and doubtful of British management's ability to coordinate shop floor activity on fixed wage systems.<sup>98</sup> Evidence is limited about the distribution of authority on the shop floor at Morris or the ability of labour to influence effort

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96. For a detailed and critical reappraisal of the many studies which have tried to claim that British labour effort norms are lacking compared with other countries see, Theo Nichols, The British Worker Question: A New Look at Workers and Productivity in Manufacturing (London, 1986).

97. For details on the history of Morris see, R.J.Overy, William Morris: Viscount Nuffield (London, 1976); P.W.S.Andrews and E.Brunner, The Life of Lord Nuffield (Oxford, 1955); R.Jackson, The Nuffield Story (London, 1964).

98. On Woollard's management philosophy see, F.W.Woollard, 'Some Notes on British Methods of Continuous Production', Proceedings of the Institute of Automobile Engineers, (1924); F.W.Woollard, Principles of Flow Production (London, 1954).

norms, although the failure to mechanize the assembly line suggests that Morris workers did have more input into effort decisions than Ford workers.

Experiments in automation at Morris Engines suggest that in this particular area, Morris actually led the Americans. In the early 1920s Morris introduced the hand transfer machine for producing cylinder blocks and this was followed by fully automated machines for manufacturing flywheels and gearboxes. This experiment in automatic transfer technology failed in part because of imperfections in hydraulic clamping devices.<sup>99</sup> It was not until the 1930s that clamping devices were perfected and really only in the 1950s that automated techniques became widespread.<sup>100</sup>

The influence of socio/political variables on the choice of technique is clearly evident in the post-war strategy of the Austin Motor Company. The firm's output reached 9,500 in 1924, rose to 25,000 in 1926 and exceeded 40,000 after this date.<sup>101</sup> Austin's strategy was influenced by the Fordist system which he observed during visits to the United States. What impressed Austin about the Ford factories was not the sophistication of the machinery used, but rather the amount of labour effort forthcoming from the work force. He was impressed that, 'everybody in the establishment seemed to be trying to do their best.'<sup>102</sup> This led him to argue that if Britain was to compete with the United States it needed an improved spirit amongst labour, not new machine methods. During the twenties, Austin made changes in the production process and moved the firm some way toward

99. Woollard, Principles, p. 30.

100. See Gartman, Auto Slavery, pp. 109-14 on the spread of automation in the United States.

101. Church, Herbert Austin, p. 84.

102. Third Annual Meeting IAE as reported in, Proceedings Institute of Automobile Engineers, (1924/25), p. 7.

flow production.<sup>103</sup> Assembly lines were installed after 1924 but they remained relatively simple and unmechanized until the late twenties. More important, Austin's system of labour control was vastly different from Ford's. The Austin workers were placed on piece work and allowed to earn bonuses often exceeding 100 per cent.

The shaping of the Austin strategy was influenced by managerial perceptions of relations between British labour and management in the early 1920s. P. Keene, the head of the costing department argued, 'the obvious difficulty at the moment is the lack of confidence as between employer and employed.'<sup>104</sup> This lack of confidence was to be resolved not by direct managerial control or machine pacing, but rather through a novel payment system called 'Bonus on Time' under which prices were set in units of work time earned rather than money earned. P.Keene suggested that the system worked because with:

Such a basis, many economic problems become common to both employers and employed, and interests flow in one direction . . . The reason why the system of control became really efficient was that they inculcated into the whole staff a maximum idea of personal responsibility to the firm itself whereby they and the firm were likely to prosper.<sup>105</sup>

To Keene, the efficiency of the payment system was obvious. 'The remuneration he(the worker) is able to obtain through savings is a sufficient incentive to the worker to make large output effective with the minimum of supervision.'<sup>106</sup>

Statements by Austin managers indicate that they saw their system as an alternative to the Ford system. They argued:

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103. C.R.F.Engelbach, 'Some Notes on Re-Organisation of a Works to Increase Production', Proceedings Institute of Automobile Engineers., (1928).

104. For statements by Engelbach and Keene see, Ward Papers, MRG1, Organisation Section, w/8/29-34/13/476, pp. 2-14, housed at the Business History Unit, London School of Economics.

105. *ibid.*

106. Ward Papers, W/8/29-34/476, P.Keene to MRG 1, 2 Dec. 1930.

There are still a few employers who object to piecework on principle. Their stand-point is that an efficient management ought to be able to get the same results at an agreed rate of wage without having to pay more money to encourage the men to work harder. . . The daily task system at fixed wages may perhaps, be workable in American, or even Continental factories, but the necessary . . . driving works policy would not be acceptable either to English Labour or Management.<sup>107</sup>

Those British managers who did show greater sympathy for direct managerial control of effort norms and the high wage policy of Fordism were severely criticized by other British managers. Captain Wilks from Rover had expressed interest in the Fordist system. Cole from the Employers Federation argued that:

Captain Wilks, to my mind is suffering from some rather ill-digested views with regard to Capital and Labour. He is a great admirer of Mr. Ford and American methods. His idea is that everybody should receive a high day rate and then be compelled to work as hard as possible and if they do not they are to be fired out.<sup>108</sup>

The extent to which many British employers had become dependent upon labour self-regulation rather than direct managerial control is revealed in their attitude toward the experiments at Associated Equipment(AEC) in the late twenties. AEC was the first British vehicle maker to adopt a mechanized moving assembly line in 1915 and by the 1920s had adopted a system which looked very similar to Fordism including the payment of high wages on a fixed day rate scheme. The London Engineering Employers Federation threatened to expel the firm from the Association unless they changed their wage policy. They argued that, 'The essential difference between his Southall scheme, and schemes in operation at Walthamstow and at other federation firms was a payment in anticipation (of output), whereas the scheme approved by the Association were payments made after the results had been

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107. EEF Archives, W(3)129, Piece Work in the Toolroom, 1 Feb. 1934, pp. 26-8.

108. EEF Archives, P(20)5, Cole Memo, 10 Sept. 1930; EEF Archives, Membership Files AEC., W.L.Bayley to A.C.Bayley, 18 March 1927.

assured.'<sup>109</sup> Management at AEC claimed that they controlled effort norms and hence it was reasonable to set wages in anticipation of certain performance standards. Their critics doubted that this was possible in the British context, and went as far as diagnosing Fordist sympathizers as suffering from a new disease, 'Forditis'. The inability of British management to enhance its authority in the shops at the expense of labour between 1900 and 1950 was evident to the 66 teams who examined American practice after World War II as part of the Anglo-American Council on Productivity. In their report they claimed, '[In America] the function, scope and authority of management are more widely recognized and asserted to inside the firm.'<sup>110</sup>

## CONCLUSIONS

Our study of the rise of Fordism in Detroit and its diffusion to Britain suggests that history and socio/political factors play an important role in shaping new technology and limiting its diffusion. The standard focus on relative factor prices and scale economies at best tells only part of the story. While the smaller market in Britain made the transition to Fordism less urgent, the evidence suggest that most elements of the new technology were applicable at the levels of output British firms had attained by the 1920s. The basic Fordist innovations were relatively simple and information regarding them was easily transmitted in professional journals and through personal visits to Detroit.

We have argued that the decision by American employers such as Ford to strengthen management's authority and rely on direct control of effort norms while British employers in general failed to increase

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109. EEF Archives, Membership Files AEC., Failure to Obey Rules, p. 4.

110. G.Hutton, We Too Can Prosper; The Promise of Productivity (London, 1953).

their authority and instead relied on indirect control of effort norms through incentive payment systems, can best be explained by looking at differences in British and American socio/political characteristics. The relative power of capital and labour, the role of group norms and group loyalty, attitudes toward consumerism, the legacy of previous economic periods such as the size of non-productive classes, whom Gramsci so vividly referred to as 'economic pensioners', all played an important role in managerial decisions as the relative price of skilled and unskilled labour or the size of markets.

In the case of Fordism it seems that tension between external demands for more democratic economic decision making and Fordism's tendency to centralize that power in the hands of management was important. For a variety of reasons, Ford was able to effect such a change in Detroit and it seems was relatively successful in transferring that system to Manchester. British managers were decidedly unenthusiastic about American labour control practices and adopted different strategies based on their perceptions of labour attitudes in Britain even though, as we have suggested, these perceptions may have been mistaken. The British system of labour control relied on internally generated group effort norms formed in the context of incentive payment systems offering high bonus rates. Our analysis of Fordism's experience in Britain supports Burrage's thesis that social variables such as loyalty to groups had an important impact on the evolution of industrial technology. History did matter in this case.