

TECHNOLOGICAL INNOVATION AND PERFORMANCE PRESSURES IN EUROPE AND JAPAN

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Abstract

This paper seeks to explain differences in the rate and character of technological innovation among European countries—particularly Britain and Germany—and between them and Japan. The general hypothesis is that the nature of the external and internal relationships of firms affects the performance pressures upon managers at the various levels in the firm; that these in turn affect their objectives; and that their objectives affect the rate and character of technological change in the firm. The empirical discussion shows how performance pressures have responded to changes in the social and economic environment of the countries concerned, since 1945, and how they may be expected to develop by the end of the century. The differences found account well for the very different pattern of revealed technological advantage in Britain and Japan. In most respects Germany is found to be intermediate between Japan and Britain, and to have an intermediate outcome in terms of technological advantage.

Introduction

There is wide concern among Europeans that their continent may be lagging in the development and introduction of new products and processes, especially in high technology sectors and by contrast with Japan. (See Patel and Pavitt, 1987a and 1991.) At the same time there is a problem of marked divergence among countries *within* Europe, particularly where product innovation is concerned (Patel and Pavitt, 1987b and 1988); the weakness of some countries not only pulls down the European average but threatens, as economic integration proceeds, to exacerbate strains in the balance of payments, exchange rates, and inflation (Greenhalgh, 1990; Tylecote, 1991 a and b). This paper addresses these issues: it seeks to explain differences in the rate and character of technological innovation among European countries—particularly Britain and Germany—and between them and Japan. In the process it examines and compares the causes and effects of *performance pressures* on and within firms. It shows how they have responded to changes in the social and economic environment of the countries concerned, since 1945, and how they may be expected to develop by the end of the century.

There has in the last decade been a lively debate in the UK and USA over the issue of '*short-termism*.' It is widely held, by industrial managers as well as academics, that pressures from stock markets are inducing 'short-termism' in industry which inhibits in-

novation, particularly in products. (See Innovation Advisory Board, 1990.) Some however argue that the problem of 'short-termism' is generated within industry itself (Marsh, 1991). The debate has until recently suffered from both a shortage of empirical data and a lack of theoretical depth. There has been no clear analytical model of the way in which performance pressures of various kinds interact in management to inhibit, encourage or bias the process of innovation. At the same time, any hypothesis in this area needs to be confronted with empirical evidence in which independent and dependent variables are disaggregated at least down to industry level, and international comparisons made. It is already clear that the deficiencies in innovation found in UK (and to a lesser extent US) industry, and often ascribed to 'short-termism,' do not exist in every sector (Patel and Pavitt, 1991). Any hypothesis as to the causes and effects of 'short-termism,' or any other set of performance pressures, must be subtle enough to account for these inter-industry variations. Moreover there is not simply one alternative to 'short-termism'; among the possible alternatives may be some with equally adverse effects. Thus in Germany many fear that the decline of owner-control by majority shareholders (Schreyögg *et al.*, 1981) is in some sense enfeebling industry (Jehle, 1982); similar fears are being expressed in the Netherlands in the context of Philips' recent difficulties, while in France and Italy (and *a fortiori* in the other Mediterranean countries) *state* control is seen as inducing inappropriate performance pressures. In all these countries there is hope that new dynamism will be gained from the trend to large public companies enjoying an open relationship with a liberalised stock market (Jehle, 1982). But may this not lead to infection with the new 'English disease'? If so, what must be done to guard against it?

The General Hypothesis

Our general hypothesis is that the nature of the external and internal relationships of firms affects the performance pressures upon managers at the various levels in the firm; that these in turn affect their objectives; and that their objectives affect the rate and character of technological change in the firm. (See Figure 1.)

To make this more specific, we can begin near the end of the sequence of causation, with objectives.

The objectives of any manager or group of managers can be defined according to how they compare with the (neoclassical) economist's ideal of 'economic rationality'—profit maximisation in the interests of shareholders. They can depart from economic rationality (ER) along any of three dimensions (Tylecote, 1991b). (See Figure 2.) The first relates to the attitude to time. The ER manager is interested in costs, profits and revenues at any future time, no matter how distant, and only discriminates against the more distant ones to the extent of discounting (reducing) them according to the cost of capital (roughly, the rate of interest). Short-termism implies that the time horizon is limited—beyond X years ahead all profits are ignored—and/or the discount rate excessive. (Long-termism, much rarer, would imply a discount rate below the cost of capital.) The second dimension relates to scope. Economic rationality implies maximising the firm's value to shareholders, but the aim in practice may be broader or narrower than that. If a particular manager is only concerned with the performance of a division or other sub-unit of a firm, the objective is

FIGURE 1. PATTERNS OF CAUSATION IN TECHNOLOGICAL CHANGE

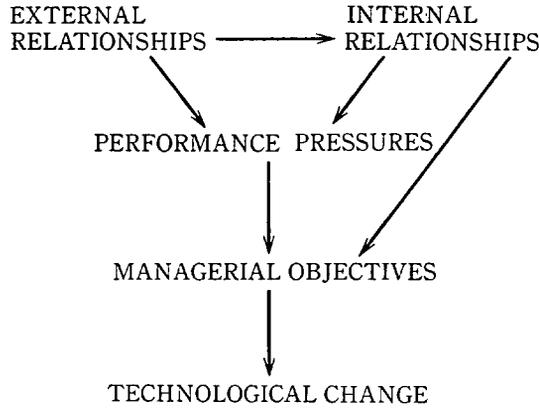
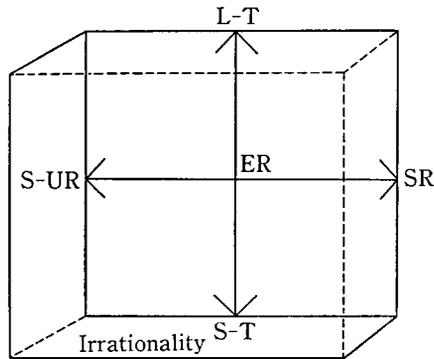


FIGURE 2. TERM, SCOPE AND RATIONALITY IN MANAGERIAL OBJECTIVES



narrower in scope, and can be described as sub-unit rationality. If managers are concerned, on the other hand, with the interests not only of the shareholders, but of other stakeholders—lenders, employees, customers and suppliers—they have broader objectives, which may be described as stakeholder rationality. The third dimension concerns the extent to which the manager can be seen as maximising in any of the above senses. A number of scholars (e.g. Cyert and March, 1963, and Leibenstein, 1975) have argued persuasively that managers do not maximise anything, rather they satisfice, they aim to achieve just ‘enough’ in various directions, including profit, and those who find it fairly easy to satisfice exhibit organisational slack. Following this reasoning we can see the third dimension as having economic rationality as one extreme—applying to firms in which for some reason maximising does prevail, or which are having extreme difficulty in satisficing; as one goes in the other direction on this dimension organisation slack increases. (One might argue for a fourth dimension, attitude to risk; but Tylecote (1987) has argued that in practice managerial risk-aversion is largely derived from position on other dimensions.)

The determination of managerial objectives

How are these managerial objectives themselves determined? This brings us to the causes and effects of performance pressures: *Performance pressures (PP)* arise from the perception by managers that given aspects of their performance will have consequences which affect them. As such they affect objectives. We can distinguish four varieties of performance pressures, any or all of which may impact from outside upon a firm's top management, and can thus be classed as *external PP*:

- (1) *Strong, short term* financial PP will arise from
 - (a) High real interest rates and/or low liquidity;
 - (b) The knowledge or belief that a rise (fall) in announced profits will lead to a rise (fall) in share price which will make capital easier (harder) to raise and hostile takeover less (more) likely. These tend to induce short-termism (or reduce long-termism) but also to reduce organisational slack.
- (2) *Long term* financial performance pressures are exerted if
 - (a) Management is judged on profitability etc. over a long period (this requires some continuity of personnel, policies and circumstances);
 - (b) Remuneration is designed to depend on future profits—as is possible with stock options.
 - (c) Managers have a major shareholding in the firm.
 These tend to induce economic rationality.

If those with power over top management have the necessary information, and are interested in the firm's long term profitability, they may make

- (3) Judgments based on the current state of the firm's technology and 'technology in the pipeline,' treated as an *indicator* of future profit. This would be equivalent, for our purposes, to (2).

If the stakeholders are not simply shareholders concerned with future profit, but have other interests—as customers, suppliers, employees, etc.—they may

- (4) Judge the firm's technology and 'technology in the pipeline' from these points of view, exerting pressure accordingly. If category (4) is added to (2) and/or (3) there will be movement on the dimension of scope towards stakeholder rationality (and under certain circumstances also towards long-termism).

If none of these four categories of PP are present, we may define a 'null' case: little or no pressure of any kind for "good" performance, short-term or long-term, financial or other, may be expected with management control in prosperous times under little threat of takeover; e.g. UK, 1950s (see Florence, 1961); the German authors referred to above fear that their industry is moving in this direction. A different approximation to the 'null' case may exist in some state-owned firms—e.g. in Italy now. In both cases we can predict a high degree of organisational slack, whatever the position on the other dimensions.

Managerial objectives and technological innovation

There can be little doubt that managerial objectives affect technological innovation. Tylecote (1991b) argues that technological innovation in products is favoured by

- (1) Stakeholder rationality, since employees, customers and suppliers can all expect to gain from it. (Moreover employees gain from training which then makes innovation more profitable.) The influence on innovation of user-supplier relationships in general has recently been shown to be of great importance (Lundvall, 1988; Hakansson, 1989; Groene-wegen, 1989).
- (2) Long-termism, since costs generally come much earlier than benefits. This lag is particularly marked in the case of radical product innovation, much less in the adoption of new processes already tried and tested elsewhere (Tylecote, 1987). This would imply that countries particularly affected by short termism—like Britain—would show more inhibition of product than of process change, which squares with the recent findings of PA Consultants (1989).
- (3) Maximisation, since successful product innovation promises a high return in the end, and is likely to require the inflicting of considerable 'pain' on various parts of the firm on the way. Thus normally a 'slack' firm will let different departments go their own way, whereas what is needed is a high degree of inter-departmental coordination.

In terms of our 3-dimensional space we can say that any move from the 'null' case to category 1 will lead to a movement towards short-termism but also towards maximisation. Compared to the 'null' case, short term pressures may have advantages, particularly in inducing tried-and-tested process change. (*Vide* UK, 1950s; Tylecote, 1977, 1982.) Categories 2 and 3 are unambiguously superior to either 1 or the null case in that they exert pressure for maximisation without pressure for short-termism.

Sources of external performance pressures

In the right circumstances banks can play an important role, as a stakeholder in their own right and on behalf of others. In this perspective it is striking that the most successful European countries in innovation, Switzerland, Sweden and Germany, all have an unusually close and understanding relationship between banks and industry (on Germany see Bessant and Grunt, 1985; Tylecote, 1991b; and see Cable's (1985) finding of superior performance in bank-controlled German companies). They also have many "industrialist" families which have maintained control over the firms they founded. Firms in these countries show notable solidarity with others in the same and related industries, through employers' associations, research associations etc. (on Germany see Cheese, 1991). In Germany at least performance pressures from employees are channeled through co-determination. The result appears to have been a happy combination of PP (2a), (3) and (4).

Japan can be treated similarly. Compared with the "successful" European countries, the power of personal shareholders there is much less, but the banks' role is similar—and as in Germany they help to protect against hostile take-overs and thus against short-termism. There is no legally-formalised structure of co-determination but there are on the other hand strong pressures from the sense of obligation of top managers towards the permanent workforce of the firm (Sasaki, 1981). Of particular importance in Japan are relationships with customers and suppliers: such related firms are usually joined by reciprocal shareholdings and common membership of a *kigyo shudan* (industrial group) and are accordingly in a strong position to exert mutual performance pressures for stakeholder rationality and long-termism. By contrast, in the UK there is clearly a rather remote relationship between the

owners of capital (shareholders and lenders) and the top managers of the firms concerned (Charkham, 1989). Banks have a loose relationship with firms, employers associations and other manifestations of solidarity are almost non-existent, and employees have little power (Tylecote, 1991b).

Internal performance pressures and the organisation of firms

The owner-top manager relationship is paralleled by that between top managers and their subordinates. Goold and Campbell (1987) distinguish three *control styles* for large and more-or-less diversified companies:

- (1) "Financial control," in which the flow of information between "profit centres" and "headquarters" (HQ) is mainly financial;
- (2) "Strategic planning," in which the flow of information to the (strongly-staffed) HQ is at least as much technological as financial, and HQ involves itself intimately in the technological decision-making of the profit-centres; and
- (3) A hybrid, "strategic control," in which a heterogeneous company is "chunked" into a number of divisions. Within each, the *divisional* head office adopts "strategic planning" vis-a-vis its subordinate profit centres, while HQ acts vis-a-vis each division as "a knowledgeable, 100% shareholder" (in other words, evaluating financial, commercial and technological performance data over a relatively long time scale and without trying to participate in such detailed decision-making as under "strategic planning").

PP from outside may be passed on from HQ to those below. HQ may on the other hand act as a buffer against PP, choosing for example to ignore short term financial PP from the stock market, in the firm's long term interests. Equally, such short term financial PP can also be *generated* internally, and will be, by the "*financial control*" style; it will also generate a "sectional selfishness," i.e. sub-unit rationality among profit centres.

At some level within any company there is a division into functional departments (R&D, sales, finance, production, etc.), which implies vertical relationships between general managers and the heads of departments reporting to them, and also horizontal relationships *among* departments. It is known that the character of these vertical relationships, and those further down within functions, is crucial to the success of innovative projects (e.g. McDonough *et al.*, 1986). Likewise the horizontal relationships which involve inter-functional coordination are also important (an Anglo-German comparison is in Bergen, 1983). (We discuss both further below.)

All these relationships involve, and are affected by, performance pressures whose character and intensity is partly determined by formal systems and structures, including accounting and budgeting procedures; but an equally important role is played by the *corporate culture*. Thus Mant (1977) has in effect argued that most firms in Sweden, Switzerland, Germany and Japan have corporate cultures which stress an interest in technological progress—revolving round the process of production; and that this "technological bias" extends right across the company and from top to bottom, providing a unifying force. By contrast he found in the UK (and Hayes and Abernathy, 1980, found in the US) a *split* corporate culture, with the dominant decision makers inclined to think in financial terms, and interest in the technology confined to the "lower ranks." The result of this split is that only financial performance can be effectively monitored; moreover the lower managers are not induced

to share their seniors' concern for the *overall, long term* profitability of the firm, only responding through *force majeure* to the short term sectional financial PP they perceive upon them.

Explaining Different Patterns of Technological Advantage among Countries

Tylecote & Demirag (1992) have developed a hypothesis, partly based on case studies of firms, to explain the poor innovative performance of the British electronic and mechanical engineering industries together with the excellent innovative performance of the British pharmaceuticals industry. The main reason for the difference was a variation in short term pressures on and in firms. Engineering companies were highly decentralised and divisionalised, so that responsibility for innovation lay mainly at rather low levels of management. Moreover successful product innovation in engineering requires effort and expense in categories which are relatively *invisible* to top management, let alone outside shareholders: the short term sacrifice of profit required looks like the result of incompetence. Pharmaceutical firms were highly centralised, with the innovative thrust concentrated in R&D departments which were cost not profit centres. Innovation was a function of (intelligent) R&D spending which though it required a sacrifice of profit was *visible*: the profit sacrifice could not be mistaken for incompetence.

The degree of decentralisation was not simply an industrial given, since clearly British engineering firms have become, since the 1970s, much more decentralised than (e.g.) German ones. It appeared that British engineering firms had found that centralised structures did not engender the inter-functional coordination (IFC) (particularly between production and R&D) required for successful product innovation in this sector. Their German rivals had not had such problems (Bergen, 1983) and we must assume that such IFC is inhibited by British culture. British engineering firms had paid a heavy price for forcing IFC through decentralisation: they had engendered sub-unit rationality as well as short-termism. Meanwhile both had been avoided in pharmaceuticals, which had not needed IFC, at least not that between production and R&D.

Behavioural requirements for innovation

Further work by Guerrieri and Tylecote (1992) has begun to develop a hypothesis which can explain the sectoral patterns of technological advantage among seven European countries (UK, Germany, France, Italy, Sweden, Switzerland and the Netherlands). It is argued that industries vary in four behavioural requirements for successful innovation:

- (1) Interfunctional coordination focussed on production (IFC1). This flourishes where there is a cultural tradition of respect for production, for making things; also of worker participation.
- (2) Interfunctional coordination focussed on (consumer) marketing (IFC2). This is inhibited (as is IFC2) by any emphasis on functional or professional specialisation, and by organisation formality or rigidity.
- (3) External interaction, with customers, suppliers, etc. (EI). This is linked with stake-

holder rationality of certain kinds; see below.

(4) Vertical interaction, within the hierarchy of the firm (VI). This normally requires a highly egalitarian culture, typical of Northern Europe; but see also Japan, below.

Financial and human resource requirements

Industries vary also in their need for “patient money”—not only in the quantities of capital required, but also the period of patience before the return (if any) is achieved, and the capacity for evaluating relatively invisible inputs and intermediate outputs of innovation.

Further, they vary in the requirement for various factors of production—from natural resources at one extreme, to human resources at the other, these latter ranging from skilled manual workers to highly-educated scientists.

International comparisons

Focussing again, for the sake of illustration, on Britain and Germany, we may note that Germany scores highly on:

IFC1; EI; patient money (all dimensions) except for venture capital for major start-ups; human resources of all kinds except perhaps the biological sciences.

Accordingly it is highly successful in sectors (like mechanical engineering and chemicals) where there is a very high requirement for at least several of these.

Britain is relatively deficient in the above requirements, but is strong in:

VI (in the higher reaches, not between management and manual workers; among the scientific elite there is a helpful informality.) Patient money: only where visibility is very high (thus including major start-up ventures such as in biotechnology). Human resources: only highly educated scientists and particularly the biological sciences.

This helps to explain British success in a number of very high-technology sectors, like pharmaceuticals, biotechnology, scientific instruments and electronic software.

Let us now turn to Japan. Japan is more similar to Germany than to Britain in its main areas of success: in motor vehicles and machinery, in particular. It is somewhat weaker in chemicals and pharmaceuticals and decidedly stronger than Germany in electronics, particularly in the consumer areas—but notoriously weak in software (Patel and Pavitt, 1987a). This pattern can be explained by certain similarities in causes:

High IFC1 (partly for similar cultural reasons)—‘Compared with US or European firms, in a Japanese firm the relationship the R&D division has with the production, marketing and other divisions is extremely close.’ (Wakasugi, 1992, p.5);

High EI (for cultural and structural reasons related to *kigyo shudan* and vertical *keiretsu*)—thus in a sample of 100 firms in Japan matched with 100 in the USA, Mansfield (1988) found that customers’ suggestions were responsible for 15% of R&D projects, compared with 9% in the US. (It must be said, however, that the differences were rather industry-specific: thus the difference was actually 8 to 3 in the US’ favour in chemicals, and only 20:18 and 13:11 in Japan’s favour in machinery and autos, instruments & metals. The overall difference is entirely accounted for by the huge 27:1 difference in electricals.)

Patient money much as in Germany (see the role of banks and other “stable share-

holders" in both countries—e.g. Kester 1992); Human resources much as in Germany (except for the stronger German tradition in chemistry).

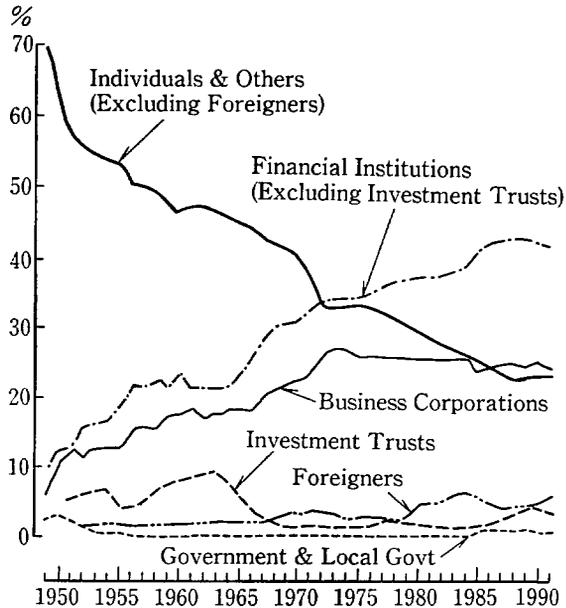
The striking Japanese superiority over Germany in electronics (particularly consumer-) can be explained by the greater range of IFC and EI. Interfunctional coordination in Japan generally extends fully to marketing, given the emphasis on corporate rather than professional allegiance. Decentralised firms like Matsushita whose structure particularly favours IFC (of both kinds) have been able through corporate allegiance and life-time employment to avoid divisional sub-unit rationality (Mintzberg and Quinn, 1991, p. 436 ff.) More centralised firms like Sony whose structure protected them against sub-unit rationality were able to achieve IFC1 and 2, again through corporate allegiance (Mintzberg and Quinn, 1991, p. 845 ff.). External interaction, in a new field like electronics, was required over a greater range than that typically needed in mechanical engineering, and the Japanese structures were able to provide it: either through the established intermarket groups (*ex-zaibatsu* or city bank groups), or through the more recently-constructed and less exclusive networks of cross-holdings and other ties, which have formed around newer entrepreneurial ventures like Matsushita and Sony.

Response to Change Since 1945: Britain, Germany and Japan

It is obvious that there has been more change in Japan than in Britain since 1945, initially because of the former's military and political failure, later because of her economic success. Germany lies somewhere between the two, nearer Japan. Thus the occupation authorities in Japan carried out, among other drastic reforms, the destruction of the *zaibatsu*, including the virtual confiscation of the controlling shareholdings and the banning of their senior managers from any authority in the successor firms. (In Germany the reforms were much less radical, the initial plans being much watered down as relations with the USSR worsened.) Together with changes in the legal regulations, this left the managers of the successor firms delightfully free of shareholder power—the shareholdings being now highly fragmented—but alarmingly exposed to takeover, for the same reason. The response was to build up a system of equity cross-holdings (our Figure 3, from Tokyo Stock Exchange Fact Book 1993, p. 59) on a pattern determined by traditional links, current intermediate product trade, and banking relationships. This soon provided complete protection from takeover in exchange for mutual influence among industrial managers and substantial bank (and other financial institutions) power over industry. At the same time the authority of management was threatened by the rise of revolutionary trade unions, and only saved or regained by the recognition that the permanent labour force had an important stake in the company. (A similar though rather less acute threat in Germany was defused by legislation for 'co-determination' which did little more than restore the status quo ante 1933.) From then on we can see in Japan the establishment as a managerial objective of stakeholder rationality in its fullest sense: linked to this is the very high capacity for external interaction. (German management is characterised by a sort of stakeholder rationality which is rather less strong towards customer and supplier companies.)

In Britain there was a similar evolution over a much longer period and without external pressure: between 1936 and 1951, as Florence (1961) showed, there was a great decline in

FIGURE 3. CHANGES IN SHAREOWNERSHIP



the concentration of shareholdings, producing a situation not unlike that in Japan at the same period. British managers appear to have recognised only the opportunity—to do as they pleased—and not the threat, of takeover, which indeed was not common in the 1950s. Certainly they made no attempt to protect themselves by equity cross-holdings. The change in the situation which took place in the following 30 years was none of their making: financial institutions (not banks but insurance companies, investment trusts and increasingly pension funds) took over from individuals as the dominant stockholders, though without any aspiration to direct control. The initial change in managerial objectives would be, one might expect, away from rationality of any kind towards organisational slack. Once financial institutions became dominant shareholders they began to exercise indirect control, with pressure to move away from organisational slack back towards 'rationality' but with a tendency (depending on the industry—see above) towards short-termism.

The relationship between management and labour evolved too, as unions grew stronger, and again there was no concerted or determined management response, simply a piecemeal accommodation which allowed unions, in their members' short-term interests, increasingly to block management initiatives. There was no inclusion of the workforce in any broad stakeholder rationality. The reassertion of shareholder power and economic rationality roughly coincided with, and encouraged, the reassertion of management power over the workers, with the help of the Conservative labour legislation of the 1980s.

The second great change which affected Japan was one which Britain did not share in at all: the effect of success when many Japanese firms which had grown up rapidly as imitators of Western (particularly US) technology, burst through rather suddenly to the technological frontier in the 1970s and early 80s, and realised that they could continue to

be successful only by themselves making the innovations of the future. This change was associated in time with two developments which did affect Britain, though to a lesser extent: the oil shock of the mid-1970s which brought Japan's period of very rapid growth to an end and obliged her to look to industries which were less energy-intensive; and the technological revolution which is replacing the 'Fordist' technological paradigm with the 'post-Fordist,' focussed on the information and communication technologies (ICT) and biotechnology. Conveniently, the latter provides leading-edge industries which are less energy-intensive than those of Fordism; even more conveniently, Japan already had a strong position in much the more important of these, ICT, notably in the 'downstream' end, consumer electronics. Returning to the first problem, that innovation not imitation was now required, Japan had at least some genuinely innovative firms already from which to learn—Sony and TDK, for example, in ICT. Further, as already indicated, the requirements for innovation in at least the 'hardware' side of ICT suited Japan's structural and cultural characteristics very well. The extra funding required for real innovation was easily available.

Britain's industries have on balance and in general slipped further away from the technological frontier since the war. The pressure to innovate has increased somewhat because increasing freedom of trade and capital mobility has made product markets more competitive; on the other hand in many sectors the pressures from short-termism not to innovate have increased more. The oil shocks of the 1970s had much less impact on Britain than on Japan because it relied much more on its own supplies of coal and gas—soon followed by oil. It was much slower also to perceive the threats and opportunities of the new post-Fordist technological paradigm—by the time this crystallised, around the end of the 1970s, the British position in ICT-producing sectors had grown weak, and in other sectors the long-term commitment to radical change required to make proper use of ICT was blocked by culture and structure.

Once again we find Germany intermediate in all respects. Its technological advance was more rapid than Britain's but less rapid than Japan's: certainly by the 1970s German firms found themselves forced by high wages to concentrate on 'upmarket' products and sectors, but few found this much of a shock. Like the Japanese, they were well able to cope with the financial requirements of increasing expenditure on innovation. They were more vulnerable than Britain but—with a substantial domestic coal industry—less vulnerable than Japan to the oil shocks. As of the late 1970s they were at least as weak as Britain in the ICT-producing sectors, but with higher wages and a better-trained labour force were quicker to respond to the new scope for introducing electronics-based processes into other industries.

Recent Trends and Future Prospects for Technological Advantage: Britain, Germany and Japan

In Britain during the 1980s short-term pressures in general seemed to strengthen. This led to further movement towards short-termism and sub-unit rationality. This in turn exacerbated a long-term trend to relatively low R&D and still less product innovation. By the early 90s British-owned firms were extremely weak in a wide range of medium- and high-technology industries, particularly in mechanical and electronic engineering; they

had weakened considerably in chemicals (as distinct from pharmaceuticals). Underspending on scientific research and education was eroding the supply of human resources to a number of high-technology industries (Martin, 1992). The prospect was for further decline in most sectors, with the notable exception of those supplying Japanese-owned car plants, and pharmaceuticals.

In Germany firms had tended to become larger through merger, and through this and the passage of time the power of family shareholders had weakened (Schreyögg, 1981). The power of the banks had also weakened somewhat, as they came under pressure from public opinion (Schneider-Lenne, 1992). This had tended somewhat to insulate top managers from performance pressures, and to let them drift somewhat towards organisational slack; however, this was held in check by intensifying international competition on product markets. Writers like Jehle (1982) argued for the liberalisation of stock markets to provide other performance pressures, but little had happened in this direction by 1992. In general, the pattern of German strength could be expected to remain fairly constant; there would be increasing Japanese pressure in electronics and vehicles, while in areas like aircraft in which for historical reasons they had fallen behind, they would continue to catch up.

In Japan during the 1980s the trend towards "stable" shareholdings continued, and the fundamental character of inter-firm relationships altered little. There were three areas in which changes of actual or potential significance were taking place. The first was the financial system. With the slow-down from the spectacular growth rates of the 1950s and 60s, firms in general had come to depend much more on retained profits, and much less on bank loans—some cash-rich companies like Toyota had become a by-word. Even share issues had become an attractive way of raising capital, for those who needed it, as the practice of issuing new shares at par was given up, and as stock prices soared during the decade. Japanese industry in general was able to apply very low time rates of discount, for a time—with a resulting huge investment boom in 1988–92. The Kuznets downswing beginning in 1990–1 changed that situation: both outside and inside funds became much more scarce. What changed relatively little during this period was the underlying relationship of banks and industry, since this was firmly cemented by the shareholdings of banks in industry (and to a lesser extent by the converse, shareholdings of industry in the banks). Given these and other 'stable' shareholdings, there was no question for the time being of any movement towards the Anglo-American type of performance pressures: although a modest degree of short-term pressure returned for some firms, there was by 1992 no pressure for a high dividend policy or to cease putting a large share of profits into investment and R&D, and if the total spend had to be held down for a while, this was quite tolerable after the investment boom.

However there was a clear possibility of much more radical change arising from the combination of huge external surplus—a trade surplus of more than \$100 bn. in 1992—with serious domestic recession and financial 'implosion': further revaluation of the yen and other obstacles to exports seem at the time of writing (January 1993) inevitable. This will create a situation where many domestic operations become highly unprofitable. In due course the Japanese economy will return, in the latter half of the decade, to internal and external equilibrium through a shift from manufacturing to construction and services; the process will involve an extremely painful 'shakeout' from manufacturing. Multinationals, able to shift their weight from Japan to lower-cost locations overseas, will be rela-

tively unscathed; other manufacturing firms will be under extreme pressure to improve profitability and cash flow, as will banks. The implications for performance pressures will be cumulative: firms will seek not only higher profits from their own operations, but also higher profits and dividends from their shareholdings in others; the hardest-pressed will sell them. It is unlikely that the cross-holding system will unravel but it will no longer act to protect firms from performance pressures tending to push their time rates of discount up above interest rates, as in the West.

The second change was in the "feudal" structure of the vertical keiretsu, with their pyramids of contractors, sub-contractors and sub-sub-contractors: there was a marked loosening, in which sub-contractors formerly tied to one "master" were allowed and even encouraged to free themselves from "servitude" and establish a strong national and international position in their own right, through their own technological advances (Shokochukin, 1983 and 1989). This development was in the interests of the "master" firms, since with internationalisation and the rise of Japanese wages and the yen, the role of low-wage suppliers would increasingly be taken by foreign firms. Those Japanese sub-contractors who could not adapt would increasingly be driven out of business. (See Small and Medium Enterprise Agency, 1991, 1992.) There was no reason to think that this development—likely to accelerate sharply in the scenario described above—would change the established pattern of Japanese technological advantage.

A third change was certainly likely to alter this pattern, but not at once. This was the movement towards Western attitudes, with greater insistence on individual freedom, and the loosening of the ties between individuals and big companies. This might in the long run weaken interfunctional coordination within firms (and interdivisional coordination within divisionalised firms) and with this erode the Japanese advantage in many areas of engineering. Cohesion within the Japanese firm is the more important given the tradition of inter-firm rivalry: there is much less sectoral cooperation (on research, for example) than in Germany, and if inter-firm mobility continues to increase the point may be reached where the incentive to internal cultivation of expertise is weakened without being replaced by sectoral regulation as in Germany. Likewise the system of worker participation is in some ways more fragile than the German, not relying on legislation or powerful unions, but on traditions (changing) and a sense of mutual need (also changing, with internationalisation). (It should however be borne in mind that Japanese multinationals are accumulating a great deal of experience, in the West, of operating effectively outside the traditional Japanese culture.) Equally, this trend towards a degree of cultural convergence with the West suggested that Japan might compete more effectively in future in areas like pharmaceuticals (already apparent during the 1980s) and even in software. Wakasugi (1992) indicates that Japanese firms in these areas have shown characteristic flexibility in modifying old practices and organisational forms to suit their requirements.

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