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Productivity and American Leadership

A Review of W. J. Baumol, S. A. B. Blackman and E. N. Wolff, *Productivity and American Leadership: The Long View, MIT Press, Cambridge, MA*, 1989.

Productivity and American Leadership brings together the earlier writings of Baumol, Blackman and Wolff (BBW) on productivity growth and applies their central ideas to the question of long-run economic growth in the U.S. and the challenge the country may now be facing. Although at one time the authors were very gloomy about U.S. prospects, the present book marks a change. They now believe that U.S. prospects are reasonably good, and although they emphasise that the retention of U.S. leadership will not be automatic or easy, they are guardedly optimistic about the future. The U.S. faces a serious challenge, but it is still the world's leader in many areas, and with a determined effort it can retain this traditional position. This is the central message of the book.

This book is a *tour de force*, both in the sweep of its ideas and in the depth of its analysis. It makes a vigorous defence of the benefits of economic growth and describes and analyses a century of productivity growth in the U.S. and other countries. It explores the dynamics of service sector employment and the rise of the so-called information economy. In addition, it has chapters on such diverse topics as education and economic development, natural resources and the measurement of productivity. These items are all treated in a careful and professional way, but to make the book accessible to the non-specialist much of the technical detail is wisely relegated to appendices, which occupy over a hundred pages.

It is impossible within the space of a single article to do justice to the whole of this book, so I shall confine myself to three key areas: (1) unbalanced productivity growth and its implications for relative costs and the structure of employment; (2) the convergence hypothesis; (3) U.S. economic leadership.

1. Unbalanced Growth and the Cost Disease

In an influential article, "The Macro-economics of Unbalanced Growth: The Anatomy of the Urban Crisis," Baumol (1967) drew attention to the phenomenon of uneven productivity growth and its implications for relative costs and the structure of employment. These topics are taken up again in the present book in two chapters devoted to the role of services and information processing in the U.S. economy.

Note: I am grateful to William Baumol, Lars Osberg and Andrew Glyn for comments on the draft version of this paper.

As in the original article, the starting point is the observation that productivity growth is persistently faster in some economic activities than others. This is true whether we look at labour productivity or some wider measure such as total factor productivity. To describe activities which experience persistently high rates of productivity growth BBW use the term "technologically progressive," whilst those experiencing relatively low rates of productivity growth are described as "technologically stagnant." Through the course of time, they argue, technologically stagnant activities will experience steadily rising costs in comparison with more progressive activities. This change in relative costs may cause some shift in the composition of demand, and hence output, away from technologically stagnant activities towards cheaper, more progressive activities. Such a shift in demand may help offset the effect of rising costs and serve to contain the total amount of resources, such as capital and labour, devoted to stagnant activities. However, if the scope for substitution is limited or non-existent, the share of total resources absorbed by the stagnant activities will rise in step with their increasing relative cost. BBW use the term "cost disease" to denote the effect of lagging productivity growth on the relative cost of stagnant activities and they argue it is responsible for many phenomena mistakenly ascribed to other factors. In their view, it is entirely responsible for the increasing share of the service sector in both employment and current price GDP in the U.S. and many other economies. The cost disease is also, they claim, a major factor behind the rapid growth of employment in information-related activities such as data processing and knowledge production.

The rising share of the service sector in employment and current price GDP is popularly seen as evidence of the declining importance of goods production in the U.S. and other advanced economies. BBW reject this explanation. They point out that the output of manufactured goods in the U.S. has risen just as fast over the past few decades as the output of services. They also cite evidence from an international cross-section study by Summers (1985) on patterns of expenditure. This study shows that, after correcting for international differences in relative prices, rich countries spend no greater share of their income on services than do poor countries. The greater share of services in total expenditure in rich countries is explained entirely by the fact that the relative price of services is much higher in rich countries than poor. From the foregoing evidence BBW conclude that goods remain as important as ever in both expenditure and production, and that the apparent shift towards services in advanced economies is a statistical illusion caused by price effects resulting from lagging productivity growth in the service sector.

As BBW themselves point out, this is a well-known line of argument which goes back at least to Lengellé (1966) and Fuchs (1968), and has been explored more recently by Blades (1987), Summers (1985) and Rowthorn and Wells (1987), among others. The evidence in support of it is considerable. Despite the familiar problems of measuring productivity in the services, there is little doubt that productivity growth in the service sector has on average been significantly lower than in goods production over the past few decades. The difference between measured productivity growth is in general too great and too persistent to be explained simply by measurement error. There is also little doubt that lagging

TABLE 1

GOODS AND SERVICES IN THE U.S. ECONOMY 1973-88

	1973	1988	Growth Rate (% p.a.)
Hours worked (billions)			
Goods	53.0	54.0	0.12
Services	94.3	132.0	2.24
Ratio services/goods	1.78	2.44	2.12
Real output ($billions 1982 prices)			
Goods	1,121	1,461	1.76
Services	1,611	2,571	3.12
Ratio services/goods	1.44	1.76	1.35
Productivity ($1982 per hour)			
Goods	21.2	27.1	1.64
Services	17.1	19.5	0.88
Ratio services/goods	0.81	0.72	−0.76

Source: All data from the *Survey of Current Business*; *Revised Output Series* for 1977-88 (as given in the January 1991 issue of the Survey) spliced to unrevised series for 1973-78.

Note: Goods = agriculture, mining, manufacturing, construction, utilities; Services = all other industries.

productivity in the service sector has been a significant factor behind the extremely rapid growth of employment in this sector.

However, there is also evidence that in recent years demand factors have played a greater role than BBW recognise. Table 1 presents U.S. data for the period 1973-88, which partially support the argument of BBW. Over the period concerned, there was a considerable rise in the share of services in total employment; moreover, productivity growth in the service sector was on average much lower than in goods production. However, it is also striking that the output of services grew much faster than that of goods, the annual growth rates being 3.12 percent and 1.76 percent respectively. If we decompose the increase in the share of services in total employment, it appears that less than two-fifths of this increase was due to the productivity lag in services, while more than three-fifths was due to the faster growth in the output of services as compared to goods.[1] This implies that in recent years demand factors have been the major force behind the apparent shift to a service economy in the U.S. This contradicts the claim of BBW that the shift in employment structure towards services is a supply side phenomenon due primarily to lagging productivity growth in the service sector. It is possible

[1]The share of services in total hours worked was 64.0 percent in 1973 and 71.0 percent in 1988. This represents a 7.0 point increase. Suppose that the structure of output had remained constant over this period, but productivity had increased in the two sectors at the rates shown in Table 1. Then the share of services in total hours worked would have been 66.6 percent in 1988. Thus, of the actual 7.0 point increase in the share of services, only 2.6 points (= 66.6 − 64.0) was due to differential productivity growth, less than two-fifths of the total increase.

that post-1973 developments are an aberration reflecting temporary factors, such as the marked deterioration in the U.S. merchandise trade balance which occurred during this period. Such a deterioration implies a shift in the pattern of U.S. demand from domestic to imported goods, whose effect was to depress the share of goods as compared to services in total production. If this is the main explanation, the falling share of goods production in U.S. real output will automatically come to a halt as the merchandise balance is eventually stabilised.

Perhaps the most interesting application by BBW of the cost disease hypothesis is in their chapter, "Is the U.S. Becoming an Information Economy." The share of information workers in total employment in the U.S. has risen from 42.2 percent in 1960 to 52.5 percent in 1980. This increase is widely seen as evidence that information processing is becoming more important in relation to traditional production activities, supposedly because of the growing complexity of modern economic life. BBW are sceptical of this view although they do not reject it out of hand. They argue that the rapid increase in the number of information workers might be just another manifestation of the cost disease, arising from lagging productivity growth in information processing. They also point out that it is hard to quantify the relative contribution of these rival explanations, because of the difficulty of measuring the output of information workers. Their main result is that between 37.8 percent and 91.0 percent of the total increase in the employment share of information workers in the U.S., over the period 1960–80, was due to some form of productivity lag. Splitting the difference would produce an estimate of 68.9 percent. This implies that over two-thirds of the increased share of information workers was due to lagging productivity growth in information intensive activities, and less than a third to a genuine increase in the volume of information processed in the U.S. economy. If correct, this is a striking conclusion.

Another interesting development of the cost disease hypothesis in this book is the theory of "asymptotic stagnancy," and its application to individual economic activities. The basic idea is not a new one. It underlies, for example, Marx's theory of the falling rate of profit (see Rowthorn, 1993) and was discussed in general terms by Kuznets (1929). What differentiates the present treatment is the careful mathematical formulation of the theory of asymptotic stagnancy and the specific applications considered. For an activity to be asymptotically stagnant it must contain a component which is technologically stagnant (i.e. experiences relatively slow productivity growth) and there must be a lower bound to the share of this component in total output. Among the various components satisfying these conditions, there will normally be one with the slowest productivity growth. Over the long-run, this will become the dominant component, and productivity growth for the activity as a whole will asymptotically approach productivity growth in this component. Some components may be highly progressive and experience very high rates of productivity growth, but these will become increasingly irrelevant in the course of time since their employment share will tend to zero. Indeed, asymptotically, employment will tend to concentrate entirely in the most stagnant component. The mathematics of this are rather obvious, but it has important implications for certain activities or even for the economy as a whole.

BBW consider two specific examples: data processing and television broadcasting. They point out that data processing has two components. There is a hardware component which is technologically progressive and has experienced very high rates of productivity growth for several decades, as evidenced by the steadily falling cost of hardware. There is also a labour intensive software component, where productivity growth is relatively slow. Over the long-term, we should expect the cost of data processing to become increasingly dominated by software and labour costs, with the share of hardware declining. BBW show that this is exactly what has happened. They show that similar developments have occurred in television broadcasting, where costs have become increasingly dominated by labour intensive programme expenses, while the share of hardware intensive technical broadcasting has declined rapidly. These examples are interesting both in their own right and for their implications for the economy as a whole. They suggest that certain apparently progressive sectors, which are currently experiencing rapid productivity growth, may in fact be asymptotically stagnant. They may contain stagnant subcomponents which in the long-run will pull down their overall rate of productivity growth. Potentially, this could have serious implications for the economy as a whole, although this question is not systematically explored by BBW. Nor do they discuss the possibility that the U.S. economy as a whole may be asymptotically stagnant, although this is clearly implied by their previous discussion of de-industrialisation and the rising share of service sector employment. I shall return to this question below.

2. The Convergence Hypothesis

Any serious discussion of U.S. leadership and international economic rivalry must take into account the possibility that follower countries have an advantage over the leaders. They can benefit from technologies developed in the leading economies which can be imported at relatively low cost. They also have an economic model to follow and improve upon. This rather obvious proposition underlies the so-called convergence hypothesis, which asserts that poor countries will normally grow faster than rich countries. The result will be a tendency towards the convergence of per capita incomes. Some countries will occasionally surge ahead, but after a time the convergence tendency will re-assert itself and those behind will start to catch-up. This does not mean that differences in per capita income will completely disappear, since countries have different endowments of natural resources and they may also differ with regard to unemployment and participation rates. However, such differences are not the main source of international variations in per capita income, and their existence does not fundamentally invalidate the basic idea behind the convergence hypothesis.

Statistical evidence in support of this hypothesis, covering a century of experience, has been presented by, among others, Abramovitz (1986), Baumol (1986) and Maddison (1987). Such studies have been criticised by Romer (1986) and De Long (1988) on various grounds. For example, the data cover only a limited sample of successful countries, all of which have a high terminal per capita GDP. Excluded are countries, such as Argentina, which have either failed to catch up or else have fallen behind despite an initially favourable position.

The inclusion of only ex-post successful countries creates an obvious bias towards acceptance of the convergence hypothesis. A more technical criticism of the evidence is that measurement errors in the initial observations may also create a bias towards acceptance of this hypothesis.

The above objections are squarely faced by BBW in the present book and a considerable effort is made to overcome earlier weaknesses. A variety of different samples and several time periods are considered. Moreover, drawing on the work of Wolff (1987), it is argued that the biases arising from measurement errors are not serious and can be ignored. The most interesting part of the discussion on convergence concerns the period since 1950, for which extensive information is available on a wide variety of countries, and statistics are more reliable than for earlier times. In examining this period, BBW distinguish between four groups of countries: industrial, intermediate, centrally planned and less developed (LDCs). Using a number of different tests they find strong evidence of convergence in GDP per capita among all countries except for those in the least developed category. As far as the industrial, intermediate and centrally planned groups are concerned, there is convergence both between and within groups. These countries all belong to what BBW call the "convergence club," within which growth rates of per capita GDP are inversely correlated with initial income. However, the convergence hypothesis does not seem to apply to the very poorest countries which make up the LDC group. In general, their per capita incomes show no sign of catching up with those of the richer countries, and in some cases they are falling even further behind. According to BBW, this points to the existence of a threshold which countries must cross if they are to join the convergence club and enjoy above average growth rates of per capita income. Very poor countries, they argue, are normally below this threshold because they have neither the material nor cultural resources to import foreign technology on the scale required for rapid growth. A final point made by BBW concerns the recent past. They suggest that, since 1973, the tendency towards convergence has weakened, and many follower countries within the former convergence club are no longer enjoying especially fast growth rates, nor by implication is the technological gap between them and the leaders any longer narrowing.

The evidence presented by BBW in support of the convergence hypothesis for the period 1950–80 is, in my view, very convincing. Also extremely interesting is their conclusion that convergence has occurred both between and within the industrial, intermediate and centrally planned groups. However, their work in this area does have certain weaknesses. For example, the discussion of convergence is conducted entirely in terms of GDP per capita or per work-hour, and apart from some discussion of U.S. manufacturing no effort is made to examine the experience of individual sectors. Nor is there any serious effort to disentangle the separate contributions of investment and technological diffusion to convergence in income levels.

The last question is examined by Dowrick and Nguyen (1989). Using a similar data base to that of BBW, they seek to isolate the separate contributions of investment and technological catching-up to per capita GDP growth. In general, their conclusions support those of BBW. Indeed, on the subject of convergence, their conclusions are even stronger. They find that even in the case of LDCs there

has been a process of technological convergence. However, this has not been reflected in per capita GDP because of low investment and/or rapid population growth. Interestingly, the negative impact of population growth on per capita income is recognised by BBW elsewhere in their book in a chapter entitled, "Education and the Convergence Club." Dowrick and Nguyen also question the view that convergence has slowed within the former Convergence Club since 1973. When allowance is made for investment, they find that purely technological convergence has continued at quite a fast rate within the OECD countries. However, per capita income levels are no longer converging so rapidly because certain follower countries are no longer investing on such a large scale as before.

Some New Evidence

Another weakness of BBW is the highly aggregative nature of their evidence on convergence. Like most other writers in this field, they are concerned mainly with overall GDP and pay relatively little attention to individual sectors.[2] This omission is explained, presumably, by a lack of suitable data on the experience of individual sectors. Since their book went to press, the OECD has recently published disaggregated statistics which throw some light on the convergence process at a sectoral level. Unfortunately, these go back only to 1970 and cover only 12 OECD countries. Even so they do raise some interesting questions. Table 2 shows the result of a simple regression analysis designed to estimate the role of "catching-up" in the growth performance of these countries over the period 1970–85. Four major sectors are distinguished, namely agriculture, manufacturing, government and community services, and a catch-all sector covering other "sheltered" sectors such as construction, transport, finance and various other services. For each sector, and also for the economy as a whole (excluding mining), equations of the following type were estimated:

$$\text{GPROD} = \text{constant} - \lambda * \text{Log (LPROD70)}$$

where GPROD is the average annual growth rate of labour productivity or total factor productivity, and LPROD is value added per worker in 1970 in the sector concerned. The coefficient λ measures the extent to which countries with initially low labour productivity enjoyed relatively fast productivity growth. This provides some indication of the degree to which international differences in performance in the sector concerned were influenced by "catching up." The reason for looking at total factor productivity, as well as labour productivity, is to allow for the potentially important influence of investment on output growth. Since the country is such an outlier for certain variables, estimation was done for samples both including and excluding Japan.

The table reports only the values of λ and their significance levels, since these are the items of real interest in the present context. The key points to note are as follows. At an aggregate level there is clear evidence of convergence. All coefficients are highly significant and of the right sign. They are largest for

[2]A rare study of convergence at the sectoral level is Dollar and Wolff (1988), which examines trends in manufacturing.

TABLE 2

PRODUCTIVITY CONVERGENCE 1970–85: REGRESSION RESULTS

	Total	G and S	Other Sheltered	Agriculture	Manufacturing
Labour productivity					
Incl. Japan	3.45**	0.43	1.79*	0.67	2.04
	(4.88)	(0.51)	(2.00)	(0.88)	(1.50)
Excl. Japan	2.71**	0.16	1.69	1.91*	1.16
	(3.83)	(0.18)	(1.49)	(2.13)	(1.02)
Total factor productivity					
Incl. Japan	1.63**	0.54	0.84	−0.26	1.24
	(4.27)	(0.83)	(1.30)	(0.35)	(1.23)
Excl. Japan	1.68**	0.64	1.37	1.13	0.68
	(3.65)	(0.92)	(1.77)	(1.43)	(0.74)

Sources: Meyer-zu-Schlochtern (1988), OECD *National Accounts* and OECD *Labour Force Statistics*.

Note: This table is based on data from the following countries: Norway, Belgium, Denmark, Finland, Sweden, Germany, Italy, U.K., Canada, Australia, U.S.A. and Japan. The coefficients reported here were obtained by regressing average annual productivity growth over the period 1970–85 against labour productivity in 1970 in the sector concerned. (For further details see the main text.) Estimation was by ordinary least squares. Absolute t-values are shown in parentheses, **(*) denotes significance at the 1% (5%) level on a one-tailed t-test. Sectors are defined as follows:

G and S:	Government, community, social and personal services.
Other sheltered:	Electricity, gas and water, construction, wholesale, retail trade, restaurants and hotels, transport, storage and communication, financial institutions and insurance.
Manufacturing:	Excludes primary metals.
Total:	Whole economy excluding mining.

labour productivity, and somewhat less for total factor productivity, but even in the latter case they suggest a fairly powerful convergence process.

If we look behind this aggregate picture, the scene is more confused. Coefficients are mostly of the right sign, but their significance levels are generally quite low. Indeed, in the case of total factor productivity not one sectoral coefficient is significant even at the 5 percent level on a one-tailed t-test, and half of them have absolute t-values of less than unity. Looking at individual sectors, there is not much evidence of convergence in the case of government and community services, although this may mean very little given the problems of measurement in this sector. In the other sectors, depending on the sample or productivity measure concerned, there is some indication of convergence but the evidence is rather shaky. The results just presented are somewhat paradoxical. At an economy-wide level the evidence for convergence appears fairly convincing, but it is much weaker or non-existent at the sectoral level. *A priori* we should expect just the opposite, since the pace of technological diffusion should depend more on conditions in a particular sector than in the economy at large. Whatever the explanation for this paradox, it raises serious questions for the interpretation of studies which are based uniquely on aggregate GDP data. It does not mean that the general conclusions of these studies are incorrect, but it does mean that

further work of a disaggregated nature is required, both to estimate the true pace of technological convergence and to identify the leading sectors in this process. My own view is that convergence is most rapid in the manufacturing sector and least rapid in many services. Such intersectoral differences in the pace of convergence have important implications for the evolution of employment structure in late developing countries. They imply, for example, that industrial employment will never achieve the same importance in late developers, such as Japan or South Korea, that it once achieved in pioneer countries such as Belgium or the U.K. In the late developers, the share of industry in employment will normally peak at a much lower level than it did historically in the pioneers—before beginning the decline which occurs eventually in all advanced economies.[3]

3. U.S. Leadership

As the title suggests, the underlying theme of this book is U.S. economic leadership. This question is examined from many different angles and is evaluated in the light of more than a century of experience. The general picture presented by BBW is cautiously optimistic. While recognising many weaknesses in the U.S. economy, they also indicate various grounds for hope. For example, they admit that the growth rate of GDP per capita has slowed down since 1973, but they point out that this deceleration has been almost universal in the OECD and in itself tells us very little about prospects for U.S. leadership. They argue that U.S. manufacturing industry is holding its own in comparison with the rest of the OECD. They also point out that U.S. productivity growth remains high in areas of traditional strength such as agriculture and manufacturing. Finally, they suggest, the obvious challenger to U.S. leadership, namely Japan, may spontaneously lose much of its dynamism as it grows richer. This may arise partly because the scope for "catching-up" will diminish as Japan reaches the technological frontier, and the scope for importing technology from more advanced economies will thereby disappear. In addition, as Japan becomes richer its austere culture will soften and the country will start to enjoy the benefits of wealth, with the result that saving and investment rates may fall to levels more like those of other rich OECD countries. Because of these developments, the spectacular growth rates hitherto achieved in Japan may slow down considerably in the near future. This does not mean that the U.S. can ignore the threat from Japan, or even Western Europe, but simply that this threat may not be quite so serious as it appears. These countries will continue to present a formidable challenge, but the U.S. still has great economic potential and with a determined effort can meet this challenge. The message of the book, the authors conclude, is that decline into second-rate status is "by no means manifest destiny. Rather, the long-run record offers much ground for optimism and indicates that a bright future remains within our grasp. It is for us to seize it." (p. 282.)

The optimism of BBW provides a useful antidote to the writings of the gloom and doom school, which both exaggerate the weaknesses of the U.S. economy

[3]For a discussion of this question see Rowthorn and Wells (1987), especially Appendix[2].

and fail to locate recent U.S. developments adequately in their proper historical and international context. However, in their discussion of the manufacturing sector, BBW underestimate the seriousness of the challenge from Japan, which is catching up with the U.S. extremely fast and on a per capita basis has already overtaken the U.S. as the world's leading manufacturing producer. However, manufacturing is not the only sector, and the long-term performance of the U.S. depends on its ability to raise productivity in the rest of the economy. As BBW themselves show, U.S. productivity growth has also declined in sheltered industries, such as construction and most services, but they fail to explore the implications of this for either future growth in the U.S. economy or the country's international position. They also fail to explore the negative implications of their own theory of asymptotic stagnancy for long-term U.S. economic growth. The result of these various omissions is a somewhat complacent view of U.S. economic prospects. The book is correct to oppose the extreme views of the gloom and doom school, but it errs too much in the opposite direction. Although it contains a germ of truth, the suggestion that the challenge from other countries, especially Japan, will spontaneously weaken as they begin to catch up and enjoy the fruits of prosperity seems dangerously familiar to a British reader such as myself. It is reminiscent of the facile optimism prevalent in my own country in the 1950s, when the Europeans and Japanese were first re-emerging on the international stage following post-war reconstruction. The catching-up hypothesis was widely used to explain away their superior economic performance and provided a convenient excuse for inactivity. Despite the authors' warnings about the need for more investment and R&D, and for a redirection of the country's entrepreneurial energies, there is a complacent thread running through this book which could reassure the American reader at a time when just the opposite message is required. This is not their intention, I believe, but it could be the result.

There is also a certain complacency in their discussion of de-industrialisation and other forms of structural change. Some authors, such as Bluestone and Harrison (1982), see the decay of the old industrial heartlands as evidence of American decline; others, such as Norton (1986), see it as an aspect of growth-enhancing structural change. But whatever their views about its long-term consequences, most authors recognise the suffering imposed on urban blacks and others hurt by these developments. It would have been nice to have seen a similar recognition in the present book. Instead, structural change is presented as a purely arithmetic process in which new jobs replace old jobs, and everyone is ultimately better off. The often huge transitional costs involved in this transformation are largely ignored by BBW. Indeed, the adjective "transitional" may itself be quite misleading in this context, since it implies a tendency for these costs to disappear spontaneously in the course of time. This assumption is not always justified. For example, decaying industrial areas may have negligible power to regenerate themselves spontaneously, and in the absence of special policy measures to help them these areas may remain depressed indefinitely and those who live in them permanently impoverished. Such durable negative consequences of structural change have as much right to be included in the "long view," as do the more positive features stressed by BBW.

U.S. Manufacturing

It is widely believed that the performance of U.S. manufacturing industry is extremely poor both by historical standards and in comparison with the country's main rivals. BBW demonstrate that such a blanket judgement is quite misleading. One index is the behaviour of manufacturing employment. In virtually all OECD countries the share of manufacturing in total employment has been falling over the past twenty years or so. However, as BBW show, the decline has not been especially fast in the U.S. Moreover, in terms of absolute numbers, employment in U.S. manufacturing has scarcely altered over this period, while many European countries have experienced a massive fall. Although the authors do not point this out, the stability in total numbers in the U.S. conceals a major geographical shift. There has been a large decline in the number of people employed in manufacturing in the Northern states of the U.S., but this has been offset numerically by a major expansion in manufacturing jobs elsewhere in the country (see Norton, 1986). In Europe, by contrast, the decline of manufacturing employment in the old industrial heartlands has not generally been accompanied by a growth of manufacturing employment in other regions. Thus, as far as manufacturing is concerned, the U.S. experience over the past twenty years has been one of geographical restructuring within a given employment total, while most European countries have experienced a massive fall in the overall number of people employed in this sector. For the old industrial regions caught up in this process the end-result may be much the same, but for the economy as a whole the picture is quite different.

In aggregate employment terms, the U.S. manufacturing industry has been more dynamic in recent decades than most of its European counterparts. This is true not just in terms of absolute numbers. BBW show that it remains true even if we allow for the fact that the U.S. has a much higher growth rate of population than most European countries. Further evidence is given in Table 3. The ratio

TABLE 3

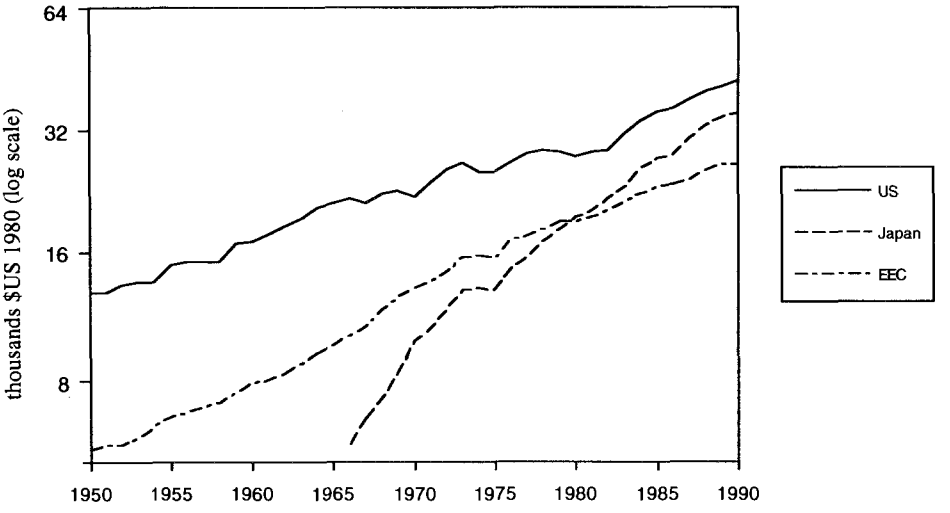
MANUFACTURING PERFORMANCE 1950-90

	% p.a. growth rates					
	50/66	66/73	73/90	50/66	66/73	73/90
	Output			Output Per Worker		
U.S.	4.5	3.2	2.6	3.1	2.5	2.5
Japan	14.8	14.4	5.8	8.7	11.5	5.5
Germany	7.8	5.3	1.7	4.2	5.1	2.4
EEC ex. Germany	5.0	6.0	1.8	3.3	5.9	3.0
	Employment/Population			Output/Population		
U.S.	−0.2	−0.5	−1.0	2.9	2.1	1.5
Japan	5.1	1.7	−0.5	13.8	13.2	5.0
Germany	2.6	−0.5	−0.7	6.7	4.6	1.7
EEC ex. Germany	0.9	−0.6	−1.5	4.3	5.3	1.4

Source: OECD *National Accounts*, OECD *Historical Statistics*, OECD *Main Economic Indicators*, U.S. *Survey of Current Business*, UN *Industrial Statistics* and UN *Demographic Yearbook*. Output per worker covers "all persons" as given in Table 15 of the OECD *National Accounts*.

of manufacturing employment to population has been falling in most European countries since as far back as 1966 and in some cases before. The pace of decline was similar to that of the U.S. over the period 1966-73. Since 1973, however, the European decline has accelerated markedly and in most countries has been far more rapid than in the U.S. This evidence supports the contention of BBW that, in terms of aggregate employment, the U.S. manufacturing sector has been doing quite well by international standards.

The picture is more complex if we look at other indicators of performance. Throughout the 1950s and 60s, manufacturing output and labour productivity grew much faster in both Europe and Japan than in the U.S. Since 1973, however, European performance has deteriorated dramatically (see Table 3). In terms of productivity growth in the manufacturing sector, there is now little to choose between the U.S. and Europe, while in terms of total output Europe has been falling behind. Since 1973, the European challenge has faded noticeably and whatever problems U.S. manufacturing has experienced during this period have been suffered as badly, or even worse, by the Europeans. The real threat to U.S. leadership is Japan, whose manufacturing sector is still expanding several times faster. This is strikingly obvious from Figures 1 and 2, which compare the

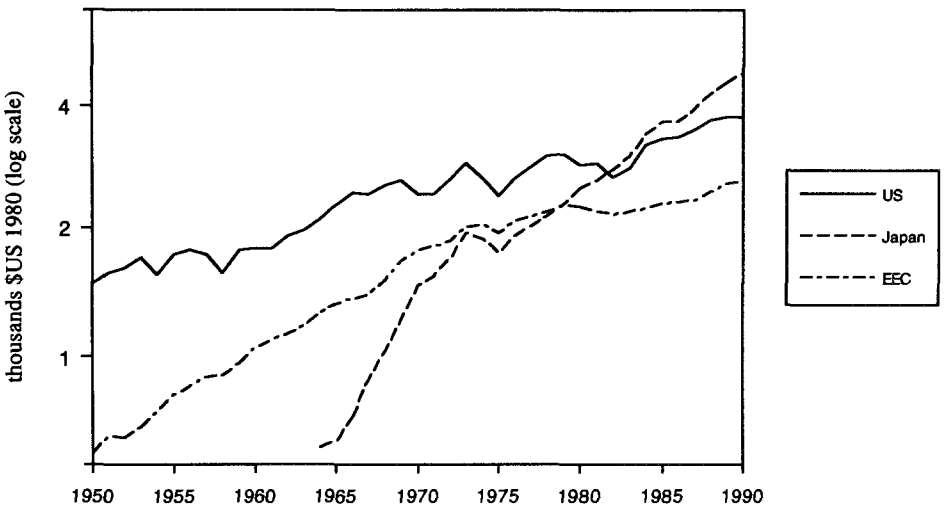


Source: See Table 3; conversion to US dollars using GDP PPP exchange rates.

Figure 1. Manufacturing Output Per Worker (1980$U.S. at GDP PPPs)

experience of the three major blocs. They illustrate clearly how the European challenge has faded and how rapidly Japan is overhauling the U.S. From Figure 1, it looks as though average output per worker in Japanese manufacturing will overtake that of the U.S. towards the end of the century. Indeed, in sectors such as machinery, transport, equipment and electronics, labour productivity in Japan is already well above the American level.[4] More interesting, perhaps, is Figure

[4]See Szirmai and Pilat (1990).



Source: See Table 3; conversion to US dollars using GDP PPP exchange rates.

Figure 2. Manufacturing Output Per Capita (1980$U.S. at GDP PPPs)

2 which suggests Japan has already overtaken the U.S. in terms of manufacturing output per head of population.

The above comparisons indicate what a serious challenge U.S. manufacturing is facing from Japan. The dimensions of this challenge is not fully brought out by BBW, whose discussion of competition in the manufacturing sector fails to distinguish adequately between Europe and Japan. They argue, correctly, that against the OECD as a whole the U.S. is holding its own. However, this overall judgement conceals the fact that, while the U.S. is pulling further ahead of Europe, it is being rapidly overtaken by Japan.

Sectoral Comparisons

Much of analysis of U.S. history in this book is concerned with intersectoral differences in growth performance. Yet apart from some discussion of the manufacturing sector, there is no effort to apply these ideas to the question of international competition and U.S. leadership. This is a pity since intersectoral differences are clearly important in this area. Table 4 provides information on sectoral performance in the U.S., Germany and Japan over the period 1970-85. The table is self-explanatory and is drawn from the same data source used for the regression analysis reported earlier.

The picture revealed by this table is as follows. In most sectors output per worker has grown more slowly in the U.S. than either Germany or Japan. The one exception is manufacturing, where the U.S. growth has been similar to that of Germany, though still well behind Japan. The generally slow growth of American labour productivity is partly explained by the fact that investment has been much lower in the U.S. In the U.S. economy as a whole, capital per worker grew by less than 1 percent p.a. over the period as compared to nearly 4 percent

TABLE 4

ECONOMIC GROWTH IN THREE COUNTRIES 1970-85

(percent per annum)

	Total	G and S	Other Sheltered	Agriculture	Manufacturing
Real Value Added					
U.S.A.	2.78	2.06	2.72	1.99	3.39
Germany	2.35	3.44	2.18	1.10	1.72
Japan	4.71	3.83	3.92	0.13	6.36
Employment					
U.S.A.	1.88	1.83	2.48	−0.52	0.17
Germany	−0.34	2.11	−0.27	−3.39	−1.37
Japan	0.75	2.76	1.34	−2.95	0.26
Capital Stock					
U.S.A.	2.81	2.30	3.63	2.32	3.46
Germany	3.29	3.77	4.09	1.99	2.48
Japan	7.47	8.65	7.80	7.65	7.12
Value Added Per Worker					
U.S.A.	0.90	0.23	0.24	2.51	3.22
Germany	2.69	1.33	2.45	4.49	3.09
Japan	3.96	1.07	2.58	3.08	6.10
Total Factor Productivity					
U.S.A.	0.59	0.15	−0.07	1.80	2.23
Germany	1.48	0.70	1.34	3.14	1.89
Japan	1.57	−0.05	0.65	0.43	3.87

Source: Mayer-zu-Schlochtern (1988).
Note: For a definition of the sectors see Table 2.

and 7 percent, respectively, in Germany and Japan. In addition, the latter countries were relatively backward at the start of the period and had considerable scope for catching up. Thus, it is not surprising that they experienced generally faster growth rates of labour productivity.

Where investment rates differ widely between countries, simple comparisons of labour productivity can be misleading, and a better indication of relative performance may be provided by total factor productivity (TFP). From the first column of Table 4, it is clear that overall TFP has been rising more slowly in the U.S. than either Germany or Japan. However, this broad comparison conceals some major sectorial variations. In manufacturing, Japan has enjoyed easily the fastest TFP growth, with the U.S. second and Germany last. In non-manufacturing activities the order is reversed, and it is Germany which has the greatest increase in TFP. These findings suggest that, over the long-run, the central problem for the U.S. and Japan will be to raise total factor productivity in services and other non-manufacturing activities, while in Germany it is the manufacturing sector where performance is relatively weak by international standards.

Unbalanced Growth

BBW document carefully the performance of various sectors of the U.S. economy. They distinguish between progressive sectors where productivity growth

has traditionally been fast, and stagnant sectors where it has normally been slow. Among the former are agriculture, manufacturing, transport, public utilities and wholesale trade; among the latter are most other services and construction. They also show how the decline in productivity growth over recent decades is mainly confined to the stagnant sectors where productivity growth was already slow. In the progressive sectors, previous dynamism has for the most part been maintained and the bulk of them, with the notable exception of mining, exhibit no sign of any permanent slowdown in productivity growth. This is an interesting distinction and the authors are justified in drawing attention to it. However, they do not seem to recognise its significance, nor do they explore its implications.

From BBW's own theory of asymptotic stagnancy, we know that long-term productivity growth is likely to be dominated, not by the experience of the most dynamic sectors, but by that of the least dynamic. The reason is simply that in the course of time technologically stagnant sectors are likely to absorb an increasing fraction of the total labour force. Even with no change in productivity growth within individual sectors, such a shift in employment structure towards stagnant sectors will in itself pull down the overall growth rate of productivity. If at the same time there is a deceleration of productivity growth within the stagnant sectors themselves, the decline in overall productivity growth will be even greater. In an asymptotically stagnant system what matters ultimately is not the rate of productivity growth in the most dynamic sectors, but in the least. BBW imply that it does not really matter that productivity growth has slowed down in traditionally stagnant sectors of the U.S. economy, since growth has continued as before in the most dynamic sectors. This is exactly the wrong conclusion to draw. It is precisely because the slowdown has occurred in the already stagnant sector that is so worrying for the long-term future.

Let us explore this question further. Tables 5 and 6 show what happened to individual sectors in the U.S. economy between 1973–88 and project forward the experience of this period up to the year 2020. The sectors shown in these tables are based on OECD definitions and are classified into two groups: dynamic and stagnant. The dynamic sectors are those in which hourly labour productivity grew by at least 1.0 percent a year over the period 1973–88; other sectors are classified as stagnant. With the principal exception of mining, the dynamic sectors correspond roughly to those labelled as progressive by BBW. From Table 5 we see that the dynamic sectors have experienced somewhat faster output growth than the stagnant sectors. However, this has not been sufficient to offset the huge differential in productivity growth, which has averaged 2.19 percent p.a. in the dynamic sectors as compared to −0.20 percent in the stagnant sectors. As a result, just as the theory of asymptotic stagnancy predicts, there has been a significant shift in employment structure towards the stagnant sectors, where employment growth has averaged 2.43 percent p.a. as compared to 0.75 percent in the dynamic sectors.

Table 6 shows three different projections. Projection A assumes no further change in the structure of employment after 1988. This is the most optimistic scenario. It is also quite unrealistic. Under this scenario, the output of the dynamic sectors increases extremely fast, and the overall growth rate of GDP per worker hour averages 1.41 percent p.a. At the other extreme is Projection B, which assumes that the structure of output remains unchanged. Due to differential

TABLE 5

U.S. ECONOMY: DYNAMIC AND STAGNANT SECTORS 1973-2020

	Projection			Growth Rate (% p.a.)	
	1973	1988	2020	1973-88	1988-2020
Real Output ($billions 1982 prices)					
Dynamic	1377	2138	4025	2.93	1.98
Stagnant	1355	1894	3214	2.23	1.65
Total	2731	4032	7240	2.60	1.83
Ratio dynamic/stagnant	1.02	1.13	1.25	0.70	0.32
Hours worked (billions)					
Dynamic	81.1	90.7	88.6	0.75	−0.07
Stagnant	66.2	95.3	167.5	2.43	1.76
Total	147.3	186.0	256.1	1.56	1.00
Ratio dynamic/stagnant	1.23	0.95	0.53	−1.68	−1.84
Productivity ($1982 per hour)					
Dynamic	17.0	23.6	45.4	2.19	2.05
Stagnant	20.5	19.9	19.2	−0.20	−0.11
Total	18.5	21.7	28.3	1.04	0.83
Ratio dynamic/stagnant	0.83	1.19	2.37	2.39	2.16

Source: 1973-88 figures from *Survey of Current Business*; the output series used in this table were obtained by splicing revised figures for 1977-88 (as given in the January 1991 *SCB*) to unrevised series for earlier years. Dynamic Sectors: agriculture, manufacturing, utilities, transport and communications, trade. Stagnant Sectors: mining, construction, FIS, community services, government. Projections assume 1 percent growth in total hours worked of the period 1988-2020, real output shares of the nine sectors listed above continue changing in the future at the same rate as in 1973-88; also hourly productivity growth in each sector continues at the same rate.

productivity growth there is a steady shift in the pattern of employment towards the most stagnant sectors, whose combined share of employment increases from 51.2 percent in 1988 to 69.8 percent in 2020. Under this scenario GDP per worker hour grows at 0.7 percent p.a.

Finally, there is Projection C which simply projects forwards all pre-1988 trends in output structure and productivity. This is perhaps the most realistic scenario. Under this scenario output in the dynamic sectors rises somewhat faster than in the stagnant sectors, which helps to offset somewhat the tendency towards asymptotic stagnancy in the system as a whole. Even so, there is a massive shift in employment structure towards the stagnant sectors, and GDP per worker hour grows on average by only 0.83 percent p.a. Table 5 explores the implications of this scenario for absolute levels of employment. For this purpose, it is assumed that the total number of hours worked in the economy as a whole rises by 1.0 percent a year, which is somewhat slower than in the past. With this assumption, it is interesting to note that the absolute number of hours worked in the dynamic sectors actually falls, since labour productivity grows faster than output. All of the additional hours worked in the economy are performed in the stagnant sectors, where productivity is virtually stationary.

TABLE 6

ALTERNATIVE PROJECTIONS FOR U.S. GROWTH 1988-2020

	Actual 1973-88	Projected 1988-2020 A	B	C
Output per Worker Hour: Annual % Growth Rate				
1. Agriculture	1.47			
2. Mining	−2.05			
3. Manufacturing	2.74			
4. Construction	−0.81			
5. Utilities	1.01	All sectoral productivity		
6. Transport	1.80	growth rates as 1973-88		
7. Trade	2.62			
8. FIS	0.43			
9. Community services	−0.60			
10. Government	0.42			
Whole economy	1.04	1.41	0.70	0.83
Dynamic sectors (1, 3, 5, 6, 7)	2.19	2.29	2.20	2.05
Stagnant sectors (2, 8, 9, 10)	−0.20	−0.01	−0.26	−0.11
Employment share (%)	1988	2020A	2020B	2020C
Total	100.0	100.0	100.0	100.0
Dynamic sectors	48.8	48.8	30.2	34.6
Stagnant sectors	51.2	51.2	69.8	65.4
Dynamic/stagnant	0.95	0.95	0.43	0.53
Real Output share (%)				
Total	100.0	100.0	100.0	100.0
Dynamic sectors	53.0	70.2	53.0	55.6
Stagnant sectors	47.0	29.8	47.0	44.4
Dynamic/stagnant	1.13	2.36	1.13	1.25

Projections assume: A: constant employment proportions; B: constant output proportions; C: output in each sector grows at 1973-88 rate; Sectoral classification as in OECD National Accounts, Output data for 1973-88 from U.S. *Survey of Current Business*, revised figures used from 1977 onwards (as given in January 1991 issue of the *Survey*). Hours from OECD *National Accounts*. Employment share based on total hours worked.

The foregoing calculations are purely illustrative. Even so, they clearly indicate the relevance of asymptotic stagnancy to the U.S. economy, and the role of the stagnant sectors as the key influence on long-term productivity growth. Given the basic thrust of their book, it is odd that BBW virtually ignore these issues when considering future prospects for the U.S.

U.S. Leadership

In their concluding chapter BBW discuss the implications of past experience for the future growth of the U.S. and other OECD countries. They make a variety of projections up to the year 2020 for such variables as per capita income and labour productivity. This is, of course, a hazardous exercise and the aim is not

TABLE 7

PRODUCTIVITY PROJECTIONS FOR SIX COUNTRIES 1988-2020

	U.S.	Japan	France	Germany	Italy	U.K.
Productivity growth (% per annum)						
1973-88						
Goods	1.5	4.3	3.2	2.1	3.1	4.0
Services	0.5	2.2	1.4	1.9	0.1	2.0
Whole economy	0.7	3.3	2.2	2.1	1.6	2.6
1988-2020						
Goods	1.5	4.3	3.2	2.1	3.1	4.0
Services	0.5	2.2	1.4	1.9	0.1	2.0
Whole economy	0.7	3.0	1.9	2.0	0.8	2.5
Output per worker (1980 U.S. dollars)						
1988:						
Goods	41.5	21.8	24.5	20.7	24.2	21.0
Services	27.2	20.4	23.8	24.3	22.5	16.9
Whole economy	31.1	21.0	24.0	22.6	23.2	18.2
2020:						
Goods	66.7	86.8	68.6	42.0	65.1	79.6
Services	31.6	41.4	37.2	45.7	23.2	33.0
Whole economy	39.1	54.3	44.6	44.0	30.3	42.0
GDP per capita (thousands 1980 $US)						
1988	14.0	10.6	9.3	9.2	9.1	7.9
2020	17.6	24.4	20.1	19.8	13.6	18.9

Source: OECD *National Accounts*, U.S. *Survey of Current Business.*

Notes: productivity is measured by output per person employed; GDP is converted to 1980 U.S. dollars using PPPs as given by the OECD; real output shares are in constant 1980 prices; projections to 2020 are derived by projecting forward 1973-88 trends in sectoral productivity and assuming the share of each sector in real output remains constant; GDP per capita projections assume that by 2020 total employment in all countries converges to the present U.S. ratio equal to 45% of population; U.K. figures exclude oil and other mining; figures for U.K. and Germany are for 1987.

so say what will happen but merely to indicate the orders of magnitude involved and the dimensions of the challenge facing the U.S.

BBW's projections for GDP per worker hour make the following assumptions. In the case of the United States, the growth rate of this variable is assumed to be the same over the period 1979-2020 as it was historically between 1950 and 1979. BBW argue that this would be an unrealistic assumption for other countries since most of them were enjoying unduly fast growth because of the benefits of catching up. To allow for the diminishing role of catching-up, they assume that in each country labour productivity will grow at a rate mid-way between the country's own growth rate over the period 1950-79 and the U.S. growth rate over the same period. This assumption implies some kind of asymptotic convergence in productivity growth rates. Projections for GDP per capita employ a similar method using data for the period 1950-80 as their starting point. BBW's per capita projections are reproduced in Figure 3.

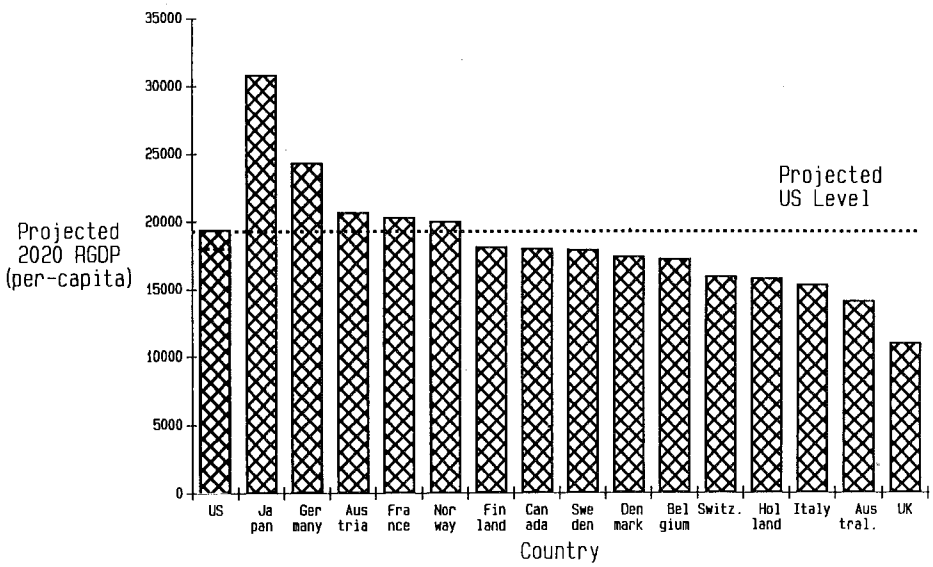


Figure 3. Real GDP Per Capita, 2020 Projections (in 1975 "International Dollars").

Source: BBW

The main conclusion drawn from these projections is that, in the absence of special policy measures or unforeseen events, the U.S. will be overtaken decisively by Germany and Japan by the year 2020. A number of other European countries will either overtake the U.S. or approach this objective. Such a conclusion may seem rather pessimistic, but the authors put an optimistic gloss on it. While conceding that it represents a serious challenge, they argue that the U.S. has the potential to rise to this challenge, provided that appropriate steps are taken to stimulate or redirect investment, R&D and entrepreneurial activity.

Putting aside the question of policy, which I shall not consider in this article, let us examine these projections. The first point to make is that they exaggerate future growth possibilities both in the U.S. and elsewhere. They take no account of the fact that overall productivity growth has slowed down dramatically in virtually every OECD country over the past twenty years. This slowdown cannot be dismissed as a mere transitory or cyclical phenomenon, since it has now been in operation for such a long period of time. In the absence of convincing evidence to the contrary, we should assume that future growth rates will be much lower than in the Golden Age prior to 1973.

In the case of the U.S. there are several reasons for believing that overall productivity growth in future will be much lower than during the Golden Age. As BBW document, there has been a marked secular decline in productivity growth in construction and many private services.[5] Since these activities have always had relatively slow productivity growth, their share in total employment is now considerably greater than it was in 1949, which BBW take as their base

[5]See Fig. 4.5, p. 76.

year. The observed decline in their productivity growth has very serious implications for overall productivity growth in the future. It is true, as BBW point out, that traditionally dynamic sectors, such as agriculture and manufacturing, continue to enjoy rapid productivity growth, but this is of diminishing importance since the share of these sectors in total employment has been falling continuously for almost half a century. Good productivity performance in these dynamic sectors will certainly not suffice to offset poor performance in the stagnant sectors, whose combined share in total employment is rising strongly. It seems almost inconceivable that overall productivity growth will return to anything like the rate observed in the Golden Age.

To explore this issue further, I have made some projections of my own which are reported in Table 7. These projections differ from those of BBW in a number of respects. To highlight the role of intersectoral differences, goods and services are treated separately. It is assumed that output per worker hour in each sector continues in the future at the rate actually observed during the period 1973–88. Moreover, the share of each sector in real output remains constant, so that output in each sector grows at the same rate. Finally, it is assumed that international differences in unemployment and participation rates disappear by the year 2020, and that the ratio of employment to total population converges to the present U.S. figure of 45 percent. Thus, international differences in unemployment and participation rates disappear by the year 2020.

These projections reveal some interesting points. The first is that asymptotic stagnancy leads to a slowdown in overall productivity growth in most countries. This is especially clear in Italy, where the growth rate of GDP per worker slows from 1.6 percent p.a. in 1973–88 to 0.8 percent in 1988–2020. Such a major slowdown occurs because of the huge difference in productivity growth between goods and services. In most other other cases, however, the slowdown in overall productivity growth is rather small. The second point to note is that output per worker grows noticeably faster in goods production than in services almost everywhere. The one exception is Germany, where productivity growth is virtually the same in both sectors. This relatively fast growth in service productivity helps to keep up GDP growth in Germany, despite a lacklustre performance in goods production.

The implications of these projections for overall GDP are as follows. By the year 2020, the U.S. is overtaken in terms of GDP per capita by Germany, Japan and France. It is also overtaken by the U.K. Looking at individual sectors, the picture is more complex. Productivity in goods production in 2020 is much higher in Japan, and also the U.K., than in the U.S. The U.K. result is surprising since oil production is excluded, but it reflects the projection forwards of the unusually fast productivity growth achieved in manufacturing during the 1980s. In the case of Germany, productivity growth lags well behind that of the U.S. in goods production. However, this is offset by rapid productivity growth in services, which explains why the country eventually overtakes the U.S. in terms of per capita income.

It is interesting to note that although the method is different and the growth rates in my projections are much lower than those of BBW, the final picture is rather similar in relative terms. Taking the U.S. as 100, the projected values of

GDP per capita in 2020 according to BBW (my projections are shown in brackets) are as follows: Japan 163 (139), Germany 126 (113), France 105 (114), Italy 79 (77), and the U.K. 58 (112). The only major conflict concerns the U.K., whose long-term growth prospects are almost certainly exaggerated in my projections, which are based on an unusual period in the country's history. However, the remaining similarities suggest that, in relative terms at least, the quantitative assessment given by BBW in their closing chapter is about right.

Concluding Remarks

It is clear that the U.S. faces a formidable challenge from Japan and possibly also from Western Europe. The central issues are: What is the nature of this challenge? Does the U.S. have the capacity to meet it? And what steps should be taken? The book by BBW provides a considerable amount of information and stimulating discussion on all of these issues. Despite certain weaknesses, it is an impressive piece of work which will remain a reference point for serious discussion for many years to come. My main reservations concern the authors' evaluation of U.S. prospects for economic growth and of the emerging challenge to the country's economic leadership. Despite their warnings towards the end of the book, I think they underestimate the seriousness of this challenge. The U.S. manufacturing sector has been doing quite well in comparison with Europe in recent years, but its performance has been poor in relation to Japan. A truly massive improvement is required to match the Japanese in this area. In sheltered sectors, such as construction and most services, the absolute level of labour productivity is still relatively high in the U.S., but its growth rate in recent times has been extremely low compared both to its own past and the experience of other countries. Without a massive improvement in this area, overall GDP growth in the U.S. will be slow no matter how good its performance in manufacturing.

To avoid being surpassed by other countries, the U.S. requires a considerable improvement right across the board. In terms of productivity growth, the sheltered sectors, such as construction and many services, are quantitatively the most important, since they employ the majority of the labour force and it is here that U.S. performance has been worst. In addition, to maintain international competitiveness, a considerably more dynamic manufacturing sector is required. It is an open question whether the U.S. has either the capacity or the political will to achieve the necessary improvements on such a broad front. Personally, I think it has the capacity. As far as the will is concerned, I am more sceptical.

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