THE FIFTH GLOBAL
TECHNOECONOMIC PARADIGM

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Abstract

The regulatory system governing the world economy, particularly the international financial system, is a creation of the Fourth Technoeconomic Paradigm ushered in by the era of mass production. It sustained the 'golden age' of the post-war period, but started to crack in the 1970s, and has fallen into disarray in the 1980s. This essay argues that the instabilities and turbulence in the international economic system can be traced fundamentally to the transitional problems encountered by the emergence of a Fifth Paradigm. Its appearance, which promises to provide a sound basis for equitable resolution of North-South issues and for sustainable development, is being frustrated by the legacies of the previous period. It is argued that radical new global institutions and procedures are needed to break this impasse. The outline of such initiatives is sketched, and a proposal advanced for a new Bretton Woods Conference to establish the global agenda for financial reform, thus bringing the unfinished business of the Second World War finally to an end.
Introduction

The turbulence, imbalances and instabilities in the international economy and financial markets is a matter of public record and of public concern. There are some obvious short-term causes of these instabilities. There are the Japanese and German trade surpluses, as well as mounting surpluses in such Newly Industrialised Countries as South Korea, brought about by their superior production systems. There is the continuing US trade deficit and budget deficit, brought about by its inferior production systems and high level of spending (particularly on armaments) and the associated continuing weakness of the US dollar. There is the continuing paralysis at an international level to resolve these twin issues, because of the unique position of the US dollar as an international reserve currency, inherited from the Bretton Woods settlement. There is the intractable problem of indebtedness of developing countries which has brought their processes of industrialisation to a halt and even reversed gains made in the 1960s and 70s, with severe hardship resulting in social strains and placing nascent democracies under severe pressure. There is an increasing divorce between the world of finance and that of production, exacerbated by deregulation of financial markets and the impact of new technologies, encouraging an increasing rate of transactions and speculation (a process which really got under way with the OPEC petrodollars and Eurodollars circulating outside their countries of origin. And there is a declining salience of national government regulatory controls in an increasingly international, indeed global, financial and economic system - which places an even higher premium on the development of a robust and stable international regulatory system. And these are just some of the most pressing issues.

So much is well known, and rehearsed regularly in the Bulletins and Reviews of the world’s leading institutions such as the IMF and World Bank (although proposed solutions are seldom found in the same pages). Underlying these issues it can be argued that there is a more fundamental shift in progress. This is operating at the level of production systems, but it is having repercussions on world trade, and through that on the global financial system.

This shift amounts to a new ‘industrial revolution’. It involves a decline in strength of the giant mass producers of the metropolitan countries, and a prolonged process of ‘structural adjustment’ leading to the emergence of new industrial sectors based on information technology, microelectronics and new materials. New centres of mass production, based on cost-competitive
low-wage labour have arisen, while in Northern Europe and Japan a new production system based on quality-competitive high-waged, high-skilled labour has made successful inroads into global markets. These structural changes are in turn linked with technological and organizational changes in production processes, encouraging new forms of linkages between firms and between units within firms. Networks of small but sophisticated firms in Italy, for example, are gaining a competitive advantage over more rigidly structured organizations in responding more flexibly to changing markets; while multinationals themselves are restructuring internally to provide operating units with more flexibility and coherence. New trade patterns emerge as a by-product from all these upheavals.

The OECD has recently adopted the position that these changes are so fundamental that they are reconfiguring the ground rules for competition and cooperation in the 1990s. Following Freeman and Perez, the OECD now calls these changes a 'shift in technoeconomic paradigm'. In the Sundqvist report (OECD, 1988) it is argued that the processes of change are both technological and social in character, and that countries will have to master both these aspects of the paradigm shift if they are to prosper.

In this essay I want to take this argument a step further. Based on a substantial body of work to which we shall refer in a moment, it is now widely accepted that the continuing instabilities and turbulence in the global economy since 1973 correspond at the most fundamental level to a shift from a technoeconomic paradigm based on mass production, to one based on a new model of productive efficiency. I wish to make the claim that the continuing structural problems in the world economy, particularly the absence of global institutions to regulate financial transactions and accounting, is actively frustrating the emergence of this new paradigm. Since the new paradigm promises lower capital costs but higher quality of production using more highly skilled work, it is open to non-industrialised countries as well as established producers, thereby offering the potential to break the North-South deadlock. Since the new paradigm is based on new materials, it promises to be resource-and energy-efficient and encourage recycling; it thus provides a foundation for sustainable development. But it will only play this role if the global economic and financial legacies from the previous era are swept away. It is not just a problem for individual countries, as posed by the OECD, but a genuinely global problem for which we must seek a global solution.

**Five paradigms**

A useful place to start in analysing the current changes is to look at the previous paradigm shifts which have convulsed production systems, to learn what we can of
their characteristics. A group of writers now known as the French Regulation School have provided a conceptual framework that facilitates this kind of analysis. (Lipietz, 1987; Boyer, 1989) They approach each production era in terms of a very general structure of interlinkages, involving a technoeconomic base, a regime of accumulation, and a mode of regulation that ties all the elements together. Following Perez and Freeman (1988), and utilising the insights of the French Regulation School, we may hazard a very compressed historical account of the five paradigms in the following terms.

The first Paradigm shift occurred with what used to be called the Industrial Revolution, in the last quarter of the 18th century. The change in technoeconomic base was fundamentally a shift from a 'putting out' system of cottage-based production using manual energy, to a factory-based system that enabled new factory masters to exercise greater control over the quality and cost of production, and to discipline a most unhappy workforce that pined for its past liberties. The first factories, particularly textile mills in England, provided the setting in which innovations such as water-driven machinery and canal-based navigation for freight transport could be made. This account therefore adopts the perspective that factories were above all a social innovation, and as such paved the way for subsequent technical innovations.

As the new system spread beyond textiles, its productive limitations became manifest, and a series of innovations triggered by the attempt to overcome them ushered in the second Paradigm shift in the 1830s. These involved a technical revolution in energy supply, with Watt's steam engine liberating factories from their dependence on a source of flowing water, and leading to further dissemination of mechanisation and the location of factories within existing communities, stimulating rapid industrial urbanisation. Accompanying this was a revolution in materials, focused on iron but also pottery, and in transport, involving iron railways and steam locomotion. Productivity soared with these innovations, leading to a broader-based regime of accumulation, and the production of wage goods for the new working class from the new factories. The railways and the fledgling postal service created the need for the first non-government bureaucracies to regulate their operations; in the absence of any other models, these organizations looked to the army and the church for their models of hierarchical efficiency. This period also saw the triumph of an industrial mode of regulation, overthrowing mercantilist protection and basing commercial activity on the foundations of the joint-stock company (itself modelled on the chartered enterprises founded by royal decree to administer colonial trade with such outposts as Hudson Bay and the East Indies). It also
saw the rise of the first skilled workers’ ‘combinations’ (trade unions) and their struggles to obtain legitimacy.

The second paradigm witnessed a much more systematic attention being paid to innovation. Some of the inventions became so important that they ushered in the Third Paradigm in the last decades of the 19th century. The technical basis of the shift was the introduction of electric power and its supply to whole industrial and urban regions through articulated networks: these were the first examples of complex technological systems that have become such a feature of the twentieth century. (Hughes, 1989) There were related technical innovations in the form of steel and chemicals, producing unheard of gains in productivity and potential (such as in the construction of the first skyscrapers). The regime of accumulation saw manufacturing become the driving economic force of the world’s emergent industrial powers: Britain, Germany and the USA. It also saw the spread of unionism to unskilled workers, and a mode of regulation that included pervasive financial innovations such as stock exchanges and private banks, backed by emergent central banks. The principal obstacle to further productivity growth was the lack of real control over the labour process in factories, exacerbated by the spread of vertical integration (bypassing the market) creating the first modern corporations.

The fourth Paradigm shift was principally a response to these obstacles. Its technical innovations involved the standardisation of products, of labour and of processes. During the third Paradigm, these innovations had developed in the form of interchangeability of parts (the ‘American system of manufacture’), the standardisation of labour processes into basic constituent units (through the work of Frederick Winslow Taylor and his disciples), and finally the standardisation of process by the introduction of moving conveyor lines for assembly, first installed by Henry Ford at Highland Park, Michigan, in 1913. If any date and place can be taken as indicating the start of the modern era, this is surely it. These processes came together in the system we now call mass production (Hounshell, 1984), which ushered in the biggest Paradigm shift of all—so significant in fact that Piore and Sabel call it an ‘industrial divide’, or parting of the ways between craft-based production and mass production. (Piore and Sabel, 1984)

Mass production became pervasive because of the significant cost advantages reaped by returns to scale and the use of unskilled detail labour. These twin advantages seriously undermined the competitive strength of production by batch and bespoke activities. But it soon became apparent that these advantages depended on certain conditions obtaining beyond the sphere of production itself. The gains of mass production could be reaped only by the creation of mass markets leading to mass consumption, which required standardisation of
consumer taste (exemplified in Henry Ford's remark that his customers could have any colour they liked in a Model T so long as it was black) and high wages to underpin purchasing power. But these efforts were not enough to create a new regime of accumulation in the 1920s, and the whole edifice came crashing down in the Depression. After painful recovery, largely through the war effort, mass production and mass consumption took off in tandem only in the post-war period, thanks to a combination of factors such as the institutionalisation of collective bargaining allowing wages to keep pace with productivity, to Keynesian macroeconomic regulation of the business cycle, and to social security systems and the welfare state which upheld purchasing power. This was complemented by an international mode of regulation involving new institutions (the IMF and World Bank), fixed exchange rates (Bretton Woods) and a liberal trade regime giving the manufactured goods from the metropolitan countries access to each others' markets and to the Third World. This whole system is what is now called Fordism. Its heyday was the 'golden era' from 1945 to 1968. (Marglin et al, 1989)

This highly compressed account of 200 years of industrial history is designed to bring out certain fundamental points. Firstly, each paradigm shift was prompted by severe restrictions to production and expansion imposed by the structure of the previous regime. Secondly, each shift required a carrier technology and organization that became pervasive, due to cheapness and abundance of supply. Finally, each transition was painful, involving major social upheavals as the former sociotechnical framework gave way and the new one emerged. Our account culminates in the claim that the decline of the Fordist system, and the prolonged labour pains of the emergent Fifth Paradigm, is fundamentally the source of the instabilities evident in the world economic and financial system over the past 15 years.

This is a sweeping statement that clearly needs substantial justification. The argument, in brief, is as follows.

In hindsight we can view the Fordist system as very rigid, depending for its competitive success on a few producers gaining monopoly control over markets, and maintaining this success with basic low cost products capable of being produced with low wage labour. With increasing monopoly and oligopoly, a margin for product restyling could be built in, to foster product replacement. But in the late 1960s and increasingly in the 1970s, the basis for this competitive advantage was undermined. Three facets of the change can be identified.

1. The technology of mass production was transparent, and was replicated in the post-war period, first in Japan, and then in the so-called NICs: Taiwan, Hong Kong, Singapore and South Korea. With their very low wage
costs, their goods started to oust those of metropolitan producers even in their domestic markets. These trade shifts put pressure on the Bretton Woods system which soon cracked, and a period of instability and extreme balance of payments disequilibria followed. Within the mass production heartlands, trade pressures led to lay-offs and closures, which in turn put unprecedented pressures on the social security and welfare systems which had not been designed to cope with such onslaughts. Thus the mode of regulation that had held the Fordist system together started to come apart.

2. Linked to these developments were shifts in the regime of accumulation. Mass markets became saturated, forcing metropolitan mass producers to seek increasingly for profits in external markets, a process which came up against the limits of low-wage purchasing power. Markets in the metropolitan countries also became more fragmented and less tolerant of the standardisation of mass production goods. (Roobeek, 1987) New producers of quality goods found markets opening for them that were not available to the mass production giants. International pressures forced mass producers to abandon their high wage policies, and mass industrial unrest followed attempts to speed up production and further intensify already extremely Taylorised labour systems. Shifts to production off-shore finally signalled the abandonment of the essential link between consumption and production, which had been the central feature of the Fordist regime of accumulation.

3. At the technoeconomic level, the rigid systems of Taylorist work organization and deskillling associated with early automation, proved to be increasingly less able to cope with shifting markets and the product and process flexibility they called for. New technologies based on microelectronics offered unheard of flexibility through programmability, but these gains could not be reaped within Taylorist work structures. (Jaikumar, 1986) The drive for productivity enhancement along the old lines proved increasingly illusory. (Skinner, 1986) In some cases these efforts ran up against human and physiological limits, as evident in widespread worker alienation, absenteeism, and injuries caused by repetitive work.

The new technologies called for task integration and group work and multiskilling, none of which were compatible with Taylorism. In Japan, the large producers quite abandoned the Taylorist ethic, producing a new intermediate variant called Toyotism. (Kaplinsky, 1988) Small producers could afford the low capital costs of programmable microelectronic equipment, and increasingly made inroads into high tech markets through networking in cooperative clusters. Thus there emerged new 'industrial districts', such as Emilia-Romagna in Italy, or Baden Wuerttemberg in Germany (Sabel, 1989), or the Tokyo-Osaka small firms axis in Japan (Friedman, 1989), all of which
have become prosperous but are based on cooperative small-firm networks rather than on mass production. Thus the Fordist technoeconomic base proved unable to respond to opportunities available to production systems that were not bound by its rigidities.

The Fifth Technoeconomic Paradigm

The Fifth Paradigm has not yet emerged with any definitive shape or structure. Yet the following features have already become apparent, captured in such phrases as: flexible specialisation, new production concepts, flexible accumulation, flexible manufacturing networks, and post-Fordism. (Mathews, 1989a, -b, -c)

1. The technoeconomic base which is driving the Fifth Paradigm shift is that of IT, microelectronics, and emergent biotechnologies and new materials. This is what gives it its flexibility, through programmability; its low energy utilisation and non-resource depleting characteristics; and its development of a new 'human-centred' approach to technology design where tools complement and extend the skills of workers rather than seek to replace them. Kern and Schumann have used the term 'reprofessionalisation' of work to describe the emergent dependence on skills and new career paths that have opened up for workers in firms which employ the 'new production concepts'. (Kern and Schumann, 1987)

2. The regime of accumulation of the Fifth Paradigm consists in finding new ways of balancing production and consumption. On the supply side, wages are increasingly linked to productivity and profit-sharing, and new forms of income from equity participation on the part of workers and communities are emerging. One of the key social innovations of the Fifth Paradigm will be Basic Income schemes offering all citizens a guaranteed minimum income to support the new emphasis on recurrent skills formation, education, and structural adjustment. These innovations will be seen as necessary to prevent incipient polarisation of skills, income and employment. On the demand side, new niche markets emphasising quality, service and non-standardisation of taste are driving the agenda of flexibility and responsiveness. These are the aspects of the Fifth Paradigm that align it with post-modernist trends in culture and the arts. (Harvey, 1989)

3. The mode of regulation of the Fifth Paradigm is what is being held back by the continuing legacy from the Fordist era in the international economy. It is most unlikely that any kind of 'global Keynesian' revival might emerge through international coordination, despite the partial success with re-regulation of exchange rates achieved at the New York Plaza agreement of the G7 in 1985, and its extension at the Paris Louvre discussions in April 1987. (Funabashi, 1988) Instead new institutions
will have to be created, to which we shall turn in a moment.

The Fifth paradigm will be a break from the rigidities and giantism of the Fourth paradigm. Mann (1988) has argued persuasively that the Fourth paradigm owed its success to war: it was mass production that was resorted to for production of armaments in the First World War, and again in the Second, and it was the exigencies of war production that allowed such a military style of work organization, based on a model of command and obey, to be tolerated and then to become entrenched beyond the armaments sector. The end of the fourth paradigm effectively promises the end of the militarisation of production. In complementary fashion, Weiss (1988) has argued that giantism was actively fostered by government policy in the post-war period, with some notable exceptions such as in Italy and Japan.

The Fifth paradigm will instead be based on the democratisation of production, finally fulfilling the promise that democracy held out at the dawn of the modern era. Instead of a Jeffersonian democracy of small independent producers, which was the vision underlying the US Declaration of Independence, we might have by the 21st century a substantive economic democracy of producers in small, medium and large enterprises each valued for their skill, responsibility and capacity to innovate.

The beauty of the notion of the Fifth paradigm is that it applies equally well at the global as well as the local level. It provides a framework for organizing production within the firm, but also for linking firms cooperatively in networks, and for providing public infrastructure to encourage these linkages. Proposals for the establishment of truly global institutions take this process one step further. This characteristic of the Fifth paradigm can be said to draw its inspiration from Stafford Beer and his notion of 'nested sequences' of organizational models, each isomorphic with the others but operating at a different level of aggregation. (Beer, 1985)

As the Fifth Paradigm emerges, so the Fourth Paradigm will continue, both in its Fordist and neo-Fordist guises. The 1990s are witness to a global-level struggle between 'competing paradigms'. (Badham & Mathews, 1989) Mass production proper will migrate increasingly to the Third World; the major centres in the 1990s are likely to be Mexico, the Philippines, Malaysia, Thailand. The NICs are moving up-market to higher quality and higher skill-based production, through Toyotism to post-Fordism. We are witnessing the democratic convulsions that are accompanying this process, because it cannot be accomplished under the hardline dictatorships that oversaw the phase of Fordism and Taylorism.
Now my argument is as follows. The emergent Fifth paradigm that is struggling to be born will bring inestimable global benefits. But it is being retarded by the remnants of the Fourth paradigm which through institutional inertia and lack of political will have not been swept away. This is having serious consequences at the level of the world system. Chief of these is the creation of an international environment which will encourage investment in Fifth Paradigm technology, and the indebtedness of 'developing' countries, now running at close to a trillion dollars, which has stalled any prospect of their moving into a Fifth paradigm. (World Bank, 1989)

Orthodox economic remedies for the current problems of the twin debt mountains of the USA and the Third World, and the continuing trade surpluses of Japan, the NICs and Germany, are as irrelevant now as they were for the world on the brink of Depression in 1929. They call for the US to stop living above its means, to pay back its debts, and for the Third World to do the same. The IMF apparently supports this position. (IMF, 1989) Yet its flaws are manifest. The huge claims on future production now held by the creditor nations, if to be paid in full, will force such austerity on the US and the Third World, that the loss in production and trading strength would ensure that the debts are never paid. These are the shifting sands on which the international financial system is built, which is why it is in constant danger of collapse. Is it realistic to expect fundamental change?

My argument is that imagination and boldness of the kind shown recently in superpower disarmament negotiations, is needed on the economic and financial front at a global level to unravel the current impasses blocking the emergence of the Fifth Paradigm.

At an analytical level, there is now only one meaningful form of conceptualisation of economic, financial and industrial systems, and that is as a global system. Hence we should be taking active steps towards the construction of truly global accounts. Taking company accounting procedures as their model, these global accounts should provide direct data on both global income and expenditure, and on global assets and liabilities. A host of conceptual and technical issues are raised by this demand - but they are not insoluble, and will only be solved when a clear political goal is set. Indeed it is the present system of accounting which presents insoluble conundrums. International transactions are currently captured most ineptly by 'national' balance of payments accounts, which become more arbitrary in their assumptions as capital itself becomes more global. Severe changes leading to quite inappropriate policy responses can be triggered in these accounts by the decision, for example, of a multinational to move its headquarters from one location to another, without making any changes to its accumulation processes. (Bryan, 1989) The IMF World
Economic Outlook issued in April 1989 found the arbitrary nature of national recording of capital transactions (according to IMF rules, be it noted) to be such a problem that it devoted a special section to this issue—but offered no structural solutions. (IMF, 1989; 26-7; 34-5)

The only structural solution, in my submission, is that the task of maintaining truly global accounts be given to a truly global authority that is established for this purpose, and that it collect its data directly by monitoring flows, rather than through the imperfect and biased procedures of national authorities seeking to ascertain their 'centres of interest' (an IMF term) and impute flows from changes in their arbitrarily denominated 'national' capital stocks. Such an authority could well develop out of a body established to deal with the immediate practical (as opposed to conceptual) issue of resolving the indebtedness of developing countries—along the lines proposed by the head of Amex, James Robinson, in the form of an Institute of International Debt and Development. (Robinson, 1988) It is not hard to imagine such an institution moving on from solving problems of indebtedness to tackling other sources of global financial instability, such as fluctuations in commodity prices, and inequitable differences in income—by establishing global buffer stocks of commodities, for example, and by imposing a global taxation system on rich countries to assist poorer countries.

Several imaginative solutions that do grasp the issues in their global totality, with an eye to sustainable development and an end to the North-South polarisation of the world, are already on the table. (WIDER, 1989; Dreze et al, 1989; Lipietz, 1989) The essence of these proposals lies in the recognition of some international institution being able to compensate banks as they write off debts, and in the process issuing 'discounted debt' as a quasi-world currency that might be able to take over from the dollar. There is nothing radically new in such a proposal. After all, this was the role conceived for the IMF by Keynes at Bretton Woods—but he was over-ruled by the Americans, who insisted that the dollar had to be effectively the international reserve currency. This decision haunts all current efforts to find a way out of our present crisis.

It seems evident that such a proposal will not emerge from the shuttle diplomacy of the US, Japanese and German finance ministers, nor from the meetings of the Group of Seven who ritually congratulate themselves on staggering through yet another year on the brink of financial disaster.

A circuit breaker is needed. I propose that such a circuit breaker could be a new Bretton Woods conference, hosted by an independent agency established for the purpose. This should be conceived as a world conference,
possibly lasting for as long as one or two years. Its proceedings would be open to public scrutiny, and its goal would be to establish the guidelines for an international financial regime that will accommodate a solution to the debt problem, removing the dollar as the reserve currency, establishing an international unit of account, revaluing the yen and mark and other currencies without provoking recession in those countries, and providing for flexible adjustments in future and for a global perspective to be maintained. This 1990s Bretton Woods conference would issue a Memorandum that all democratic countries would be placed (by their citizenry) under great pressure to sign. It would create a new international institution that could take over the functions of the IMF, which has now lost the capacity and the will to effect fundamental reform. The new body could be capitalised from a variety of sources, one of which would be the 'buying' of discounted debt. The aim would be to have all this in place by 1995, the 50th anniversary of the original Bretton Woods agreement. In this way the problems left unsolved at the end of the Second World War - the questions of European borders leading to the Cold War, and the weaknesses of the international financial system, would finally be solved. The war would finally be over, and the world could look forward to peaceful sustainable development in the 21st century.

This may read like a fanciful account, yet it is not unachievable. We have witnessed astonishing events in the past eighteen months, as the communist bloc have thrown off their shackles, and Gorbachev leads the Soviet Union into a new era. The western world has yet to show that it can match the political imagination being demonstrated in the East. A new Bretton Woods conference, with an open agenda and a will to tackle underlying structural problems once and for all, could be just such a response.

Concluding remarks

We have only one earth, and the need to look after it through carefully designed institutions and procedures is becoming a matter of survival. The management systems we have in place - basically those of corporate entities, governments, markets for goods, services, capital and labour, public regulatory bodies and associations of citizens and producers - are robust and resilient, but cannot be expected to deliver a global stability they were never designed to achieve. Now is the time, in the 1990s, when a new green agenda has seized the popular imagination, that radical initiatives are feasible. The world swing towards democracy and capitalism, currently being registered in Eastern Europe and the USSR, covertly in China and overtly in the NICs, means that there exists the will to set some fundamentals in place. In the 21st century we don't have to repeat the depressing cycle of the 'let it rip' developments of the 19th century and their consequent wars, revolutions and depressions in the
20th century. This time we have the chance to do it right: indeed failure to do so will result almost certainly in the destruction of the earth and its inhabitants from holocaust, environmental degradation, hunger wars, or nuclear war and nuclear winter. These are the prospects that shadow political and diplomatic moves in the 1990s.

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