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# USSR: Economic Projections, 1982-90



A Research Paper

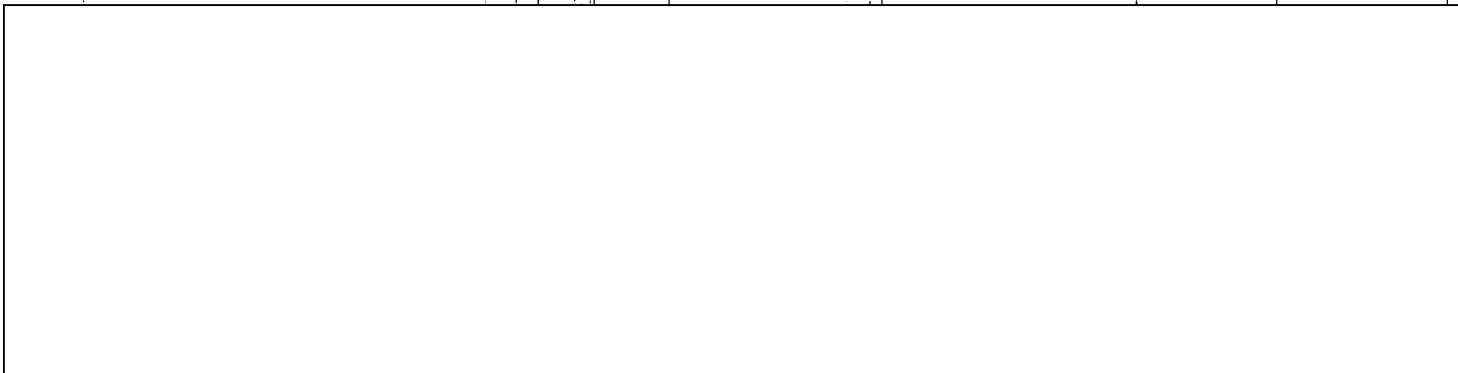
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SOV 82-10127  
September 1982

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# USSR: Economic Projections, 1982-90

A Research Paper

This paper was prepared by [redacted] of  
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**Preface**

The 1980s promise to be a difficult period for the Soviet economy. Demographic factors are certain to keep labor force growth at very low levels. We believe that partial depletion of the raw material base in the developed European regions will increasingly force expensive new investments in remote areas of Siberia, while improvements in labor productivity will be hindered by a slowdown in the growth of capital investment. Hard currency trade, which is heavily dependent on earnings from energy exports, is likely to experience slower growth during the decade and, as a consequence, will not offer a solution to the industrial materials and investment problems that are already emerging. Superimposed on these trends is the sharpening competition between the civilian and military sectors of the economy for claims on resources.

This paper offers a preliminary quantitative picture of the growth prospects for the Soviet economy in the 1980s to serve as a basis for discussion and analysis. In this sense, the projections shown provide a reference point or baseline case. Hence, the paper should be viewed as a point of departure and should not be construed as a formal "best estimate" of the outlook for the Soviet economy.

More specifically, the results of ongoing research on selected topics may result in changes in our baseline assumptions concerning the economic environment (for example, the future of Soviet oil production, the outlook for earnings of hard currency from exports, likely future divergency from past trends in total factor productivity in selected industrial sectors). In addition, the estimate of growth presented in this report depends in part on a number of key judgments about Soviet policy decisions. In the coming months, new information may clarify policy decisions already taken (for example, raw materials—including energy—export policy toward the East European client states) or may reveal new policy decisions (for example, investment policy toward agriculture following the fourth consecutive poor harvest). A forthcoming major study—scheduled for the fourth quarter of calendar year 1982—on Soviet economic prospects and the impact of these prospects on Soviet military and foreign policy will consider these and other factors. For the present, we have chosen—on the basis of current information and research findings—initial baseline assumptions to represent what we think will be the most likely developments in the 1980s. These are delineated on page 1.

The projections shown in this paper were developed using a large-scale econometric model and reflect the current best judgments of analysts following Soviet economic trends and policies.<sup>1</sup> The results are organized into two sections: one gives a graphical summary, and the other presents the detailed annual estimates in tabular form.<sup>2</sup> Given the nature of the assumptions postulated in this paper, we have much more confidence in the general trends of the projections than in estimates for particular years. The annual figures, however, can be used to illustrate where the economy might be in a given year in the absence of major changes in political and economic conditions.

To illustrate the impact of alternative assumptions concerning the economic environment or policy decisions on the baseline results, we have included results for three hypothetical shifts in the assumptions underlying the baseline solution.

<sup>1</sup> An earlier version of this model has been documented in CIA Research Paper ER 79-10001 (Unclassified), February 1979, *SOVSIM: A Model of the Soviet Economy*. A number of important improvements in the model have been made since this report was published, but the essential structure of the model has not changed. This model was constructed primarily to make medium- to long-term projections. Therefore, its estimates for the short term, while very near the trend, are not generally as accurate as those available from alternative methods.

<sup>2</sup> Throughout this report, components may not add to the totals shown because of rounding.

**USSR:  
Economic Projections,  
1982-90 (U)**

**Overview**

*Information available  
as of 1 August 1982  
was used in this report.*

Our preliminary projections show that Soviet economic growth will continue to decline in the 1980s as average annual rates of increase of labor and capital decline and productivity gains fall short of plans. We expect average annual GNP growth to fall below 2 percent per year in the 1980s.

Our projections depend on a number of baseline assumptions. The results of ongoing research on selected topics may result in changes in the assumptions that concern the economic environment, and, in the coming months, new information is likely to clarify Soviet policy decisions that affect other assumptions. In brief, the results shown in this report are tentative.

Slower growth of production will mean slower expansion in the availability of goods and services to be divided among competing claimants—resources for future growth (investment), the consumer, and defense. If Soviet defense spending in the 1980s increases at around 4.5 percent per year, as assumed in our projections, consumption and investment will expand at record low rates for the postwar period. Under this scenario, the defense burden would increase to over 15 percent of GNP in 1985 and to 17 percent in 1990.

Our projections indicate that new fixed investment in the 1980s will expand at about one-third the annual rate of the 1970s, due not only to slower growth in production of machinery and new construction starts but also to the rising share of durable goods going to the military. Moreover, the greatly expanding share of investment going to the energy sectors just to keep up low growth in energy output will depress the expansion of investment in nonenergy sectors.

Substitution of gas for oil will continue, and production of nuclear power will increase. Nonetheless, according to our preliminary assessment of energy production, these trends will not be sufficient to meet increased energy requirements. In particular, given our assumption regarding the decline of oil production, an oil gap emerges. The gap represents 10 to 20 percent of oil requirements in the second half of the decade but only about 5 percent of total energy requirements. A prospective shortage this large would raise yet another problem for Soviet planners and accounts for part of the projected slowdown in economic growth. Our projections, however, suggest that even without an energy gap Soviet economic growth would slow markedly.

We assume that part of the gap between growth of energy production and growth of requirements probably will be covered by a reduction in net exports of energy, from 4.3 million barrels per day oil equivalent (b/doe) in 1980 to about 3 million b/doe in 1990. With the emerging tightness in the Soviet oil balance, we assume that oil exports will fall by roughly 2 million barrels per day (b/d) by 1990. This will be partially offset by an increase in gas exports of 1 million b/doe.

Moscow could take steps to avoid an oil bottleneck, such as by investing even more in energy production and conservation. Though this could reduce and perhaps eliminate the gap, it would mean less investment and subsequent production in other sectors of the economy. Thus, the ultimate effect on economic growth would be similar to that of an oil shortage.

In our projections real hard currency export earnings decline by about 10 percent between 1981 and 1990. The Soviets could afford more imports than these earnings would permit by increased borrowing from the West. Credits at the average level of recent years, combined with additional borrowings for the Yamal pipeline, would permit Moscow to maintain roughly stable real imports over the next few years. But in the second half of the 1980s new credits would be exceeded by the debt service obligations on previous borrowing. As a result, in the absence of even higher amounts of borrowing, real imports from the West would be determined largely by export earnings after mid-decade.

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**USSR:  
Economic Projections,  
1982-90**

**Key Baseline  
Assumptions**

The projections presented in this report reflect a number of key assumptions about future trends in the Soviet economic environment. We have chosen these to represent what we think will be the most likely developments in the 1980s. (The sensitivity of the projections to alternative assumptions is examined on pages 18 through 20.) The *baseline assumptions* include the following:

- Growth in the productivity of Soviet plant and equipment, which has fallen substantially since 1975, will continue to drop.
- The labor force will grow more slowly in the eighties than it did in the seventies—at an average annual rate of 0.7 percent compared with 1.5 percent.
- Soviet defense spending in the 1980s will increase at an average rate of about 4.5 percent per year, with growth somewhat higher than average in the first half of the decade.
- The allocation of investment and labor among producing sectors reflects an extrapolation of trends based on data presented in the Soviet Five-Year Plan for 1981-85. Agriculture's share of investment is largely kept fixed, with the share for the energy sectors increasing substantially by 1985 at the expense of the rest of the economy.
- Oil production will begin a slow decline in the next few years, eventually reaching 10 million barrels per day in 1990, compared to the current production level of 12.2 million b/d. At the same time, gas production will continue to increase rapidly, more than offsetting the drop in oil.
- The energy efficiency of newly installed plant and equipment will continue to improve at 2.5 percent per year.<sup>3</sup> When the assumed energy efficiency gains of new plant and equipment are coupled with our projections of capital stock, we are able to calculate total energy requirements.
- With continued growth of domestic energy requirements, Moscow will face a conflict between maintaining oil exports and meeting domestic needs. We assume a middle course is followed, with reduced exports and unmet domestic requirements absorbing roughly equal parts of the shortfall.
- There will be no major shift in political or economic policy that will have a significant impact on economic performance.

<sup>3</sup> By energy efficiency we mean the units of energy needed per unit of plant and equipment to support its use in the production of goods and services.

**Results in Brief**

***Sources of GNP***

Our projections indicate that Soviet economic growth will continue to decline in the 1980s as the average annual rates of increase of labor and capital decline and productivity increases fall short of plans.

Substitution of gas for oil will continue, and production of nuclear power will increase. Nonetheless, according to our projections, these trends will not be sufficient for the Soviet economy to avoid a serious shortage of oil in the second half of the decade.<sup>4</sup> The oil gap will represent 10 to 20 percent of oil requirements, but less than 5 percent of total energy requirements. This emerging shortfall will raise yet another problem for Soviet planners, although even without this bottleneck Soviet economic growth would continue to decline.

Prospects for industry, which contributes roughly 35 percent of the national product, are dismal compared to its performance in the 1970s. Besides facing the economy-wide problems of slower growth of labor, plant and equipment, and other inputs, industry also must cope with a rapid depletion of raw materials production capacity in traditional areas. This means that more and more investment resources are needed just to maintain production levels as new raw material deposits are developed in the high cost areas of Siberia.

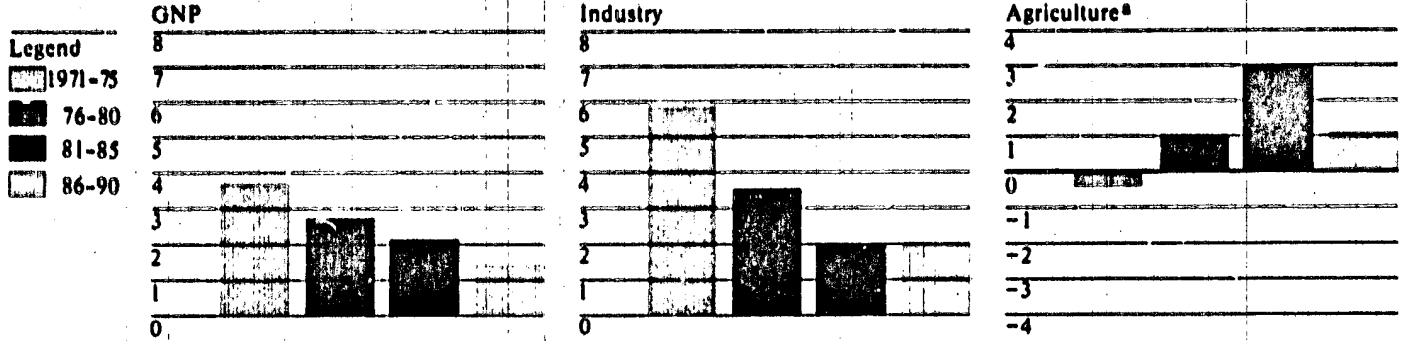
Agriculture is still the most unstable sector of the Soviet economy, with performance in any year highly dependent on weather conditions. Because weather conditions in the years ahead cannot be predicted, future crop yields are estimated on the basis of historical trends.<sup>5</sup> Thus, the growth estimate for farm output for 1981-85 (3 percent) is deceptively high since it primarily reflects a return to trend-line crop yields in 1985 compared to the below-trend yields of 1980 that resulted from poor weather.

<sup>4</sup> Our calculations result in an *ex ante* oil shortage in the Soviet economy. *Ex post*, such shortages are rarely observable because of adjustments taken in the economy over time. The adjustments the Soviets could take include increased investment for energy conservation and energy production or less than full utilization of production capacity. Our projections assume the main Soviet adjustment would be through the latter course of action. (U)

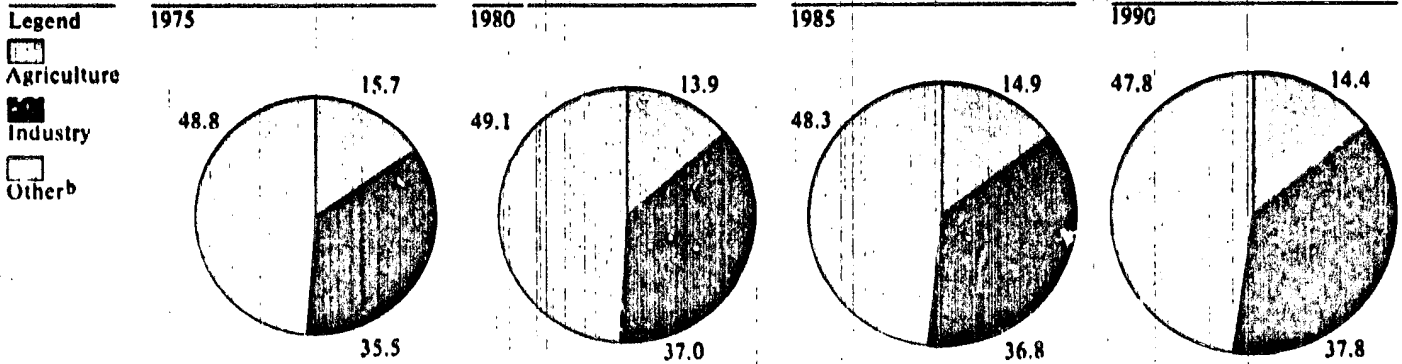
<sup>5</sup> Our projection of 1985 grain production is 215 million tons. A more complex method, which explicitly accounts for weather, arrives at the same estimate for 1985, assuming "average climate." See Russell A. Ambroziak and David W. Carey, "Climate and Grain Production in the Soviet Union," forthcoming in the Joint Economic Committee compendium, *Soviet Economy in the 1980s: Problems and Prospects*.

**Figure 1**  
**Sources of GNP**

**Average Annual Growth Percent**



**Production Shares Percent**



<sup>a</sup> Excludes intra-agricultural use of farm products but is not adjusted for purchases by agriculture from other sectors.

<sup>b</sup> "Other" includes construction, transportation and communications, and trade and services.

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***Uses of GNP***

Slower growth of production means slower expansion in the availability of goods and services to be divided among competing claimants—resources for future growth (investment), the consumer, and defense.

If Soviet defense spending in the 1980s increases at around 4.5 percent per year, consumption and investment will expand at record low rates of increase for the postwar period.

The immediate impact of slower expansion of investment is fairly small. Nevertheless, the rate of increase in production capacity is reduced because growth in the *stock* of plant and equipment will eventually follow growth in the *flow* of investment goods.

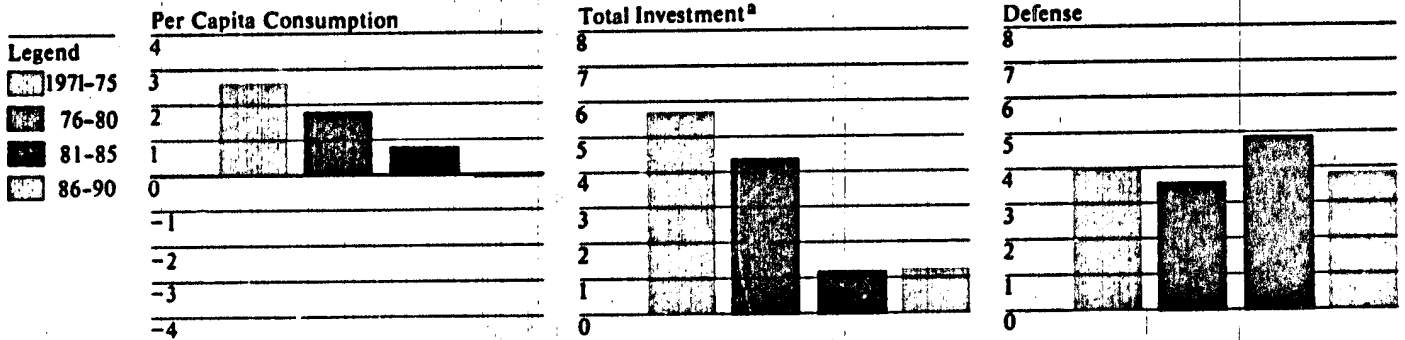
Despite the emphasis in the 1981-85 Plan on increasing the supply of consumer goods and services, the arithmetic implies negligible improvements in average living standards, especially in the second half of the decade. This will have an adverse effect on labor productivity, as continued increases in money wages, taken together with large holdings of personal savings, create a reservoir of purchasing power that greatly exceeds the amount of goods and services available for wage earners to buy.

Assuming continued expansion of defense spending, we calculate that the defense burden will increase to over 15 percent in 1985 and 17 percent in 1990.

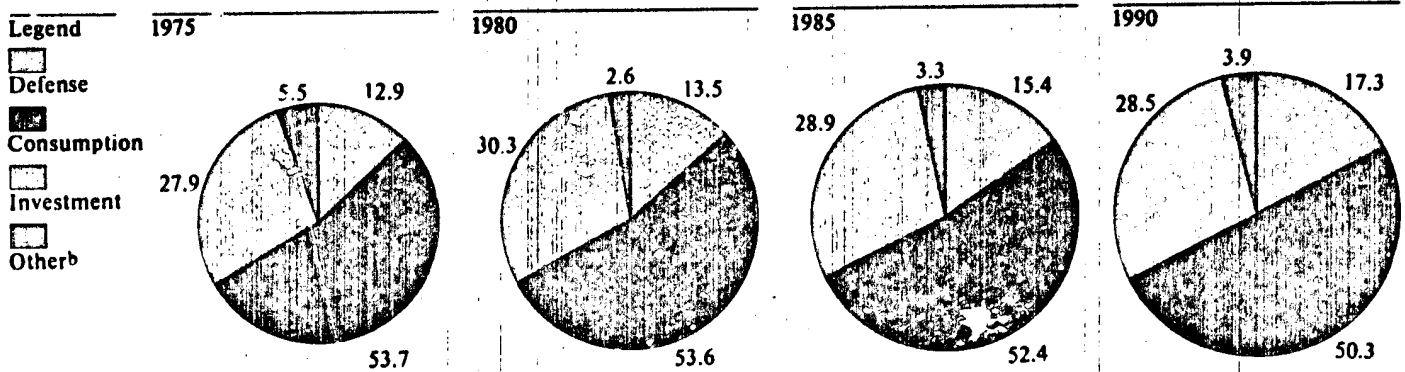
**Figure 2**

**Uses of GNP**

**Average Annual Growth Percent**



**End-Use Shares Percent**



<sup>a</sup>Total investment consists of: repairs to the capital stock, net additions to livestock herds, and new fixed investment for expansion of Soviet production capacity.  
<sup>b</sup>"Other" includes expenditures for government administration, civilian R&D, net exports, and inventory change.

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**Key Resources**

The Soviet economy has followed an "extensive" rather than "intensive" growth path. Growth of the economy has been largely driven by a rapid expansion of the labor force and the stock of plant and equipment rather than, as in the West, by productivity increases.

The increase in the labor force in the 1980s will be less than half of what it was in the 1970s. The labor force—up by nearly 20 million during 1971-80—is expected to increase by roughly 9.5 million in 1981-90.

Our projections indicate that new fixed investment in the 1980s will increase at about one-third the rate of the 1970s due not only to the slower growth in production of machinery and new construction starts but also to the rising share of durable goods going to the military. (The investment estimate for 1981-85 is consistent with the Soviet plan for investment in this time frame.)

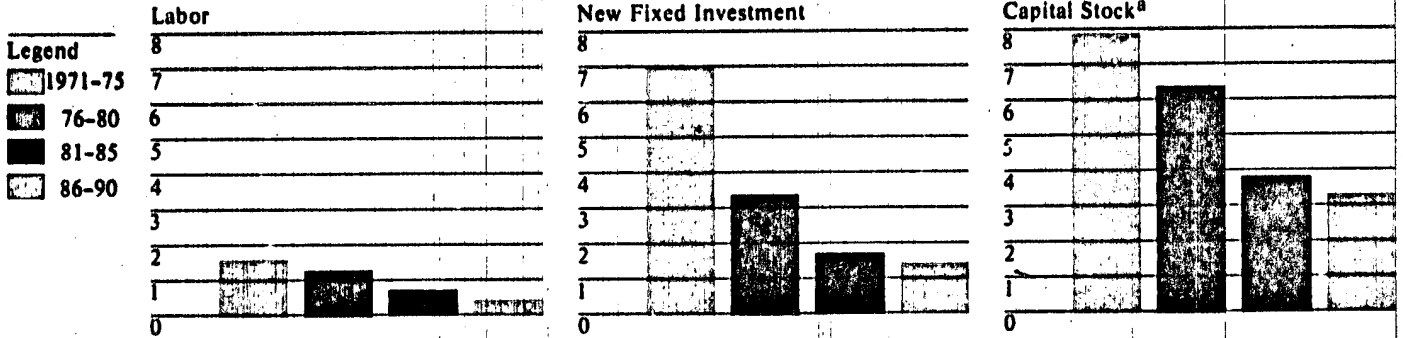
The impact of the reduced expansion of investment on GNP growth will be compounded by the increasing demand for investment goods by the energy sectors. The greatly increasing share of investment going to these sectors just to sustain low growth in energy output will depress the expansion of investment in the nonenergy sectors.

Finally, in the second half of the 1980s, according to our results, a significant oil deficit will develop in the domestic economy (1 to 2 million b/d out of total oil requirements of 10 to 11 million b/d). This will negatively affect expansion of the active capital stock—probably through the combination of earlier-than-planned retirement of the most inefficient oil-using equipment and lower rates of capital utilization.

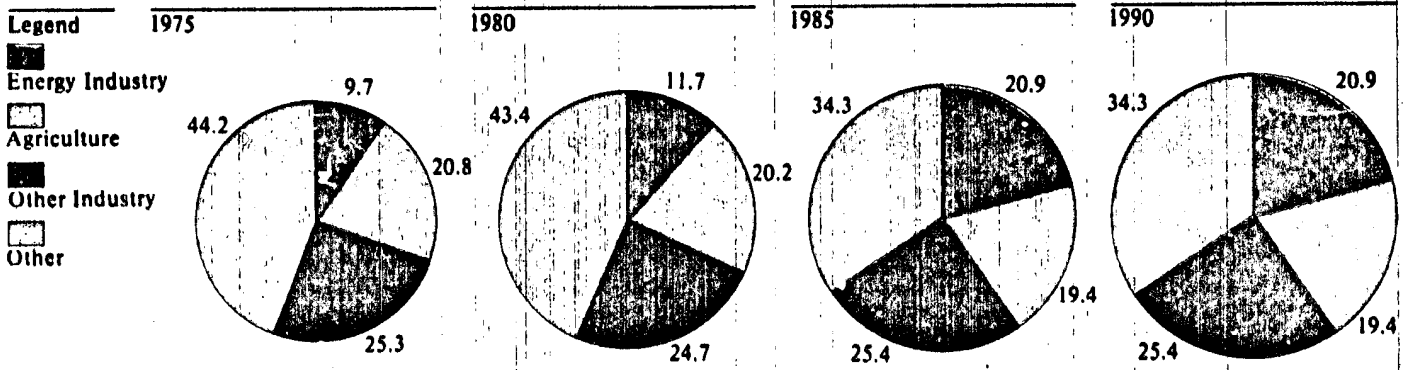
**Figure 3**

**Key Resources**

**Average Annual Growth Percent**



**Investment Shares<sup>b</sup> Percent**



<sup>a</sup> Does not include housing. The estimates for 1981-85 and 1986-90 reflect adjustments for reduced utilization because of a projected oil deficit.

<sup>b</sup> "Other" includes construction, transportation and communications, and trade and services. The changes in shares between 1980 and 1985 reflect the Soviet 11th Five-Year Plan.

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**Labor Productivity**

The key to Soviet labor productivity improvement has been increases in capital per worker. Without more success in realizing technological innovations, improvements in organization, and other sources of productivity increases, additional increases in capital per worker will have less and less effect on productivity

Moreover, since about 1975 the effect of extra capital on output has diminished more than in earlier years. The reasons for this include raw material shortages, greater costs associated with the shift in the locations of raw material supplies from the depleted traditional area to Siberia, and worsening worker morale.

We have no indication that the Soviets will be able to draw on alternative sources of productivity gains. On the contrary, the influence of those factors that led to the shift in the effect of extra capital on output in the late 1970s will probably intensify in the future so that the low labor productivity growth estimates shown here are conservative.

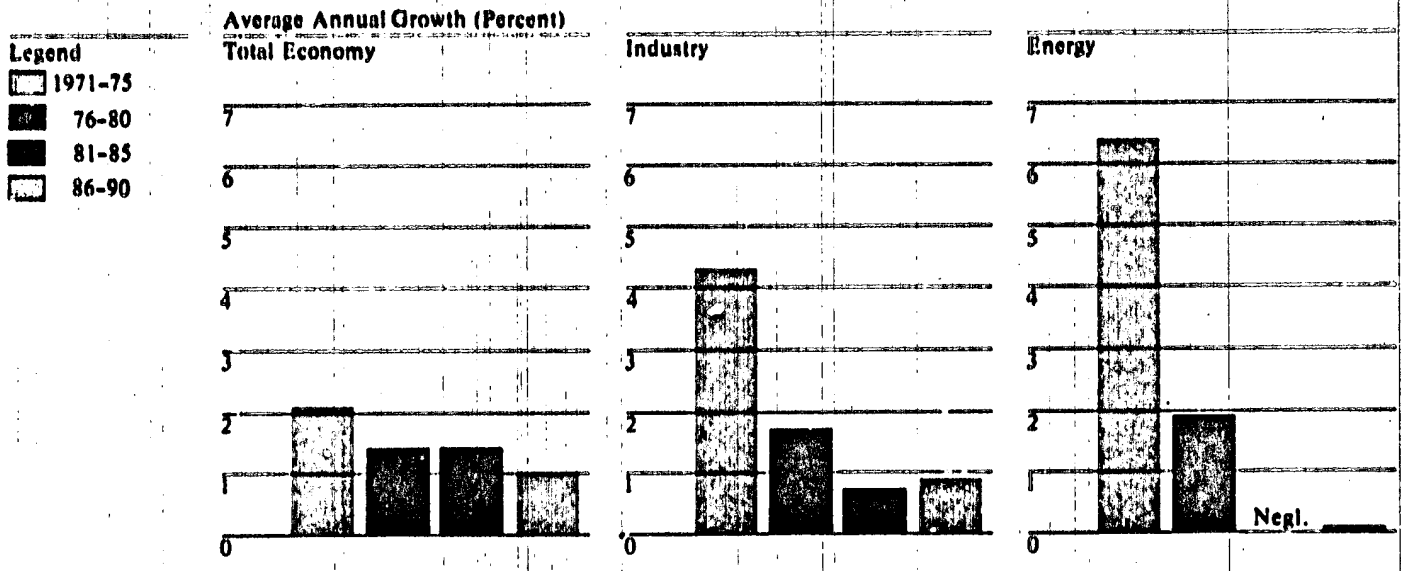
The small increase for industry from 1981-85 to 1986-90 is not significant given the margin of error in the projections. The main point of these figures is that labor productivity growth in the industrial sector over the 1980s is projected to be about one-half of the rate of increase achieved during the 10th Five-Year Plan period (1976-80).

Productivity gains in the energy sectors become negligible in the face of increasing depletion of oilfields and coal mines in the western region of the USSR. Greater numbers of workers and large infusions of capital are needed just to maintain the low growth of energy production.



**Figure 4**

**Labor Productivity**



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***Energy Balance Trends***

We estimate that in the 1980s Soviet primary energy production growth will slow to about 1.2 percent per year on the average compared to 4.5 percent in the 1970s and 5.7 percent in the 1960s. The main cause of this slowdown is the assumed fall in oil production after 1985. Gas production will continue to increase rapidly, while coal production will be practically stagnant.

At the same time, our projections indicate that requirements for primary energy, which depend in large part on the size of the capital stock and its composition, will rise at 2.5 percent per year in the 1980s.

We assume part of the gap between growth of energy production and growth of requirements will be covered by reduced net exports of energy, from 4.3 million b/doe in 1980 to about 3 million b/doe in 1990. With the emerging severe tightness in the Soviet oil balance, we estimate oil exports will fall by around 2 million b/d by 1990. This will be partially offset by an increase in gas exports of about 1 million b/doe.

Although a policy of reducing oil exports will help make more energy available for domestic needs, our calculations show it will not be sufficient to avoid a significant oil shortage of 1 to 2 million b/d in the second half of the 1980s. This shortage will arise even with substantial substitution of gas for oil, as shown in the consumption charts. Further substitution that could eliminate the oil deficit will be limited by gas production.

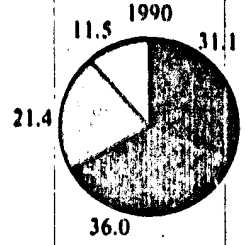
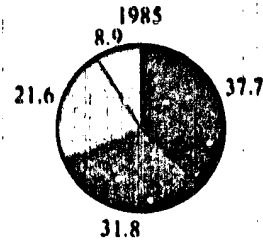
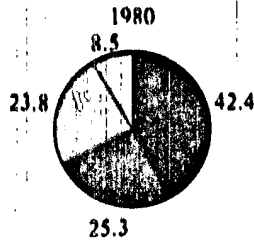
Figure 5

Energy Balance Trends

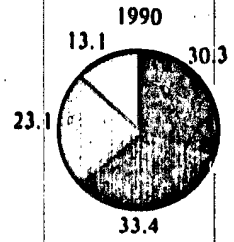
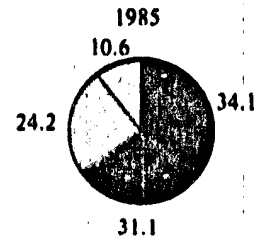
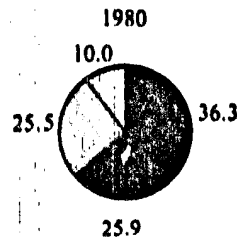
- Legend
- Oil
  - Gas
  - Coal
  - Other<sup>a</sup>

Percent

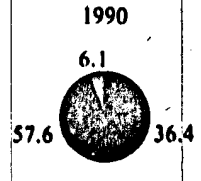
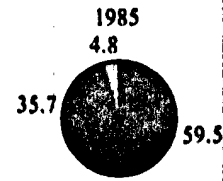
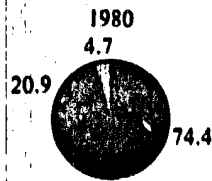
Production Shares



Consumption Shares



Net Export Shares



<sup>a</sup>"Other" includes hydroelectric and nuclear power.

***Oil Balance Trends***

Current oil production of 12.2 million b/d accounts for about 40 percent of total primary energy production. Three-fourths of this oil is used domestically and one-fourth is exported. Roughly two-thirds of the exported oil goes to the Council for Mutual Economic Assistance (CEMA) countries and one-third to the West.

Although the future of Soviet oil production is uncertain, increasing depletion rates, rising fluid lift requirements, constraints on drilling of new wells, and lagging infrastructure development in West Siberia suggest that it will start to decline in the next few years. We use a working assumption that production will fall to 11.5 million b/d in 1985 and 10 million b/d in 1990.

Hard currency oil exports have fallen over the last few years, from 1.1 million b/d in 1978 to around 0.9 million b/d in 1981. We expect further cut-backs in this trade, as production stabilizes and domestic requirements increase. Because of likely high demand for hard currency imports and lack of other exportable goods, we assume these exports will decline gradually to 0.3 million b/d by 1990 rather than cease as implied by the trends in production and domestic needs.

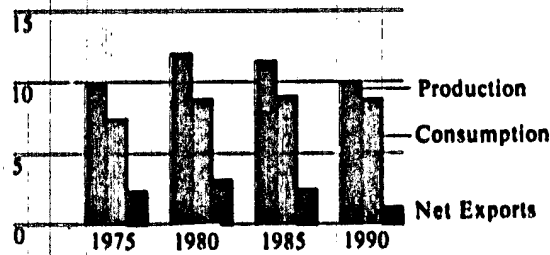
Similarly, the Soviets recently announced a reduction of 100,000 barrels per day in oil exports at subsidized prices to the GDR, Czechoslovakia, and Hungary effective this year. Further reductions in deliveries to CEMA are also likely, especially after 1985 when the drop in Soviet oil production becomes severe. Exports to CEMA probably will be allowed to fall to 1 million b/d by 1990. Any further reduction could risk economic collapse, especially of the weaker economies in this group.

Despite a leveling off in domestic oil needs and a substantial reduction in exports, we project a significant oil deficit of around 1 to 2 million b/d will develop in the second half of the decade. This probably will lead to selected retirement of the most inefficient oil-using equipment and also reduced utilization of other plant and equipment, with lower GNP in both cases.

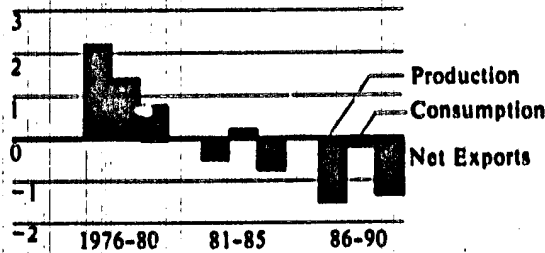
Moscow could take steps to avoid an oil bottleneck, such as investing further in energy production and conservation. Though this could reduce and perhaps eliminate the gap, it would mean less investment and subsequent production in other sectors of the economy. Thus, the ultimate effect on economic growth would be similar to that of an oil shortage.

**Figure 6**  
**Oil Balance Trends**

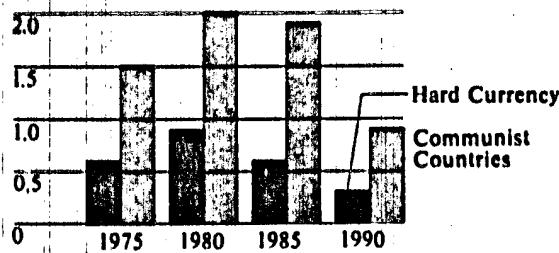
Million Barrels per Day Note change in scales  
Levels



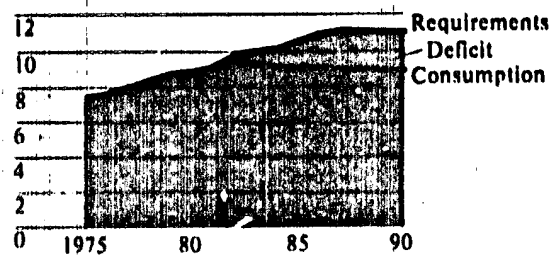
Increments



Net Exports



Prospective Oil Deficit



***Gas Balance Trends***

The USSR has the world's largest gas reserves in northern Siberia. Construction of six pipelines from this area to the central USSR during the 11th Five-Year Plan period will result in continued rapid growth of gas production through 1985. Because gas is cheaper to extract and transport than Siberian oil or coal, further substantial increases in gas production are projected for 1986-90 on the basis of likely Soviet construction of increased pipeline capacity and storage facilities.

We estimate most of the production increments in the 1980's will be used to meet greater domestic energy needs.

The Yamal export pipeline will permit a doubling in gas deliveries to Western Europe when it comes into full operation in mid-decade. This project will give the Soviet Union an important source of hard currency, especially in view of lost earning capacity from reduced oil exports.

With stable and probably eventually lower Soviet oil exports to Eastern Europe, increased gas deliveries are consistent with Soviet intentions to increase overall energy exports to this region.

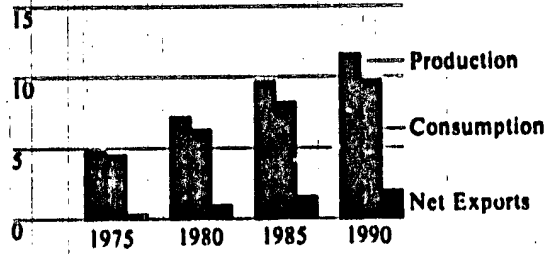
**Figure 7**

**Gas Balance Trends**

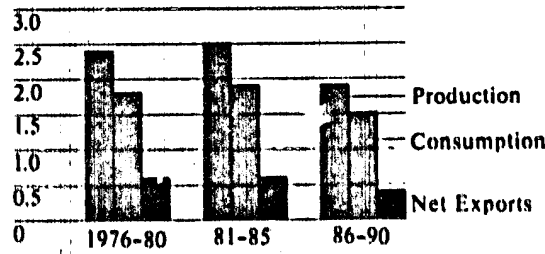
Million Barrels per Day,  
Oil Equivalent

Note change in scales

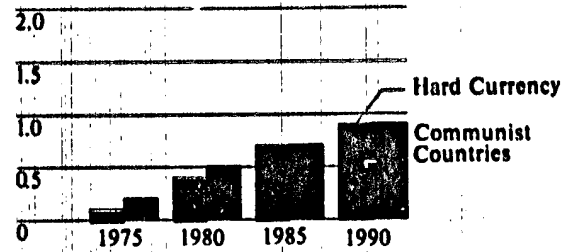
Levels



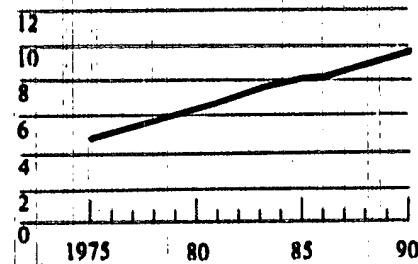
Increments



Net Exports



Gas Consumption



***Hard Currency Trade***

Improving terms of trade in the 1970s—particularly the rise in oil and gold prices—allowed the USSR to expand rapidly imports from the West without comparable increases in its volume of exports. The Soviets cannot count on improved trade terms in the 1980s. We assume that oil and gold prices do not increase in real terms from the current levels. The real gas price is allowed to increase somewhat according to a Soviet agreement with Ruhrgas on the price of future gas deliveries. Thus future import levels will depend mostly on trends in export volume.

In constant dollars, the estimated increase in gas exports through the 1980s will offset only about two-thirds of the expected drop in oil sales. Increased gold sales will help narrow the loss. However, other commodity exports are estimated to stay constant at best in real terms. Opportunities for expanding exports of other commodities will be limited by their low marketability in world trade and continuing tightness in domestic supplies. Under these conditions, real export earnings (the earnings in the chart at right discounted for inflation) decline by about 10 percent between 1981 and 1990.

The Soviets could afford more imports by increasing borrowing from the West. The trend in new borrowing is difficult to project because it will reflect policy decisions both by Moscow and Western governments and banks. Given the present low debt burden of the USSR, a reasonable projection of future nonpipeline borrowing appears to be a flat level of 4.5 billion dollars per year—roughly equal to average credits per year in the second half of the 1970s—with about an extra \$2 billion annually in 1982-85 for the gas export pipeline.

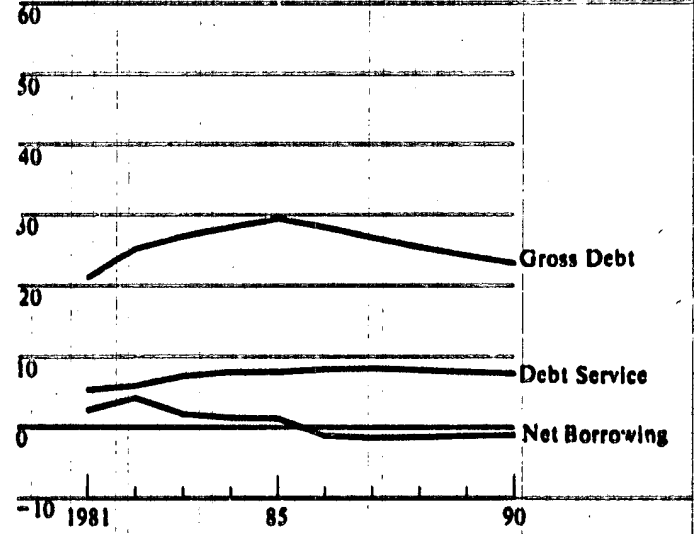
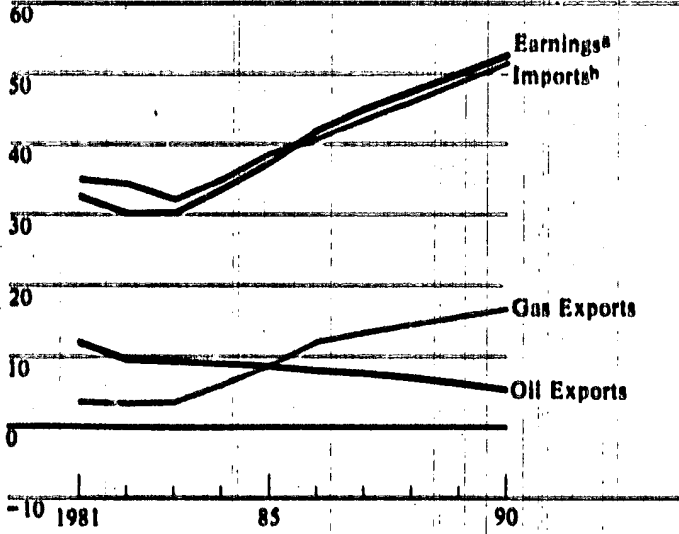
These levels of borrowing from the West can permit Moscow to maintain roughly stable real imports over the next few years. But toward the second half of the 1980s borrowings would be exceeded by the debt service obligations on previous drawings of credit. As a result, in the absence of even higher amounts of borrowing, real imports (the imports in the chart at right discounted for inflation) would be determined largely by export earnings after mid-decade. Compared to the level in 1981, real imports by 1990 would fall by around 10 percent, a decline equal to that in export earnings. Soviet debt would increase in the next few years and then fall to about its current level by 1990.



Figure 8

Hard Currency Trade

Billion Current Dollars



<sup>a</sup> Includes merchandise exports, gold sales, arms sales, and net earnings on invisibles.  
<sup>b</sup> Includes upward adjustment for unrecorded expenditures such as aid to Poland and intra-CEMA trade.

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**Possible Range  
in Soviet Growth  
Outlook**

The estimate of Soviet growth prospects presented above depends in part on a number of key judgments about the future Soviet economic environment and policy decisions. Although we have attempted to make the best judgments possible, various degrees of uncertainty surround them. The results shown in figure 9 suggest the possible impacts of some of those uncertainties on the estimates.

***Flat Oil Production***

This case assumes that Soviet oil output stabilizes at 12 million b/d through 1990 instead of falling as in the baseline assumptions. With this greater supply, our calculated oil deficit becomes much smaller and effective capital growth is therefore greater. Although this leads to an increase in GNP growth of around three-tenths of a percentage point, it clearly is not sufficient to bring about a turnaround in the long-run decline in the rate of economic progress. The difference in consumption per capita would be barely perceptible.

***Zero Defense Growth***

The baseline projections suggest a significant increase in the defense burden by 1990 because the estimated growth of defense spending is about twice estimated GNP growth. One option available to a new Soviet leadership is a cutback in the expansion of defense spending. This case examines the implications for the economy of a constant level of defense spending from 1982 to 1990. Stable defense procurement of investment goods—largely weapons—allows some increased expansion of production capacity. The impacts on GNP growth are fairly small, around one-tenth of a percentage point, because of the low productivity of extra investment resources.<sup>6</sup> Impacts on per capita consumption growth of one-half to 1 percentage point are considerably greater because of stable rather than increasing demands of defense on the final bill of goods available from the economy.

***Level Oil Exports***

Our baseline estimate of Soviet growth prospects assumes that when oil production starts to decline some of the resulting deficit is met by reducing oil exports both to the CEMA countries and to the West. This policy would raise the costs of economic progress for Eastern Europe and also weaken

<sup>6</sup> This impact on GNP growth assumes the extra investment resources from reduced growth of defense spending have the productivity typical in the overall economy. It is possible to assume these resources have higher productivity than average, which would increase the impact on GNP growth. See DDI Intelligence Assessment, SOV 82-10101 (Secret), June 1982, *Can the Soviets "Stand Down" Militarily?*

**Figure 9**

**Impact of Alternate Assumptions on Baseline Estimates**

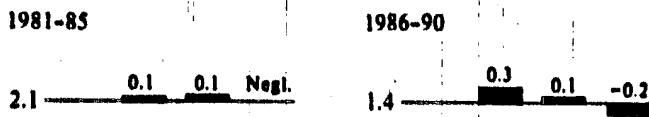
The levels are the baseline estimates and the bars indicate the incremental changes.

**Legend**

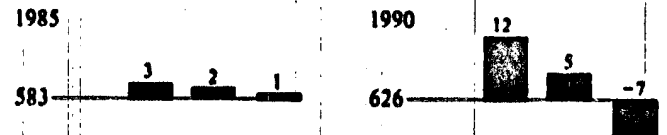
- Flat Oil Production
- Zero Defense Growth
- Level Oil Exports

Note change in scales

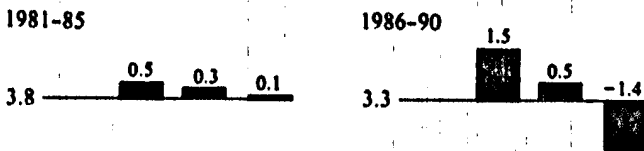
**GNP Growth  
Percent<sup>a</sup>**



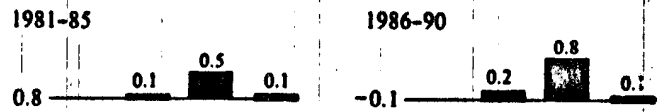
**GNP  
Billion 1970 Rubles**



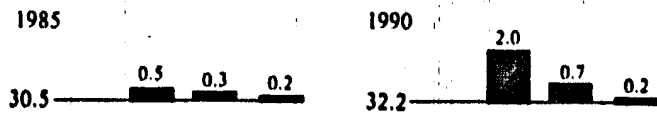
**Capital Growth<sup>b</sup>  
Percent<sup>a</sup>**



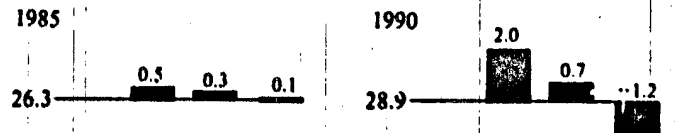
**Per Capita Consumption Growth  
Percent<sup>a</sup>**



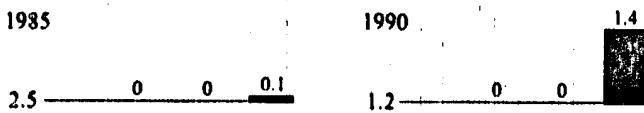
**Energy Production  
Million Barrels per Day Oil Equivalent**



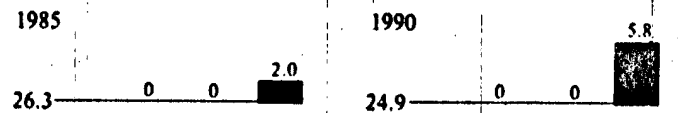
**Domestic Energy Use  
Million Barrels per Day Oil Equivalent**



**Net Oil Exports  
Million Barrels per Day**



**Hard Currency Import Capacity  
Billion 1981 Dollars**



<sup>a</sup> Annual average.

<sup>b</sup> Does not include housing. Estimates include adjustment for energy availability.

the economic linkage between these countries and the Soviet Union. At the same time, reduced oil sales to the West would lead to a drop in the volume of total imports over the rest of the decade. Moscow could conclude that the costs of this policy are too high compared to the benefit of extra domestic output. Our estimates suggest that if instead the Soviets maintain oil exports at their present level this would (1) lower GNP by about 1 percent by 1990, but (2) permit imports from the West to roughly keep pace with economic growth, and (3) also permit increased imports from Eastern Europe. From the Soviet view a key factor in evaluating this trade-off would involve the composition of the goods, with the trade-off being more favorable if the increased imports were made up of critical goods not easily produced in the Soviet economy while the lost domestic output consisted of nonessential goods.

**Detailed Results**

The following tables contain the projection results obtained with our macroeconomic model of the Soviet economy under the baseline assumptions. The tables include model estimates for 1981 as well as the years beyond to 1990. Since model estimates almost always result in at least small errors, the 1981 numbers should not be used as if they were actual results.



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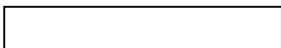
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**Table 1**  
**Selected Key Assumptions <sup>a</sup>**

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Population ( <i>million persons</i> )	267.9	270.1	272.4	274.6	276.8	278.8	280.7	282.7	284.6	286.6
Total defense ( <i>billion rubles</i> )	74.4	78.3	82.4	86.0	89.9	93.2	96.8	100.6	104.5	108.5
Machinery procurement ( <i>billion rubles</i> )	25.6	27.4	29.3	30.8	32.4	33.6	35.0	36.4	37.9	39.4
Manpower ( <i>million persons</i> )	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9	5.9
Oil production ( <i>million b/d</i> )	12.2	12.2	12.0	11.7	11.5	11.2	10.9	10.6	10.3	10.0
Hard currency oil exports ( <i>million b/d</i> )	0.9	0.8	0.8	0.7	0.6	0.5	0.5	0.4	0.3	0.3
Oil exports to Communist countries ( <i>million b/d</i> )	2.0	1.9	1.9	1.9	1.9	1.7	1.5	1.3	1.1	0.9
Gas production ( <i>billion cm</i> )	465.0	495.0	525.0	555.0	585.0	608.0	631.0	654.0	677.0	700.0
Hard currency gas exports ( <i>billion cm</i> )	28.8	25.7	25.7	30.7	42.1	53.9	55.9	56.3	56.7	56.7
Gas exports to Communist countries ( <i>billion cm</i> )	33.0	34.0	37.0	41.0	45.0	50.0	54.0	54.0	54.0	54.0
Coal production ( <i>million mt</i> )	716.8	717.6	718.4	719.2	720.0	731.0	742.0	753.0	764.0	775.0
Nonenergy hard currency exports ( <i>billion US \$</i> )	8.7	9.1	9.7	10.4	11.1	11.9	12.7	13.6	14.5	15.5
Gold sales ( <i>billion US \$</i> )	2.7	3.4	3.6	3.8	4.1	4.6	5.2	5.8	6.4	7.2
Sales volume ( <i>tons</i> )	200.0	300.0	300.0	300.0	300.0	315.0	330.0	345.0	360.0	375.0
Gold price ( <i>US \$</i> )	420.0	350.0	371.0	397.0	425.0	455.0	486.0	520.0	557.0	595.0
Arms sales ( <i>billion US \$</i> )	5.0	5.2	5.6	6.0	6.4	6.8	7.3	7.8	8.4	8.9
Grain production ( <i>million mt</i> )	160.0	165.0	208.7	212.1	215.5	218.8	222.2	225.6	229.0	232.3

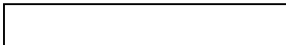
<sup>a</sup> This table shows the assumed values for the key input variables in SOYSIM. Along with the equations in the model, these variables are the basis for the estimates presented in later tables.



**Table 2**  
**New Fixed Investment: Percent Distribution \***

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
<b>Total</b>	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<b>Industry</b>	36.2	37.8	40.1	43.0	46.3	46.3	46.3	46.3	46.3	46.3
Industrial materials	9.4	9.5	9.5	9.6	9.7	9.7	9.7	9.7	9.7	9.7
Oil	4.8	5.5	6.4	7.6	8.9	8.9	8.9	8.9	8.9	8.9
Gas	1.7	1.9	2.2	2.6	3.0	3.0	3.0	3.0	3.0	3.0
Coal	1.7	1.9	2.2	2.6	3.0	3.0	3.0	3.0	3.0	3.0
Electric power	3.2	3.7	4.3	5.1	6.0	6.0	6.0	6.0	6.0	6.0
Machine building and metalworking	8.5	8.5	8.6	8.7	8.7	8.7	8.7	8.7	8.7	8.7
Chemicals	3.4	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5
Consumer goods	3.4	3.4	3.4	3.4	3.5	3.5	3.5	3.5	3.5	3.5
<b>Construction</b>	3.8	3.6	3.3	2.9	2.5	2.5	2.5	2.5	2.5	2.5
<b>Agriculture</b>	20.1	20.0	19.8	19.6	19.4	19.4	19.4	19.4	19.4	19.4
<b>Transportation and communications</b>	12.3	12.1	11.7	11.3	10.8	10.8	10.8	10.8	10.8	10.8
<b>Trade and services</b>	14.4	13.4	12.1	10.5	8.6	8.6	8.6	8.6	8.6	8.6
<b>Housing</b>	13.2	13.1	12.9	12.7	12.5	12.5	12.5	12.5	12.5	12.5

\* This table shows the investment distribution assumed for the baseline case. Changes in this distribution through 1985 reflect Soviet intentions as expressed in the 11th Five-Year Plan. The distribution from 1985 onward is kept fixed.





**Table 3**  
**Employment<sup>a</sup>** Thousand persons

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Able-bodied population	156,568.0	157,307.0	157,822.0	158,248.0	158,621.0	158,906.0	159,274.0	159,853.0	160,490.0	161,106.0
Participation rate (percent)	84.8	85.0	85.3	85.5	85.6	85.7	85.7	85.6	85.6	85.5
Military manpower	5,850.0	5,870.0	5,870.0	5,890.0	5,900.0	5,890.0	5,880.0	5,900.0	5,900.0	5,900.0
Civilian labor force	141,903.0	143,345.0	144,651.0	145,782.0	146,747.0	147,576.0	148,327.0	149,050.0	149,834.0	150,655.0
Total employment	137,544.0	138,798.0	139,925.0	140,891.0	141,700.0	142,385.0	142,996.0	143,581.0	144,223.0	144,900.0
Industry	37,615.3	38,196.7	38,746.1	39,251.5	39,717.8	40,176.5	40,608.3	41,032.2	41,475.7	41,931.8
Industrial materials	9,431.7	9,610.8	9,777.8	9,929.0	10,066.4	10,192.6	10,292.1	10,399.5	10,511.9	10,627.5
Oil	317.0	322.0	327.5	333.4	339.6	343.5	347.2	350.8	354.6	358.5
Gas	33.2	35.0	36.9	38.8	41.0	41.4	41.9	42.3	42.8	43.2
Coal	1,223.3	1,244.5	1,267.5	1,291.8	1,317.6	1,332.8	1,347.1	1,361.2	1,375.9	1,391.1
Electric power	777.0	794.0	812.5	832.0	852.8	862.7	872.0	881.1	890.6	900.4
Machine building and metalworking	15,575.1	15,866.8	16,138.9	16,385.4	16,609.3	16,801.1	16,981.7	17,158.9	17,344.4	17,535.1
Chemicals	1,906.2	1,932.4	1,956.8	1,979.0	1,998.9	2,022.0	2,043.8	2,065.1	2,087.4	2,110.4
Consumer goods	8,351.8	8,391.2	8,428.2	8,462.0	8,492.2	8,590.3	8,682.6	8,773.3	8,868.1	8,965.6
Construction	11,447.0	11,588.2	11,707.9	11,802.9	11,874.8	12,012.0	12,141.0	12,267.8	12,400.4	12,536.7
Agriculture	34,642.1	34,051.6	33,464.7	32,883.9	32,297.0	31,717.5	31,139.9	30,557.2	29,977.5	29,397.8
Transportation and communications	12,249.0	12,499.8	12,725.7	12,921.3	13,089.8	13,240.9	13,383.2	13,522.9	13,669.1	13,819.4
Trade and services	41,037.4	41,787.3	42,413.5	42,899.4	43,255.9	43,755.6	44,225.8	44,687.4	45,170.5	45,667.2

<sup>a</sup> The civilian labor force is somewhat greater than participants from the able-bodied population less military manpower because the civilian labor force also includes significant numbers of workers past retirement age who are not counted in the able-bodied population. Changes in the distribution of workers among sectors is tied to changes in investment through a linking methodology. The sum of employment over sectors is a little less than the figure for total employment because our data base carries a small number of workers in a residual category.

Billion 1970 rubles

**Table 4**  
**Sources of GNP (Factor Cost) <sup>a</sup>**

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
<b>GNP</b>	529.7	544.6	563.1	576.3	583.3	591.0	599.3	608.2	617.3	626.7
<b>Total industry</b>	196.5	202.1	206.6	210.8	214.5	218.4	222.7	227.3	232.1	236.9
Industrial materials	46.5	47.8	48.9	49.9	50.8	51.6	52.5	53.4	54.4	55.4
Oil	9.4	9.4	9.2	9.0	8.8	8.6	8.4	8.2	7.9	7.7
Gas	2.9	3.1	3.3	3.5	3.7	3.8	3.9	4.1	4.2	4.4
Coal	6.1	6.1	6.1	6.2	6.2	6.3	6.4	6.5	6.6	6.7
Electric power	14.9	15.4	15.8	16.2	16.6	17.2	17.8	18.5	19.2	19.9
Machine building and metalworking	74.4	77.5	79.9	82.1	84.1	86.0	88.1	90.3	92.6	94.9
Chemicals	14.5	14.8	15.1	15.4	15.6	15.9	16.2	16.5	16.8	17.1
Consumer goods	27.7	28.0	28.3	28.5	28.7	29.0	29.4	29.9	30.3	30.8
Construction	42.0	42.8	43.3	43.6	43.7	44.0	44.3	44.8	45.3	45.8
Agriculture	67.2	71.0	80.5	86.1	86.9	87.6	88.3	89.0	89.7	90.3
Transportation and communications	62.0	63.7	65.0	66.0	66.7	67.5	68.5	69.6	70.9	72.2
Trade and services	151.1	153.9	156.7	158.8	160.4	162.4	164.3	166.2	168.2	170.2
Military personnel	9.5	9.5	9.5	9.5	9.6	9.5	9.5	9.6	9.6	9.6
Residual	1.4	1.5	1.5	1.6	1.6	1.6	1.6	1.7	1.7	1.7

<sup>a</sup> This table presents the key SOVSIM production estimates. Because weather conditions cannot be predicted, agricultural production for 1983 and following years reflects crop yields estimated on the basis of trend lines. The measure of agriculture is adjusted for both intra-agricultural use of farm products and purchases by agriculture from other sectors.

**Table 5**  
**Annual Growth of GNP (Factor Cost) <sup>a</sup>**

Percent

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
<b>GNP</b>	1.5	2.8	3.4	2.3	1.2	1.3	1.4	1.5	1.5	1.5
<b>Total Industry</b>	2.0	2.9	2.2	2.0	1.8	1.8	2.0	2.1	2.1	2.1
<b>Industrial materials</b>	1.0	2.8	2.3	2.0	1.8	1.7	1.7	1.8	1.8	1.8
<b>Oil</b>	1.7	0.0	-1.9	-1.9	-2.0	-2.6	-2.7	-2.8	-2.8	-2.9
<b>Gas</b>	6.9	6.5	6.1	5.7	5.4	3.9	3.8	3.6	3.5	3.4
<b>Coal</b>	0.3	0.3	0.3	0.3	0.3	1.7	1.7	1.7	1.6	1.4
<b>Electric power</b>	2.4	3.3	2.7	2.6	2.6	3.5	3.5	3.7	3.9	3.9
<b>Machine building and metalworking</b>	2.4	4.2	3.1	2.8	2.4	2.2	2.4	2.6	2.5	2.5
<b>Chemicals</b>	3.4	1.9	2.1	1.8	1.6	1.7	1.8	1.9	1.9	1.9
<b>Consumer goods</b>	1.9	1.1	0.9	0.8	0.6	1.3	1.4	1.5	1.6	1.6
<b>Construction</b>	1.7	2.1	1.1	0.6	0.2	0.7	0.9	1.0	1.1	1.1
<b>Agriculture</b>	-5.7	5.5	13.5	6.9	0.9	0.9	0.8	0.8	0.7	0.7
<b>Transportation and communications</b>	3.6	2.7	2.0	1.6	1.1	1.1	1.5	1.7	1.8	1.8
<b>Trade and services</b>	2.7	1.9	1.8	1.4	1.0	1.2	1.2	1.2	1.2	1.2

<sup>a</sup> This table expresses the production estimates contained in table 4 in terms of annual growth rates. The model behind these estimates was constructed primarily to make medium- to long-term projections. Therefore its estimates for the short term, while very near the trend, are not generally as accurate as those available from alternate methods. Furthermore, annual growth rates are highly sensitive to small shifts in annual production increases or decreases. Consequently, the growth rates shown here should be understood as suggesting trends and not as estimates for individual years. The very high growth in 1983 for agriculture reflects an assumed return to trend crop yields from depressed yields in 1982. Although very high, such growth is not unprecedented for this unstable sector.

**Table 6**  
**Average Annual Growth of GNP (Factor Cost)**  
**by Five-Year Plan Period <sup>a</sup>**

Percent

	1966-70	1971-75	1976-80	1981-85	1986-90
GNP	5.2	3.7	2.7	2.1	1.4
Total industry	6.3	5.9	3.5	2.0	2.0
Industrial materials	5.0	4.4	1.5	1.9	1.7
Oil	7.8	6.8	4.2	-0.9	-2.8
Gas	9.2	7.9	8.5	6.1	3.7
Coal	1.6	2.3	-0.1	0.5	1.6
Electric power	7.9	7.0	4.5	2.7	3.7
Machine building and metalworking	6.9	7.9	5.3	2.8	2.4
Chemicals	8.9	8.6	3.8	2.1	1.9
Consumer goods	6.4	3.4	1.6	1.0	1.5
Construction	5.8	5.6	2.4	1.1	0.9
Agriculture	3.5	-2.3	NEGL	3.8	0.8
Transportation and communications	6.9	6.6	3.6	2.0	1.6
Trade and services	4.9	3.7	2.9	1.7	1.2

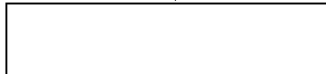
<sup>a</sup> This table translates the production estimates of table 4 into average annual growth rates for 1981-85 and 1986-90. Although these growth rates are more representative of trends than individual annual growth rates are, they are very sensitive to the base years. Thus the growth rate for GNP in 1981-85 will somewhat overstate the trend because poor weather in 1980 affected agriculture adversely, resulting in a below-trend GNP for that year.

**Table 7**  
**Labor Productivity Growth <sup>a</sup>**

Percent

Average Annual Growth	1966-70	1971-75	1976-80	1981-85	1986-90
<b>GNP</b>	3.3	2.1	1.4	1.4	1.0
<b>Total industry</b>	3.3	4.3	1.7	0.7	0.9
Industrial materials	3.2	3.6	-0.9	0.3	0.6
Oil	4.3	5.7	2.7	-2.5	-3.8
Gas	2.3	8.5	10.7	0.8	2.5
Coal	3.0	4.5	-1.8	-1.2	0.5
Electric power	4.6	5.3	2.3	0.5	2.6
Machine building and metalworking	2.9	4.9	3.2	1.2	1.3
Chemicals	4.1	6.2	2.3	0.9	0.8
Consumer goods	3.6	2.8	1.0	0.7	0.4
<b>Construction</b>	1.4	2.3	1.2	NEG	-0.1
<b>Agriculture</b>	4.6	-1.6	0.7	5.7	2.7
<b>Transportation and communications</b>	4.4	3.6	1.4	0.2	0.5
<b>Trade and services</b>	0.6	0.4	0.5	-0.4	0.1

<sup>a</sup> Labor productivity is defined as the ratio of output (value-added in rubles, factor cost, 1970 prices) to employment. The growth estimates shown here for the 1980s are derived from the results presented in tables 3 and 4.



**Table 8**  
**Capital Productivity Growth <sup>a</sup>**

Percent

Average Annual Growth	1966-70	1971-75	1976-80	1981-85	1986-90
<b>GNP</b>	-2.8	-4.5	-4.2	-2.5	-2.2
<b>Total industry</b>	-2.3	-2.5	-3.5	-3.3	-3.0
<b>Industrial materials</b>	-1.8	-4.3	-4.5	-4.1	-2.9
<b>Oil</b>	-2.4	-1.2	-3.6	-9.0	-10.4
<b>Gas</b>	-0.6	-11.0	NRQL	-1.4	-3.6
<b>Coal</b>	-3.6	-2.3	-4.6	-5.6	-5.7
<b>Electric power</b>	-2.3	-0.2	-1.4	-2.9	-2.4
<b>Machine building and metalworking</b>	-2.7	-1.9	-3.8	-2.5	-1.7
<b>Chemicals</b>	-2.9	-0.9	-5.0	-2.8	-2.1
<b>Consumer goods</b>	-1.4	-3.9	-4.1	-2.3	-1.5
<b>Construction</b>	-6.2	-3.8	-6.5	-3.4	0.1
<b>Agriculture</b>	-2.9	-10.8	-6.8	0.8	-1.8
<b>Transportation and communications</b>	-0.2	-1.2	-3.1	-2.7	-1.9
<b>Trade and services</b>	-3.6	-4.1	-3.8	-2.3	-1.0

<sup>a</sup> Our measure of capital productivity is the ratio of output (value-added in rubles, factor cost, 1970 prices) to capital stock in place (rubles, 1973 prices). The growth estimates shown here for the 1980s are derived from the output results in table 3 and our projections of capital stock. Historically, capital productivity in the Soviet economy has been falling. The rate of fall was especially high during the 10th Five-Year Plan period (1976-80). The estimates for 1981-85 show similar decreases. The rate of fall generally is slower in the second half of the 1980s because of a reduction in the effect of diminishing returns (as capital grows more slowly compared to labor growth than in the earlier period).



**Table 9**  
**Uses of GNP (Factor Cost) <sup>a</sup>**

*Billion 1970 rubles*

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
<b>GNP</b>	529.7	544.6	553.1	576.3	583.3	591.0	599.3	608.2	617.3	627.7
<b>Consumption</b>	278.1	287.0	295.1	302.9	305.5	307.4	309.3	311.2	313.2	315.3
<b>Investment</b>	160.9	163.0	166.5	168.0	168.6	170.0	172.0	174.1	176.4	178.6
<b>New fixed investment</b>	128.8	130.2	133.2	134.3	134.7	135.8	137.2	138.9	140.6	142.3
<b>Defense</b>	74.4	78.3	82.4	86.0	89.9	93.2	96.8	100.6	104.5	108.5
<b>Government administration</b>	13.0	13.3	13.6	13.8	13.9	14.0	14.1	14.1	14.2	14.4
<b>Government research and development</b>	4.8	5.1	5.4	5.6	5.8	6.0	6.2	6.5	6.7	7.0

<sup>a</sup> SOVSIM estimates consumption as the residual end-use after subtracting investment and defense and other government expenditures from GNP. Investment is estimated as the residual in an investment goods balance which takes into account production of investment goods and such claims on this production as consumer durable goods and military procurement of machinery (including weapons). Because of data constraints, SOVSIM must work with two measures of new fixed investment: (1) a factor cost measure that fits in with SOVA's reconstruction of Soviet GNP and (2) the official Soviet measure, which is used in tracing investment flows to producing sectors and housing. This table presents estimates of the factor cost measure. Defense is an assumed variable, while the estimates for government administration and research and development are based on assumed shares of GNP. The uses of GNP shown do not sum to the total shown because there is a small residual that includes net exports and inventory change.

**Table 10**  
**Percent Distribution of GNP Uses (Factor Cost) <sup>a</sup>**

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
<b>GNP</b>	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
<b>Consumption</b>	52.5	52.7	52.4	52.6	52.4	52.0	51.6	51.2	50.7	50.3
<b>Investment</b>	30.4	29.9	29.6	29.1	28.9	28.8	28.7	28.6	28.6	28.5
<b>New fixed investment</b>	24.3	23.9	23.7	23.3	23.1	23.0	22.9	22.8	22.8	22.7
<b>Defense</b>	14.1	14.4	14.6	14.9	15.4	15.8	16.2	16.5	16.9	17.3
<b>Government administration</b>	2.5	2.4	2.4	2.4	2.4	2.4	2.3	2.3	2.3	2.3
<b>Government research and development</b>	0.9	0.9	1.0	1.0	1.0	1.0	1.0	1.1	1.1	1.1

<sup>a</sup> The uses shown do not sum to 100 percent because there is a small residual category that includes net exports and inventory change.

**Table 11**  
**Average Annual Growth of GNP Uses (Factor Cost)**  
**by Five-Year Plan Period**

Percent

	1966-70	1971-75	1976-80	1981-85	1986-90
<b>GNP</b>	5.2	3.7	2.7	2.1	1.4
<b>Consumption</b>	5.3	3.5	2.6	1.7	0.6
<b>Per capita consumption</b>	4.3	2.6	1.8	0.8	-0.1
<b>Investment</b>	6.1	5.7	4.4	1.2	1.2
<b>New fixed investment</b>	6.7	5.0	3.9	1.1	1.1
<b>Defense</b>	4.3	4.0	3.6	4.9	3.8
<b>Government administration and research and development</b>	8.2	3.3	0.8	5.0	1.6

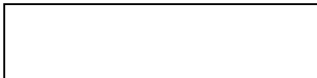


**Table 12**  
**New Fixed Investment <sup>a</sup>**

Billion 1973 rubles

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
<b>Total</b>	136.8	139.8	142.0	143.9	144.9	146.5	148.5	150.7	153.0	155.3
<b>Industry</b>	49.5	52.8	56.9	61.9	67.1	67.8	68.8	69.8	70.9	71.9
Industrial materials	12.9	13.2	13.5	13.8	14.0	14.2	14.3	14.6	14.8	15.0
Oil	6.6	7.7	9.1	10.9	12.9	13.1	13.3	13.5	13.7	13.9
Gas	2.3	2.6	3.1	3.7	4.4	4.4	4.5	4.6	4.6	4.7
Coal	2.3	2.6	3.1	3.7	4.4	4.4	4.5	4.6	4.6	4.7
Electric power	4.4	5.1	6.1	7.3	8.6	8.7	8.9	9.0	9.1	9.3
Machine building and metalworking	11.7	12.0	12.2	12.5	12.6	12.8	13.0	13.2	13.4	13.6
Chemicals	4.7	4.8	4.9	5.0	5.1	5.1	5.2	5.3	5.4	5.4
Consumer goods	4.6	4.8	4.9	4.9	5.0	5.1	5.1	5.2	5.3	5.4
<b>Construction</b>	5.3	5.1	4.7	4.2	3.6	3.6	3.7	3.7	3.8	3.8
<b>Agriculture</b>	27.5	27.9	28.1	28.2	28.0	28.3	28.7	29.2	29.6	30.0
<b>Transportation and communications</b>	16.8	16.9	16.6	16.3	15.7	15.8	16.0	16.3	16.5	16.8
<b>Trade and services</b>	19.7	18.8	17.2	15.0	12.4	12.5	12.7	12.9	13.1	13.3
<b>Housing</b>	18.1	18.3	18.4	18.3	18.1	18.3	18.6	18.8	19.1	19.4

<sup>a</sup> The estimates of total new fixed investment in this table are for the official Soviet concept of such investment. The estimated flows of investment goods to producing sectors and housing depend directly on this total and the allocation pattern assumed in table 2.



**Table 13**  
**Energy Balance <sup>a</sup>**

*Million barrels per day,  
oil equivalent*

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
<b>Production</b>	28.7	29.4	29.8	30.2	30.5	30.8	31.2	31.5	31.8	32.2
Oil	12.2	12.2	12.0	11.7	11.5	11.2	10.9	10.6	10.3	10.0
Gas	7.7	8.2	8.7	9.2	9.7	10.0	10.4	10.8	11.2	11.6
Coal	6.7	6.7	6.7	6.6	6.6	6.7	6.7	6.8	6.8	6.9
Peat	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3	0.3	0.3
Hydroelectric power	0.9	1.0	1.1	1.1	1.2	1.2	1.2	1.3	1.3	1.3
Nuclear energy	0.4	0.6	0.7	0.8	0.9	1.0	1.1	1.3	1.4	1.6
Other	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
<b>Consumption</b>	24.4	25.2	25.7	26.1	26.3	26.6	27.1	27.7	28.3	28.9
Oil	9.1	9.3	9.2	9.1	9.0	9.0	8.9	8.9	8.9	8.8
Gas	6.7	7.1	7.6	7.9	8.2	8.3	8.6	8.9	9.3	9.7
Coal and peat	6.7	6.7	6.6	6.6	6.6	6.7	6.8	6.8	6.9	7.0
Other	1.9	2.1	2.3	2.4	2.6	2.7	2.9	3.1	3.3	3.5
<b>Net exports</b>	4.3	4.1	4.1	4.1	4.2	4.2	4.0	3.8	3.5	3.2
Oil	3.1	2.9	2.8	2.6	2.5	2.2	2.0	1.7	1.4	1.2
Gas	1.0	1.0	1.1	1.2	1.5	1.8	1.9	1.9	1.9	1.9
Coal	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2

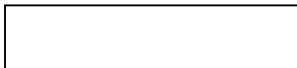
<sup>a</sup> The production and net exports estimates reflect analysts' judgments. Therefore, the balancing item in these calculations is consumption.

**Table 14**  
**Oil Balance <sup>a</sup>**

*Million barrels per day*

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
<b>Production</b>	12.2	12.2	12.0	11.7	11.5	11.2	10.9	10.6	10.3	10.0
<b>Consumption</b>	9.1	9.3	9.2	9.1	9.0	9.0	8.9	8.9	8.9	8.8
<b>Final demand</b>	0.8	0.8	0.8	0.8	0.8	0.9	0.9	0.9	0.8	0.8
<b>Industry</b>	5.9	6.1	6.1	6.0	6.0	6.1	6.2	6.2	6.2	6.3
<b>Industrial materials</b>	1.3	1.4	1.4	1.3	1.2	1.2	1.2	1.1	1.1	1.1
<b>Oil</b>	1.0	1.0	1.1	1.2	1.3	1.4	1.5	1.5	1.5	1.6
<b>Electric power</b>	2.4	2.4	2.4	2.4	2.4	2.5	2.5	2.6	2.6	2.6
<b>Machine building and metalworking</b>	0.4	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3
<b>Chemicals</b>	0.5	0.5	0.5	0.5	0.5	0.4	0.4	0.4	0.4	0.4
<b>Consumer goods</b>	0.3	0.3	0.3	0.3	0.3	0.3	0.2	0.2	0.2	0.2
<b>Construction</b>	0.7	0.7	0.7	0.6	0.6	0.5	0.5	0.5	0.4	0.4
<b>Agriculture</b>	0.9	0.9	0.8	0.8	0.8	0.8	0.7	0.7	0.7	0.7
<b>Transportation and communications</b>	0.8	0.8	0.8	0.7	0.7	0.6	0.6	0.6	0.6	0.6
<b>Trade and services</b>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Net exports</b>	3.1	2.9	2.8	2.6	2.5	2.2	2.0	1.7	1.4	1.2
<b>Hard currency net exports</b>	0.9	0.8	0.8	0.7	0.6	0.5	0.5	0.4	0.3	0.3
<b>Net exports to Communist countries</b>	2.0	1.9	1.9	1.9	1.9	1.7	1.5	1.3	1.1	0.9

<sup>a</sup> Oil consumption starts to fall below oil requirements around 1983, with a resulting negative effect on GNP.



**Table 15**  
**Gas Balance <sup>a</sup>**

*Million barrels per day  
oil equivalent*

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
<b>Production</b>	7.7	8.2	8.7	9.2	9.7	10.0	10.4	10.8	11.2	11.6
<b>Consumption</b>	6.7	7.1	7.6	7.9	8.2	8.3	8.6	8.9	9.3	9.7
<b>Final demand</b>	1.0	1.0	1.1	1.1	1.2	1.1	1.2	1.2	1.2	1.3
<b>Industry</b>	5.4	5.7	6.1	6.4	6.6	6.7	7.0	7.3	7.6	8.0
<b>Industrial materials</b>	1.6	1.8	1.9	2.0	2.1	2.1	2.2	2.3	2.4	2.5
<b>Oil</b>	0.3	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.7
<b>Gas</b>	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3
<b>Electric power</b>	1.7	1.7	1.8	1.8	1.8	1.9	2.0	2.1	2.2	2.3
<b>Machine building and     metalworking</b>	0.5	0.6	0.6	0.7	0.7	0.7	0.7	0.7	0.8	0.8
<b>Chemicals</b>	0.8	0.9	1.0	1.0	1.0	1.0	1.1	1.1	1.1	1.2
<b>Consumer goods</b>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.3	0.3
<b>Construction</b>	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
<b>Transportation and   communications</b>	0.2	0.2	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3
<b>Net exports</b>	1.0	1.0	1.1	1.2	1.5	1.8	1.9	1.9	1.9	1.9
<b>Hard currency net exports</b>	0.5	0.4	0.4	0.5	0.7	0.9	0.9	0.9	0.9	0.9
<b>Net exports to Communist   countries</b>	0.5	0.6	0.6	0.7	0.7	0.8	0.9	0.9	0.9	0.9

<sup>a</sup> The Yamal gas pipeline is assumed to come into operation in 1986.

**Table 16**  
**Coal Products Balance <sup>a</sup>**

*Million barrels per day  
oil equivalent*

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
<b>Production</b>	6.9	6.9	6.9	6.8	6.8	6.9	7.0	7.0	7.1	7.2
<b>Consumption</b>	6.7	6.7	6.6	6.6	6.6	6.7	6.8	6.8	6.9	7.0
<b>Final demand</b>	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
<b>Industry</b>	5.4	5.4	5.4	5.4	5.4	5.5	5.6	5.7	5.8	5.8
<b>Industrial materials</b>	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.2	2.3	2.3
<b>Coal</b>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Electric power</b>	2.7	2.7	2.7	2.7	2.7	2.8	2.8	2.9	2.9	3.0
<b>Machine building and metalworking</b>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Chemicals</b>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
<b>Consumer goods</b>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1
<b>Construction</b>	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
<b>Agriculture</b>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Transportation and communications</b>	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
<b>Trade and services</b>	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
<b>Net exports</b>	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
<b>Hard currency net exports</b>	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
<b>Net exports to Commu- nist countries</b>	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

<sup>a</sup> Coal products include coal and peat.

**Table 17**  
**Electric Power Balance \***

Billion kilowatt hours

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
<b>Production</b>	1,325.0	1,368.3	1,405.6	1,442.8	1,480.0	1,531.8	1,585.4	1,644.0	1,708.0	1,775.0
<b>Consumption</b>	1,308.6	1,348.5	1,382.4	1,416.2	1,450.0	1,498.8	1,549.4	1,605.0	1,666.0	1,730.0
<b>Final demand</b>	162.0	165.5	168.1	170.6	173.1	177.2	181.6	186.8	192.7	199.0
<b>Industry</b>	927.4	957.7	984.8	1,013.2	1,042.9	1,084.3	1,126.6	1,172.4	1,222.0	1,273.7
<b>Industrial materials</b>	383.2	398.2	411.2	424.2	437.2	454.5	472.7	492.5	514.2	537.0
<b>Oil</b>	48.7	51.6	54.8	58.8	63.6	69.5	75.2	81.0	86.9	92.8
<b>Gas</b>	9.9	10.4	10.9	11.6	12.4	13.4	14.3	15.3	16.3	17.3
<b>Coal</b>	31.9	32.8	34.1	35.9	38.3	41.3	44.4	47.5	50.7	54.0
<b>Electric power</b>	78.1	76.1	74.8	73.6	72.5	73.1	74.0	75.1	76.6	78.2
<b>Machine building and metalworking</b>	156.1	162.2	167.3	172.2	176.8	183.0	189.3	196.0	203.3	210.8
<b>Chemicals</b>	164.2	170.1	174.9	179.5	184.0	190.0	196.2	203.0	210.4	218.0
<b>Consumer goods</b>	55.3	56.3	56.9	57.5	58.2	59.4	60.7	62.1	63.8	65.6
<b>Construction</b>	51.4	53.2	54.2	54.5	54.0	53.8	53.7	53.8	54.2	54.7
<b>Agriculture</b>	60.3	61.3	61.8	62.3	62.8	63.8	64.9	66.2	67.7	69.4
<b>Transportation and communications</b>	79.9	82.5	84.5	86.3	87.8	90.1	92.5	95.2	98.2	101.3
<b>Trade and services</b>	27.7	28.5	29.0	29.3	29.4	29.7	30.1	30.6	31.2	31.8
<b>Net exports</b>	16.4	19.8	23.2	26.6	30.0	33.0	36.0	39.0	42.0	45.0
<b>Net exports to Communist countries</b>	16.4	19.8	23.2	26.6	30.0	33.0	36.0	39.0	42.0	45.0

\* Conversion and distribution losses are spread across domestic users for purposes of our calculations.



**Table 18**  
**Agriculture: Selected Key Variables <sup>a</sup>**

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Grain production ( <i>million mt</i> )	160.0	165.0	208.7	212.1	215.5	218.8	222.2	225.6	229.0	232.3
Grain imports ( <i>million mt</i> )	40.7	48.0	44.0	33.4	34.4	35.5	36.5	37.5	38.6	39.7
Grain feed ( <i>million mt feed units</i> )	120.3	113.3	126.6	139.9	144.1	148.3	152.5	156.7	161.0	165.3
Nongrain feed ( <i>million mt feed units</i> )	273.0	269.9	277.7	288.0	289.9	291.9	293.8	295.7	297.7	299.6
Total feed ( <i>million mt feed units</i> )	393.3	382.2	404.3	427.9	434.0	440.1	446.3	452.5	458.7	465.0
Grain feed share ( <i>percent</i> )	30.6	29.6	31.3	32.7	33.2	33.7	34.2	34.6	35.1	35.6
Herd ( <i>index, 1980 equals 100</i> )	100.4	100.8	99.8	100.8	101.4	102.0	102.7	103.3	103.9	104.5
Total feed per head ( <i>centners feed units</i> )	27.4	26.5	28.3	29.7	29.9	30.1	30.4	30.6	30.9	31.1
Meat production ( <i>million mt</i> )	15.0	14.7	15.2	16.3	16.5	16.7	17.0	17.2	17.4	17.7
Meat imports ( <i>million mt</i> )	1.0	1.0	1.0	1.0	1.0	1.1	1.2	1.3	1.4	1.5
Meat consumption per capita ( <i>kilograms</i> )	49.8	48.3	49.5	52.3	52.6	53.2	53.9	54.5	55.1	55.8
Net agricultural output ( <i>billion 1970 rubles</i> )	81.3	85.0	93.6	98.8	100.0	101.2	102.3	103.5	104.6	105.7
Current purchases ( <i>billion 1972 rubles</i> )	26.4	27.0	27.5	28.1	28.6	29.2	29.8	30.4	31.0	31.6
Agriculture value-added ( <i>billion 1970 rubles</i> )	67.2	71.0	80.5	86.1	86.9	87.6	88.3	89.0	89.7	90.3

<sup>a</sup> Following Soviet practice, grain production is measured in terms of bunker weight, which includes harvest waste and losses. The feed variables also are measured gross of waste and losses. By Soviet definition, feed units have the nutritive value of oats. Grain production in 1983-90 reflects the past trend in yields and a constant area sown to grain (130 million hectares). Meat production and meat imports are not additive because the Soviet measure of production includes slaughter fat. Agriculture value-added (at factor cost) is derived from net output and current purchases, but not simply as the difference between them; it is necessary to adjust for units of measurement.

**Table 19**  
**Hard Currency Import Capacity <sup>a</sup>**

*Billion current \$*  
(except where noted)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Import capacity	27.8	30.1	27.5	30.1	33.6	35.3	37.7	39.9	42.2	44.4
Total exports	24.7	22.4	22.9	25.8	28.9	32.6	34.2	35.5	36.7	37.9
Nonfuel exports	8.7	9.1	9.7	10.4	11.1	11.9	12.7	13.6	14.5	15.5
Oil exports	12.0	9.5	9.3	9.0	8.6	8.2	7.7	7.0	7.2	5.3
Price (US \$ per barrel)	36.5	31.5	33.4	35.7	38.2	40.9	43.8	46.8	50.1	53.6
Volume (million b/d)	0.9	0.8	0.8	0.7	0.6	0.5	0.5	0.4	0.3	0.3
Gas exports	3.7	3.4	3.6	6.0	8.8	12.1	13.5	14.5	15.6	16.7
Price (US \$ per barrel oil equivalent)	21.1	22.1	23.4	32.7	34.9	37.3	40.0	42.8	45.8	49.0
Volume (million b/d oil equivalent)	0.5	0.4	0.4	0.5	0.7	0.9	0.9	0.9	0.9	0.9
Arms sales	5.0	5.2	5.6	6.0	6.4	6.8	7.3	7.8	8.4	8.9
Gold sales	2.7	3.4	3.6	3.8	4.1	4.6	5.2	5.8	6.4	7.2
Price (\$ per ounce)	420.0	350.0	371.0	397.0	425.0	455.0	486.0	520.0	557.0	595.0
Volume (tons)	200.0	300.0	300.0	300.0	300.0	315.0	330.0	345.0	360.0	375.0
Credits	5.7	7.7	6.3	6.3	6.3	4.5	4.5	4.5	4.5	4.5
Debt service	5.3	5.8	7.2	7.8	7.8	8.2	8.3	8.1	7.8	7.6
Unrecorded expenditures	7.1	4.2	4.5	4.8	5.1	5.5	5.8	6.2	6.7	7.1

<sup>a</sup> Import capacity is defined as the level of imports that could be afforded, given earnings, credits, and debt service. The order of the line items in this table follows the SOVSIM calculations: import capacity equals exports plus arms and gold sales plus credit drawings plus miscellaneous other net earnings (not shown) less debt service and less assumed unrecorded expenditures. Higher credit drawings in 1982-85 reflect financing of the Yamal gas pipeline. Nonpipeline credits are held at a flat level of \$4.5 billion—roughly equal to average credits per year in the second half of the 1970s.

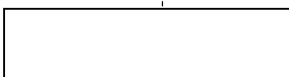


**Table 20**  
**Hard Currency Imports <sup>a</sup>**

*Billion 1981 \$*  
(except where noted)

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Total imports	27.8	28.6	24.8	25.3	26.3	26.0	25.8	25.6	25.3	24.9
Grain imports	5.7	6.8	6.2	4.6	4.7	4.9	5.0	5.2	5.3	5.5
Price (\$ per ton)	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0	150.0
Volume (million mt)	37.7	45.0	41.0	30.4	31.4	32.5	33.5	34.5	35.6	36.7
Imports other than grain	22.2	21.8	18.6	20.7	21.6	21.2	20.8	20.4	19.9	19.4
Machinery imports	5.0	7.1	6.7	6.3	5.9	3.7	3.4	3.2	3.0	2.8

<sup>a</sup> Total imports are equal to import capacity from table 19, adjusted for inflation. The difference between grain imports in this table and total grain imports in table 18 is a small amount of grain assumed to be imported for soft currency.

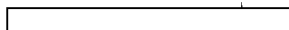


**Table 21**  
**Hard Currency Balance of Payments <sup>a</sup>**

*Billion \$*

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Trade balance	-3.1	-7.6	-4.6	-4.3	-4.6	-2.9	-3.5	-4.4	-5.5	-6.6
Exports	24.7	22.4	22.9	25.8	28.9	32.6	34.2	35.5	36.7	37.9
Imports	27.8	30.0	27.5	30.1	33.6	35.5	37.7	39.9	42.2	44.4
Gold sales	2.7	3.4	3.6	3.8	4.1	4.6	5.2	5.8	6.4	7.2
Net interest earned	-1.1	-1.3	-1.8	-2.0	-1.9	-1.8	-1.6	-1.5	-1.4	-1.3
Other earnings	6.0	5.3	5.6	6.0	6.4	6.8	7.3	7.8	8.4	9.9
Current account balance	4.5	-0.3	2.7	3.5	3.9	6.7	7.3	7.6	7.9	8.2
Net borrowing	2.4	4.1	1.8	1.3	1.2	-1.2	-1.5	-1.4	-1.2	-1.1
Net change in assets	-0.2	-0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Capital account balance	2.6	4.5	1.8	1.3	1.2	-1.2	-1.5	-1.4	-1.2	-1.1
Unrecorded expenditures	7.1	4.2	4.5	4.8	5.1	5.5	5.8	6.2	6.7	7.1

<sup>a</sup> Other earnings include arms sales plus net earnings on tourism, transportation, and official transfers. The credit assumptions are the same as in table 19.

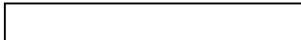


**Table 22**  
**Western Debt <sup>a</sup>**

*Billion current \$*  
*(except where noted)*

	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
Credit drawings	5.7	7.7	6.3	6.3	6.3	4.5	4.5	4.5	4.5	4.5
Debt service	5.3	5.8	7.2	7.8	7.8	8.2	8.3	8.1	7.8	7.6
Repayments	3.3	3.6	4.5	5.0	5.1	5.7	6.0	5.9	5.7	5.6
Interest	2.0	2.2	2.7	2.8	2.7	2.5	2.3	2.2	2.1	2.0
Amount available to offset trade deficit	0.4	1.9	-0.9	-1.5	-1.5	-3.7	-3.8	-3.6	-3.3	-3.1
Gross debt (end of year)	21.0	25.1	26.9	28.2	29.4	28.2	26.7	25.3	24.1	23.0
Assets (end of year)	8.4	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Net debt (end of year)	12.6	17.1	18.9	20.2	21.4	20.2	18.7	17.3	16.1	15.0
Total hard currency earnings	32.3	29.7	30.3	33.6	37.5	42.2	45.0	47.5	50.1	52.6
Debt service ratio (percent)	16.3	18.6	22.5	21.9	19.8	18.6	17.8	16.5	15.1	14.1

<sup>a</sup> The debt service ratio is calculated as repayments plus interest over the sum of exports, gold sales, and arms sales (table 19). The credit assumptions are the same as in table 19.



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