

## 8. Income inequality in changing techno-economic paradigms

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This chapter discusses the relationships among technical change, economic growth and income distribution. The first section of the chapter concentrates on technical change and unemployment; it is fairly clear that the prevalence of mass unemployment will tend to aggravate inequalities in income distribution. The second section of the chapter discusses the effects of technical change on the earnings of those who are employed. Both in relation to unemployment and in relation to the earnings of those who are employed, the chapter argues that waves of technical change have profound long-term effects on income distribution.

Formal growth theory and growth models (Romer 1986, Grossman and Helpman 1990) have at last begun to recognize that the combination of technical change and increasing returns to scale, which Antonio Serra first explored (Reinert 1996, 1999), are at the heart of the process of economic growth. However, most formal models still ignore the cyclical aspects of growth. This chapter therefore first of all argues that the study of long cycles is essential to an understanding of the relationship between technical change, economic growth and income distribution.

### 1. UNEMPLOYMENT AND TECHNOLOGY

At the simplest level, it is obvious that the standard of living for all of us depends on the achievements of science and technology. Since Adam Smith's *Wealth of Nations* and Alfred Marshall's comments on *Knowledge as the Chief Engine of Production*, the role of technical change in economic growth has been universally accepted by all schools of economists. The so-called New Growth Theory gives to research, development and education a more central role than earlier growth models, but no economist of repute had ever denied their importance.

However, it is one thing to pay lip service to the importance of science and technology in economic and social change but quite another thing to

study this interdependent relationship in depth, that is, to study the actual process of technical change in firms, in industries, in nations and in the world economy. In the first half of this century almost the only economist to attempt this was Joseph Schumpeter, and for this reason research on the economics and sociology of technical change is usually described as neo-Schumpeterian. Its relevance to the problems of income distribution and social cohesion is not immediately obvious, and I shall argue that to understand this relationship requires the exploration of cycles of investment and the associated problems of employment, skills, unemployment and profitability.

Schumpeter suggested in his magnum opus on *Business Cycles* (1939) that waves of new investment were generated by the diffusion of new technologies. Following the Russian economist Nikolai Kondratiev, he argued that successive industrial revolutions led to long cycles of about 50 years' duration (see Table 8.1). In Schumpeter's theory, the ability and initiative of entrepreneurs, drawing upon the discoveries and ideas of scientists and inventors, create entirely new opportunities for investment, growth and employment. The exceptional profits made from these innovations are then the decisive signal to swarms of imitators, generating bandwagon and multiplier effects throughout the system. Schumpeter studied the extraordinarily rapid growth of the cotton and iron industries in the first industrial revolution, of steam power and railways in the second and of electrification in the third.

In a passage which is seldom referred to, John Maynard Keynes (1930) fully acknowledged the significance of these influences on investment behaviour:

In the case of fixed capital it is easy to understand why fluctuations should occur in the rate of investment. Entrepreneurs are induced to embark on the production of fixed capital or deterred from doing so by their expectations of the profits to be made. Apart from the many minor reasons why these should fluctuate in a changing world, Professor Schumpeter's explanation of the major movements may be unreservedly accepted.

The big investment booms of the 1850s and 1860s, of the *belle époque* before the First World War or of the golden age of the 1950s and 1960s were followed by fairly prolonged periods of recession, depression and high unemployment. In Schumpeter's scheme, these recessions were the combined result of the erosion of profits and the slow-down of growth in the previous wave of technology and the disruptive effects of the emergence of new technologies and a new infrastructure to unleash the next wave. His theory is still controversial; opposition has come both from more orthodox mainstream economists, including Keynesians who have been preoccupied with the

Table 8.1 Long Waves

Kondratiev Wave	Cycle	Recession trough	Key Factor(s)	Carrier Branches	Infrastructures
1st	1780s–1840s	1820s 1830s	Cotton yarn Iron	<b>Cotton textiles</b> Ship building	Ports Canals Water power Roads Ships, barges
2nd	1840s–90s	1880s 1890s	Coal Coal gas	<b>Steam engines</b> Railways Mechanization Gas Machine tools	Iron–rail networks Telegraphy Steam ships Gas light and heat
3rd	1890s–1940s	1920s 1930s	Steel	Electrification Electrical and heavy engineering Non-ferrous metals	Electric power Steel ships Global steel rail networks Telephones
4th	1940s–90s	1980s 1990s	Oil Natural gas	<b>Automobiles</b> Consumer durables Refineries Automation	Motor highways Airlines Tankers Roll-on, roll-off
5th	1990s–?	?	Microelectronics	<b>Computers</b> Video, telephone equipment Software, info services	'Information highways' E-mail Air freight

shorter business cycles, and from orthodox Marxists, who drove Kondratiev to an early death in the 1930s. Orthodox economic theory has tended to accept purely econometric attempts to refute Schumpeter's long-wave theory, but recently a Portuguese economist (Louça 1997) has provided a powerful critique of econometrics and reinforcement for neo-Schumpeterian theories of the long wave.

If the test of a theory in the social sciences, as in the natural sciences, is its predictive power, then the ideas of Kondratiev and Schumpeter come out of this test in the twentieth century extremely well. At a time when more orthodox Marxists were predicting the collapse of capitalism and the final crisis in the 1930s, Kondratiev pointed to the possibility of a new capitalist growth boom. When the biggest ever boom materialized in the 1950s and 1960s, long-wave theorists such as Mandel pointed to the probability of a new deep recession. This was at a time when many economists and government advisors, such as those at the Organization for Economic Cooperation and Development (OECD), assumed that the problem of mass unemployment would never return. Even in the 1970s they continued to believe this despite the mounting evidence of structural unemployment (see, for example, OECD 1977 [McCracken Report]). In the 1930s, however, many economists had believed the opposite: that unemployment would remain permanently at a high level. Even William H. Beveridge and Keynes in the early 1940s were pessimistic about the possibilities of achieving a 3 per cent level of unemployment and thought 8 per cent a more realistic target. The definition of 'full employment' as 3 per cent or less came relatively late in the deliberations of Beveridge and his colleagues. Mainstream economics thus showed a persistent inability to understand or cope with the problems of structural change and unemployment related to new technologies. Yet the prevalence of mass unemployment for quite long periods has been one of the major causes of inequality in income distribution and related social problems.

In what was to become the accepted definition of 'full employment', it was often assumed that about 1 per cent would be 'frictional' unemployment – the simple gaps in the movement of people between jobs, which would occur in any changing economy; a further 1 per cent would be 'regional' unemployment caused by delays in the movement of people between regions; and 1 per cent would be 'structural' unemployment – longer-lasting unemployment associated with changes in technology, skills and industrial organization (Beveridge 1946).

In fact, unemployment in the 1950s and 1960s, as in the 1850s and 1860s, fell well below 3 per cent throughout almost the whole of Europe (Table 8.2). In the 1980s and 1990s it was well below 3 per cent in the East Asian 'Tigers', but almost everywhere else, and especially in Europe, it reached

Table 8.2 Unemployment in the 1990s (% of workforce)

	1959–67 average	1982–92 average	1992	1995
USA	5.3	7.1	7.4	5.6
Canada	4.9	9.6	11.3	9.5
Germany <sup>a</sup>	1.2	7.4	7.7	9.5
France	0.7	9.5	10.4	11.6
Italy	6.2	10.9	11.6	12.1
UK	1.8	9.7	10.0	8.2
Spain	2.3	19.0	18.4	22.9
Japan	1.5	2.5	2.2	3.1
Belgium	2.4	11.3	7.3	9.9
Denmark	1.4	9.1	9.2	7.1
Finland	1.7	4.8	13.1	17.3
Ireland	4.6	15.5	16.7	12.4
Netherlands	0.9	9.8	5.6	7.3
Norway	2.1	3.2	5.9	5.7
Sweden	1.3	2.3	5.3	9.2
S. Korea	n.a.	2.5	2.4	2.3
Singapore	n.a.	2.9	2.7	2.6

Note: <sup>a</sup> 1959–92 = German Federal Republic

Source: European Commission (1996).

levels described by M. Paye, the Secretary-General of the OECD, as ‘disturbing, perhaps alarming’ (OECD 1993). The relatively low levels of unemployment in the ‘Tigers’ were clearly related to their high overall growth rate, averaging 7 per cent or more over long periods in the 1970s, 1980s and 1990s, but also to the high rate of structural change, as shown in the output and exports of their information and communications technologies (ICT) industries (Table 8.3). Europe suffered from the reverse problem of low rates of growth, relatively poor performance of the ICT industries and other high-tech industries and an inadequate level of aggregate investment. Since 1997 the Asian countries have suffered from the problems of overcapacity and the instability of investment, collapsing from the very high levels of the boom period. The bubble economy in Japan and its collapse in the 1990s added to the instability of the entire region and of the world economy.

The social consequences of these failures in economic policy and in structural adjustment are very severe indeed. The continuing high levels of

*Table 8.3 Percentage share of office machinery and telecom equipment in total merchandise exports (ranked by value of 1989 exports)*

	1980	1989
1. Japan	14	28
2. USA	8	13
3. FRG	5	5
4. UK	5	9
5. Singapore	14	34
6. South Korea	10	22
7. Taiwan	14	25
8. Hong Kong	12	16
9. France	4	7
10. Netherlands	5	7
11. Canada	2.5	4

*Source:* GATT

unemployment have undermined social services in many European countries because the payment of unemployment benefits and many other benefits indirectly associated with unemployment leads to budget deficits of a scale and duration which are hard to sustain and led to the deflationary Maastricht criteria for the European Monetary Union. The early social reformers, such as Beveridge, were absolutely right to assume that the welfare state depended on full employment. In her earliest social research in Liverpool, Eleanor Rathbone had demonstrated the close relationship between casual part-time employment, unemployment, poverty and malnutrition (Stocks 1949).

Persistent mass unemployment presents society with great dangers. It is an unmitigated social disaster as well as a loss of output, and the OECD was right to urge that the restoration of full employment in Europe should be a high priority for both economic and social reasons. The IMF medicine for Asian countries poses the danger of undermining their achievements in the development of new industries, services and employment by drastically curtailing their rate of investment. In many Asian countries social services have never been fully developed, placing a greater strain on social cohesion when the recession began.

The future growth of employment in both Europe and Asia must depend, as indicated in the US estimates (Table 8.4), on three main categories:

*Table 8.4 US occupational employment forecasts, 1990–2005 (total percentage growth of fastest-growing occupations)*

Occupation	Projected growth
Systems analysts	79
Computer programmers	56
Information clerks	47
Home health aides	92
Child care providers	49
Nurses	44
Nursing aides	43
Cooks	42
Gardeners	40
Food counter workers	34
Food preparers	32
School teachers	34
Educational assistants	34

*Source:* US Bureau of Labor Statistics

1. Occupations related to the computerization of all industries and services: software engineering, design and programming and new telecommunications-based networking services.
2. Personal and public service occupations in health care, care for the elderly, child care, improvement of the urban and rural environment, and leisure activities.
3. Education, training and related professional occupations. These are closely related to the first category because the education and training system will make massive use of multimedia.

All three of these areas offer enormous scope for future growth of employment, but the third category is of exceptional importance because the entire economy will increasingly depend on the efficiency and scope of education, training and retraining. The US figures probably underestimate the potential growth of educational products and services and the associated growth of employment in publishing, multimedia and other ‘cultural’ industries closely related to the first category.

Whether for nursery schools or primary or secondary education, it is essential for education policy to play an active role in developing new ICT products in cooperation with industry. Developing new modules for new courses in every discipline and combination of disciplines and keeping

them up to date are enormous educational undertakings. They will require the active participation of the teaching profession at all levels. A regular part of in-service teacher training and post-experience training should be participation in design and development teams for new course CD-ROMs and other materials in cooperation with publishers, video companies, information services and other related industries.

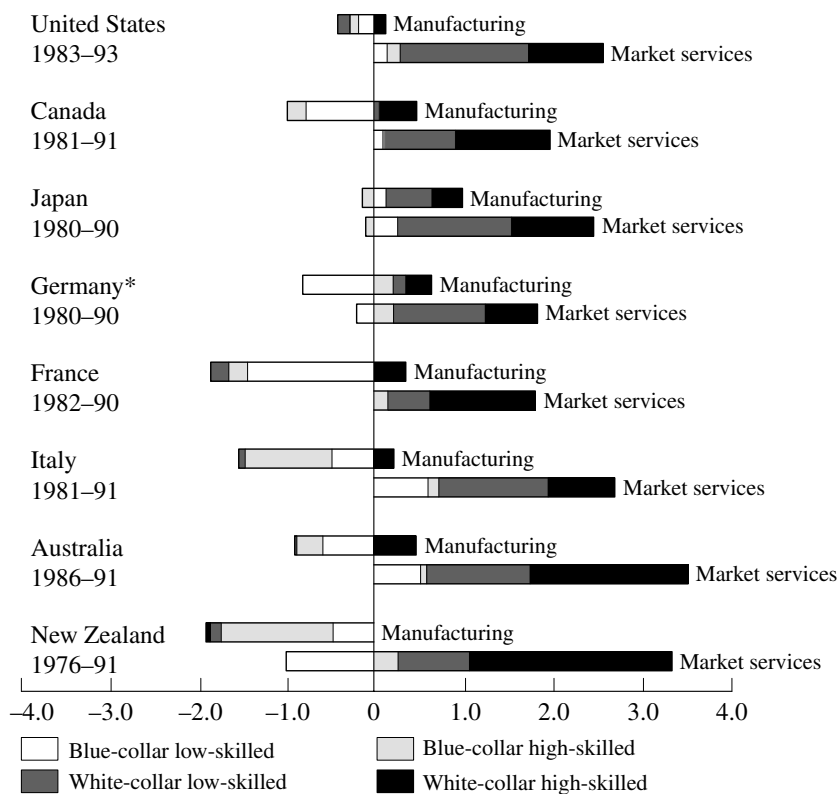
Far from leading to unemployment amongst teachers, the widespread use of ICT will enhance their importance although changing their role to that of guides and counsellors rather than instructors. Home learning will complement rather than replace schools for many social, economic and cultural reasons. Children learn from each other, and direct interaction with other children and teachers is essential if they are to develop the social skills and communication skills which are so important in our economic, social and political life. Scale economies and indivisibilities are just as important for equipment and materials in education as in other sectors of the economy (Freeman and Soete 1994). There is already a tendency for society to divide into 'information-rich' and 'information-poor' households, and any move towards 'de-schooling' would exacerbate these divisions. Schools provide the best opportunity for children from deprived households to obtain education and skills.

## 2. TECHNICAL CHANGE AND EARNINGS DISPERSION

So far this discussion has focused on long waves of technical change and their effects on employment. It points to the conclusion that to cope with structural change and to return to high levels of employment, it is essential to restore high levels of investment and to overcome the mismatch of skills and qualifications which is an inevitable feature of technical change.

However, as the case of 'information-rich' and 'information-poor' households suggests, social inequality is not only a question of employment and unemployment. Each new wave of technical change brings with it many social benefits in the forms of new, more skilled occupations and professions and higher standards of living for many people based on the growth of new industries and services. But each wave also brings high social costs in the forms of erosion of old skills and occupations and the decline of some older industries, services and industrial areas. The main trends in the change from mass production to ICT are illustrated in Figures 8.1 and 8.2. They show the general decline in manual (blue-collar) occupations and the rise in service (white-collar) occupations in the 1980s. This uneven distribution of social costs and benefits occurs also on an international scale, with some





*Notes:*

See text for definitions.

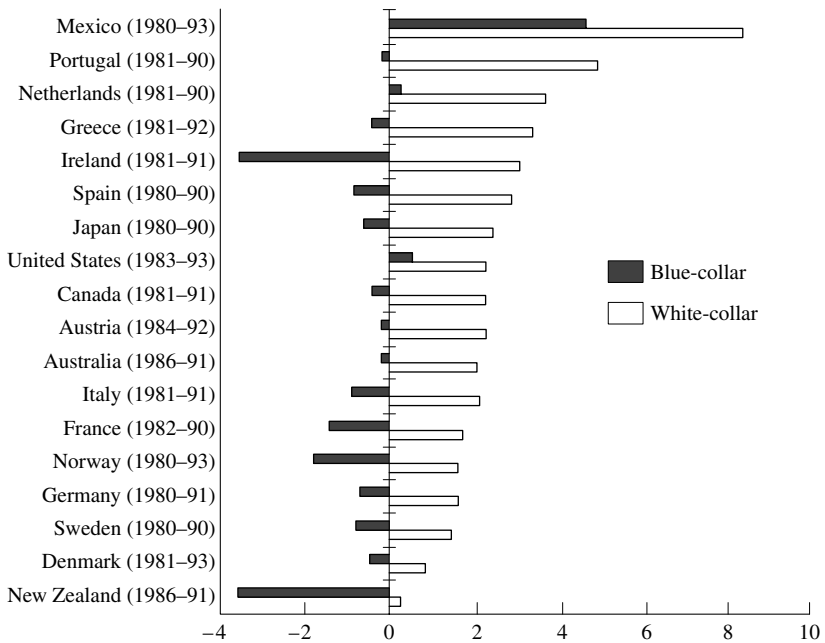
\* The white-collar high-skilled group in Germany excludes some occupations and is thus underestimated.

*Source:* OECD Secretariat calculations from national data; STI/EAS Division.

*Figure 8.1 Employment growth breakdown by skill level in manufacturing and services*

nations taking full advantage of the new technologies and others unable to do so. Reinert (1996) has demonstrated the 'collusive' effects in the distribution of the benefits of technical change associated with increasing returns to scale at the national level.

The effects of this uneven distribution of social costs and benefits are clearly visible in the statistics on income distribution for the 1980s and 1990s (Table 8.5). Twelve out of 17 OECD countries showed an increased dispersion of earnings in the 1980s, four showed no change and only one



Source: OECD Secretariat calculations from International Labour Office data.

Figure 8.2 Employment growth for blue- and white-collar workers over the 1980s (average annual growth rate)

(Germany) showed a decrease. In the 1970s the reverse was true. In that decade only one country (the United States) showed an increase in inequality while most others showed a decrease in dispersion. These statistics are for income before tax. Taking into account that fiscal changes in the UK and many other countries were regressive in this period, the increase of inequality in incomes was substantial for those who were employed. These trends were aggravated in most countries in the 1990s, above all in Eastern Europe and China.

Similar changes took place in previous waves of technical change: the earnings of engine drivers and fitters in the nineteenth century, of electricians in the 1890s, of assembly line workers in the 1940s and 1950s and of software engineers and programmers in the 1980s were all well above the average earnings of their times. It is obvious that in any well-functioning market system, the shortage of workers in rapidly expanding industries will have these effects. The Japanese electronic employers in the 1980s agreed not to poach each other's workers and tried thus to avoid the wage-push

Table 8.5 *General pattern of changes in the dispersion of earnings in the 1970s and 1980s (hourly earnings or earnings of full-time workers)*

	1970s	1980s	Comments on extent and type of changes in dispersion
Australia	–	+	Increase in the dispersion from 1979 onwards
Austria	–	+	Increase from 1980 to 1989
Belgium		+	Slight increase due to gains at top over 1983–88
Canada	0	+	Increase mainly due to gains at top
Denmark		0	Slight gains at top and bottom
Finland	–	0	Slight gains at top and bottom
France	–	–/+	Decrease in dispersion ended in 1983
Germany	0	–	Decrease mainly due to gains at bottom
Italy	–	0	Gains at top and bottom
Japan		+	Increase due to gains at top
Netherlands	0	–/+	Slight decrease to 1984, then slight increase
Norway		0	Gains at top and bottom
Portugal		+	Increase between 1985 and 1990
Spain	– –/0	+	Sharp decrease in mid-1970s, rise in 1980s
Sweden	0	0/+	Increase after 1986, except for low-paid women
United Kingdom	–	++	Increase from 1979 onwards
United States	+	++	Increase for men only in 1970s; strong gains at top in 1980s

*Notes:*

+ Increase in dispersion; ++ Strong increase; – Decrease; – – Strong decrease; 0 No clear change (perhaps changes at top and bottom working in opposite directions); +/– Increase followed by decrease (etc.); Blank No information available

*Source:* OECD (1993).

effects of the extremely rapid growth of that industry. This was a fairly typical response to this problem, even though it has rarely been effective outside Japan. Consequently, periods of rapid structural change and high unemployment have generally been associated with increased inequality of incomes.

The combined effect of prolonged periods of high unemployment together with this increased dispersion of earnings and increasingly regressive taxation has been to create or to enlarge an ‘underclass’ in the United States, Britain, Russia, France, Spain and many other countries. A huge underclass already existed in Mexico, Brazil and most other countries of Latin America and Africa, and this is growing even faster. A rise in social

tensions, crime and ethnic hostility is evident almost everywhere and clearly associated with the loss of social cohesion and increasing insecurity of employment. One of the early responses to the East Asian crisis was seen in the attempts to expel immigrant workers and hostility to 'foreigners'.

In the past when alarm bells rang, whether in the 1830s, the 1880s or the 1930s, ultimately they led to programmes of social reform, educational reform, employment policies and fiscal changes designed to mitigate the worst effects of these problems of structural change and to share the burdens more equally.

In his highly original and thorough analysis of long waves in the world economy, Andrew Tylecote (1992) studied two aspects of inequality which he designated as inequality in the North and in the South respectively. He suggested that in the North the dispersion of incomes which widened in the downswing of each long wave was superimposed on a long-term secular trend towards greater equality in income distribution. No such tendency was yet apparent in the South, with the exception of a few countries in East Asia. Moreover the inequality gap between average per capita incomes in most of the underdeveloped countries of the South and countries in the North has widened enormously in the last century. Tylecote argues that deep inequality is actually harmful for long-term growth, whether in the South or the North, and a similar point is made in the World Bank report (1993) on the 'East Asian miracle' and by Persson and Tabellini (1994). It is a tragic effect of the present crisis that the more equal income distribution which the World Bank reported in East Asia is now being undermined.

In his classic paper on 'Economic growth and income inequality', Simon Kuznets (1955, p. 20) argued that

one might assume a long swing in the inequality characterizing the secular income structure: widening in the early phases of economic growth . . . becoming stabilized for a while; and then narrowing in the later phases . . . The long swing in income inequality is also probably closely associated with the swing in capital formation proportions – in so far as wider inequality makes for higher, and narrower inequality for lower, country-wide savings proportions.

An American economist, Brian Berry, following in the tradition of Kuznets, suggested that income dispersion increased in four different periods of American history since 1776 (Berry et al. 1994). Whereas Kuznets suggested that wide dispersion of incomes was characteristic of the early stages of industrialization and economic growth, diminishing with maturity, Berry proposed that alternating periods of wider and lesser dispersion correspond to long (Kondratiev) cycles of economic development. Like Tylecote, Berry maintained that 'it is in the immediate post stagflation decade that inequality surges' (p. 10). These surges of inequality in the 1820s, 1870s, 1920s, 1980s

and 1990s were associated with the downturn of the long wave, with major structural changes, with demand for new skills (Williamson and Lindert 1980) and with exceptionally high profits in new industries.

Initially, strongly pro-business governments tend to aggravate the growing inequality, believing that a dose of strong medicine is needed to set the economy right, but ultimately, according to Berry's analysis, this leads to a political revulsion against the hardships which these policies incur (Jackson and the Homestead Act in the 1830s, antitrust legislation and other reforms in the 1890s, and the New Deal in the 1930s and 1940s). Williamson and Lindert (1980, p. 33) concluded from their study of inequality in America, 'In contrast with the previous periods of wealth leveling, the twentieth-century leveling has not been reversed.'

As Berry points out, this conclusion was too hasty. The United States and the United Kingdom have led the way in the reversal of that trend in the 1980s and 1990s. In the UK, the share of the lowest quintile (20 per cent) of household disposable incomes fell from 10 per cent of the total in 1979 to 6 per cent in 1992, while the share of the top quintile rose from 35 to 43 per cent over the same period (Table 5.19 in Central Statistical Office 1995). To reverse these trends anywhere will not be easy. John Kenneth Galbraith (1992) has pointed to the political coalition favouring inequality, and the opposition to fiscal changes favouring greater equality is everywhere formidable. New ways of thinking and policy making are urgently needed.

We can only speculate about two policy changes which have been proposed by a group which reported in 1997 to the Directorate of Social Affairs within the European Union (European Commission 1996, 1997). This group proposed first that the EU and all its member countries should examine the potential of a new tax, the so-called bit tax, to redress the gulf between the 'information-rich' and the 'information-poor'. Fiscal policy must always change with the changing structure of the economy and political realities. Principles of public finance dictate that any tax should justify three basic criteria:

1. enlargement of the revenue base;
2. economy in collection; and
3. social equity.

At first sight, the bit tax would seem to satisfy all these requirements and offer the possibility of significant redistribution, both nationally and internationally. It has been attacked as a 'Luddite tax', but the rate of growth of ICT transactions is so rapid and the lock-in effects are so strong that a low rate of levy would have only marginal effects and might indeed improve

efficiency in the information technology industries. However there are important technical problems which must be resolved before any tax could be introduced. It would probably have to be a transmission tax and could not simply be levied on numbers of bits (Soete and Kamp 1997).

The group's second proposal relates to the measurement of inflation and the argument has also been advanced by a recent report to the Senate Finance Committee. The indexing of price inflation depends on the selection of a 'basket' of commodities and services and measuring the changes in the prices of this selection. The chairman of the EU group, Luc Soete, has argued that this selection is out of date as it understates some of the information services which are now commonplace (Soete and Kamp 1997). The prices of ICT goods and services have generally been falling since the late 1980s, in contrast to the general inflationary trends. Yet the inflation index still reflects to some extent the old structure of the economy. The very use of the word 'basket' reflects the old goods-based structure of the economy when these indices were first introduced. They have of course been revised since then, but the report to the Senate Finance Committee maintained that US inflation has been overestimated by between 1 and 2 per cent. Luc Soete has calculated that inflation in the EU has been overestimated to a greater extent.

This has major implications for macroeconomic policy and social policy, as the overestimation of inflation has led to unnecessarily restrictive policies and higher rates of interest in Germany, France and other European countries. This has slowed down growth and raised unemployment. The understanding of structural change and technical change is thus fundamentally linked to the great social problems which confront us. This is even more true of James Tobin's proposal to tax speculative transactions on the foreign exchange markets, which were a major source of the instability in the East Asian markets in 1997 to 1998. All of these examples seem to indicate the type of new thinking and policy-making which will be needed to overcome the recessionary trends in the world economy which now confront us.

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