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To: Members of the Executive Board

From: The Secretary

Subject: World Economic Outlook: Supplementary Note 6 –
           Estimating Growth Potential in Industrial Countries

The attached note on estimating growth potential in industrial
countries provides background material for the Executive Board discussion
on Monday and Wednesday, April 1 and 3, 1985 of the World Economic
Outlook.

If Executive Directors have technical or factual questions
relating to this paper prior to the Board discussion, they should contact
Mr. Blackwell (ext. 8980).

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World Economic Outlook: Supplementary Note 6

Estimating Growth Potential in Industrial Countries

Prepared by the Research Department
(in consultation with other Departments)

Approved by Wm. C. Hood

March 11, 1985

I. Introduction

Scenarios of the world economy over the medium-term depend crucially on projections of growth rates in the major industrial countries. Making such projections involves not only difficult choices of assumptions regarding the future policy environment and the reactions to it of private economic agents, but also some puzzling technical questions regarding the underlying determinants of growth. One of the most important of these questions relates to the absence of any fully convincing explanation for much of the slowdown that has occurred during the past decade or so.

Fundamentally, the growth of output depends on changes in the quantities of factors of production utilized and improvement in the effectiveness with which these factors are used. It is with respect to this latter category of changes—those which can be subsumed under the heading of gains or losses in "productivity" (output per unit of input)—that the main uncertainties have arisen.

Of course, prospective inputs are also subject to uncertainties. Even over a medium-term period in which the number of persons of working age can be accurately projected, labor force participation rates can vary appreciably with both economic conditions and social attitudes. Given the current high levels of unemployment in most of the major industrial countries, the scope for variation in the numbers actually employed, and in their hours of work, is somewhat greater. 1/ Similarly, the available stock of capital will depend on uncertain rates of private and public saving, as well as on current investment incentives, expected rates of return to investors, and costs incurred in making capital investments. The product "mix" of aggregate demand may also exert an influence

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1/ In Europe, recent political and social pressures to deal with unemployment by shortening the normal length of the work week may bring some novel changes in the composition of labor input and in some of the conventional productivity ratios.

on the effective availability of existing capital; facilities made obsolete by changing tastes or technology no longer have economic value. In general, however, most of these factors relating to growth of inputs of productive resources are amenable to systematic projection on the basis of observed functional relationships. Although such relationships are often by no means precise, the scope for miscalculation of inputs under any given set of basic assumptions is not great enough to be particularly disturbing.

With respect to the productivity component of total GNP growth, on the other hand, forecasters are confronted with a much more difficult analytical task. There has been a marked difference between average rates of productivity increase recorded since the earlier 1970s, and those that prevailed prior to that. To an important extent, of course, the overall contrast reflects the depth and duration of the two international recessions that have occurred since 1973. However, most leading students of productivity trends have concluded that the bulk of the slowdown in productivity gains cannot be explained on purely cyclical grounds. A number of alternative explanations have been advanced, some of them implying a more or less permanent shift in the pace of productivity growth and others implying at least a partial recovery as temporarily depressive influences fade away. Since most of the lines of explanation are not mutually exclusive, it is quite possible—perhaps probable—that the phenomenon in question is attributable to a complex and partly coincidental combination of factors. Until their effects can be identified more positively, there remains a considerable range of doubt regarding the size of a realistic allowance for the productivity component in projections of medium-term growth rates for the major industrial countries.

II. General Dimensions of the Problem

Although serious and detailed analysis of productivity movements requires a narrower and more selective focus than can be provided through examination of economy-wide output and input data, the broad dimensions of the productivity slowdown can be seen in aggregated data. For each of the major industrial countries, Table 1 summarizes the evolution of a number of key variables related to productivity growth. Attention to the comparative records before and after 1973 is sharpened in Table 2, which lists for each series in Table 1 the difference between the average rate of increase registered during the period 1960-73 and the corresponding average for subsequent years through 1984 (or, in some instances, only through 1980). These periods have been chosen because the major downturn in productivity gains is widely dated by scholars in this field as having begun about 1974. (There is also a body of expert opinion that would place the onset of the decline somewhat earlier, at least in some countries, and there is controversy as to whether—with due allowance for

Table 1. Major Industrial Countries: Rates of Change in GDP,
Employment, GDP Per Employee, Gross Capital Stock, 1/
and Capital Stock Per Employee

(Average annual rates of change, in percent)

	Canada	United States	Japan	France	F.R. of Germany	Italy	United Kingdom
GDP:							
1960-73	5.6	4.0	9.8	5.6	4.4	5.3	3.1
1973-80	3.0	2.2	3.8	2.8	2.3	2.8	0.8
1973-84	2.5	2.4	3.9	2.2	1.7	1.9	1.1
Persons employed:							
1960-73	2.9	1.9	1.3	0.7	0.1	-0.3	-0.1
1973-80	2.8	2.2	0.7	0.2	-0.5	1.0	0.1
1973-84	2.0	2.0	0.9	--	-0.6	0.7	-0.3
GDP per person employed:							
1960-73	2.6	2.1	8.5	4.9	4.3	5.6	3.2
1973-80	0.2	--	3.1	2.6	2.8	1.8	0.7
1973-84	0.5	0.4	3.0	2.2	2.3	1.2	1.4
Private nonresidential capital stock:							
1960-73	5.0	4.1	11.9	5.8	5.9	...	3.8
1973-80	5.2	3.8	6.8	4.7	3.6	...	3.1
Capital stock per person:							
1960-73	2.1	2.2	10.6	5.1	5.8	...	3.9
1973-80	2.4	1.6	6.1	4.5	4.1	...	3.0

Sources: OECD Secretariat and staff estimates.
1/ Other than dwellings and fixed assets held by the general government sector.

Table 2. Major Industrial Countries: Differences in Selected
Average Rates of Increase, 1973-84 Compared With 1960-73 1/

(Average annual rates of change, in percent)

	Canada	United States	Japan	France	F.R. of Germany	Italy	United Kingdom
GDP	-3.1	-1.6	-5.9	-3.4	-2.7	-3.4	-2.0
Persons employed	-0.9	0.1	-0.4	-0.7	-0.7	1.0	-0.2
GDP per person employed	-2.1	-1.7	-5.5	-2.7	-2.0	-4.4	-1.8
Private nonresidential capital stock 1/	0.2	-0.3	-5.1	-1.1	-2.3	...	-0.7
Capital stock per person 1/	0.3	-0.6	-4.5	-0.6	-1.7	...	-0.9

Source: Table 1.
1/ For private nonresidential capital stock and capital stock per person,
the differences shown are based on comparisons of average rates for 1973-80,
rather than 1973-84, with those for 1960-73.

purely cyclical influences--the slowdown occurred rather abruptly in the middle 1970s or more gradually. For present purposes, however, it is convenient to accept the 1973 "watershed" and unnecessary to resolve the question of exact dating.)

The extent of the decline in GDP growth rates in all of the major countries since 1973 is brought out in the first line of Table 2. These decelerations ranged from 1 1/2-2 percentage points for the United States and the United Kingdom to about 6 percent for Japan, with the declines for the other four countries amounting to 2 1/2-3 1/2 percentage points. In most cases, with the notable exception of the United States, there was also somewhat slower growth in employment in the more recent period, reflecting the steep rise in structural unemployment in many countries, as well as the impact of the 1975 and 1980-82 recessions. In no case, however, was the slowing of growth in employment remotely commensurate with that in expansion of total output; and in the United States and Italy, average rates of change in employment were larger after 1973 than before. The great bulk of the overall slowdown in growth thus represented a weakening of increases in labor productivity. In crude terms of GDP per employed person (third line of Table 2), this weakening ranged from about 1 3/4 percentage points in the United States and the United Kingdom to 5 1/2 percentage points for Japan.

The absolute annual rates of productivity advances shown in Table 1 are biased downward by inclusion of the output of general government employees (whose productivity is assumed, by statistical convention, not to change). They are also subject to bias through the inclusion of other forms of output (e.g., services derived from owner-occupied dwellings) bearing very different relationships to labor inputs. These biases, however, are much less applicable, at least over the particular period under review here, to the differences in productivity gains for the respective subperiods, as shown in Table 2. In most cases, these differences are of the same order of magnitude as those identified in some of the various more refined studies mentioned below.

In addition to providing a prima facie guide to the degree of deceleration in productivity gains, Tables 1 and 2 provide a straightforward clue to one of the major factors contributing to that deceleration. The data on real rates of growth in private nonresidential capital stocks of the respective countries indicate clearly that increases in amounts of capital per worker were appreciably lower (except in Canada) during the period after 1973 than during the preceding 13 years. This difference in the pace of capital deepening was especially marked in Japan, where the process of adaptation to modern industrial technology, which had been particularly rapid in the earlier period, tapered off as it approached more or less full realization in the second half of the 1970s.

The estimates given in Tables 1 and 2 on rates of growth in capital stock and their relationship to changes in employment are intended to be only very broadly and loosely suggestive of the capital deepening process and its implications for productivity. For one thing, quantitative measurement of the real capital stock is subject to well-known statistical difficulties. The figures underlying the rates of change listed in the accompanying tables, like those generally used in more refined analyses, are based on "perpetual inventory" methods. These methods involve vast uncertainties regarding the economically useful lives of various types of capital assets and the relative valuation of capital equipment embodying different technical features. Quantitative estimation is thus a great deal more hazardous for capital inputs than for labor inputs, and the uncertainties posed by qualitative issues are at least as great for capital as for labor. Nevertheless, since these two factors of production are overwhelmingly the most important ones, an effort to quantify their combined contribution to growth of output is an essential starting point for efforts to measure other influences on growth.

A second important qualification is that serious analysis of the contributions of capital and labor to the production process requires a refinement of focus to exclude elements of total output that bear peculiar functional relationships to inputs of labor and capital (with corresponding exclusions from the input side). Typically, this means omission of production representing the services provided by government employees and dwellings. Some studies are substantially more restrictive in coverage, dealing only with the manufacturing sector. For purposes of this discussion, however, the best blend of broad coverage with reasonable technical validity appears to be found in studies dealing with the private nonresi dential business sector as a whole.

III. Disaggregation of Growth Rates by Source

Efforts to disaggregate the effects of particular causative influences on economic growth have relied on a variety of methods. Among these, the ones yielding perhaps the most solid and convincing estimates—as far as they go—are those based on production function or "growth accounting" methods. This approach, pioneered by Edward F. Denison of the Brookings Institution, provides a reasonably firm identification of that part of total growth in output that has been associated directly with quantitative changes in factor inputs. It also identifies the effects of a number of essentially qualitative changes in factor inputs that lend themselves to objective measurement and weighting. The effects of other qualitative changes in either the labor force or the stock of capital, however, remain indistinguishably imbedded in a residual component of the change in total factor productivity. Also included in this residual are most advances in technical knowledge and "disembodied" productivity gains associated with improvements in organization and management.

    Figures extracted from a representative study 1/ utilizing the "growth
accounting" approach are presented in Table 3. These estimates, covering
all of the large industrial countries, provide, first, a much better indi-
cation than Tables 1 and 2 of the combined contribution of labor and
capital--both measured in purely quantitative terms--to increases in output.
The output growth thus analyzed is that of the business enterprise sector,
which accounts for the bulk of total GDP in each of the countries listed.
Labor input is measured here in terms of total hours worked, rather than
employment, thus providing a somewhat more accurate indication of the
input contributed by workers.

    It may be noted that the rates of increase in real business-sector
output per labor-hour (lines 9 and 12 of Table 3) are all substantially
higher than the corresponding growth rates for total GDP per employed
person (third section of Table 1), reflecting mainly the exclusion of
government employees to whom no measurable changes in productivity are
attributed. The important feature of Table 3, however, is the sizable
share of the increase in output per labor-hour that can be attributed
to capital deepening (last two lines of Table 3), even in terms of a
relatively narrow view of the contribution of capital. For the major
industrial countries as a group, that share averaged more than one third
for the pre-1974 period and about one half for the later period. In no
case was the 1960-73 share below one fourth or the 1973-79 share less
than 45 percent. These ratios suggest that the most important single
factor in the maintenance of satisfactory labor productivity gains in the
period ahead may be continued expansion of the real stock of capital per
worker. 2/

    In five of the seven major industrial countries, this capital-
deepening process appears to have proceeded less rapidly after 1973 than
before, thus accounting for some part of the slowdown in growth of real
output per labor-hour. (See Table 4, which recapitulates some of the key
differences between the time periods shown in Table 3.) Although resto-
ration of the earlier pace of capital/labor substitution would be one
means of raising labor productivity, the feasibility of such a restora-
tion is open to doubt. Rates of capital deepening were particularly high
in Japan and the continental European countries during the 1960s and
early 1970s, in part for reasons associated with the deficiencies in
their stocks of capital earlier in the post-World War II reconstruction

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    1/ J.W. Kendrick, "International Comparisons of Productivity Trends,"
in Essays in Contemporary Economic Problems: Demand, Productivity, and
Population, American Enterprise Institute, Washington, D.C. 1981.
    2/ This statement assumes that changes in the typical numbers of hours
worked per week in Europe do not become so drastic as to exert a dominant
influence on calculated productivity gains.

Table 3. Major Industrial Countries—Business Sector: Rates of Change
in Real Gross Product, Factor Inputs, and Factor Productivity,
1960–73 and 1973–79 1/

(Average annual percentage rates of change)

	Canada	United States	Japan	France	F.R. of Germany	Italy	United Kingdom
Real gross product **(of business sector)**							
1960–73	5.8	4.4	10.8	5.8	4.6	5.6	2.9
1973–79	3.2	2.9	4.2	3.2	2.2	2.6	0.5
Factor inputs							
1960–73—Labor (hours worked)	1.6	1.3	0.9	-0.1	-1.2	-2.2	-0.9
—Capital 2/	4.7	4.5	10.9	5.1	6.1	4.3	3.6
Combined total 3/	2.9	2.5	4.2	1.9	1.4	-0.2	0.7
1973–79—Labor (hours worked)	2.2	1.8	0.4	-1.0	-2.1	1.0	-1.4
—Capital 2/	4.8	3.1	6.4	4.3	4.1	3.4	3.1
Combined total 3/	3.3	2.3	2.4	1.1	0.1	1.8	0.2
Factor productivity **(gross product per unit of input)**							
1960–73—Labor	4.2	3.1	9.1	5.9	5.8	7.8	3.8
—Capital	1.1	-0.1	0.1	0.7	-1.5	1.3	-0.7
Combined total 4/	2.9	1.9	6.6	3.9	3.2	5.8	2.2
1973–79—Labor	1.0	1.1	3.8	4.2	4.3	1.6	1.9
—Capital	-1.6	-0.2	-2.2	-1.1	-1.9	-0.8	-2.6
Combined total 4/	-0.1	0.6	1.8	2.1	2.1	0.8	0.3
Estimated effects of capital **deepening** **("Capital/labor substitution") 5/**							
1960–73	1.3	1.2	3.3	2.0	2.6	2.0	1.6
1973–79	1.1	0.5	2.0	2.0	2.2	0.8	1.6

1/ Adapted from J.W. Kendrick, op. cited in footnote 1, p. 10.
2/ Based on OECD estimates of real gross stocks of fixed capital.
3/ Based on a weighted composite of the separate labor and capital inputs, with weights
proportionate to factor shares of national income.
4/ Based on composite described in footnote 3, above.
5/ Difference between composite of total factor input (labor and capital combined) and
labor input alone; also equivalent to difference between labor productivity and total
factor productivity.

Table 4. Major Industrial Countries—Business Sector: Differences
in Rates of Change in Selected Variables,
1973-79 vs. 1960-73 1/

(Average annual percentage rates of change)

	Canada	United States	Japan	France	F.R. of Germany	Italy	United Kingdom
Real gross product (of business sector)	-2.6	-1.5	-6.6	-2.6	-2.4	-3.0	-2.4
Labor input (hours worked)	0.6	0.5	-0.5	-0.9	-0.9	3.2	-0.5
Total factor input (labor and capital combined)	0.4	-0.2	-1.8	-0.8	-1.3	2.0	-0.5
Labor productivity 2/	-3.2	-2.0	-6.1	-1.7	-1.5	-6.2	-1.9
Total factor productivity 3/	-3.0	-1.3	-4.8	-1.8	-1.1	-5.0	-1.9
Estimated effect of capital deepening 4/ ("capital/labor substitution")	-0.2	-0.7	-1.3	--	-0.4	-1.2	--

1/ Derived from Table 3.
2/ Output per labor hour.
3/ Output per composite unit of factor input (labor and capital combined).
4/ Difference between composite representing total factor input and labor input alone.

period. Furthermore, although capital deepening would be highly desirable for the long run, there may be some question about the desirability of accelerating capital-labor substitution in Europe during the period immediately ahead. With unemployment so high and unduly high wages (in relation to labor productivity) widely believed to be a contributing factor, further substitution might risk a worsening of an already unsatisfactory unemployment situation. In these circumstances, it would be important for accelerated capital deepening—in itself clearly a beneficial development—to occur hand-in-hand with rising aggregate demand and expansion of employment opportunities, as well as in the stock of capital per employed worker.

Estimated changes in total factor inputs (lines 5 and 8 of Table 3), account for only a part of each country's average rate of growth in total output (of the business sector). The remainder of that growth reflects, in principle, unmeasured qualitative changes in labor and capital inputs plus changes in productive efficiency that take place independently of the identified and measured determinants.

IV. Sources of Change in Total Factor Productivity

Qualitative changes in the labor force that lend themselves to objective measurement include its education (to the extent reflected in such indicators as years of schooling) and its age-sex composition. Estimates of the way changes in these two labor force characteristics have affected the productivity slowdown from the 1960-73 period to 1973-79 are given in the second and third lines of Table 5. Although educational improvements contributed substantially to productivity gains during both periods in all of the major industrial countries, their positive influence is calculated to have been greater in the recent period in six of the seven countries. Changes in the age-sex composition of the labor force, although generally unfavorable to productivity in both periods, were less so after 1973 than before in the majority of these countries. Together, these two types of change in characteristics of the labor force are estimated to have contributed some 0.2-0.4 percentage points toward improvement in the rate of change in total factor productivity from 1960-73 to 1973-79.

All of the other explanatory factors listed in Table 5, however, contributed negatively to that difference. Improvements in resource allocation proceeded more slowly in the second period than in the first—chiefly, in most cases, because of the greatly reduced scope for shifting workers from agricultural to industrial or service activities where their average productivity was higher. Similarly, economies of scale are extimated to have contributed less positively to productivity gains in the more recent period, mainly because of the retardation of overall economic growth. This factor appears to have been especially important in Japan, where scale economies were a particularly large element in pre-1973 productivity gains.

Table 5. Major Industrial Countries: Estimated Contribution of Various Factors to Changes in Rates of Improvement in Total Factor Productivity from 1960-73 to 1973-79 1/

(Percentage points of difference between annual rates of change during the respective periods) 2/

	Canada	United States	Japan	France	F.R. of Germany	Italy	United Kingdom
Total (i.e., difference in growth rates of total factor productivity, 1973-79 vs. 1960-73)	-3.0	-1.3	-4.8	-1.7	-1.1	-5.0	-1.9
Changes in labor quality:							
Better education	0.1	0.3	-0.2	0.3	--	0.1	0.3
Age-sex composition	0.2	0.1	0.1	-0.1	0.2	-0.4	--
Improvements in resource allocation	-0.3	-0.3	-1.1	-0.3	-0.2	-0.6	-0.3
Economies of scale	-0.3	-0.1	-0.7	-0.3	-0.3	-0.3	-0.2
Capacity utilization	-0.7	-0.3	-0.3	-0.4	-0.1	-0.2	-0.7
Government regulations	-0.2	-0.3	-0.8	-0.2	-0.4	-0.3	-0.2
Advances in knowledge and other factors not elsewhere classified	-1.8	-0.7	-1.8	-0.7	-0.3	-3.3	-0.8

1/ Adapted from J.W. Kendrick, op. cit. (footnote 1, p. 9).
2/ Average rate for first period minus that for later period.

Considerably greater slack in capacity utilization during the second half of the 1970s than during the 1960s and early 1970s tended to reduce both output/capital ratios and output/labor ratios (because employment responds less than output in cyclical downturns). Estimates of the impact of these reduced ratios on the period-to-period change in total factor productivity gains are given on the sixth line of Table 5.

Another universally negative influence on productivity gains after the early 1970s was the impact of new or intensified regulatory requirements designed for such purposes as protection of the environment against pollution and protection of the health and safety of workers. In most of the major industrial countries, significant amounts of labor and capital inputs were diverted from production of measured output to achievement of regulatory goals which—while contributing to overall welfare—are not recorded in measured GNP. Estimates of the extent to which major diversions of this type lowered rates of improvement in total factor productivity are given on the penultimate line of Table 5.

The last line of that table is a residual that might be viewed, in principle, as reflecting mainly a slowing of average advances in cost-reducing technology, broadly defined. However, it obviously reflects also any errors of estimation in the other sources of productivity gains listed in the table. Indeed, it is possible that the entire residual could be attributable to such miscalculations. It seems more likely, however, that much of it is traceable to factors not quantified in the presentation given in Table 5.

The most important such factor is perhaps the succession of very large changes in the cost of energy that occurred in 1973-74 and again in 1979-80. The change in energy prices, by rendering some types of energy-intensive capital goods obsolete, and by raising the cost of operation of almost every type of energy using equipment, must be presumed to have had some directly negative impact on productivity. In addition, major indirect effects were felt through the adverse impact on aggregate demand in the industrial countries, the acceleration of inflation, and the worsening of the investment climate. At least a part of these indirect effects is presumably reflected in Table 5 under the headings of scale economies and capacity utilization, and the direct effects must be at least partly reflected in the lower rate of capital deepening already discussed. According to strict growth accounting technique, an attribution of separate influence to the energy price changes would be limited by the relatively small size of the change in energy input per unit of total factor input and the low ratio of energy costs to total output. In themselves, these relationships would imply a directly adverse effect on growth of output per unit of combined labor and capital input amounting to only a minor fraction of 1 percentage point. Such calculations, however, do not cover important indirect effects of the types noted above, nor do they take adequate account of the complementarity of capital and energy inputs in many uses.

Various other conceptual and statistical techniques have yielded
considerably larger estimates of the impact of the energy price change on
productivity. The most plausible among these estimates have attributed
up to 15-20 percent of the productivity slowdown after 1973 to the change
in energy prices, and a few estimates have run consideraly higher. How-
ever, most of the relevant methodologies are based on some combination
of production functions with regression analysis in which the variance in
output growth may tend to be ascribed to any exogenous variables display-
ing similar (or inverse) behavior, whether or not direct causal linkages
exist. Effects attributed to the energy price change by these techniques
may partly overlap those assigned to other causes by the growth account-
ing approach. Nevertheless, the results of the alternative methodologies
are strongly suggestive, and the coincidence over time of higher energy
prices with slower productivity gains is undeniable. Despite a risk of
overattribution the higher alternative estimates of the impact of oil
price changes on productivity gains can serve as a reminder that the
concept underlying the corresponding growth accounting estimates is a
narrow one.

For a majority of the larger industrial countries, there is reason
to believe that one significant element in the productivity slowdown was
a deceleration in the diffusion of technology already applied in the
United States to other economies. Estimates of the impact of this "catch-
ing up" process have been undertaken, but their statistical foundations
are very uncertain.

Both for the United States and for the other countries, some analysts
have attempted to estimate the influence of expenditures for research
and development on productivity gains, and have suggested that relative
declines in the former may have been responsible for a significant part
of the slowdown in the latter. However, it is by no means clear that
real expenditures for types of organized research and development that
contribute to growth of measured productivity have in fact been reduced
in importance. At any event, the contribution of such research and devel-
opment to pre-1973 productivity gains was not large enough, according to
some of the experts (e.g., Denison) for their reduction to exert a large
influence.

A more probable explanation for some significant part of the unex-
plained residual of declines in rates of growth of output per unit of
total input is the thesis that "product wage rates" (i.e., real wage
costs to employers in relation to prices of their output) became unduly
high in relation to labor productivity during the decade of the 1970s.
Such a relationship, apart from its adverse impact on both employment and
total capital investment, could have increased the extent to which actual
allocation of individual workers among particular jobs and of capital
among particular types of facilities departed from that which would have

maximized national income. Conceptually, the latter kind of misallocation is unambiguously part of the growth-accounting residual of productivity changes that cannot be identified with specific causes. Since there is persuasive evidence of "overshooting" of product wage rates in relation to labor productivity, at least in the manufacturing sectors of several major industrial countries (most notably, France, the Federal Republic of Germany, and the United Kingdom), 1/ this explanation for part of the productivity slowdown has considerable credibility, even in the absence of similar findings on an economy-wide basis. A corollary point is that correction of the "overshooting", which seems to have been in progress in the past few years, may contribute toward revival of productivity gains during the coming decade.

Other economic disturbances of the 1970s that may well have impinged unfavorably on productivity gains, but whose specific influence does not seem to be amenable to measurement, include the acceleration of inflation, the associated price uncertainties and distortions of relative prices, the fall in profitability of enterprises, the emergence of rigidities that appear to interfere with the functioning of markets and the efficiency of economic incentives, 2/ and the prolonged operation of most industrial economies at levels far below their potentials. More recently, the proliferation of protectionism in international trade policies may have become a significant negative factor. For present purposes, the most important aspect of these diffused negative influences may be the expectation that most of them should be either no longer operative or reversed during the remainder of the current decade if developments follow the course projected in the current World Economic Outlook exercise. This hopeful observation would be more useful, of course, if it could be given quantitative content; but even a directional assumption is helpful in fixing a range of probabilities.

V. Considerations Regarding Medium-Term Growth Projections

Among the more definitely established factors contributing to the productivity slowdown of the 1970s and early 1980s, prospective developments during the remainder of the current decade appear to be mixed. Some of the negative influences will be inoperative or greatly diminished (under the assumptions guiding the staff's medium-term projection), and a few may be at least partially reversed. Since several important factors

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1/ See J.R. Artus, "The Disequilibrium Real Wage Rate Hypothesis: An Empirical Evaluation," Staff Papers, International Monetary Fund (Washington), Vol. 31 (June 1984), pp. 149-302.

2/ See, e.g., Assar Lindbeck, "The Recent Slowdown of Productivity Growth" in the Economic Journal, Vol. 93 (March 1983), pp. 13-34.

at work during the 1960s are quite unlikely to recur, it would clearly be imprudent to assume anything close to full recovery of gains in output per person to the rates witnessed during the decade and a half before 1973. At the same time, the probable tapering off or reversal of other recently negative influences offers some ground for a presumption that productivity gains will not remain as weak as they have been during the past decade.

Foremost among the probably irreversible declines in sources of productivity growth are perhaps those relating to reallocations of manpower from agriculture to industrial or service activities and those associated with the diffusion of applied technology from North America to the other industrial areas. In the major industrial countries, any remaining scope for realization of further gains from these sources must be small. By the same token, however, there is no reason to suppose that further slowing of the processes in question will detract from productivity gains in the coming decade.

Shifts in the age-sex composition of the labor force, although generally less adverse to productivity during the past decade than during the preceding one, continued to represent a drag on productivity gains. With considerable stabilization of labor force composition now in prospect, this drag may be removed. A related consideration is that increased average age and experience of the labor force in countries (notably the United States and Canada) where demographic conditions produced a marked surge of new entrants during the 1970s may help to raise labor productivity during the years immediately ahead. Although the impact of declining average experience on output per worker during the past decade has not been conclusively established, the hypothesis that it was responsible for some part of the growth-accounting residual is widely regarded as plausible.

At the same time, it must be borne in mind that the subsidence of the surge of new entrants from the "baby boom" cohorts of the first decade after World War II also implies a considerable slowing of growth in total labor input. For the United States, at least, this deceleration will substantially outweigh the productivity implications of higher average experience, so far as potential growth of total output is concerned.

Whatever the true measure of the productivity impact of the energy price changes of the 1970s and early 1980s, the absence of any similar influence during the next several years must be counted as a generally favorable factor. Given the declines in use of energy per unit of output that have occurred during the period of peak relative prices for oil, along with the lowering of those prices now in process and the base-line projection of essentially constant real oil prices from 1987 to 1990, the prospective world oil and energy situation is clearly more propitious for economic growth than it has been for a number of years.

A major question in projecting productivity trends relates to the course of the capital/labor substitution process, which exercises such a crucial influence on the rate of increase in output per unit of labor. Both the energy situation and an appreciable degree of recovery in profitability of enterprises during the past two years augur well for arresting the decline in the pace of capital deepening. Most governments in the major industrial countries are pursuing policies intended to improve investment incentives, and success of such policies could conceivably lead to renewed acceleration of capital deepening. On the other hand, some of those governments are also borrowing much more heavily than in earlier periods, thus absorbing larger shares of private savings than before and contributing strongly to the persistence of high real interest rates. Although the latter may help to raise aggregate private saving, they militate against the recovery in rates of capital/labor substitution. On balance, it would seem prudent not to count on an early acceleration of labor productivity gains from this source.

Although the baseline scenario visualized for the medium term in the present World Economic Outlook posits only a limited absorption of current unemployment, even a limited shift toward fuller use of potential economic resources will generate a contrast with the situation of recent years. It should lead to a mild improvement in productivity emanating from economies of scale and from higher capacity utilization.

The multiple uncertainties pervading the foregoing discussion have been resolved for purposes of the baseline medium-term scenario by projecting advances in GNP per person employed at rates somewhat above the averages of the past decade, but still considerably below those of the dozen years before 1973. Particularly for Japan, but also for the major European industrial countries, the projected labor productivity gains are much closer to the recent experience than to the earlier experience. Labor force growth in the major industrial countries outside North America is expected, on average, to differ relatively little from that of the period 1973-84, but the annual rate of growth in total employment in the four European countries is projected to outpace that of their combined labor force by something like 1/4-1/2 of a percentage point, reflecting some moderate absorption of unemployment between now and 1990. For the North American industrial countries, a somewhat fuller recovery of gains in labor productivity is assumed, but growth of the labor force and of total employment will be considerably slower (for demographic reasons noted above) than during the period 1973-84. The combination of increases in employment and in GNP per worker that emerge from the foregoing line of analysis yields for the period to 1990 average rates of expansion of GNP in the 2 1/2-3 percent range for all of the major industrial countries except Japan, where a 4 percent estimate appears to be justified by continuation of productivity gains considerably above the average for the other countries.