

# SOME ECONOMIC SCENARIOS FOR THE 1980's

Nobel Memorial Lecture, 8 December, 1980

by

LAWRENCE R. KLEIN

University of Pennsylvania, Philadelphia, Pennsylvania 19 104, USA

At the beginning of a decade it is tempting to look ahead for the next ten years. In addition to end-of-decade targets, there is considerable interest, at the present time, in end-of-century targets. Analysis of multi-decade developments depends on an even longer view, and I shall focus my attention on the medium-term outlook for one decade as much as possible.

This analysis will proceed through the medium of two econometric models, one for the United States and one for the World as a whole. I shall refer to available simulations of the Wharton Model of the United States for a single (large) country appraisal. The U.S. weight in the total for all OECD countries is more than one-third of aggregate production. Any sizeable action by the U.S. is, therefore, reflected in the totals.

Other countries are going in their own chosen directions, and it will be useful to try pull them all together in world model simulations from the equation system of project LINK. The LINK system is an amalgamation of econometric models from 17 OECD industrial countries, eight socialist countries, and four regional models of developing countries.<sup>1</sup>

## BASE CASE - UNITED STATES

First, let us consider a baseline simulation for the United States. There is general recognition that something large (a "sea change") has come over the leading countries in the OECD area. In the case of the United States, real GNP growth, from the end of World War II until the end of the 1960's, averaged just under 4%. The baseline projection shows a distinct tendency for the economy to hover in the neighborhood of 3% growth. Slower growth, more inflation, high interest costs, an elevated rate of unemployment and balance-of-payments problems are manifest in the long sequence of tables generated by the Wharton Annual Model. Some annual growth rates, recorded at live year intervals, are listed in Table 1.

<sup>1</sup>This is the present country/regional make-up of the LINK system. In some versions of system simulations - set up a year or so ago - there are four fewer OECD country models and one fewer centrally planned model.

This is a pattern familiar not only in the United States but in other industrial countries. The changed economic profile between the post World War II recovery/expansion period (1945-1970) and the period since 1970, through the end of the decade, is a result of some profound changes in the underlying economic environment. They are related to such major events as

- (i) energy supply-demand imbalance and a shift from inexpensive to dear prices;
- (ii) pressure on available food supplies and a shift towards higher food prices;
- (iii) accelerated inflation;
- (iv) declining productivity growth;

Table 1. Five Year Average Annual Percentage Growth Rates

Five Years Ending:	1960	1965	1970	1975	1980 <sup>1</sup>	1985 <sup>1</sup>	1990 <sup>1</sup>
Real GNP	2.4	4.7	3.0	2.3	3.3	3.0	3.0
GNP Deflator	2.4	1.6	4.2	6.8	7.3	8.0	7.6
Nominal GNP	4.9	6.3	7.4	9.2	10.8	11.3	10.8
Real Consumption	2.8	4.3	3.7	3.0	3.6	2.7	3.0
Durables	0.1	6.9	3.9	4.9	3.5	3.1	2.6
Nondurables	2.4	3.2	3.0	1.6	2.8	1.4	2.0
Services	4.1	4.6	4.3	3.6	4.3	3.4	3.8
Total Real Investment	0.2	7.3	0.6	-1.6	5.3	5.9	3.8
Nonresidential	1.5	7.7	2.8	0.6	4.8	3.2	4.5
Residential	-0.1	4.3	-1.3	-0.8	2.2	7.5	2.2
Real Trade Flows							
Imports	5.5	6.2	9.9	0.5	8.8	3.1	3.7
Exports	5.1	6.5	6.4	6.0	7.7	3.9	3.3
Real Government							
Spending	2.8	3.9	3.6	1.0	1.4	1.9	2.2
Federal	0.9	2.1	2.0	-2.7	2.0	3.3	2.0
State and Local	5.1	5.9	5.0	3.6	1.0	0.9	2.3
Employment	1.1	1.6	2.0	1.5	2.7	1.4	1.3
Civilian Labor Force	1.4	1.3	2.1	2.3	2.5	1.3	1.1

<sup>1</sup>Forecast values: Wharton EFA. Real values in prices of 1972

- (v) rapid expansion of the labor force;
- (vi) increasing attention paid to problems of quality of life.

These issues started to appear in the late 1960's, many in the wake of the Vietnam war, and prevailed during the 1970's which proved to be a turbulent decade for the U. S. economy. Averages for the past decade, after smoothing of cyclical movements show changed trends in growth, inflation, unemployment rates, interest rates, internal deficits, and external deficits. It is also a period in which the U. S. economy became highly internationalized; i. e., increasingly subject to pressures of international events, less self-contained, and not at all insulated. The differences between the 1970's and earlier decades are matters of recorded history. The average trends estimated from the decade 1971-1980

govern the projections for the 1980's and 1990's. There is no indication that the trends of the 1970's were aberrations and that we are likely to return to the heady days of earlier postwar decades. The reasons for this changed performance are contained in the six points listed above, but in this essay, I want to look at the problem through the medium of econometric model simulation, rather than point-by-point analysis of the six items.<sup>2</sup>

Table 2. Selected U. S. Economic Indicators Projections to 1990.

WHARTON ANNUAL AND INDUSTRY FORECASTING MODEL  
PRE-MEETING CONTROL SELECTION - JULY 1980

SELECTED INDICATORS

ITEM	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
GROSS NATIONAL PRODUCT (BOB \$)	2559.2	2659.0	3212.8	3552.3	3939.6	4362.5	4859.2	5412.7	5983.2	6614.8	7286.2
% CHANGE	8.0	11.7	12.6	10.6	10.9	10.7	11.4	11.4	10.5	10.6	10.1
GROSS NATIONAL PRODUCT ('72 \$)	1416.5	1448.8	1511.1	1553.6	1606.9	1645.3	1696.5	1745.2	1795.5	1852.9	1903.2
% CHANGE	-1.0	2.2	4.3	2.8	3.4	2.4	3.1	2.9	2.9	3.2	2.7
GROSS NAT. PRD. DEFL. (1972=100.0)	180.6	197.3	212.6	226.7	245.2	265.1	286.4	310.2	333.2	357.0	382.6
% CHANGE	9.2	9.3	7.7	7.6	7.2	8.1	8.0	8.3	7.4	7.1	7.2
POPULATION (MILLIONS)	222.51	224.57	226.72	228.89	231.08	233.27	235.46	237.63	239.77	241.87	243.93
% CHANGE	0.9	0.9	1.0	1.0	1.0	0.9	0.9	0.9	0.9	0.9	0.8
LABOR FORCE (MILLIONS)	104.53	106.15	108.16	109.41	110.68	112.00	113.42	114.79	116.04	117.16	118.19
% CHANGE	2.0	1.6	1.4	1.2	1.2	1.2	1.3	1.2	1.1	1.0	0.9
PARTICIPATION RATE	63.5	64.1	64.3	64.7	64.5	64.6	64.8	64.9	65.1	65.3	65.4
% CHANGE	-0.2	0.3	0.3	0.1	0.2	0.2	0.2	0.2	0.3	0.3	0.3
EMPLOYMENT (MILLIONS)	97.05	97.93	99.79	101.23	102.80	103.91	105.37	106.84	108.20	109.59	110.91
% CHANGE	0.1	0.9	1.9	1.4	1.6	1.1	1.4	1.4	1.3	1.3	1.2
WAGE RATE PER WEEK, ALL INDUSTRIES	315.6	346.1	384.9	416.2	453.4	496.0	542.3	594.9	650.4	709.8	777.6
% CHANGE	8.4	10.9	10.6	8.7	8.4	9.4	9.3	9.7	9.3	9.1	9.5
PRODUCTIVITY - ALL INDUSTRIES	14.00	14.79	15.14	15.34	15.63	15.83	16.09	16.34	16.59	16.90	17.16
% CHANGE	-1.1	1.3	2.4	1.4	1.8	1.3	1.7	1.5	1.6	1.9	1.5
PRODUCTIVITY - ALL MANUFACTURING	7.57	8.11	8.35	8.53	8.82	9.01	9.27	9.56	9.84	10.15	10.44
% CHANGE	-1.3	2.3	3.0	2.5	3.0	2.2	3.0	3.0	2.9	3.2	2.8
REAL PER CAPITA GNP (THOU '72 \$)	6368	6451	6665	6788	6954	7053	7205	7344	7439	7661	7802
% CHANGE	-1.9	1.3	3.3	1.8	2.5	1.4	2.2	1.9	2.0	2.3	1.8
REAL PER CAP GNP INC (THOU '72 \$)	4450	4502	4603	4688	4810	4870	4986	5071	5171	5290	5411
% CHANGE	-1.3	1.2	2.2	1.7	2.6	1.3	2.4	1.7	2.0	2.3	2.3
CORPORATE PROFITS BEFORE TAXES	23.5	23.5	24.1	27.6	32.1	38.3	45.1	53.0	58.9	65.9	72.4
% CHANGE	-2.0	2.6	5.3	10.9	16.5	19.1	17.7	17.5	10.7	12.4	9.7
BOND RATE (%)	12.33	12.28	11.83	10.98	10.73	10.29	10.32	10.66	9.96	9.63	9.54
PRIME COMMERCIAL PAPER RATE (%)	11.23	11.17	9.66	7.61	9.29	8.78	8.87	9.29	8.66	8.23	8.17
MONEY SUPPLY	1124.2	1221.4	1326.9	1539.3	1734.6	1961.8	2196.4	2450.5	2712.0	3020.2	3359.6
% CHANGE	8.5	8.7	8.6	16.0	12.6	13.1	12.0	11.6	10.7	11.4	11.2
UNEMPLOYMENT RATE (%)	7.51	6.17	7.74	7.48	7.12	7.43	7.09	6.92	6.76	6.46	6.17
SAVINGS RATE (%)	4.29	4.79	4.90	5.23	5.58	5.36	5.61	5.44	5.51	5.80	6.04
SURPLUS OR DEFICIT, FEDERAL (CUR \$)	-51.1	-58.3	-37.7	-28.0	-23.5	-7.7	-9.8	-0.7	-5.0	3.3	-1.1
SURPLUS OR DEF, STATE & LGV (CUR \$)	23.2	31.0	42.6	38.9	39.4	37.9	37.0	36.5	41.3	45.5	44.4
COMPEN. TO EMPLOYEES TO NAT. INCOME	77.0	77.1	77.0	76.0	75.8	75.5	75.0	74.5	74.9	74.8	75.3
PROFITS TO NATIONAL INCOME	11.2	10.3	9.6	9.0	10.1	10.8	11.4	12.0	12.0	12.2	12.2

A trend projection of a large scale econometric model has a special interpretation. In the initial two or three years of such an extrapolation, an attempt is made to introduce as much specific business-cycle content as possible by moving principal policy magnitudes along specified short-run courses that interpret budget commitments, tax statutes, behavior of monetary authorities, and various economic regulations. This portion of the extrapolation may properly be labelled as a multi-dimensional forecast. From that point forward, major inputs are placed on recent medium-term trend paths. A set of exoge-

<sup>2</sup>The Wharton Model projections for the United States, reported here, were prepared by Vijaya Duggal, Gene Guill, George Schink, and Yacov Sheinin.

nous inputs are sought, by trial and error, that generate a balanced growth path for the economy. By balanced growth, I refer to several established long run characteristics that are used to constrain the solution. These are:

- (a) equality between the real growth rate and real interest rate;
- (b) a stable savings ratio;
- (c) a stable wage share of GNP;
- (d) a stable velocity ratio;
- (e) tolerable deficits, internal and external.

It is not easy, but it is generally possible, to find a set of input values which, together with initial conditions, generate a model solution with these properties. There is no guarantee that such a solution, determined from a model of some 1000 or more interrelated equations, is unique, but there is no indication that a very different one exists that also meets these enumerated conditions.

It was evident at the beginning of the 1970's - as early as 1970, in fact - that if we were to try to bring projected solutions of the Wharton Model closer to established long run trends for growth and unemployment that internal pressures would be built up that would unbalance the solution for the economy. Inflation would pick up, the domestic deficit would grow abnormally large, and the net foreign balance would move into serious deficit. It did not seem possible to start from prevailing initial conditions and end up with a solution to the model that moved on a higher growth path, conforming to history and satisfying the constraints imposed on the long run extrapolation. Generally speaking, the model would produce higher rates of inflation and large domestic and foreign deficits. Further development of feedbacks to capital flows and dollar exchange rates were not explicitly developed.

The trial and error simulation procedure gives the following indications:

- (i) the long term growth rate has fallen by about one percentage point;
- (ii) the inflation rate has been raised by about five percentage points;
- (iii) the current account balance is barely maintained;
- (iv) productivity growth is resumed, but at a rate lower by about one percentage point;
- (v) nominal interest rates are generally higher than in the past;
- (vi) domestic fiscal balance is eventually attained.

At the very beginning of a new economic situation, determined to a great extent by adverse external circumstances, we should expect to find an immediate decline in the growth rate, but should the production path of the economy be shifted downwards, once and for all by a level amount, and then revert to the former growth rate, or should the growth rate itself, be lowered? Equilibrium growth theory and intuition suggest that after the initial growth decline the economy should return to the old growth rate. The level of production should be shifted downwards, but the rate of expansion should recover to the old position. Large scale econometric models do not seem to produce that result, at least over the period of one decade. There appears to be a downshift of the entire growth rate; thus, the United States are now expected to grow at about 3% instead of 4%, and that is a familiar pair of numbers often cited to describe expectations in a number of individual countries of Western Europe. For

Japan, the downshift in long term equilibrium growth is from about 10 percent to 5 %. This is an interesting finding that pervades many econometric modeling exercises for different countries and, as we shall see, for the world, too.

If the economy of the United States is stimulated toward recovery of the higher growth path of the 1950's and 1960's, a gap in trade and payments appears. But if the economy is allowed to proceed along the more moderate path of 3%, the current account stays close to balance with only slight deterioration in spite of a continuing increase (assumed) in the real price of imported oil. There is some tendency towards energy conservation, but the value of oil imports is expected to grow significantly, year by year. Mainstays of the American current balance are growing agricultural exports and an impressive positive balance for services, or invisible accounts. Among the latter, the most important growth item is investment income. Many U. S. firms unsettled the balance of payments when they invested capital abroad in earlier formative years. But eventually, they made good on their investments, which was always the intention. U. S. based multinational enterprises now enjoy good income from abroad. In many cases, foreign income is much more favourable than domestic income.

Two other developments also contribute to net investment income from invisibles; high interest rates abroad, especially in the Euro-dollar market, enable U. S. corporate treasurers to realize good earnings from short term investments of working capital. High oil prices, which hurt our balance in the visible, merchandise sector, are offset by high earnings of U. S. multinational oil companies.

The U.S. economy is fundamentally beset by "fiscal drag". When the economy is operating in the neighborhood of full employment, present tax and revenue statutes are capable of generating very large receipts, generally large enough to cover all reasonable expenditures, extrapolated along historical growth paths. There will be some fresh tax cuts, and these are, indeed, factored into the baseline projection. But that is not enough to prevent overall expansion, by large sums, of revenues for the account of central government. Although we seldom realize balanced internal budgets, after the year is over, we do project them in baseline simulations. Major disturbances that bring forth new outlays and hold back the expansion of the personal income base cause internal accounts to fall into deficit positions much more frequently than is expected when a decade projection is made.

It is not solely energy considerations, such as the shift to relatively higher energy prices, that have caused the new slower profile of economic expansion in the United States, but energy is a key factor in these aspects of economic change. It is not possible to appreciate fully the new dimensions of the modern economy without devoting a great deal of attention to the role of energy. Accordingly, the Wharton Model, among other econometric interpretations of the United States, has incorporated a great deal of energy detail. It is evident from the accompanying table that progress is expected in energy conservation, a natural component of economic efficiency. Inefficiency in the use of an expensive scarce resource such as energy should eventually result in its more

careful use. The baseline projection for the American economy shows a steady downward trend in the energy (BTU) to GNP ratio, from 52.48 (Thou BTU/1972\$) in 1980 to 44.57 in 1990. Were it not for energy conservation, in response to a relative price shift, the problem of bringing external trade accounts into current balance would be much more difficult, with added pressure on the dollar and thus on domestic inflation; therefore, energy use in response to the laws of economics forms an important component of this entire look into the future.

It is not only the free working of the market economy that brings about increasing energy efficiency but also legislative mandates on the fuel efficiency of the automobile fleet. The steady improvement of the statistics on average miles-per-gallon is clearly evident in Table 3. By meeting these standards from the side of the fleet supply, consumers and producers are implicitly contributing to the improvement in the energy to GNP ratio. These institutional considerations are part of the exogenous input into the baseline case.

Table 3. Energy and R&ted U.S. projections to 1990

	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Gasoline and oil											
consumption (bill \$72)	24.0	23.3	23.7	23.0	22.3	21.8	21.4	21.1	20.8	20.5	20.3
Miles per gallon (new)	17.19	18.84	20.47	22.02	22.78	23.18	23.39	23.59	23.80	24.01	24.22
Miles per gallon (all)	13.75	14.23	14.88	15.70	16.64	17.63	18.62	19.60	20.51	21.32	22.02
Crude oil imports (m b)	2017	1956	2138	2030	1996	1952	1921	1898	1872	1843	1796
Import price (\$/b)	32.25	38.46	44.99	50.39	54.92	59.87	65.25	71.13	77.53	84.51	92.11
Energy consumption											
(quad BTU)	74.35	75.24	77.10	77.57	78.41	78.91	80.11	81.30	82.41	83.73	84.83
Energy GNP ratio											
thous. BTU/1972\$)	52.48	51.93	51.02	49.93	48.80	47.96	47.22	46.58	45.90	45.19	44.57

The projected decline in energy use per unit of production is not simply a "hope" built into the solution of the Wharton Model; it is, in fact, a continuation of an existing trend that has been apparent but too little appreciated since 1973. The energy-GNP ratio fell from 60.41 to 54.50 over the period 1973-79.

In searching for a set of economic policies that give rise to the balanced solution, termed the baseline case, I have been mindful of contemporary politics. Since the Kennedy-Johnson years, the federal administration in the United States has been conservative, undoubtedly becoming more conservative with the passage of time and with mounting frustration in dealing with inflation. The fiscal and monetary policies of the baseline case are appropriately constrained to be conservative also. They continue basic downward trends in public expenditures as a percent of GNP and keep taxes high enough to generate an eventual domestic budget balance. The growth of money supply is prudent. In the long run there is a tendency for this model to conform to the quantity theory of money, i.e., nominal GNP and money supply expand at the same rate of change.<sup>3</sup> This is shown by a tendency toward steady velocity of

<sup>3</sup>See L.R. Klein, "Money in a General Equilibrium System: Empirical Aspects of the Quantity Theory", *Economic Appliquée*, XXXI (1-2, 1978), 5-14.

circulation. This is a conservative monetary policy, to go hand-in-hand with an assumed conservative fiscal policy.

Table 4. Estimated M4 Velocity in U.S. Baseline Projections

1980	2.28	1984	2.27	1988	2.21
1981	2.34	1985	2.22	1980	2.19
1982	2.42	1986	2.21	1990	2.17
1983	2.31	1987	2.21		

#### BASE CASE-THE WORLD ECONOMY<sup>4</sup>

In many respects, the economic evolution of the United States over the next decade should indicate a general pattern for most developed industrial economies. To be sure, every country will have its own special situation, but the principal simulation results - moderate growth, less inflation, and overall balance - should prevail for several if not all industrial market economies. Next let us consider the world as a whole, not just the group of industrial countries which comprise the OECD, but the centrally planned and developing countries as well. Interest centers on their interaction and the way the world economy evolves.

During the 1960's economic development was rapid. Among industrialized countries, Japan's growth was unusually high, exceeding 10% annually. The growth rate of all industrialized countries averaged 5.1% over the decade but fell to only 3.2% during the greater part of the 1970's as a result of business cycle swings. The centrally planned economies turned in some individual good performances, but the cultural revolution in China, internal upheavals in Czechoslovakia, and difficulties elsewhere held their growth rate to 4.9%, just under the OECD average. The socialist countries picked up considerably in the 1970's but now face the same problems as the market economies in the period ahead.

For the developing countries, the results are very mixed depending on country classification. According to World Bank estimates, low income countries grew at rates significantly under 4% in both the 1960's and 1970's. Performance was close to 6% in the middle income grouping, and even higher for Persian Gulf Oil exporters. These tabulations cut off notably in 1978, just prior to the revolution in Iran, which has disrupted economic activity for some time to come.

<sup>4</sup>Members of the research team of Project LINK contributed markedly to the results reported in this section. They are Victor Filatov, Shahrokh Fardoust, Yuzo Kumasaka, Michael Papaioannou, and Baudouin Velge.

Table 5. Some World Historical Statistics

	GDP Growth		Inflation rate		Export Growth		Import Growth	
	1960-70	1970-78	1960-70	1970-78	1960-70	1970-78	1960-70	1970-78
Low Income Countries	3.9	3.6	3.0	10.6	5.0	-0.8	5.0	3.2
Middle Income Countries	6.0	5.7	3.1	13.1	5.5	5.2	6.8	5.8
Industrial Countries	5.1	3.2	4.2	9.4	8.7	5.7	9.4	5.1
Persian Gulf Oil Exporters	13.0	6.0	1.2	22.2	9.5	-1.2	11.1	21.1
Centrally Planned	4.9	5.6	-	-	-	-	-	-

Source: World Development Report, 1980  
World Bank

Inflation rates were modest prior to the economic dislocations of the past decade, with single-digit rates well under 5% customary in the non-socialist world. There were some significant exceptions in the developing world. After the large increments in food and fuel prices during the early 1970's, and the absorption of the legacy of Vietnam, prices took off to new heights. The average, 1970-78, was just below 10% for the industrialized countries, but the situation has worsened considerably in the most recent years. This is one of the bleakest aspects of the future outlook.

There are no satisfactory price reports from the centrally planned economies. Very recently, they have shown a series of once-for-all price changes, but their opening of their borders to trade on a significantly larger scale means that they will have to absorb a large degree of imported inflation. Where appropriate price indexes are available, they indicate price increases comparable to those in the West.

Another dimension in the world economy is the growth and pattern of world trade. The decade of the 1960's was a "golden era" in trade development. Both exports and imports grew faster than did aggregate production. As recession hit the world economy in the 1970's, trade growth also receded, but it remained significantly above the growth in production. On a world scale, the growth in trade volume was about 50% faster than production growth.

For most of the historical period since the end of World War II, the fixed parity system of the Bretton Woods Agreement took care of adjustments in trade balances, while developing a thriving multilateral system of trade. The build up of large surpluses by countries like Japan and Germany and the relative weakness of the United States, United Kingdom and a few other key countries brought the downfall of this system at the end of the 1960's or beginning of the 1970's. The managed floating system was being given a chance to operate, when the world was shocked by the oil embargo of 1973, followed by high energy pricing by OPEC. Now there are large surpluses and deficits among countries, subject to a great deal of turnover from year to year, as regards who is in surplus and who is in deficit. Overshadowing the short run adjustments among various OECD members is the very large balance of oil exporting nations. After the first buildup of surplus balances by OPEC in 1974-75, the excess funds were recirculated throughout the world economy through inflation, dollar devaluation, and OPEC's high propensity to import.



This situation has been halted, and a large surplus for oil exporting countries is presently matched by a deficit for oil importing countries in both the developed and developing world.

The basic assumption for world model projections into the 1980's is that oil production will be more moderate; price increases will be maintained above western inflation rates; and the surplus of oil exporting countries will be used for the development of the non-oil sectors of their economies or invested throughout the world.

By using the initial conditions of recent world economic history, an assumption about the course of oil prices, and extrapolated trends of major exogenous variables, we can compute a baseline projection of the world economy as a whole. The interrelated system of national and regional econometric models that constitute project LINK is the statistical medium through which this calculated projection is made.<sup>5</sup>

Each component model of the LINK system is put through a trend extrapolation exercise analogous to that described above for the Wharton Model of the United States, the main difference being that the models of project LINK, including the U.S. component, do not have the large detailed input-output and energy sectors that are present in the version of the Wharton Model that is being used for these longer term analyses. In the U.S. case, the projected American economy of the LINK model is monitored by the known results of the annual Wharton Model.

The main advantage of using the integrated LINK system for this medium term projection is to develop the growth patterns of world trade and inflation as part of the outcome of the calculation rather than as assumed inputs. For the individual assessment of growth patterns in each separate country or region, assumed values for world trade and import prices must be established in advance.

The base case projection for the world economy bears some close resemblances to the results discussed already for the U.S. case, since most parts of the world are experiencing the same kinds of economic pressures and converging towards a similar response and outcome.

<sup>5</sup>R. J. Ball, ed., *The International Linkage of National Economic Models*, J. Waelbroeck, ed., *The Models of Project LINK*, and J. Sawyer, ed., *Modelling the International Transmission Mechanism*. (Amsterdam: North-Holland Publishing Co., 1973, 1976, 1979). See also B. G. Hickman and L. R. Klein, "A Decade of Research by Project LINK", *ITEMS* (New York: Social Science Research Council), vol. 33, (December, 1979) 49-56.

Table 6. World Summary Measures of Growth and Inflation 1980–1990 Baseline (annual percentage changes)\*

Country Grouping	1980	1981	1982	1983	1984	1985	1986
<b>Gross Domestic Product</b>							
13 LINK OECD							
Countries <sup>1</sup>	1.3	2.3	4.2	3.7	3.4	3.4	3.2
Level <sup>2</sup>	(2613.5)	(2672.5)	(2785.5)	(2889.0)	(2987.9)	(3087.5)	(3184.7)
Developing Countries	5.0	5.6	5.3	5.7	5.4	5.6	5.4
Non-Oil Exporting	5.5	5.6	5.3	5.7	5.4	5.6	5.3
Oil Exporting	2.2	5.3	5.3	5.3	5.3	5.3	6.3
Centrally Planned							
Countries <sup>3</sup>	4.2	3.4	4.3	4.4	4.6	4.4	4.4
World <sup>4</sup>	2.2	3.0	4.3	4.1	3.9	3.9	3.7
<b>Private Consumption Deflator</b>							
13 LINK OECD							
Countries	11.2	8.5	6.4	5.9	5.6	5.4	5.4
(GDP Deflator)	(9.5)	(8.1)	(6.6)	(5.9)	(5.6)	(5.6)	(5.5)
Developing Countries	25.3	29.1	20.7	18.1	16.2	13.0	11.2
Non-Oil Exporting	26.8	31.6	22.7	19.6	17.4	13.8	11.8
Oil Exporting	14.4	11.3	6.3	7.4	8.0	7.5	6.9
World <sup>5</sup>	13.8	12.3	9.1	8.2	7.6	6.8	6.5

\* Weighted averages of own country/region growth rates.

<sup>1</sup> 13 LINK OECD countries are Australia, Austria, Belgium, Canada, Finland, France, Federal Republic of Germany, Italy, Japan, Netherlands, Sweden, United Kingdom, and the United States of America.

<sup>2</sup> Billions of 1970 U.S. \$ at 1970 exchange rates.

<sup>3</sup> Includes only Eastern Europe CMEA and the U.S.S.R.

<sup>4</sup> World = .6565×OECD+.1494×DEVE+.1851×CMEA.

<sup>5</sup> World = .8145×OECD+.1855×DEVE. Inflation measures for CMEA are not available.

Period averages are calculated as the geometric mean of the first through last period growth rates.

On average, the industrialized countries are projected to lose one or two percentage points of growth. During the 1960's they expanded at more than 5%, but a longer stretch of time including the 1950's would reduce that estimate. In the projection, the growth rate is about 3%, the same as in the cyclical decade of the 1970's. GDP growth of the developing countries is reduced in this projection, as is that of the centrally planned economies. All told, When the figures are averaged on a world-wide basis, the resulting figure for growth is between 3.5 and 4.0% for the decade ahead. The corresponding figure was in excess of 5% for the 1960's and somewhat smaller during the 1970's.

Historically, world trade has expanded more rapidly than production, in a ratio of about 1.5. In the projection, however, the ratio falls considerably, so that world trade is expected to grow by little more than 10% above the growth rate of production. This is a new situation, with new large economies entering the world trade system on a large scale - China, the U.S.S.R., and other socialist countries - together with an awareness of an increasing degree of interrelatedness among nations. The United States is noticeably more concerned about its international economic relations, and more involved too. Countering these tendencies are efforts at import substitution, the introduction

1987	1988	1989	1990	1981-1985	1986-1990	1980-1990	1981-1990
2.9 (3277.2)	2.9 (3373.1)	2.9 (3471.6)	2.7 (3564.4)	3.4	2.9	3.0	3.2
5.3	5.3	5.3	5.3	5.5	5.3	5.4	5.4
5.2	5.2	5.2	5.2	5.6	5.2	5.4	5.4
6.3	6.3	6.3	6.3	5.3	6.3	5.5	5.8
4.6	4.4	4.6	4.6	4.2	4.5	4.3	4.4
3.6	3.5	3.6	3.4	3.8	3.6	3.6	3.7
5.4 (5.5)	5.5 (5.5)	5.4 (5.4)	5.4 (5.6)	6.4 (6.4)	5.4 (5.5)	6.4 (6.2)	5.9 (5.9)
11.1	10.8	10.5	10.3	19.3	11.5	15.9	15.0
11.7	11.4	11.0	10.8	20.9	11.3	17.0	16.0
6.9	6.8	6.8	6.6	8.1	6.8	8.1	7.4
6.5	6.5	6.3	6.3	8.8	6.5	8.2	7.6

of some measures of protectionism, and some attempts by oil exporting nations to restrain the growth of their output.

In this moderate growth, relatively slow trade era, it is expected that eventually anti-inflationary policies will take hold. These are promoted by the conservative economic attitudes of policy makers now prevalent in the United States. The overall inflation rate does not fall back to the very low ranges that prevailed some twenty years ago. In place of the less than 5% rates what we once enjoyed, a reduction to single digit ranges and ultimately to about 5-6% is considered a significant achievement. In the developing world, a reasonable target would be about 15%, on average.

The growth of the OPEC surplus, covered over in these tables as a result of the amalgamation of all developing countries is matched, over the decade, by the deficit of the industrial countries. There is some deficit, as well, among the socialist countries. This projection assumes that these offsetting balances are recycled through the world financial system. The actual process may be quite difficult to accomplish.

Within the OECD area, there is a great deal of shifting between surplus and deficit areas. While the U.S. goes from deficit towards balance by 1990, Japan and Germany initially move into deficit, as do France, Italy, and the United

Table 6. (continued) World trade summary

	1980	1981	% $\Delta$	1982
13 LINK OECD Countries <sup>1</sup>				
Exports <sup>2</sup>	1036.0	1219.3	17.7	1420.8
Imports	1090.0	1275.2	17.0	1439.0
Balance	-54.0	-55.8		-18.2
Developing Countries				
Exports	532.1	631.6	18.7	693.7
Imports	438.5	564.3	28.7	629.2
Balance	93.6	67.4		64.5
Centrally Planned Countries <sup>3</sup>				
Exports	138.4	156.7	13.3	177.2
Imports	146.7	168.2	14.6	186.5
Balance	-8.3	-11.4		-9.3
Rest of the World <sup>4</sup>				
Exports	163.4	203.0	19.8	189.8
Imports	194.7	203.1	4.3	226.8
Balance	-31.3	-0.1		-37.0
World Exports	1869.9	2210.7	18.2	2481.5
World Export Price	3.3	3.8	14.8	4.1
World Exports (Real)*	572.2	589.4	3.0	612.6
World Export Price of Fuel	10.9	13.2	20.8	14.3
World Exports of Fuel (Real)*	40.9	39.6	-3.2	41.3

\* Constant dollar measures have base 1970 = 1.0

+ Figures in parentheses are annual average trade balances.

<sup>1</sup>13 LINK OECD countries are Australia, Austria, Belgium, Canada, Finland, France, Federal Republic (if Germany, Italy, Japan, Netherlands, Sweden, United Kingdom and the United States of America.

<sup>2</sup>Measures are for merchandise trade, F.O.B.

<sup>3</sup>Includes only Eastern Europe CMEA and the U.S.S.R

<sup>4</sup>Period averages are calculated as the compound annual growth rate of the last over first year projection.

Kingdom. The Japanese situation is projected to change drastically and promptly back into surplus by mid-decade, while the German case follows a more moderate path towards balance and reaches a small surplus by 1990.

The analysis of U.S. growth prospects is applicable by analogy to the industrial countries as a whole. Restrictive policies to fight inflation, to pay for expensive oil imports, protect exchange value of the currency, and to recoup productivity losses keep the economy on a moderate path. The slowdown in the industrial world holds back the export potential of developing countries. In order to cope with adverse trade and payments deficits, restrictive policies are followed. In this environment, capital inflows for development are harder to

% $\Delta$	1983	% $\Delta$	1984	% $\Delta$	1985	% $\Delta$
16.5	1592.3	12.1	1788.9	12.3	2012.7	12.5
12.8	1622.5	12.7	1833.2	13.0	2055.5	12.1
	-30.2		-44.3		-42.7	
9.8	773.5	11.5	859.0	11.1	954.7	11.1
11.5	719.9	14.4	807.2	12.1	912.9	13.1
	53.6		51.8		41.8	
13.0	201.1	13.5	229.7	14.2	261.3	13.8
10.9	207.3	11.2	235.3	13.5	265.9	13.0
	-6.2		-5.6		-4.6	
-6.5	239.7	26.3	286.9	19.7	329.2	14.8
11.7	256.9	13.2	288.9	12.5	323.7	12.0
	-17.2		-2.0		5.5	
12.2	2806.6	13.1	3164.5	12.8	3557.9	12.4
8.0	4.4	7.9	4.7	7.8	5.1	7.5
3.9	641.9	4.8	671.4	4.6	702.3	4.6
8.5	15.8	10.5	17.4	9.9	19.1	9.7
4.3	42.9	3.9	44.5	3.7	46.1	3.5

come by. High debt service burdens, in a number of cases, act as additional constraints. Conservative governments in the OECD area are less disposed than previously to grant concessionary aid.

The centrally planned economies used to consider themselves well insulated against the economic ills of the rest of the world. This is no longer the case.

The centrally planned economies, dissatisfied with the outcome of their own efforts to achieve good economic growth performance, have changed strategy and decided to import high technology from the West, as well as necessary grains to supplement their domestic agricultural supplies. This new approach has opened their economies to Western inflation because imports have been

Table 6. (continued)

	1986	% $\Delta$	1987	% $\Delta$	1988	% $\Delta$
<b>13 LINK OECD Countries</b>						
Exports	2259.8	12.3	2522.4	11.6	2824.7	12.0
Imports	2295.4	11.7	2551.0	11.1	2840.3	11.3
Balance	-35.6		-28.5		-15.6	
<b>Developing</b>						
Exports	1055.8	10.6	1161.0	10.0	1273.5	9.7
Imports	1020.1	11.7	1134.0	11.2	1258.6	11.0
Balance	35.7		27.0		14.8	
<b>Centrally Planned Countries</b>						
Exports	298.2	14.1	333.2	11.7	376.0	12.8
Imports	304.9	14.7	339.5	11.3	383.9	13.1
Balance	-6.7		-6.2		-7.9	
<b>Rest of the World</b>						
Exports	367.8	11.7	408.3	11.0	454.8	11.4
Imports	361.2	11.6	400.7	10.9	446.1	11.3
Balance	6.6		7.7		8.7	
World Exports	3981.6	11.9	4425.1	11.1	4929.0	11.4
World Export Price	5.4	7.1	5.8	7.1	6.2	6.9
World Exports (Real)	733.9	4.5	761.9	3.8	793.7	4.2
World Fuel Price	20.9	9.3	22.9	9.7	25.0	9.2
World Fuel Exports (Real)	47.9	3.9	49.2	2.7	50.7	3.1

reflecting rising world price. Gold and oil sales at correspondingly rising prices have been used by the Soviet Union to finance part of their import needs, but they are fully enmeshed in world inflation accounting in balancing rising export prices.

The economies of Eastern Europe have had to cope with trade deficits and unusual borrowing in order to pay for imports, over and above their abilities to produce exports for the world markets. As their external accounts have got out of line, they have had to resort to the "stop" phase of familiar "stop-go" politics. In addition, Poland and other Eastern countries have been confronted with domestic labor unrest in an inflationary environment.

The People's Republic of China are resorting to similar trade politics, but mindful of the complications that arise when socialist countries rush headlong into an open economy format, they are taking lessons from the European experience and moderating their original trade and capital import plans. Although the Chinese are approaching this phase of development quite cautiously, they have enough pent-up growth potential at the present time to support a growth rate in excess of the average for centrally planned economies.

1989	% $\Delta$	1990	% $\Delta$	1981-1985 % $\Delta$	1986-1990 % $\Delta$	1980-1990 % $\Delta$	1981-1990 % $\Delta$
3172.8	12.3	3545.1	11.7	13.3	11.9	13.1	12.6
3174.3	11.8	3532.1	11.3	12.7	11.4	12.5	11.9
-1.5		13.0		(-38.2) <sup>+</sup>	(-13.6) <sup>+</sup>	(-28.5) <sup>+</sup>	(-25.9) <sup>+</sup>
1399.8	9.9	1534.0	9.6	10.8	9.8	11.2	10.3
1403.2	11.5	1559.0	11.1	12.7	11.2	13.5	11.9
-3.4		-25.0		(55.8) <sup>+</sup>	(19.8) <sup>+</sup>	(38.3) <sup>+</sup>	(37.8) <sup>+</sup>
424.6	12.9	477.2	12.3	13.6	12.5	13.2	13.1
433.6	12.9	487.2	12.3	12.1	12.4	12.7	12.5
-9.0		-10.0		(-7.4) <sup>+</sup>	(-7.9) <sup>+</sup>	(-7.7) <sup>+</sup>	(-7.7) <sup>+</sup>
512.5	12.7	576.7	12.5	12.8	11.9	13.4	12.3
498.7	11.8	554.7	11.2	12.3	11.3	11.0	11.8
13.9		22.0		(-10.2) <sup>+</sup>	(11.7) <sup>+</sup>	(-2.1) <sup>+</sup>	(0.8) <sup>+</sup>
5509.7	11.8	6133.0	11.3	12.6	11.4	12.6	12.0
6.6	6.8	7.1	7.8	7.6	7.1	8.0	7.2
830.4	4.6	861.9	3.8	4.5	4.1	4.2	4.3
27.3	9.1	29.7	9.0	9.6	9.2	10.6	9.4
52.3	3.2	54.0	3.3	3.8	3.1	2.8	3.5

In the near term, China is growing at 7 percent or more. For the longer term, 6% seems to be attainable, although they could slip backward by another percentage point, or so.

A special group of nations among the developing countries are the OPEC nations or, more broadly, the oil exporting nations. They have little or no balance of payments constraint attached to their development plans for the medium term at least. Although they may be in a position to develop at a more rapid rate, they are reconsidering the experience of the past five years in which rapid exploitation of oil resources did not optimize their purchasing power for capital and other imports and created dangerous or fatal unrest in several countries. Many of these countries were not able to absorb imports efficiently at the more rapid pace. Their overseas investments have been only partially successful. As a consequence of all these problems, oil exporting nations are opting for a more moderate rate of industrialization. Both the oil and non-oil sectors of their economics will be expected to phase down to a slower growth path.

No matter where we look in the assessment of the world economy, there are

fundamental reasons for expecting a slower rate of development.

Recognition of lack of abundant energy resources for the world, more particularly crude oil resources, has by itself contributed to the slowing down of the world economy. This can be seen by looking at the results of alternative simulations of the LINK model with different assumptions about energy prices. A standard procedure is to compute a baseline projection, as has already been described here, and then compare this result with an alternative projection where specific changes in external factors have been imposed on the model. In the case being examined here, the change imposed is an increase in the world oil price by 10%; i. e., the exogenous path of world oil prices, set by OPEC, is raised, year by year, to a new path that is uniformly about 10% above the baseline path.

On occasion, we have made simulations in which the oil price was kept fixed at some base year value or in which the real price of oil was kept fixed - by allowing the nominal price to move by the same percentage change as an accepted index of inflation, say a general price index in the OECD countries. The LINK system has a basic symmetry property. Results with lower oil prices are opposite in sign, with similar magnitude, to those with an increase in price.

The general findings can best be described by considering main elasticities of the system. These are percentage changes in principal magnitudes associated with a change in oil price, other external inputs remaining unchanged.

In the first place, fuel import demand falls by about 1.1% for a 10% increase in price. The elasticity coefficient is about 0.11. This degree of sensitivity appears in the first year of a projection and persists for a whole decade. After 10 years, if the price is higher by 10%, the trade volume is lower by about 1% .

Higher oil price discourages world economic activity and adds to world inflation. Industrial world GDP falls by about 0.5% when oil prices are initially 10% and then about 6% higher after the first year. This works out to be an elasticity coefficient of 0.06. For this same change in oil price, OECD inflation measured by the GDP implicit deflator is up by about 0.2% and consumer price rises by 0.3% to 0.4%.

When we consider that world energy prices have gone up much more than 10%, after 1973 - they quadrupled and then more than doubled again - we can see that energy issues had much to do with the present state of stagflation. It is not a simple matter of finding a multiple of the 10% change used in the elasticity calculations, because those changes were introduced in an artificial *ceteris paribus* situation, while many things changed in the actual world environment after oil prices first jumped. In fact, real oil prices did not permanently rise after the initial change in 1974-75; they did, however, after the latest change in 1979.

In any event, we can plainly see that world economic activity and world inflation are highly sensitive to world energy prices. The present slowing down of economic growth, accompanied by higher inflation, is due, in part at least, to higher energy prices.

The baseline projections made here for both the United States and the world as a whole are done in a *benign* environment; that is to say, there are no



untoward major disturbances contemplated for the 1980's in this case. Since the end of World War II and the immediate readjustment period there have been three completed decades, each with its own disturbing factors that upset an otherwise benign environment. These have been:

1950's Korean War

    "Cold" War

    Suez Canal Closing

1960's Vietnam War

1970's Breakdown of Bretton Woods

    Massive Harvest Failures

    Oil Embargo cum OPEC Cartel Pricing

    Iranian Revolution

These major events had enormous impact on economic performances all over the world. Within each decade there were other disturbances as well, less dramatic, yet economically significant.

In thinking about possible "futures" for the 1980's, it may be convenient to formulate baseline cases without contingency planning for such disturbances because, in many respects, the kinds of formal models that we use decompose, approximately, into a systematic (baseline) component and a disturbance component.

This property is associated with linearity in formal model theorizing, and it appears to be a reasonable approximation. Therefore, we proceed by first working out the base case and then superimposing disturbances on it.

Sometime during the 1980's there can very well be - according to many thinkers there *will* be - another significant interruption of delivery of oil supplies and another large harvest failure. During the 1970's there was war in the Middle East but not on the scale and duration of Korea or Vietnam. In a sense, the oil embargo and OPEC pricing listed above are economic surrogates for the Middle East War.

Will the military experience of the 1950's and 1960's be repeated during the 1980's? This is certainly a contingency. There could well be large scale cold or hot war during the coming decade. Also, the international economy has been so upset by events in the food and fuel sectors that we tend to look to those areas for the reappearance of disturbances. It is likely that a large scale economic disruption will occur during the decade, but there will probably be disturbances in surprising new areas. Shortages of basic materials other than food and fuel could develop. There could be a wave of debt defaults running throughout the developing world or among relatively poor countries of the developed world. There could be a massive dislocation in the physical environment, in atmospheric or water pollution, or urban congestion. It is worthwhile exploring in some detail the economic dimensions of a few of the disturbances.

## POSSIBLE DISTURBANCES

Cartel Pricing: For the baseline case, we have assumed that, after the immediate effects of the Iranian Revolution have been worked out, crude oil prices would rise, on average, by about 10% annually for the whole decade. This turns out to be about 3% above the inflation rate that is relevant to the oil exporting countries, namely, the export price of OECD countries. In the baseline solution, this key price grows at about 6-7% annually. Between 1980 and the attaining of the trend pattern for the rest of the decade, there is an assumed transitional period before world inflation and the growth rate of oil prices decline; thus, the 1981 real price increases by more than 3%. In addition, a disturbance did appear during 1980, continuing at the end of this year, in the form of war in the Middle East. We are witnessing an unusual event in which two members of an effective cartel are engaged in open warfare. This has significantly reduced oil supplies and provides another reason for marking up the price in the transitional period, at least.

The steady rise of 3% in the real price of oil, together with an approximate solution path for OECD export prices at 7%, amount, in a numerical sense, to the indexation of oil prices. It has often been mentioned that a stated objective of OPEC is to devise an index formula for oil pricing. The simplest of such formulas is implicit in the baseline cast. Variations on this cast have been worked out with either higher or lower rates of increase of real oil prices. Another route to follow is to have a multivariate indexation formula, in which the oil price is also tied to GDP growth in the developed world, to the exchange value of the dollar, and other relevant indicators.

Indexation formulas give smooth steady paths for the course of oil prices, but at least one unsteady path is worth consideration as a result of a possible disturbance. If foreseeable world supplies of oil are balance against estimated world demand, there appears to be a large scale shortfall developing by mid-decade. This deficit could be made up either by having price rise steadily on a faster gradient, by having a one-time large upward step of 50-100%, or by rationing.

The fact that the OPEC Cartel has been as cohesive and long lasting as it has, surprises many economists. At the present time it even appears to be surviving open warfare between two members. We should be prepared, therefore, to experience other surprises of similar proportions. There are, of course, some unique features about OPEC that are not easily duplicated. Cartels in other fields of economic activity may not reach out to such important products from an industrial viewpoint. Cartels in diamonds, mercury, chromite or other industrial products would not have as great an impact on overall world activity. In most food lines, grains for example, large developed countries, which would be more disposed towards maintenance of a multilateral free trade system, are major export suppliers and could, therefore, inhibit or prohibit effective cartel action. Petroleum products are peculiarly concentrated, as far as surplus capacity for export is concerned, in the hands of a fairly cohesive politico-social group, dedicated to pan-Arabism or to aspirations of developing

nations. If export capacity of important industrial products were concentrated in the hands of a cohesive group of nations (religious, political, social, geographical) another effective cartel could arise. Such a possible field of action does not presently appear to exist on the world scene.

The world has been economically disturbed by food, as well as by fuel. There is certainly a possibility of unforeseen supply shocks in the provision of food during the 1980's. Harvest failures have been occurring with alarming regularity as ambitious attempts are being made to upgrade diets over a large part of the world. The year 1980 initiates the decade on an insecure footing with some measurable disturbances. The embargo of American grain shipments to the U.S.S.R., as a result of the invasion of Afghanistan has been controversial, not only because of its political impact but also because of doubts about its effectiveness. When all the arguments are sifted, it does appear that the embargo has been effective in delaying the delivery of larger meat supplies to the Soviet population. When it is placed in juxtaposition to the disappointing Soviet harvest of 1980 and the food shortages in Poland, it is evident that there are quite significant stresses on the world economy. To add to the list of food supply setbacks, we can also cite the drought, resulting in a poor crop in feed grains in the United States in 1980. We are starting out the decade with upward pressure on food/agricultural prices. The downward drift in world inflation, which is an important component of the baseline economic scenario for the 1980's is temporarily being thrown off course by rises in food/agricultural prices and in energy prices. If more disturbances like these occur during the course of the decade, we could have significantly worse economic performance than in the base case.

There is an important difference between food and fuel disturbances. The fuel disturbances of the 1970's, stemming from the 1973 Middle East War, were institutionalized and made permanent by the control power of OPEC. Food/agricultural prices, however, fluctuated during the decade, since supply responses to high prices have been relatively quick in agriculture. U.S. grain supplies, in particular, were expanded on a large scale after the massive depletion of stocks by Soviet purchases in 1972/73. The responsiveness of U.S. and other suppliers tends to soften the effect of agricultural disturbances when spread over a two or three year horizon.

The next disturbance to the world economy could well be entirely unforeseen. In searching for new and different areas where contingent planning would be helpful, we may cite the possibility of simultaneous debt default. Many developing countries, some centrally planned economics, and some poorer developed countries are seriously in debt. The degree of seriousness is indicated by debt service ratios showing the extent to which trade gain can cover (or fail to cover) needs for interest payment and debt amortization. There have been several singular cases of a nation's inability to meet current debt service requirements, but they have always been met in recent years without the precipitation of a crisis. Debt rescheduling has been successful for dealing with the specific situations that have arisen - Peru, Zaire, Zambia, Poland, Turkey, to name a few. As long as such cases can be kept isolated from the routine

functioning of the world financial system, a major disturbance can be averted. Commercial banks and international institutions have become alerted to the situation as a result of experiences in these singular cases. They have, accordingly, become more prudent in loan activity. This is another reason why moderation in the face of economic activity has become a characteristic of the baseline projection for the decade ahead. Although there is good reason to believe that disturbances in the form of a wave of debt defaults will not occur, such an event is by no means impossible.

#### AN OPTIMISTIC CASE

While some economists may feel that the base case, itself, is optimistic - at least complacent and trouble free - there are many industrialists, policy makers, financiers, and economists who strive for a better outcome. If there is a single measure, among the many that properly describe the economy, that indicates the unsatisfactory nature of present performance and its extrapolation along the path of the baseline case, it is the poor performance of *productivity*. In Table 2, it can be seen that productivity growth during 1980, in the United States, has been *negative*, while its trend projection, at rates of change that are mainly between 1.0 and 2.0% annually, fall considerably below a previously established long run path. It used to grow at a rate in excess of 3% in the United States. Outside the U.S., across most international lines, it is also true that the productivity improvement factor has fallen, perhaps not as drastically as in the United States, but it is uniformly lower in recent years.

A central focus for policy targets that gives some promise for better economic performance is, therefore, a policy mix that attempts to enhance productivity growth. Since we are not sure of the causes that led to the productivity slowdown it is especially difficult to prescribe policies for productivity improvement. Of the possible sources of productivity decline, it is widely felt that relatively weak capital formation, in the private sector, plays a major role.

Both through general capital expansion, and through modernization, it is expected that higher rates of fixed capital formation will lead to better productivity growth. It is necessary to make firms want to invest and to use the new capital at a high capacity rate.

Capital formation is important but not the whole story, because there is still a long way to go towards revitalizing the economy even after some objectives on capital formation have been reached. In a study for the New York Stock Exchange, last year, the operators of the Wharton Model examined the resulting net gains for the United States as a consequence of raising the investment share of GNP to about 12% from a stagnating level of about 10%.<sup>6</sup>

In a rounded policy package, the raising of the investment and savings rates by 2 percentage points are formidable steps forward, but they apparently do not suffice to restore the rate of growth of productivity to its historical trend of

<sup>6</sup>*Building a Better Future: Economic Choices for the 1980's*. New York Stock Exchange, New York, (December, 1979).

the early 1960's. This drastic upward shift in investment is estimated to add about 0.2 to 0.5 percentage points to the overall rate of productivity expansion. This in turn is associated with an overall improvement of the GNP growth rate by about 0.5 percentage points. These are promising policies but standing by themselves, they are not enough.

It is one thing to assume in a statistical mathematical model solution that the investment ratio is to be higher (by about 2.0 percentage points) and quite another to design policies that will, indeed, raise the share of capital formation in GNP by 2.0 percentage points. The policy discussion in the United States is narrowing to the provision of tax incentives for investment through liberalized depreciation rules and investment tax credits. There is still ample room for improvement of the rate of return on capital through changes in the appropriate tax parameters. Additional policy measures concern tax benefits for R & D outlays, more federal spending for R & D, and more federal spending for basic research. In addition to these standard fiscal measures on the taxing and spending sides of the national budget, there is expectation that productivity growth will be helped by relaxation of restrictive regulations and by the promotion of worker training programs on-the-job. To complement policies designed to raise the investment share of GNP, there should be corresponding policies to raise the savings share. One possible route is to encourage private savings for pension systems, possibly through policies to make retirement pensions portable between jobs. Another way is to exempt some interest on savings accounts from income taxation. The basic issue, however, is to shift the proportions in the make-up of U.S. GNP, namely, to reduce the consumption ratio by 2 percentage points while raising the investment ratio by an equal amount. This is the same thing as saying that the savings ratio should be increased by the same amount as the increase in the investment ratio. In other words, the objective is to shift the U.S. economy from being fundamentally a high consumption to being a high investment economy.

Other countries may view the problem differently, but there should be broad agreement that capital formation has had a relatively poor recovery since the start of the cyclical upswing after 1975. World-wide, the problem is to stimulate investment, but, as in the United States, that will be only a step in the right direction; it will lead to only modest improvement. Clearly, more imaginative policy thinking will have to deal with higher productivity growth.

A feature of the baseline path is the gradual reduction of the average rate of inflation. Many economists would argue that the central economic problem in both the long and short run is to reduce the inflation rate and that many things will "fall-into-place" once inflation has been controlled and gradually reduced.

Many policies can contribute to this worthy end, but a principal line would be to tie changes in the rate of productivity growth to the inflation rate. In the long run, if the rate of inflation is to be lowered, the growth rate of productivity must be significantly increased on a lasting basis.

If the rate of return on capital can be raised, if R & D activity can be made popular again, if economic regulation is liberalized, if worker productivity can be improved through training schemes, and if the rate of inflation can be

moderately but steadily decreased, then there is a chance that we can enjoy an investment boom in the 1980's that compares favorably with the great expansionary era of the 1950's and early 1960's.

The appropriate policy measures for raising capital formation and productivity growth are being looked at essentially on individual national bases. But coordinated fiscal and monetary policies offer a new dimension in which to act. If all major countries act synchronously to stimulate capital formation or to ease monetary stringency, there can be added reinforcement effects. International amplification of national fiscal multipliers is estimated to be as large as 1.25 to 1.50. Simultaneous expansions operate through the world trading system because as countries expand, they generally increase import demand. This, in turn, helps partner country export activity and feeds back again on domestic expansion in each individual country. The stronger the response, both nationally and internationally, the less the stimulus has to be in order to arrive at a specified objective. The more we can moderate the use of fiscal/monetary policy, the better is the prospect for lower inflation. By keeping inflation on a favorable path, we stand to gain much through better trade performance.

The figures in Table 7 give a rough indication of what might be expected if the federal government were to stimulate private fixed investment so that it would grow by an extra 2% annually. The policies are different among countries, but they generally consist of tax changes, support from public capital formation and support from general government spending.

The growth rate of GDP is improved over the course of this scenario by about 0.5 percentage points at the beginning, but gradually the investment stimulus tends to wear off by mid-decade. Similarly, there are gains in reducing inflation, again by 1.0 or 2.0 percentage points. A major contributing factor to the inflation gains is the improvement in productivity (real output per worker hour). It, too, performs better at the outset than at the end in 1985.

Table 7. Coordinated Investment Stimulus 13 LINK Members in OECD 1979–1985  
Differences in Percentage Growth Rates

	1979	1980	1981	1982	1983	1984	1985
GDP	0.3	0.6	0.5	0.2	0.2	0.2	0.1
Inflation							
(consumer prices)	0.0	-0.2	-0.1	0.0	0.0	0.0	0.0
Productivity gains	0.3	0.4	0.3	0.0	0.0	-0.3	-0.1