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BETWEEN FORDISM AND FLEXIBILITY: THE AUTOMOBILE INDUSTRY AND ITS WORKERS - PAST, PRESENT AND FUTURE

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Between Fordism and Flexibility: The Automobile Industry and its Workers - Past, Present and Future*

ABSTRACT

Since the days of Henry Ford the automobile industry has served as a model of economic expansion and technological progress based on mass production. But from the mid-1970s, sweeping changes in markets and technology have transformed international competitive conditions and spurred automobile manufacturers in every country to experiment with new strategies based on greater product diversity and more flexible methods of production. This paper surveys the behaviour of the industry from its origins to the present in a perspective informed by current developments. It looks first at the emergence, diffusion and modification of the Fordist model in different countries, before going on to examine international variations in trade union structure, bargaining strategy and job control practices. The final section traces the recent transformations in the international automobile industry, considers the extent to which new production and marketing strategies mark a break with Fordism, and draws out the implications for industrial relations and trade union strategy.

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NON-TECHNICAL SUMMARY

The automobile industry has long occupied a central place in debates about management, technology and labour organization in advanced industrial societies. Since the days of Henry Ford the industry has served as a model of economic expansion and technological progress based on mass production and distribution: the manufacture and marketing of standardized products in huge volumes using special-purpose machinery and unskilled labour. This paper surveys the development of the automobile industry from its origins to the present in a perspective informed by current upheavals in markets, technology and work organization. The first section looks at the rise of mass production and the modification of the Fordist model to suit national circumstances by managers, workers and trade unions. The second section examines industrial relations in the age of Fordism, focusing on international variations in trade union structure, bargaining strategy and job control practices. The final section traces the recent transformations in the international automobile industry, considers how far new production and marketing strategies mark a break with Fordism, and draws out the implications for industrial relations and trade union strategy.

Mass production of automobiles, as developed by Henry Ford in the half-dozen years before the First World War, depended on three basic principles: the standardization of the product, the use of special-purpose equipment, and the elimination of skilled labour in direct production. More than any of his contemporaries, Henry Ford grasped the vast latent demand for cheap, reliable basic transport in the American Midwest with its prosperous but isolated farms and small towns. His 'Model T', ruggedly designed, easy to repair and priced well below its competitors sold in unprecedented numbers.

By the First World War, Ford had synthesized his innovations in product design, production and labour management into a coherent competitive strategy whose application appeared universal. But the tremendous success of Ford's strategy depended in practice on

specific features of the American market in this period: its enormous size, vast distances, egalitarian income distribution and homogeneous tastes. European markets were fundamentally different, remaining much smaller and more fragmented throughout the interwar period, and a strategy based on price competition and economies of scale accordingly proved far less effective. While leading French and Italian manufacturers were fascinated by Fordist methods on technological grounds, the structure of their domestic markets forced them to multiply models and expand their product ranges, and the organization of production remained less rigid and less mechanized than across the Atlantic. In the United States itself, the changing pattern of demand for cars in the 1920s enabled General Motors to overtake Ford through new strategies based on product differentiation and annual model changes. Despite these moves towards more differentiated marketing strategies, however, car firms on both sides of the Atlantic continued to regard Fordism as an ideal production strategy to be pursued as far as the market allowed, and the long postwar boom saw a renewed emphasis on standardization and economies of scale in manufacture.

By the 1970s the modified Fordist systems practiced by American and European automobile manufacturers had become sluggish and internally contradictory. Their factories were bulging with inventory and work-in-progress; maintenance and work scheduling were a constant problem, resulting in frequent interruptions of production; and high volume output was pursued at the expense of product quality. The diversity of models and options required for marketing stood in tension with the uniformity and standardization required for the efficient operation of a Fordist production system, and Western car manufacturers had become extremely vulnerable to any major disruption in the postwar growth pattern.

The Japanese set out initially to adapt Fordist systems to the requirements of an accelerated catching-up process, and some

requirements of an accelerated catching-up process, and some observers see their achievement as a quantum leap forward in the same direction. The Japanese, in this view, have brought out and eliminated certain key imperfections in the Fordist model, making it possible to combine product diversity with mass production on an unprecedented scale.

Other observers, by contrast, see the Japanese innovations as a deeper challenge to the Fordist model which reverses its central principles and points towards the emergence of a qualitatively new system of production. This system, which can be termed "flexible specialization", has been observed across a wide range of industrial sectors. It depends on the combination of increasingly flexible, general-purpose equipment and a skilled, adaptable labour force to manufacture an ever more diversified range of products for which economies of scale are becoming decreasingly important. Not only the Japanese but also some Western automobile manufacturers seem to be moving in this direction, notably the Germans and the Swedes.

Recent developments in the international automobile industry have undermined the foundations of the Fordist model as it developed in the postwar period. Sweeping changes in markets and technology have transformed international competitive conditions and spurred automobile manufacturers in every country to experiment with new strategies based on greater product diversity and more flexible methods of production. The outcome of shifts in competitive strategy and productive organization is still uncertain. But many of the established features of automobile production can still be discerned, while the more recent innovations are susceptible to elaboration in different directions. CAD/CAM systems have reduced the lead time for the introduction of new models, facilitating the development of wider product ranges; but the increasing complexity of the product and the difficulties of integrating automobile subsystems experiencing different rates of innovation keeps research and

manufacturers. While there has been a qualitative expansion in the available range of vehicle types and models, the use of common components and subsystems has also become increasingly important in the generation of new variants. Flexible automation equipment and changes in job design have lowered minimum efficient scales of operation in many stages of component production and vehicle assembly, but substantial economies of scale still remain in the manufacture of major mechanicals such as engines and gearboxes, leading to growing reliance on joint ventures on the part of smaller producers.

The new automation equipment can be used to decrease batch sizes and eliminate machine pacing for more broadly skilled workers, or can serve instead to move towards the ideal of a 'workerless factory' through the integration of complex sequences of transfer machines. While overall skill levels have clearly been rising, it remains uncertain, finally, whether this tendency will be confined to the development of a wider range of interchangeability between semi-skilled jobs or will lead instead to the emergence of new job categories which more fundamentally erode the boundary between skilled and semi-skilled tasks. Current practice in automobile companies accordingly ranges from the reduction of rigidities in the manufacture of a broadly standardized product line to conscious efforts at building maximum flexibility into all aspects of an increasingly diversified production process.

The changed market conditions and new technologies of the 1970s and 80s have brought with them shifts in competitive strategy and manufacturing practice which pose a fundamental challenge to the Fordist model. But as in the case of the emergence and diffusion of Fordism itself, the outcome of its crisis for the future of the automobile industry and its workers will be determined not by some intrinsic imperatives of markets and technology but rather by the strategic choices of corporate managements, trade unions and national governments.

The automobile industry has long occupied a central place in debates about management, technology and work in advanced industrial societies. Since the days of Henry Ford the industry has served as a model of economic expansion and technological progress based on mass production: the manufacture of standardised products in huge volumes using special-purpose machinery and unskilled labour, a system which has come to be known as 'Fordism'. But from the mid-1970s, sweeping changes in markets and technology have transformed international competitive conditions and spurred automobile manufacturers in every country to experiment with new strategies based on greater product diversity and more flexible methods of production. These shifts in competitive strategy and manufacturing methods, whose outcome is still far from certain, pose far-reaching challenges not only for the automobile companies and their workers but also for trade unions and national governments.

This paper considers the development of the automobile industry from its origins to the present in a perspective informed by current upheavals in markets, technology and industrial relations. Section I looks at the rise of mass production and the modification of the Fordist model to suit national circumstances by managers, workers and trade unions. Section II examines industrial relations in the age of

Fordism, focusing on international variations in trade union structure, bargaining strategy and job control practices. Finally, Section III traces the recent transformations in the international automobile industry, considers how far new production and marketing strategies mark a break with Fordism, and draws out the implications for industrial relations and trade union strategy.

I

Mass production of automobiles, as developed by Henry Ford in the half-dozen years before the First World War, depended on three basic principles: the standardisation of the product, the use of special-purpose equipment, and the elimination of skilled labour in direct production. More than any of his contemporaries, Henry Ford grasped the vast latent demand for cheap, reliable basic transport in the American Midwest with its prosperous but isolated farms and small towns. His 'Model T', ruggedly designed, easy to repair and priced well below its competitors sold in unprecedented numbers, jumping from 6000 in 1908 to 189,000 in 1913 and 802,000 in 1917 to reach a total of 15 million by 1926 [illegible].

In its heyday, the 'T' came in a single standard model and was available in 'any color as long as it was black'. The

standardisation of the car and its components was intended to facilitate repair by distant customers, but more importantly to permit a dramatic reduction in costs through the use of special-purpose machinery and the division of labour. Ford drew upon and elaborated the heritage of the 'American system of manufactures' as it had developed from firearms through sewing machines, agricultural equipment and bicycles towards the high volume production of interchangeable parts. He and his engineers simplified each component as far as possible, using new materials such as pressed steel; arranged the equipment in their new Highland Park factory so that the flow of materials followed the sequence of operations; and designed first jigs, fixtures and gauges and then new special-purpose machines to ensure full interchangeability. These 'farmer tools' could be operated by unskilled workers without a background in the industry, and Ford likewise pursued the reduction of skill requirements in vehicle assembly through the subdivision of tasks and the elimination of fitting, hallmarks of 'mass production' as he was later to define it. With the astronomical growth of sales, each of these developments reinforced the others in a constant struggle for faster throughput which gave rise to Ford's most famous innovation: the introduction of the moving assembly line in 1913.

Ford's rapid growth and dramatic innovations in production brought with them unprecedented problems of labour management. Skilled workers progressively moved into new 'indirect' services such as toolmaking, toolsetting and maintenance, joining the growing army of supervisors, inspectors, progress chasers, clerks and engineers needed to administer mass production. The workforce shot up from 1548 in 1909 to 13,667 in 1913, an increasing proportion of which were unskilled immigrants from southern and eastern Europe, many of whom spoke no English. Turnover levels reached 370% in 1913, with absenteeism rates of 10% per day, creating enormous difficulties in production planning. It was in this context that Ford inaugurated his famous 'Five Dollar Day', a profit-sharing plan designed to stabilize and integrate the workforce alongside other measures such as a Sociological Department and intensive, driving supervision.

By the First World War, Ford had synthesised his innovations in product design, production and labour management into a coherent competitive strategy whose application appeared universal. Product standardisation led to economies of scale, resulting in falling unit costs which permitted price reductions, expanding the market and leading on to further economies of scale in an endless virtuous circle. The huge River Rouge complex, built at the end of the First World War, integrated from steelmaking to final

assembly, with its own railways, docks and power plant was the tangible embodiment of this strategy. As sales of the Model T soared, capturing 55% of the American market in 1921, Ford's prospects seemed limitless and 'Fordism' to define an international standard of modern manufacturing practice.

But the tremendous success of Ford's competitive strategy depended in practice on specific features of the American market in this period: its enormous size, vast distances, egalitarian income distribution and homogeneous tastes. The British market was fundamentally different in each of these respects, remaining much smaller and dominated by quasi-luxury demand into the 1920s, and a strategy based on price competition and economies of scale accordingly proved far less effective than across the Atlantic [23]. While the underdevelopment of the British motor industry allowed Ford to sell significant numbers of Model Ts before 1914, the company's hold on the British market quickly evaporated with the emergence of large-scale domestic production in the 1920s. Ford officials in Detroit refused to allow local managers to develop a model aimed specifically at the British market until 1928, and sought to impose American practices of exclusive dealerships, high day wages and low manning levels quite unsuited to British conditions. Even once local management achieved autonomy and began to pull the company back from its nadir of the late 20s, the influence of Detroit practice

remained strong: Ford's Dagenham factory, opened in 1932 as a scaled-down version of River Rouge, proved too large for the British market until the 1950s.

British manufacturers such as Morris and Austin pursued a more pragmatic strategy, competing on the basis of new models and designs as well as price and moving gradually towards higher volumes of production. Production methods accordingly remained less rigid and capital-intensive than at Ford's, with greater customisation in bodywork, more adaptable equipment in machining and greater use of hand labour in assembly. In contrast to Ford, British manufacturers also relied on piecework incentive schemes rather than tight supervision to motivate the labour force; and this distinctive complex of product, production and labour strategies remained characteristic of the British motor industry until its crisis of the 1960s and 70s.

Elsewhere in Europe, the market for automobiles also differed sharply from the American pattern, but the attitude of local manufacturers was different [sic]. Leading French and Italian entrepreneurs such as Andre Citroen, Louis Renault, Marius Berliet and Giovanni Agnelli were fascinated by Fordist methods on technological grounds and sought to impose them on the market. Engineers and managers from each of these companies visited the United States on several occasions, and each time came away determined to emulate the Fordist model on

a more ambitious scale. In the 1920s and 30s, vast new factories were constructed, modelled first on Highland Park and then on River Rouge; machine tools were imported from the United States in large numbers; product lines were drastically simplified; and valiant efforts were made to rationalise production along American lines through the use of work measurement and the introduction of the assembly line.

In practice, however, European motor manufacturers' infatuation with Fordism created major difficulties both for production management and marketing. The great leap forward to mass production ran ahead of management's ability to elaborate suitable systems of cost accounting, work scheduling, supervision and quality control, so that shop-floor realities often lagged well behind the glossy visions of the engineers. The smaller size and greater differentiation of the French and Italian markets also created obstacles for Fordist marketing strategies, and overambitious expansion projects such as those of Berliet and Citroen crashed when demand turned downwards in 1921 and again in the early 30s. All the main manufacturers were forced to multiply models and expand their product ranges in order to maintain their sales, and as in Britain the organisation of production accordingly remained less rigid and less mechanised than in the United States. None of the European manufacturers, finally, dared to emulate Ford's labour strategies in full, eschewing high day

wages in favour of piece rates, speed up and worker flexibility as means of boosting output and adjusting to fluctuations in demand.

Despite these practical limits to the development of Fordism in Europe between the wars, the leading French and Italian automobile manufacturers continued to regard it as an ideal production strategy, to be pursued as far as the national market allowed. Certain smaller companies, such as Alfa Romeo in Italy and Mercedes-Benz in Germany followed with varying degrees of commercial success an alternative strategy of specialisation on high-performance luxury cars produced with modified craft methods. But on the eve of the Second World War Fiat, Renault, Peugeot and Citroen were all experimenting with small 'people's cars' intended to create a new mass market, as was the Volkswagen Werke in Germany under the personal sponsorship of Adolf Hitler, another of Ford's European admirers [43].

But even as European automobile manufacturers were straining against the limits of their national markets in their efforts to emulate Fordist principles, the American market itself was changing in ways that ultimately necessitated their partial modification [44]. In the United States, the 1920s saw a growing saturation of the market for utility cars; a fall-off in the proportion of first-time buyers and the spread of used-car sales; and a slower overall

growth of demand. With the emergence of what Alfred P. Sloan of General Motors called the 'mass-class' market, cars could no longer be sold effectively on the basis of price alone, and GM was able to invade the mass market from above by pricing its more comfortable and up-to-date Chevrolet only slightly above the Model T. To ensure that no one else could follow his lead, Sloan set out to produce 'a car for every purse and purpose' in four autonomous divisions, each aimed at a distinct price band; and the company also used advertising, installment sales and annual model changes to stimulate consumer demand and outdistance its rivals. To prevent model changes disrupting production, to curb fluctuations in sales and to increase economies of scale, GM executives developed new methods of forecasting demand, raised the proportion of components purchased from outside subcontractors, and began to interchange parts across divisions. On the shop floor itself, the company moved away from Fordist practice by introducing 'semi-special' machine tools which could be adapted to new models by changes to cams and gears, increasing the proportion of toolmakers and toolsetters in the workforce; and it sought added flexibility through seasonal layoffs for production workers and the use of piece rates and group bonuses rather than a day wage system.

GM's innovations in product and production strategy soon began to undermine Ford's grip on the American market. The

Model T had become increasingly outdated despite incremental changes introduced over the years, and sales dropped off sharply after 1924 despite repeated price cuts. By 1927 Ford was forced to admit defeat and begin work on a wholly new model to restore the company's competitive position. The extreme specialisation of production for the Model T made the changeover enormously difficult and expensive: all the existing machinery had to be scrapped and the factory shut down entirely for nearly a year, opening the door for the emergence of new competitors such as Chrysler. Despite an initial sales boom, the new Model A never dominated the market as the T had and periodic modifications soon proved unavoidable; by 1932 Ford had been forced to introduce a successor, the V-8. These failures in product policy in turn necessitated a retreat from some aspects of Fordism in production as well: assembly lines became shorter and machinery less specialised; vertical integration was reduced to gain flexibility; and wage rates were cut to compensate for the collapse of profits.

Thus Fordism was widely modified to permit greater flexibility in response to shifts in the market and the innovations of GM. But the triumph of what came to be called 'Sloanism' proved ambiguous in practice. During the depression of the 1930s, GM reduced the number of its divisions and increased the interchangeability of components

across models to secure greater economies of scale in a contracting market, and in a postwar competitive environment of steady growth in demand and oligopolistic 'room for all' pricing policies, the Sloanist strategy of 'a model for every market' degenerated into a strategy based almost exclusively on styling and marketing competition. Once they had perfected the big V-8 engine and 3-speed automatic transmissions in the early 1950s, the big US companies turned their backs on innovation and abandoned investment in experiments that did not yield quick results. For twenty years, the only major technical innovations in the U.S. came in the field of air-conditioning. The styling studios were in command and led the industry through successive milestones of kitsch - the tail-fins of the late forties, the port-holes of the early fifties and the panoramic windshields of the mid-fifties, all adorned with flashing chrome and lurid paintwork.

Underlying this market pattern was a commercial and competitive logic. Continuous restyling became one of GM's big selling features to defeat smaller companies who could not generate new styles and who lacked marketing power. The Big Three used their powerful advertising and dealership networks to force up the costs of competition by forcing diseconomies of scale in body tooling on their rivals. They were ready to carry much higher fixed costs in design and tool and die equipment per vehicle in order to carry through the annual

model changes that the smaller independent companies could not afford to emulate; and the latter's inability to participate in this model competition was one of the crucial factors leading to their eventual demise.

But much of this apparent product diversity remained superficial. Following GM's lead, the Big Three centralised their styling variants around a limited number of basic interior platforms and body-shells, with distinctive 'skins' placed on each, while the 'family resemblance' enabled many major stampings of body parts to be used in common over many models. Many key components, such as engines, transmissions or chassis were shared by several cars and often retained for twenty years or more. This interchangeability of components enabled American manufacturers to pursue ever greater economies of scale through vertical integration and the introduction of dedicated automation equipment such as transfer machines. In assembly on the other hand, the proliferation of options involved enormous complexity and inhibited rationalisation of the production process as a whole [63].

In the immediate postwar period, European automobile producers followed a more classically Fordist strategy, centred on the mass production of basic transport for the newly 'democratised' markets at home and abroad. Until the late 1960s, each national market in Europe remained quite

distinct and dominated by one or two domestically produced cheap small cars such as the Renault 4 and Citroen 2CV in France, the VW Beetle in Germany, the Fiat 500 and 600 in Italy and the Morris Minor and BMC Mini in the U.K. But with widely varying taxation structures, income distributions and road conditions, it was impossible for any single producer to dominate the European market or for any single design philosophy to prevail. This fragmentation of the European market left ample space for more specialised manufacturers of luxury cars alongside the mass producers, such as BMW, Daimler-Benz, Volvo, Jaguar and Alfa Romeo. And as incomes rose in the 1960s, European mass producers themselves began to offer a wider range of models in order to maintain their coverage of increasingly diverse national markets. But the European manufacturers, unlike their American counterparts, did not integrate their differentiated product ranges into coherent families of models based on common components. Instead, as Volpato's essay demonstrates, the Europeans maintained their practice of developing each model separately, which allowed greater scope than in the US for continuous improvement and technical innovation, but made it difficult to match the economies of scale of their mass market best sellers across the whole of a scattered and unbalanced product line. Thus in Europe as in the United States, by the late 1960s Sloanist marketing strategies based on product differentiation coexisted uneasily with automobile

manufacturers' continuing commitment to Fordist production strategies based on standardisation and economies of scale [73].

II

As we have seen, by the 1930s the mass production of automobiles on Fordist lines had established itself to varying degrees in most of the major industrial nations, and this process of international diffusion and adaptation gathered renewed force during the long postwar boom. In every country, the advent of large-scale car production created new problems for workers and trade unions. The size and power of the emergent companies; the rapid expansion of the labour force and the new distribution of skills within it; acute fluctuations in employment and the introduction of new payment systems all posed a major challenge to the established organisational practices of trade unions.

These distinctive features of the automobile industry came together with ideological debates within the international labour movement to suggest that the establishment of industrial unions was the key to the organisation of mass production workers, an analysis which seemed largely borne out by the experience of the 1930s. The breakthrough to mass-production unionism in the United States followed directly on the split between the American Federation of Labor (AFL) and the Committee for Industrial Organization (CIO), which paved the way for the establishment of the United Auto Workers' Union (UAW) against the violent objections of

the craft unions. Similarly in France, the strike wave of 1936 which organised the Renault factories was run by the Metalworkers' Federation of the Confederation Generale du Travail (CGT) which had long been committed to industrial unionism. And the situation in Britain where a variety of craft and general unions catered for the automobile industry with limited success thus appeared to be the exception that proved the rule [cos].

With greater distance from the debates of the 1930s, however, the idea of industrial unionism as the uniquely appropriate form of organisation for the automobile industry - a trade union counterpart to Fordism - seems less compelling. Two main objections stand out. Closer historical investigation of the 1930s suggests that industrial unionism was a far from sufficient condition for the breakthroughs to mass organisation in France and the United States. And a broader temporal and spatial perspective suggests that under favourable conditions other forms of union organisation could prove equally effective.

The first objection stresses the role of politics and the state in the breakthrough to mass organisation of automobile workers. Revisionist historians of American labour have shown that without the political context of the New Deal and the support of the Federal government first under the Wagner Act and then under the War Labor Board, it is unlikely that the

newly-formed industrial unions could have overcome the resistance of the giant corporations such as GM and Ford [79]. In France, it was the advent to power of the Popular Front in 1936 which triggered off the factory occupations and enabled the French Communist Party and the CGT to realise their longstanding aspirations to organise these symbols of the modern proletariat. In Italy, too, successful organisation in the car factories depended heavily on support from the government and the law in the 1940s and again in the late 1960s and early 70s, while industrial unions proved unable to resist determined management offensives in periods of political reaction such as the 1920s and 50s [80].

In Britain, the political context of the 1930s - dominated by the National Government after the collapse of the Labour Party in 1931 - was unfavourable towards a union breakthrough in the motor industry. Some of the difficulties in organising the industry did stem from the structure and policies of the unions concerned, notably the craft unions' attachment to the standard district rate and friendly benefits, issues of limited relevance to semi-skilled pieceworkers, and the general unions' preoccupations with sectors outside automobiles. But in periods when government policies inhibited managerial resistance - the two world wars and the late 1950s and early 60s - both craft and general

unions displayed considerable capacity for creative adaptation in organising motor workers [113].

A further demonstration of the centrality of the political context and the variety of possible union structures compatible with mass production can be seen in the cases of West Germany and Japan in the postwar period. The German trade unions emerged from the experience of Nazism and war with a politically heightened commitment to broad, encompassing industrial organisation. This went even further than in the US, since a single union was established for the whole of the metalworking sector, and the strategy of centralised bargaining was reinforced by a legal framework which limits the right to strike to recognised unions and extends collective agreements to cover even ununionised firms. But the political upheavals of the reconstruction period also resulted in a statutory system of works councils outside the unions' direct control. The codetermination powers and 'peace obligations' of the works councils created the conditions for informal plant bargaining which has acted as a counterweight to the centripetal pull of industry-wide negotiations [123]. In Japan, industrial unionism on the American model also seemed destined to become the dominant pattern in the early postwar years. But during the early 1950s, as national politics swung against the left and the automobile companies struggled for economic survival, the centre of gravity shifted

to enterprise unions, involving both white and blue collar workers in enterprise unions which relegated the industry-wide federation to a residual role in collective bargaining [143].

Mass production of automobiles posed new problems of job control for trade unions alongside the establishment of collective bargaining itself. In many countries, grievances about the impact of Fordism on working conditions and job security were as important as wages in the early unionisation drives. The 1936 sitdown strikes at General Motors, for example, were sparked off by demands for an end to speed up on the assembly lines. But by the late 1960s and early 70s, observers in countries such as the US and West Germany believed that the institutionalisation of collective bargaining there had resulted in the sacrifice of these job control aspirations to the pursuit of economic gains which did not threaten managerial prerogatives on the shop floor. In this light, radical critics of trade unions drew invidious contrasts with the situation in Britain and Italy, where powerful and autonomous workplace organisations appeared to exercise the direct controls over the production process so conspicuously absent at home [144].

Recent research on the automobile industry, has tended to modify such stark contrasts between national systems of

industrial relations in terms of the presence or absence of job control. In Britain, for example, shop stewards in many car factories during the 1950s and 60s achieved a measure of control over manning, workloads and job definition that made them the envy of local militants in countries like the United States. But job control under shop stewards was more limited and precarious than is commonly supposed. Controls over the production process did not form part of a wider union strategy but were tied instead to sectional bargaining over piecework prices, and there was little coordination even at the level of the individual factory, perpetuating wide differentials between shops and insecurity of earnings for the workforce as a whole. Such job controls were, moreover, rooted in British management's own past modifications of Fordism - its reliance on incentive systems rather than mechanisation and tight supervision - and their exercise involved shop stewards' assuming considerable responsibilities for coordinating production to achieve high levels of output. When management strategies shifted away from piecework towards more direct administration of production during the 1970s, the weaknesses of union organisation at the company level made it increasingly difficult for the stewards to defend the pattern of job control which had developed in the preceding period [1983].

In Italy, by contrast, direct controls over the production process grew out of the success of a Fordist strategy rather than its limitations. During the 1950s and 60s, Fiat management reorganised car production on Fordist lines and recruited vast numbers of southern migrants to fill the resulting unskilled jobs. It was these production line workers who struck en masse in 1969-70, establishing a new system of factory councils based on elected shop stewards. Once in place, the factory councils used their new-found power not to push up the earnings of individual work groups as in Britain, but instead to impose strict controls over workloads, compress wage differentials, simplify job classifications and make layoffs close to impossible. In certain shops, stewards began to experiment with a more cooperative style of shop floor bargaining, but political rivalries and the shifting strategies of the national unions pushed workplace organisation at Fiat away from any durable accommodation with management. As the economic and political climate began to change in the late 1970s, this confrontational line isolated the factory council from key sections of the Fiat workforce and left it vulnerable to a managerial offensive aimed at restoring productive flexibility. The failure of a company-wide strike against redundancies in 1980 because of widespread worker defections resulted in a collapse of shop floor organisation as sudden as its emergence a decade earlier [illegible].

In the United States, the main constraints on managerial prerogatives came not from direct controls over manning and work organisation as in Italy and Britain, but rather from contractually negotiated seniority rules and grievance procedures which governed the allocation of workers between jobs. While management was free to determine the initial job structure according to Fordist principles, the association of wage rates and job security rights with these job definitions then imposed substantial rigidities on the deployment of labour in the plant. In recent years, these rigidities have become a major problem for management in its attempts at work reorganisation and their relaxation has assumed a key significance in plant negotiations. In its heyday, the US industrial relations system did not in itself preclude the decentralised bargaining over issues such as workloads which was central to job control in Britain, since production standard grievances remained strikeable during the life of the contract. But UAW leaders' preoccupation with company-wide bargaining objectives - together with the centralisation of corporate industrial relations policies and the growing political isolation of organised labour - left little room in practice for dynamic local bargaining over shop floor issues [173].

Two more varieties of job control, rooted in varying management and union strategies, can be seen in the cases of

West Germany and Japan. Detailed studies of workplace industrial relations in West German car factories show that while there are few constraints on management's ability to allocate labour between jobs, they are much less free than their American or British counterparts to lay off workers in response to fluctuations in demand. As we have seen, West German works councils are legally prohibited from direct negotiations over wages or calling strikes; and sectional bargaining on British lines is further discouraged by the union's preoccupation with industry-wide objectives. But the works councils also have far-reaching statutory powers of codetermination in hiring, dismissals and overtime which they use systematically to protect the employment prospects of their core constitutency in the factory. The result has been the development of long-term manpower policies in the enterprise - themselves consonant with the orientation of some German car firms towards specialised production and with public apprenticeship programmes - which provide maximum security of employment in exchange for great flexibility in the deployment of labour within the enterprise [103].

A similar trade-off between relative employment security and the flexible deployment of labour within the firm can also be seen in the case of Japan. While there is considerable controversy about the independence of Japanese enterprise unions - which often contain representatives of lower

management in leading positions - recent scholarship suggests that these organisations can exercise considerable influence on company policy through an extensive system of consultation and consensus-building and through occasional alliances with factions of management. Thus at Nissan, where the enterprise union has been closely linked with key managers, union leaders have used their influence to impose greater restrictions on work intensity and automation than at Toyota as well as to obstruct proposals for overseas production. Like German works councils, Japanese enterprise unions press corporate management to maintain maximum stability of employment for their core workforce; and they are also concerned to regulate the resulting inter-plant transfers so as to cushion their impact on individual workers. As the pace of industry expansion has slowed since the mid-1970s, union cooperation and consensus has been sustained by increasing stability of employment within the factory, secured through mobility of the core workforce between jobs rather than through the use of temporary and seasonal workers, who had previously played a larger part in responses to cyclical fluctuations. As we shall see in the next section, such mobility forms part of a flexible system of car production based on fluid job roles and broad worker training which marks a clear break with Fordist principles [1*3].

National systems of industrial relations thus differ in the focus as much as the level of job control: direct controls over the production process in Britain and Italy; contractual seniority rules and job classifications in the US; and broad employment guarantees in West Germany and Japan. These international variations in the focus of job control stem as much from differences in strategy as from differences in power: from differences in management's interpretation of Fordism and in the responses of unions once established. Each national pattern involves a complex balance of advantage and constraint for management and unions alike. But as the recent decline of shop-floor organisation in Britain and Italy demonstrates, some forms of job control may prove less adaptable than others to the demands of new product and labour strategies.

III

For nearly three decades after the Second World War, both the American and European automobile industries remained faithful to the underlying principles of the Fordist model, with varying degrees of modification to accommodate more differentiated marketing strategies. But by the early 1970s a series of forces were at work within the world economy which would call this model into question more fundamentally than ever before. Throughout the Western economies, the postwar boom was losing momentum, with a small but visible slowdown in overall growth rates. Major national car markets were becoming saturated at existing income levels, and the proportion of replacement demand relative to sales of new models was rising. By the late 1960s, for example, replacement demand had reached 75-80% of the US market with a motorisation level of more than one car for every two people [203].

These trends made it difficult to achieve continued economies of scale within national boundaries. Previously, trade between manufacturing countries had concentrated on the market segments furthest from the specialisation of domestic producers, presenting little challenge to their product ranges, as in the case of small car imports to the US and exports of large luxury cars from Germany and Sweden to other

European countries. But now slowly growing domestic demand and underutilisation of capacity triggered off a scramble for exports resulting in direct head-to-head competition between mass producers in the core segments of each other's markets. In 1960, for example, cross-national trade between West European producers accounted for 20% of total sales; by 1980 this figure had risen to 36%. But while each of the major producers moved down this road, only the Japanese really succeeded in making a major impact across a wide range of foreign markets. By 1980 the Japanese had seized 23% of the US market, 10% of the European market and a 28% share of world imports. Since no major manufacturer has been eliminated and all companies have invested massively in new production facilities, the resulting boost to overall capacity has exacerbated the struggle for market share. At the same time, however, the growing saturation of demand for basic transport has forced mass producers in each country to explore new forms of product differentiation in order to appeal to market segments increasingly sensitive to quality, technical innovation and the special attributes of products.

Superimposed on these structural trends were a number of external shocks which exacerbated the growing crisis of the Fordist model and brought it to a head in sudden and unexpected ways. Most dramatic were the oil shocks of 1974 and 79 which sent petrol prices soaring and created widespread

consumer alarm about the security of sources of supply. For the first time since the war, absolute levels of world demand fell off, declining by 16% between 1973-5. While car sales quickly recovered as oil prices fell back in real terms, they never returned to previous growth rates, and demand fell again by 12% between 1979 and 1981. The oil shocks also had a major impact on the composition of demand within each market. Growing consumer anxiety about petrol consumption set off a headlong rush among producers to shift car designs in the direction of smaller, more fuel efficient cars. This move towards 'downsizing' was most pronounced in the United States where imports of small cars rose sharply at the expense of domestically-produced 'gas guzzlers'.

These broader trends in consumer awareness were given added bite by dramatic shifts in public policies. Governments everywhere set out to contain their dependence on imported energy sources by regulating the use and production of automobiles. Particularly important were the US Corporate Average Fuel Economy (CAFE) regulations which set mandatory fuel consumption targets for domestic producers based on a weighted average of their product ranges and forced them to move towards a larger proportion of small cars. Alongside these interventions in many countries came the proliferation of regulations concerned with emissions controls and vehicle safety which gave a further impetus to product redesign.

To many observers, the events of the 1970s signalled the clear transformation of automobiles into a mature industry characterised by slow growth of demand for a well defined and technologically stable product. The two oil shocks appeared to have accelerated this process by eroding the distinctiveness of national markets and promoting the convergence of international demand on a limited range of fuel-efficient cars. But viewed in the longer-term, these assumptions about the development of international automobile markets proved ill-founded. Firstly, the oil shocks of the 70s did not signal a once-and-for-all shift to higher oil prices. By the early 1980s OPEC was struggling to maintain its cohesion and oil prices were falling again in real terms, as they had between the two shocks themselves. Secondly, the fears about the exhaustion of oil resources commonly voiced in the mid-70s came to appear exaggerated as recession and energy conservation drastically reduced the fuel consumption of the developed countries. The real long-term consequence of the oil shocks proved to be a growing trend towards instability of raw material prices more generally, which, reinforced by the erratic fluctuations of exchange rates throughout the international economy, created major difficulties in forecasting demand and made large-scale investments and locational decisions increasingly uncertain.

Despite the worldwide pressures for greater fuel efficiency, moreover, the impetus to convergence of national markets proved less intense than had been expected. Economies in petrol consumption were secured across the whole spectrum of car sizes, and markets such as that of the United States remained distinctive in the share of larger cars in total demand. Within each national market, finally, competition came to centre increasingly on the multiplication of an ever-wider range of models and vehicle types and the introduction of new product features such as aerodynamic bodies, electronics and fuel injection, fragmenting demand into a larger number of less clearly defined segments. Observers have accordingly come to characterise the international automobile industry in terms of tendencies towards 'de-maturity' or indeed as a 'neo-infant industry' in which the definition of the product and the conditions of competition have once again become open questions [213].

No one has done as much as the Japanese to push the world automobile industry towards 'de-maturity' and no one has benefited as much from the market trends associated with it. By 1982, Japan had become the world's biggest automobile producer, with an annual output of 6.9 million cars, 60% exported. The Japanese had won a major stake in many Western car markets - 23% in the US and 8.6% in Europe - and their share would have been considerably higher had they not been

forced to accept voluntary import quotas in many cases. To take the most extreme examples, Italy limits Japanese sales to 2,200 per year or less than 0.1% of the domestic market and France to 2.7% [illegible].

The Japanese industry revived after the war as a low volume, high cost producer catering for a protected home market characterised by low incomes, poor roads and restricted demand. Japanese producers initially set out to emulate the Fordist model as far as possible. Some companies such as Nissan sought access to foreign technology and vehicle designs through joint ventures with Western companies such as Austin, employment of consultant engineers and imports of machinery. Others such as Toyota preferred to learn by doing rather than buy in ready-made equipment and designs, copying Western machines in their own workshops and adapting them to the smaller volumes demanded by the Japanese market. But in both cases, the Japanese struggle to catch up with their Western competitors through continuous rationalisation and model upgrading gave rise to distinctive modifications of Fordist methods which would ultimately permit greater product diversity and productive flexibility.

The Japanese pursued their dash for growth through the constant redesign of their manufacturing system and the establishment of new relationships between assemblers and suppliers and between managers and workers substantially

different from those prevailing in Western car firms operating on Fordist principles. To offset the cost penalties of low volume production, the Japanese reduced their dependence on special-purpose machinery by lowering minimum efficient scales of operation in each phase of the manufacturing process, by replacing large machines with several small ones, attaching special jigs and fixtures to general-purpose equipment, perfecting quick die changes and machine set-ups, and assembling several different models on the same line. Similarly, to reduce the capital costs of rapid expansion, the Japanese cut down inventory and work-in-progress as far as possible. Rather than depending on large buffer stocks to ensure continuity of production, they developed 'kanban' systems whereby components were produced to order and delivered 'just-in-time' for the assembly process. 'Just-in-Time' systems highlighted bottlenecks in production and helped to overcome the poor reputation of Japanese products in export markets by facilitating continuous quality control and defect prevention in place of the systems of inspection and rectification used by Western car firms.

To lessen their dependence on imported components and facilitate continuous upgrading of models and rationalisation of production, the Japanese assemblers deliberately stimulated the creation of networks of specialist suppliers clustered around the main factory, frequently spun off from their own

organisation. In contrast to prevailing Western practice of vertical integration, multiple sourcing and competitive contract tendering, the Japanese assemblers decentralised production as far as possible to component suppliers with whom they cultivated long-term relationships based on single sourcing and detailed collaboration on product engineering and technology transfer. After the defeat of the industrial unions in the early 1950s, the Japanese car manufacturers were also able to undertake a major restructuring of workplace relations as part of the broader changes in manufacturing practice. In return for considerable security of employment for their core labour force, the Japanese, as we have seen, created a highly flexible system of working practices based on widespread job rotation linked to broad worker training, a wage system that facilitated transfers between posts without constant renegbtiation, and the devolution of responsibility for task assignment and quality control to supervisors and work groups. In the 1950s the Japanese enjoyed the advantage of wage levels well below those of Western producers, but by the 1970s earnings in the car assembly plants had begun to catch up with European standards and by the early 1980s had overtaken countries like Britain and Italy. As in Western countries, however, compensation levels in supplier firms remain substantially lower, and the Japanese continue to enjoy a relative cost advantage in this area because of their lower degree of vertical integration.

The Japanese innovations in car production began as a series of ad hoc modifications to Fordist practice designed to enable them to match Western standards of efficiency and quality in mass production as quickly as possible. But over time these innovations came to form the basis of a new system of production which could outpace Western car manufacturers in labour productivity, product quality and cost competitiveness while also permitting the production of a wider range of models and more flexible responses to market trends. With the main features of this system already in place, the Japanese automobile industry took off in the 1960s, pushed forward by high levels of investment and capacity utilisation within a rapidly expanding domestic market and by the first wave of export sales. The oil shocks of the 1970s gave an added boost to the Japanese industry by cracking open the North American market and realigning demand in precisely those segments where they were strongest. As sales volumes soared, the Japanese were able to achieve dramatic advantages in cost competitiveness - as great as $2000 per model over the Americans - while at the same time achieving higher standards of quality and reliability. This cost advantage, as a number of detailed studies show, is not the result of greater mechanisation nor can it be explained in any large measure by lower wages. Japanese companies' pioneering use of CAD/CAM systems has allowed them to capitalise on their productive flexibility to speed up the introduction of new models and

widen their product ranges, opening up a variety of specialist market niches. And by the mid-1980s, their growing financial and productive strength had enabled the Japanese to close the design gap with the Europeans and force the pace in technical innovation, leaving them poised to achieve competitive superiority across the entire product spectrum.

The crisis of the 1970s presented Western automobile manufacturers with three main strategic options which they pursued singly and in various combinations. Faced with changes in demand and new forms of international competition, Western car firms could seek to revivify the Fordist model through increased automation, decentralisation of production to low wage areas abroad and reduction of manning and compensation levels at home; they could seek to emulate the Japanese by revamping their own manufacturing systems in the direction of increased flexibility and product diversity; or finally they could seek to insulate themselves from the effects of international trends through the pursuit of protection and joint ventures in their domestic markets.

In the late 1970s, the American producers in particular based their strategy on the diagnosis discussed earlier that international demand for cars was converging around a narrow range of models. They believed that the rise in oil prices

necessitated a once and for all design shift towards smaller cars which would be even more standardised than their predecessors. This shift would revive the possibility of further economies of scale and cost reductions through the introduction of new forms of dedicated automation and the relocation of labour-intensive phases of production in low wage areas abroad, a trend encouraged by the efforts of less developed countries to attract multinational direct investment. Costs in the remaining domestic production facilities could then be dramatically reduced by massive cutbacks in employment and pressure on the surviving workforce to accept lower wages and revised working practices. The most ambitious attempt to put this 'World Car' strategy into practice was GM's 'J-Car', a small fuel-efficient model aimed to be built and sold world-wide, but Ford, too, sought economies of scale at a global level with its 'Escort-Lynx' project, and European manufacturers such as Volkswagen began to step up their investments in Third World countries such as Mexico and Brazil. While most automobile companies trimmed their workforce, these cutbacks reached dramatic levels in the US and the UK, where employment fell by more than 25% between 1978 and 1981. The resulting unemployment, together with the threat of increased overseas production, gave the companies the opportunity to extract major concessions from the unions.

The 'World Car' strategy quickly ran aground on a series of unforeseen problems. Rather than the expected convergence of national markets, as we have seen, world demand for cars entered a phase of progressive 'de-maturity' and diversification. Relocation in Third World countries, moreover, proved no guarantee of low production costs: long supply lines, large inventories, poor quality control and unstable exchange rates more than offset the advantages of low wages. By the late 1970s, finally, political upheavals and labour militancy in countries like Brazil had begun to close the wage gap with domestic manufacturing facilities. With the increasing importance of tailoring production to precise segments of demand in individual national markets, even General Motors had been forced to retreat from its full-blooded 'World Car' strategy by the early 1980s, though it continues to source certain components such as engines and minor mechanicals on a global basis [23].

With the eclipse of the world car strategy, automobile manufacturers in the US as in Europe have turned increasingly towards efforts to emulate the achievements of the Japanese in product diversity and productive flexibility. As in the case of responses to Fordism in a previous era, however, reactions to the Japanese model have taken a variety of forms depending on the configurations of national markets, the political and institutional context and the strategic choices of the various

actors concerned. And just as the lessons of Fordism proved ambiguous when the Europeans tried to appropriate them between the wars, so too the sources of Japanese success have been subject to countervailing and often contradictory interpretations by academics and Western car makers alike [2-4].

Both in the US and in Europe the 1980s have seen far-reaching renewal and restructuring of model ranges. As Volpato argues, in the US manufacturers' efforts have centred on large-scale entry into hitherto neglected market segments involving smaller vehicles and front-wheel drive, most notably in GM's new Saturn project for the production of a wholly new American small car. In Europe, on the other hand, where vehicle designs were more advanced and model ranges wider, efforts centred initially on the rationalisation and integration of unbalanced product lines through increased use of common components. But in both regions car manufacturers have become increasingly concerned to offer a wider variety of distinctive packages targetted at more narrowly defined market segments. The model replacement cycle has been accelerated, particularly through the use of CAD/CAM, and there has been a multiplication of engine types as well as an increasing emphasis on specialised products such as people carriers, off-road vehicles and high-performance saloons.

But both European and American automobile companies have concentrated their greatest attention on production in order to narrow the Japanese cost advantage and introduce a larger measure of flexibility into the manufacturing process. Much of the effort and investment in this area has focused on the introduction of new forms of automation aimed at improved product quality and process efficiency rather than the elimination of direct labour per se. Whereas in the past automation had been associated with dedicated machines and extreme productive rigidity, technological developments such as reprogrammable robots have now made it possible to combine high levels of automation with increased flexibility. Such developments have accordingly reduced the importance of economies of scale in many parts of the manufacturing process, bringing the benefits of automation within the reach of specialist as well as mass producers. But the new technology also leaves considerable scope for managerial choice and some companies have gone further down this road than others. Fiat set a pioneering example with its Robogate system which allowed several different body types to be assembled on the same line, and German producers such as VW have largely followed this lead. Giant multinationals such as Ford of Europe have felt less need to move away from dedicated equipment because of their ability to achieve considerable flexibility through switching production between plants in different countries; while BL has turned increasingly towards

flexible automation after its negative experience with rigid multiwelders installed on the Metro lines at end of the 1970s.

These changes in product and production strategies have driven car manufacturers to seek new relationships with their component suppliers. Pressures towards improved quality and lower costs along with the growing trend towards the use of common components across different models have led to the rationalisation of component supply networks and the elimination of weaker companies. But Western automobile producers have also set out to imitate the Japanese Kanban model by developing closer and more collaborative relationships with the suppliers who remain. Many companies have turned towards single sourcing and long-term contracts with a smaller number of suppliers whom they expect to take increasing responsibility for quality control, technical innovation and the reduction of inventory through frequent deliveries; and American automobile manufacturers in particular have pressed component firms to relocate around their main assembly plants. Even in the most advanced cases, however, these changes have tended to fall short of the Japanese example, since supply lines remain relatively long and manufacturers have found it difficult to resist the temptation to offload the burdens of frequent deliveries onto their suppliers rather than helping them to develop genuine forms of 'just-in-time' production.

Efforts to imitate the Japanese example have also led European and American car manufacturers to seek far-reaching changes in shop-floor relationships and working practices. Growing product diversity and the shift away from rigid technologies creates pressures for more fluid job roles and more flexible deployment of labour within the factory. Management on both sides of the Atlantic has pursued the goals of broader job classifications and the abolition of barriers to labour mobility: widespread use of team working, the devolution of certain skilled tasks to production workers and the relaxation of demarcation lines on maintenance crews are all examples of this trend. But as in the case of automation, management retains considerable strategic choice in the development of working practices, and there remains great ambiguity about the implications of the Japanese example. In some cases, as in Britain, management has been most concerned with the reassertion of its authority on the shop floor against the unions and the improvement of productivity through tighter discipline and more intensive working, with limited aims in the area of flexibility. In other cases, management has made increased flexibility of labour deployment a central priority, whether imposed unilaterally as in Italy or bargained with trade unions as in West Germany and the US.

Where management has pursued increased flexibility of working practices as a central objective, the institutional

context of industrial relations and trade union strategies have strongly conditioned the outcome. In Italy, as we saw in the previous section, the trade unions' political commitments and tactical rigidity made any durable accommodation with Fiat management impossible, and after its victory in the strike of 1980 the company swept away shop floor controls and moved rapidly to introduce team working and job mobility. In West Germany, industrial unions and works councils concerned with job security have been quite prepared to collaborate with management in reorganising work practices to enhance established patterns of flexible labour deployment, as in the case of the LODI agreement at Volkswagen which links wages to skill within broad job bands. Finally, in the US, the UAW and its locals under intense pressure from management have moved slowly towards the relaxation of seniority rules and the widening of job classifications in exchange for greater job security, protection against outsourcing and the prospect of greater influence over business decisions. But in every case, the growing demands from management for increased productive flexibility are forcing the unions to rethink and revise job control practices and bargaining strategies established in the heyday of Fordism [23].

While Western car manufacturers have sought to emulate Japanese product, production and labour strategies, they have also sought to insulate themselves to some degree from the

harsh winds of international competition through government protection and joint ventures with the Japanese themselves. Nearly every major car producing nation maintains formal or informal restrictions on Japanese imports of varying intensity. In some markets such as France, Italy and Spain, Japanese cars are almost entirely excluded and in others such as Britain and the US, domestic pressures have been mounting for some kind of local content legislation. At the same time, however, Western manufacturers have entered commercial tie-ups with Japanese automobile companies in hopes of learning to emulate their production methods or failing that to gain a financial stake in Japanese success and keep intact their dealer networks by maintaining a full range of products. The Japanese, for their part, have responded to these barriers against their products by moving into direct foreign investment, either independently as in the case of Honda and Nissan or in collaboration with local manufacturers. The success or failure of these ventures which are still in their early stages will prove a major test of the transportability of the Japanese model outside its national base [202].

By the 1970s the modified Fordist systems practiced by American and European automobile manufacturers had become sluggish and internally contradictory. Their factories were bulging with inventory and work-in-progress; maintenance and

work scheduling were a constant problem, resulting in frequent interruptions of production; and high volume output was pursued at the expense of product quality. The diversity of models and options required for marketing stood in tension with the uniformity and standardisation required for the efficient operation of a Fordist production system, and Western car manufacturers had become extremely vulnerable to any major disruption in the postwar growth pattern.

The Japanese set out initially to adapt Fordist systems to the requirements of an accelerated catching-up process, and some observers see their achievement as a quantum leap forward in the same direction. The Japanese, in this view, have brought out and eliminated certain key imperfections in the Fordist model, making it possible to combine product diversity with mass production on an unprecedented scale. In consequence, the gap they have opened up can now be closed by Western manufacturers through a straightforward process of organisational imitation and management reform without a fundamental reconsideration of established strategy and practice. Some automobile manufacturers appear to share this view, notably Ford, whose 'After Japan' programme concentrates on automation, inventory reduction and quality control with more limited shifts in personnel policies and relations with suppliers [273].

Other observers, by contrast, see the Japanese innovations as a deeper challenge to the Fordist model which reverses its central principles and points towards the emergence of a qualitatively new system of production. This system, which can be termed flexible specialization and has been observed across a wide range of industrial sectors, depends on the combination of increasingly flexible, general-purpose equipment and a skilled, adaptable labour force to manufacture an ever more diversified range of products for which economies of scale are becoming decreasingly important. Not only the Japanese but also some Western automobile manufacturers seem to be moving in this direction, notably the Germans and the Swedes with their growing emphasis on multi-skilled work teams to exploit the full potential of flexible automation systems for the manufacture of a changing array of high quality products[28].

Recent developments in the international automobile industry have undermined the foundations of the Fordist model as it developed in the postwar period. But many of the established features of automobile production can still be discerned, while the more recent innovations are susceptible to elaboration in different directions. CAD/CAM systems have reduced the lead time for the introduction of new models, facilitating the development of wider product ranges; but the increasing complexity of the product and the difficulties of

integrating automobile subsystems experiencing different rates of innovation keeps research and development costs high and creates financial problems for smaller manufacturers. While there has been a qualitative expansion in the available range of vehicle types and models, the use of common components and subsystems has also become increasingly important in the generation of new variants. Flexible automation equipment and changes in job design have lowered minimum efficient scales of operation in many stages of component production and vehicle assembly, but substantial economies of scale still remain in the manufacture of major mechanicals such as engines and gearboxes, leading to growing reliance on joint ventures on the part of smaller producers. The new automation equipment can be used to decrease batch sizes and eliminate machine pacing for more broadly skilled workers, or can serve instead to move towards the ideal of a 'worker-less factory' through the integration of complex sequences of transfer machines. While overall skill levels have clearly been rising, it remains uncertain, finally, whether this tendency will be confined to the development of a wider range of interchangeability between semi-skilled jobs or will lead instead to the emergence of new job categories which more fundamentally erode the boundary between skilled and semi-skilled tasks. Current practice in automobile companies accordingly ranges from the reduction of rigidities in the manufacture of a broadly standardized product line to

conscious efforts at building maximum flexibility into all aspects of an increasingly diversified production process.

The changed market conditions and new technologies of the 1970s and 80s have brought with them shifts in competitive strategy and manufacturing practice which pose a fundamental challenge to the Fordist model. But as in the case of the emergence and diffusion of Fordism itself, the outcome of its crisis for the future of the automobile industry and its workers will be determined not by some intrinsic imperatives of markets and technology but rather by the strategic choices of corporate managements, trade unions and national governments.

FOOTNOTES

1. This account of Ford's innovations and the development of his competitive strategy draws on the following sources: A.D. Chandler Jr. (ed.), Giant Enterprise: Ford, General Motors and the Automobile Industry (New York, 1964), pp. 23-95; D. Hounshell, From the American System to Mass Production, 1800-1932 (Baltimore, 1984), pp. 217-63; S. Meyer III, The Five Dollar Day: Labor Management and Social Control in the Ford Motor Company (Albany, NY, 1981); idem, 'Mechanical Engineers and Automobile Workers: American Machine-Tool Technology and the "Transfer of Skill" from the 1900s through the 1930s', in N. Lichtenstein and S. Meyer (eds.), The American Automobile Industry: A Social History (Champaign-Urbana, IL, forthcoming 1986); A. Nevins with F.E. Hill, Ford: The Times, the Man, the Company (New York, 1954); and C.F. Sabel, Work and Politics (Cambridge, 1982), pp. 32-33.

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27. For interpretations in this direction, see: Williams et al., The Breakdown of Austin-Rover, ch. 3; and Wood, 'Technological Change and the Cooperative Labour Strategy'. For a senior management view from the Ford Motor Company, see the interview with James Bakken, Vice-President Operations Support Staff, Ford U.S. in Automotive News 28 February 1983.

28. For a fuller discussion of 'flexible specialization', see Piore and Sabel, The Second Industrial Divide; and C. Sabel and J. Zeitlin, 'Historical Alternatives to Mass Production: Politics, Markets and Technology in Nineteenth-Century Industrialization', Past and Present no. 108 (1985). Analyses of the automobile industry in these terms include Katz and Sabel, 'Industrial Relations and Industrial Adjustment'; and Streeck, 'Industrial Relations and Industrial Change', who also uses the term 'differentiated quality production'.