The Soviet Union's Hard-Currency Balance of Payments and Creditworthiness in 1985

Gregory Grossman, Ronald L. Solberg

35th Year Rand

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PREFACE

Since Poland's dramatic lapse into insolvency in 1980-81, world attention continues to attach to the hard-currency positions of communist countries from Cuba to Vietnam, and especially those in Eastern Europe. Among the communist countries, the Soviet Union has enjoyed the highest financial reputation as a creditworthy borrower; but even its hard-currency position and prospects are not without weakness. This report projects the Soviet hard-currency balance of payments to 1985 under a set of basic assumptions (initial scenario) with respect to economic growth and energy production and then examines the effects of a number of selected economic shocks on the Soviet hard-currency position in that year.

Systematic data on hard-currency trade and payments, let alone comprehensive balance-of-payments accounts, are not published by the Soviet Union. Nonetheless, sufficient information is available from studies prepared by the CIA and from several other sources to construct international financial cash-flow accounts for the USSR.

This report combines a theoretical model of international financial creditworthiness developed by one of the authors in his doctoral dissertation (Solberg) with expertise on the Soviet economy by the other author (Grossman). The model highlights the vulnerability of the Soviet hard-currency balance of payments to a liquidity squeeze by examining its near-term financial policy variables. The initial scenario and the alternative scenarios measure the cash-flow effects of internally and externally generated economic disturbances. The model is used to assess the prospects for maintenance of USSR financial integrity in the usual banker's sense and the hard-currency effects of economic disturbances transmitted through the balance of payments. The conclusions have particular relevance to the ongoing debate on the efficacy of Western economic policies and more generally to the interests of the Western financial community.

This report is part of The Rand Corporation's work for the Under Secretary for Policy in the Department of Defense dealing with economic relations between the West and East, and the extent to which relations may directly or indirectly affect the Soviet Union's military efforts. Authority for this research is contained in DoD Policy Research Memorandum No. I-11541/82 of July 20, 1982.

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while on a leave of absence from Wells Fargo Bank, N.A., as a research fellow at the Institute of International Studies, and a doctoral candidate in the economics department at the University of California, Berkeley. The authors are consultants to The Rand Corporation.

SUMMARY

This study of Soviet hard-currency balance-of-payments structure and creditworthiness in 1985 is intended to be not a prediction but rather a set of projections of the Soviet Union's financial position in 1985 based on several scenarios resting upon an array of stylized but plausible assumptions.

The secular decline in Soviet GNP growth rates during the 1970s reflects both a slowdown in the growth of combined factor inputs and an increasingly poor performance of overall factor productivity. Although the structural characteristics of the economy deteriorated over this period, its balance-of-payments performance has remained quite manageable. Occasional moderate hard-currency difficulties in 1975-76 evoked rapid and effective policy responses.

A distinction between noncompressible and compressible imports is central to the projections used in the various scenarios. Largely determined by the structural characteristics (constraints) of the economy, noncompressible imports are considered to be rigid requirements without which the momentum of economic growth, the basic standard of living, or the country's creditworthiness would be jeopardized. Compressible imports are considered to be less critical to the ongoing operation of the economy and to represent one of three near-term policy response variables to a hard-currency trade deficit.

In our balance-of-payments projections, the sum of total trade revenue and total noncompressible expenditures yields the balance for compressible imports. The decisionmakers then determine the amount of asset reduction (gold sales and reserve depletion) or gross foreign borrowing required to augment the balance for compressible imports to meet a targeted level of net compressible-import capacity (NCIC). The magnitude of the balance on the NCIC (surplus or deficit) signals whether a cash-flow squeeze, which could jeopardize the country's creditworthiness, is in effect.

The *initial scenario* comprises two GNP growth variants (baseline and low-productivity) that form the basis for two distinct balance-of-payments/creditworthiness projections to 1985.

The meager surplus of $5.0 billion projected in 1985 for the NCIC in the *baseline variant* signifies the increasingly severe constraints the Soviet Union will face. This balance requires an average 5.0 percent per year volume decline in compressible imports during 1981-85,

which precludes an import-stimulated solution to the secular GNP growth slowdown.

The *low-productivity variant* results in a more favorable conclusion. Because of slower GNP growth, fuel export volume is correspondingly higher, and noncompressible imports are lower. As a consequence, the NCIC balance records a surplus of $9.5 billion in 1985. Such a substantial hard-currency surplus implies an average 6.5 percent per year growth of compressible import volume which would allow the USSR considerable scope in exercising the import-stimulated solution to its structural problems.

As measured by the usual financial ratios, the two variants of the initial scenario result in a manageable financial profile for the USSR through 1985.

The effects of less favorable assumptions are measured by their reduction of the NCIC for each of the two variants of the initial scenario. The single most damaging alternative assumption is low growth of energy production. It negates the entire NCIC surplus under both the baseline and low-productivity variants and requires additional policy responses (e.g., gold sales, foreign borrowing) to avoid a debt rescheduling. Similarly, larger grain imports (and concurrently higher grain prices), a complete multilateral lending embargo, and larger volumes of hard-currency capital goods imports each results in a negative NCIC. These variants would also require additional policy response measures (albeit on a smaller scale) to avoid default.

Each additional assumption results in a reduced NCIC surplus under either the baseline or the low-productivity variant. The confluence of several of these less favorable assumptions would clearly pose a very limited range of policy options for the Soviets.

Five *alternative scenarios* are examined and result in very large NCIC deficits. The first three scenarios group the less favorable assumptions along their common geographic locus of origin: domestic difficulties scenario, Eastern Europe or the "Soviet hegemonion" scenario, and Western constraints scenario. The final two mixed scenarios assume that the shocks to the Soviet hard-currency balance of payments can originate from all three areas concurrently.

The major conclusions are (1) a small leveling off in the production of exportable fuel can have a severe effect on the hard-currency balance of payments; (2) there is a sharp tradeoff between Soviet GNP growth and hard-currency revenue from fuels and other raw materials; (3) grain and other agricultural imports represent a moderate to severe claim on hard-currency revenue; (4) the confluence of domestic politico-economic difficulties may require substantial use of additional Western credit on short notice; (5) political or economic difficulties in Eastern Europe and other countries under Soviet influence, whether involving a "military option" or not, may require substantial

hard-currency costs; (6) adverse events in the West, whether resulting from market forces or concerted policy, seem to pose only a moderate constraint on the Soviets' hard-currency balance of payments, unless these events become extreme or numerous; and (7) further study seems warranted on the complications of a political and economic nature for Western countries that may result from continued Soviet debtor-superpower status.

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I. INTRODUCTION

North Korea, Vietnam, Poland, Rumania, Cuba—such is the list of communist countries to go insolvent to the detriment of Western creditors in the past half-dozen years. Other communist countries may follow suit in the near future. A shining exception is the Soviet Union itself, which is almost universally regarded as eminently creditworthy by virtue of its nearly impeccable past record of "always paying" and its strong international financial condition at this time. This financial strength derives from a low level of debt to the West and a correspondingly light debt service, ample balances in Western banks (at least at this moment), a reputed very large gold stock, and an enormous storehouse of potentially salable natural riches on and under its vast territory.

Nonetheless, the USSR has had a chronic hard-currency shortage and tight import and exchange controls for its entire history; and at certain times, most recently in 1981, it has given evidence of even more serious short-term hard-currency stringency. The imports and exchange controls are, of course, an integral part of the Soviet command economy and administrative allocation of resources and relate among other things to the chronic repressed-inflationary situation in the economy. Moreover, the Soviet hard-currency balance of payments depends heavily on fuel exports, most of which consist of crude oil and oil products, and these are almost certain to begin to decline in quantity in the near term. Further, Soviet hard-currency imports of grain, other foodstuffs, and other consumer goods are subject to wide fluctuation for both economic and internal political reasons. Finally, the steady deterioration in the recent performance of the Soviet economy and its bleak prospects until at least the end of the decade, the equally bleak economic outlook for many countries in the Soviet sphere of control or major influence, and the political uncertainties both within and outside its own borders raise further questions about the Soviet international financial position in the future.

This report looks ahead to 1985, the last year of the current (11th) Five-Year Plan. We underscore at the outset that our purpose is *not* to predict the international financial position of the Soviet Union in that year. That would be foolhardy: The variables are too many, the amplitude of their possible movement too wide, and the relevant probabilities too uncertain. Instead we prepare a number of *projections* of the

Soviet hard-currency balance of payments for 1985 based on a series of alternative assumptions and scenarios.

The starting points for our projections are the 1981 balance-of-payments estimates of Zoeter (1983); see also Table 1.[1] We first estimate an "initial scenario" for the 1985 hard-currency balance of payments, which comes in two variants according to the assumed rate of Soviet GNP growth during the current Five-Year Plan, 1981 through 1985. The baseline variant of the initial scenario postulates an annual average rate of growth for the five-year period of 2.4 percent, the baseline variant 1.9 percent. (Judging from what we know of performance in 1981 and most of 1982 the higher figure may be somewhat optimistic.) We then introduce the distinction between "noncompressible" and "compressible" imports, i.e., highest priority imports that are likely to be maintained even under very adverse balance-of-payments conditions and imports that are likely to take the brunt of a hard-currency shortage to a greater or lesser extent. Our ordering between the two groups is "lexicographic"; we assume no tradeoff between the two groups of imports, although tradeoffs within each group are admissible. For each variant of the initial scenario we compute the "net compressible-import capacity" (NCIC)—as it were, the amount of hard currency left over for the purchase of compressible imports—which indicates the degree of Soviet hard-currency supply in 1985 and, under extreme conditions, the possible state of Soviet creditworthiness in Western markets. NCIC can be negative, meaning that the supply of hard currency is so stringent as to cut into the noncompressible (highest priority) import capacity and probably even into debt-service ability (provided our assumptions regarding the inflow of hard currency are valid).

Next, we examine a list of adverse events of internal and external origin and the effects of each individually on NCIC. The most serious of these for the Soviet hard-currency balance of payments is low growth of energy production, which means primarily a drop in crude oil production—to 585 million metric tons (mmt) in 1985. In this event, NCIC is wiped out twice over if GNP grows at 2.4 percent per year, and just completely wiped out if it grows at 1.9 percent per year.

Finally, we examine a series of "worst cases," which combine several of the more serious adverse events at once. They turn out to be serious indeed for the Soviet hard-currency balance of payments. We

[1]The 1981 external accounts in Zoeter (1983) were preliminary in nature. However, they were the most current and inclusive data available during the preparation of this report. Although published after this report's completion, the interested reader will want to reference Joint Economic Committee (JEC), *USSR: Measures of Economic Growth and Development, 1950-80* (1982), for a comprehensive coverage of USSR national accounts data.

do not examine any "best cases" in the present study, although in principle they can occur as well.

Other adverse events (alternative assumptions) examined in connection with both variants of the initial scenario include larger than average grain imports; politically necessitated larger imports (smaller exports) of other types of goods; the USSR providing Rumania with an additional 5 mmt of oil in 1985 (as against 1.5 mmt in 1980); enhanced economic aid to friendly countries; reduction of arms sales for hard currency; "opening of the umbrella" in relation to East European debts; adverse movement of prices for oil, gold, and grain; and a refusal on the part of the West to extend any more credit to the USSR in 1985. The mutual interaction of these events is not pursued except insofar as larger imports of grain may have an upward effect on world grain prices.

In what follows, we recognize the following politico-economic groups of countries: the six East European members (designated by EE) of the Council for Mutual Economic Assistance (CMEA); the other three members of the CMEA (Cuba, Mongolia, Vietnam) plus those countries under considerable Soviet influence and for which the USSR presumably takes a certain amount of responsibility (such as Afghanistan, Angola, Cambodia, Ethiopia, North Korea, Laos, Mozambique, South Yemen), which we have designated as the "Soviet hegemonion" (SH); the Organization for Economic Cooperation and Development (OECD) countries and other noncommunist advanced industrial countries (the West); and noncommunist less-developed countries (LDCs).

The contingent of countries with which the USSR conducts trade multilaterally and makes payments in hard currency includes all of the West (except Finland) and a substantial part of the LDC group.[2] In any case, the dividing line between hard-currency trade and non-hard-currency trade is not sharp. A case in point is Finland, with which the USSR trades on a clearing basis but essentially in "hard commodities" (readily salable or purchasable at the given prices in hard-currency markets). Finland accounts for some 12 percent of Soviet trade with the West.

Underlying the assumptions and scenarios are our general premises, which refer to the broad political configuration of the world and each of its major regions, the political and economic systems in the more important countries, general worldwide economic conditions, and the state of international relations, both political and to some extent economic. We postulate that 1985 will see essentially the same socio-politico-economic institutions and systems in the USSR, in each EE country, and in all the major countries of the globe. We rule out

[2]Zoeter (1983), Appendix A.

major economic reforms and significant currency reforms in the USSR or in any EE country: in other words, we expect none of the seven countries, by 1985, to take a quantum jump in the efficiency of resource use (except that some economic recovery may take place in Poland), or to substantially eliminate the repressed inflation that now plagues them all. Finally, we postulate no major changes in the ratios of defense outlay to GNP in any of the major military powers.

II. RECENT TRENDS: AN OVERVIEW

GROWTH PERFORMANCE

Fifty years of economic growth under the Five-Year Plans oriented toward "heavy" industrialization at the expense of agriculture and consumer welfare have transformed the Soviet Union from an agrarian society to the world's second-largest economy and a military superpower. Development proceeded on the principle of "extensive" growth, whereby large annual increments of raw materials, labor, and capital were directed into industry and other modern sectors. With a wealth of natural resources, a large labor force, and an unchallenged leadership bent upon rapid growth, this approach resulted in massive but crude economic strength.

By the early 1970s, however, both the easily accessible raw materials and land and the surpluses of labor (especially among peasants and housewives) had been largely utilized by the rapidly growing modern sector. By the early 1980s, the natural increase of manpower all but disappeared, at least for the decade. Further development must increasingly rely upon an "intensive" pattern, whereby technical progress productivity increases constitute the primary engine of growth. This required shift has been (and should continue to be at least through 1985) problematic for the centrally planned economy, whose accomplishments have tended to be more quantitative than qualitative. In the meantime, there has been a marked slowdown in economic growth during the 1970s and near stagnation from 1979 to the present.

After averaging 5 to 7 percent per year in the 1950s and 1960s, the GNP growth rate declined to 3.7 percent in the early 1970s and further to a 1 to 2 percent average during 1979-82. Even industry, the favored sector for investment allocation, has not avoided this general malaise. After increasing at a 10.2 percent yearly average during the 1950s, industrial production decelerated to 6.5 percent during the 1960s, to 4.8 percent in the 1970s (see Appendix Table A.1), and to even less in the early 1980s.

Although this deceleration reflects the exhaustion of abundant supplies of labor and of readily accessible oil fields and other natural resources, it also results from a secular decline in the growth of overall productivity. As seen in Appendix Table A.5, growth of total factor productivity rose from 0.6 percent per year in 1961-65 to 1.1 percent in 1966-70, only to fall to *minus* 0.5 percent during 1971-75, and further to minus 0.8 percent per year during 1976-80. This downward

trend in overall factor productivity results from a variety of forces in the present Soviet system, some of which are or may be: (1) growth of repressed inflation, (2) rising raw-material costs, (3) increasing complexity of economy-wide planning and coordination leading to more supply bottlenecks, (4) lack of resolve among Soviet leaders, (5) a rising incremental capital-output ratio (ICOR) because of an absorptive capacity constraint, (6) deteriorating worker morale, and (7) growth of the second economy.

Raising productivity has been stressed as the prime solution to an upturn in economic growth in the 1980s.[1] Yet reversing the trend would require sweeping institutional reform, which may well be beyond the bounds of the prevailing political will. Thus, poor prospects for total factor productivity growth, coupled with the further deceleration in the growth of physical inputs, imply that GNP growth will continue to decline during 1981-85. The growth prospects have been incorporated in this study as two separate variants (baseline and low-productivity), to provide the basis for the subsequent analysis of the balance of payments and creditworthiness. Under the two variants, GNP growth rates are projected to average 2.4 and 1.9 percent per year, respectively, during 1981-85.

BALANCE-OF-PAYMENTS PERFORMANCE

The Current Account

In achieving the position of a major industrial economy, the Soviet Union had until recently a low involvement in foreign trade, although it relied critically on technology and at times on machinery from the West. Even by 1960, after 30 years of rapid economic growth, total trade turnover (in domestic prices) was equivalent to only 12 percent of net material product (NMP). During the 1970s, however, the role of imports in alleviating domestic bottlenecks and hence the role of exports have become increasingly important. Thus, over the past two decades trade turnover has grown over twice as fast as NMP, reaching 21.4 percent of NMP in 1976[2] and as much as 34.2 percent in 1982.[3]

Increased dependence on technology transfer and agricultural imports has also meant a shift after 1960 toward trade with nonsocialist countries, which, in turn, has been associated with an unprecedented resort to Western credit in the 1970s. In constant 1970 prices, Soviet

[1]"Growth Targets for Main Economic Indicators" (1982).
[2]Treml (1980), Tables 8.1 and 8.2.
[3]Treml (1982), personal communication.

imports from nonsocialist countries advanced from 28 to 44 percent of total imports between 1965 and 1975. Similarly, Soviet exports to the same group of countries increased from 36 to 42 percent of total exports over the period.[4] The average rate of growth of *hard-currency* import volume rose from 9.3 percent per year during 1963-70 to 12.9 percent during 1970-80.[5]

Western equipment and machinery became increasingly important, their share rising from 2.0 to 2.5 percent of Soviet-installed capital in the mid-1950s to 6.7 percent in 1976, then declining to 5.4 percent in 1979.[6] During 1970-76, machinery imports increased fivefold in value (threefold in volume), accounting for 34 percent of total hard-currency imports in 1976.[7]

Imports of grain and other agricultural products became increasingly important during the 1970s, especially from 1975 on. From 1975 through 1982, the Soviets imported an average 26.3 mmt of grain annually reaching a record of 46 mmt in 1981. Grain imports in 1982 are estimated at 42 mmt. The four consecutive poor grain crops, 1979-82, cost the Soviets an estimated total of over $20 billion in hard currency (see Appendix Table A.4). Large grain imports are likely to continue well into the 1980s.

Nongrain agricultural imports have also grown rapidly in the 1970s. At an average level of $1 billion per year during 1970-75, such imports increased to an average $2.5 billion per year from 1976 to 1980 (see Appendix Table A.4). Sugar, beverages, meat, and meat products are the major nongrain imports among a whole array of agricultural commodities whose import requirements have rapidly increased after 1975.

The worsening structural weaknesses in the Soviet economy have required both a sharp rise in hard-currency import volume and a considerable broadening of import composition. As the growth of hard-currency export volume actually decelerated in the 1970s, it was largely a combination of dramatically improved commodity terms of trade and unprecedented resort to foreign credit that financed the growth of noncompressible imports.

Soviet commodity terms of trade in hard currency improved an *average* 11.2 percent per year during 1971-80.[8] This strikingly favorable trend in foreign trade prices added $14.2 billion to net hard-currency export receipts during 1971-77.[9] The terms-of-trade

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[4]Hewett (1980), Table 3.
[5]Ibid., Table 2; Zoeter (1983), Appendix B.
[6]Hanson (1981b), Table 3; Hanson (1982b), p. 10.
[7]Zoeter (1983), Appendix B.
[8]Ibid., Table 2.
[9]Hewett (1980), Table 10.

movement also contributed to an improved credit standing, which, coupled with the inception of detente, meant greater access to Western credit during the 1970s.

Growth of export volume to capitalist countries slowed from an average 10.5 percent per year in the period 1963-70 to an average 4.8 percent during 1970-80,[10] a trend that may in part have been brought about by the very sharp improvement in terms of trade. Soviet planners recognize the need to diversify the commodity composition of hard-currency exports, but have had little success in this regard. Attempts to diversify by selling more manufactured products have been thwarted by insufficient external demand, resulting from deficiencies in Soviet nonprice competitiveness, which, in turn, reflect the structural problems of the domestic economy. As a result, the Soviets have increasingly relied upon larger shares of primary products in merchandise exports.

The traditional predominance of raw materials in Soviet hard-currency merchandise exports persists despite the rapid growth of Soviet industry. Since 1955, major advances in the production of certain raw materials (e.g., petroleum, gas, and cotton) above domestic consumption needs have increased the proportion of total output going to Western export markets. By 1977, 83 percent of all Soviet hard-currency export earnings were generated by raw materials.[11] This pattern runs contrary to the performance of other industrialized countries, and given the low supply elasticity of the major raw-material export (oil), casts doubt upon the Soviet Union's ability to reverse the deceleration of export growth rates. The one exception to this trend has been the performance of the natural gas sector, whose production output has grown rapidly in recent years, outpacing the growth of domestic consumption.

The change in the character of Soviet foreign trade over the past two decades—its growing importance relative to GNP, its reorientation toward hard-currency areas, the rising proportion of noncompressible imports, and its increasing reliance upon raw-material exports—has occurred quite rapidly. Despite this rapid pace, prudent foreign trade policies and certain fortuitous circumstances have resulted in a generally successful performance of the Soviet hard-currency balance of payments.

The hard-currency balance of merchandise trade has been on the average $2.6 billion in deficit every year during the 1970s (see Table 1).[12] This substantial net inflow of merchandise has been largely offset

[10]Ibid., Table 2; Zoeter (1983), Appendix C.
[11]Goldman (1979), Table 1.
[12]See CIA (1978a), Table 44, for data on 1971-74.

by net invisible receipts and arms sales, which averaged $1.7 billion per year over the last decade,[13] and of course by gold sales and capital inflow.

However, there was wide variation in year-to-year performance during the 1970s. In 1975, a coincidence of rapidly growing machinery orders, a poor grain harvest, and a temporary decline in net barter terms of trade culminated in a record high current account deficit of $5.4 billion. The magnitude of this deficit evoked an effective policy response. Export volume (particularly oil) was increased while capital equipment orders were scaled back. These policy measures coupled with improved terms of trade resulted in a reduction in the merchandise trade deficit during 1976-79 and a return to a surplus in the current account balance of $2.3 billion and $1.2 billion in 1979 and 1980, respectively (see Table 1).

The tightened foreign exchange constraint that the Soviets experienced in 1975-76 apparently led to a policy shift concerning the role of hard-currency foreign trade in domestic economic growth, at least for the time being. Machinery imports in the latter 1970s fell as precipitously as they had climbed earlier in the decade, from a peak of 34 percent of merchandise import expenditures in 1976 to just under 18 percent in 1981.[14] Windfall gains from higher gold and oil prices moved the current account into surplus in 1979 and 1980, increasing Soviet import capacity; but instead of resuming large machinery orders, the Soviets lowered net debt.

Mirroring the reduction of capital equipment imports, the geographic distribution of Soviet foreign trade also shifted away from capitalist countries back toward socialist countries since 1976.[15] The Soviets may have recognized the limits the domestic absorptive capacity constraint imposes on the payoff from foreign capital equipment as well as from domestic equipment, and that, in turn, may have led Soviet planners to reconsider their import policies. What was probably a divided Soviet opinion on the efficacy of expanded technology transfer, coupled with a tightened foreign exchange constraint in 1975-76, resulted in a retreat from this strategy since 1976.[16] Nonetheless, the potential benefits from imported Western technology, as contrasted with alternative domestic solutions to the secular growth slowdown (and their corresponding costs), would seem to augur well for a return during the 1980s to the

[13]Ibid.
[14]Zoeter (1983), Appendix B.
[15]Gardner (1981), Table 1.
[16]Hanson (1982b), pp. 32-34.

Table 1

HARD-CURRENCY BALANCE OF PAYMENTS, 1970-80

(Millions of U.S. dollars)

	1970	1975	1976	1977	1978	1979	1980[a]
Merchandise exports, free on board (f.o.b.)[b]	2,201	7,835	9,721	11,345	13,157	19,549	23,498
of which: energy[c]	412	3,420	4,847	5,866	6,763	11,004	14,734
Merchandise imports, f.o.b.[b]	-2,701	-14,257	-15,316	-14,645	-16,951	-21,585	-26,017
of which: grain[d]	(-214)	-2,673	-2,968	-1,371	-2,417	-3,426	-4,891
Trade balance	-500	-6,422	-5,595	-3,300	-3,794	-2,036	-2,519
Net invisibles and arm sales[e]	522	983	1,295	2,454	2,642	4,341	3,690
which includes:							
Interest on total debt[f]	-83	-804	-1,012	-1,140	-1,219	-1,430	-1,620
Arms sales[g]	80	1,000	1,250	2,300	2,500	2,750	3,500
Other net invisibles	525	787	1,057	1,294	1,361	3,021	1,810
Current account	22	-5,439	-4,300	-846	-1,152	2,305	1,171
Capital account	291	5,399	4,264	895	719	860	69
Direct foreign investment[b]	0	-3	-31	0	0	0	0
Net foreign borrowing	291	5,402	4,295	895	719	860	69
Disbursements[f]	450	6,371	5,661	2,850	3,051	3,660	3,103
Official[h]	450	1,972	2,611	1,991	2,500	2,500	2,433
Private[i]	0	4,399	3,050	859	1,351	1,160	670
Amortization[f]	-159	-969	-1,366	-1,955	-2,332	-2,800	-3,034
Official[g]	-159	-730	-1,036	-1,285	-1,456	-1,702	-1,915
Private[i]	0	-239	-330	-690	-876	-1,098	-1,119

Basic balance	313	-40	-36	49	-433	3,165	1,240
Errors and omissions[j]	-313	1,080	278	-1,907	-577	-2,536	-3,058
Overall balance	N.A.	-1,120	242	-1,858	-1,010	629	-1,818
Financed by:							
Gold sales[a]	0	725	1,369	1,618	2,522	2,167	1,580
Change in commercial bank assets[k] (+ denotes asset reduction)	N.A.	+395	-1,611	+240	-1,512	-2,796	+238

[a]All data for 1980 are from Zoeter (1983), Table 1.

[b]CIA (1981), Table 46. Merchandise exports include some arms sales (see footnote f).

[c]From Appendix Table A.2, line 6; Appendix Table A.3, line 6.

[d]U.S. Department of Agriculture (1982b), Table 13.

[e]Includes interest income and payments, LDC arms sales, net income from tourism and merchandise freight, and official transfers. CIA (1981), Table 46.

[f]CIA (1981), Table 47.

[g]Zoeter (1983), Appendix F; these data include only that portion of hard currency arms receipts (primiarily from LDCs) not included in merchandise exports.

[h]CIA (1980a), Table A-4.

[i]Residual when official figures are subtracted from total.

[j]Includes omitted information on: (1) hard-currency assistance to other communist countries; (2) hard-currency trade with other communist countries; (3) net supplier's credits granted to LDCs; (4) net short-term credits provided to developed West; (5) hard-currency expenditures in support of clandestine activities in the West; (6) change in commercial bank assets (for 1970 only).

[k]CIA (1981a), Table A-1; Bank for International Settlements (various issues).

( ) = Authors' estimate.

machinery import strategy of the early 1970s, assuming sufficient purchasing power.

THE CAPITAL ACCOUNT AND INTERNATIONAL LIQUIDITY

Soviet financial management has been equally cautious. The deficits on current account have been financed by a combination of gold sales and accumulation of Western debt. Sales of gold rose to nearly $2 billion per year in the late 1970s, reflecting a combination of increased volume and a favorable price movement. Similar to the windfall gains to the merchandise trade balance derived from improved commodity terms of trade, the Soviets benefited from generally rising gold prices, which yielded an additional $8.1 billion to what would have been earned (at pre-1971 prices) from actual sales throughout the 1970s.[17]

Gross debt outstanding (see Appendix Table A.7) increased from $1.5 billion in 1970 to $18.1 billion at year-end 1980. Much of this increase occurred in the mid-1970s when large amounts of Western equipment were being purchased and the foreign exchange constraint, despite the favorable trend in the Soviets' terms of trade, became particularly binding. The subsequent decline—for whatever reasons—in equipment purchase, plus stepped-up exports, were associated with reduced average borrowing, which resulted in a negative net transfer during the period 1976-80 (see Appendix Table A.8). The growth of gross debt outstanding slowed after 1976, averaging 5.1 percent per year during 1977-80. Concomitant growth of commercial assets throughout the 1970s also contributed to the absolute decline of net debt outstanding from its peak of $11.2 billion in 1977 to an estimated $9.5 billion in 1980. Even though total debt service has risen steadily, it still consumed a modest 16.2 percent of export receipts in 1980 (see Table 2).

Between its commercial assets deposited in Western banks and its estimated gold holdings of approximately 1,800 metric tons, the Soviet Union possesses sizable international liquidity. In 1980, the two types of assets together were equivalent to 19.8 months of hard-currency imports (see Table 2), although the liquidity of the gold stock is seriously limited by gold's price-inelastic demand in world markets. Not only will Soviet import capacity be unhindered by short-term

[17]Hewett (1980), Table 10.

debt-service requirements, but the strong liquidity position will also allow a substantial lead time to make adjustments in the balance of payments that might be necessitated by economic or financial disturbances in the near term.

Table 2

DEBT BURDEN AND LIQUIDITY RATIOS, 1970-80[a]

(Percent)

	1970	1975	1976	1977	1978	1979	1980
Debt Burden							
Debt/export-revenue	53.0	108.8	122.4	107.6	100.2	68.3	62.9
Debt-service/export-revenue	8.5	18.2	19.8	21.3	21.8	16.7	16.2
Net-transfer/imports	7.7	32.3	21.3	-1.8	-3.1	-2.6	-6.0
Borrowing Terms							
Debt-service/total-debt	16.0	16.8	16.1	19.9	21.7	24.5	25.6
of which:							
Amortization/total-debt	10.5	9.2	9.3	12.6	14.3	16.2	16.7
Interest/total-debt	5.5	7.6	6.8	7.3	7.4	8.3	8.9
Rollover ratio (Debt-service/disbursements)	53.8	27.8	42.4	109.3	117.0	115.6	150.0
International Reserves							
Import cover (in months)	8.7	9.8	9.8	11.1	12.1	19.4	19.8

[a]Computed from Appendix Table A.8.

III. PROJECTIONS TO 1985

CONCEPTS AND METHODS OF PROJECTION

A sovereign borrower's creditworthiness may be analyzed as a function of three temporally distinct potential constraints to its debt-service capacity. Depending upon the critical values of the determinant variables, each constraint will result either in borrowing requirements or repayment sources. These potential constraints are: (1) a long-term structural process involving the saving rate, the relative investment efficiency of borrowed foreign assets, and its allocation between traded and nontraded goods; (2) a medium-term foreign trade disturbance-stabilization component; and (3) the short-term liquidity variables.[1]

Skilled management of the three constraints will normally ensure continued financial market confidence and the necessary capital inflow. Properly managed, this capital transfer will improve the economic structure of the borrower and ultimately transform these constraints from borrowing requirements into repayment sources. Alternatively, mismanagement will lead to loss of market confidence, a narrower range of policy response parameters, and potential arrears. A flexible but consistently balanced financial strategy, whereby the borrowing capital receipts are used productively, will maintain a sovereign borrower's creditworthiness.

Structural Constraints

To assess the longer-term creditworthiness of the Soviet Union, we have to consider the economy's structural characteristics with a critical emphasis on the country's ability to mobilize a sufficient domestic surplus over and above consumption (saving capacity), efficiently channel some of these resources into productive investments of potentially traded goods (absorptive capacity), and convert the balance of the domestic surplus into foreign exchange without decreasing its international value (foreign exchange capacity).[2] The last increases the country's import capacity. The extent to which any of these three factors is binding will limit the growth of per capita income and diminish the economy's long-term debt-service capacity. Although this report is concerned with short- and medium-term

[1]Solberg (1982).
[2]Ibid., pp. 16-18.

creditworthiness only (to 1985), the long-term determinants of sovereign credit risk are listed for completeness. Moreover, these structural rigidities circumscribe the range of foreign trade policy options, which, in turn, impinge upon medium-term creditworthiness.[3]

Foreign Trade and Liquidity Constraints

Timely and skilled economic management of trade-policy variables in response to disturbances transmitted by means of the balance of payments is the fundamental condition for a capital-importing country to maintain its medium-term creditworthiness.[4] The source of these disturbances may be either internally or externally generated and its effect may be through either the current or capital external account.[5] The range of policy options will be largely circumscribed by the structural constraints of the economy (e.g., degree of import compressibility, elasticity of export supply). In the case of the USSR, an exporter of primary materials for hard currency, a major additional factor is the domestic/Eastern-Europe/"Soviet-hegemonion" supply-demand balance for the exportables. In many instances policy options are available and should be exercised to effect a real trade adjustment (narrowing of the resource gap) in response to a balance-of-payments disequilibrium.

Similarly, active management of a country's borrowing policy is crucial to the maintenance of its short-term creditworthiness.[6] Almost every country, at some stage of its development, requires a period of net capital inflows to ease either a saving or foreign exchange constraint (both of which manifest themselves in balance-of-payments disequilibrium). However, prudence is required to ensure that the stock dependence (debt level) and the flow dependence (net financial transfer) do not become excessive.[7] Hence, a balanced response, including both an improvement in the current account and an increase in net indebtedness, is required. In this manner, a country's debt burden is maintained within the bounds of serviceability. That is, debt involvement and the terms of its repayment do not reach the point where the rollover process is interrupted by reaching the

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[3]Solberg (1981), Appendix E.

[4]Solberg (1982), pp. 18-24.

[5]Tyson and Kenen (1980), pp. 35-37.

[6]Solberg (1982), pp. 24-30.

[7]See Dhonte (1975) for a detailed analytical discussion of the inherent mechanics of financial capital.

liquidity constraint, as signified by either insufficient capital disbursements or inadequate international liquidity.[8]

Debt-Service Capacity Constraints and Balance-of-Payments Cash-Flow Projections

The hard-currency balance-of-payments projections were structured so as to highlight the magnitude of three near-term policy option variables: actual expenditures for compressible imports, gross foreign borrowings, and liquidity management including gold sales. These variables are determined either directly by or in response to the confluence of the previously mentioned three debt-service capacity constraints. Together these variables represent the range of near-term policy options available to manage the country's resource gap, short of severe austerity (noncompressible import reduction) or default.

This study's hard-currency balance-of-payments projections divide merchandise imports into two distinct categories: noncompressible and compressible (Avramovic, 1964). The exact proportion of noncompressible to total merchandise imports depends on country-specific factors. Pursuit of rapid income growth targets, an absorptive capacity constraint (for domestic capital goods), or a prominent role for foreign trade in the country's development strategy would all introduce an element of rigidity into the borrower's import structure. Moreover, the degree of import inflexibility would depend on the country's structure of production and income distribution. In effect, the "minimum tolerable" or the "noncompressible" level of imports is determined jointly by the several structural debt-service capacity constraints. All the components of noncompressible imports are considered to be rigid in that a forced reduction in their required levels would adversely affect either the momentum of economic growth, the basic standard of living, or the country's creditworthiness. A country's degree of import rigidity is also an important concept in assessing the depth and severity of a medium-term foreign trade constraint and the extent to which various meliorative policy options will be adequate.

What is not noncompressible is compressible. In this study, compressible imports constitute 60 percent of imported Western machinery and all manufactured consumer goods. The level of expenditures on compressible imports is one of three near-term policy response variables to a foreign trade deficit.

In this study, import capacity is estimated as a (partial) function of the growth rate of Soviet output. However, in determining the rate of economic growth, no explicit (dynamic) feedback from compressible

[8]Ibid., pp. 24-25.

import capacity is incorporated. This seems justified in that our analysis focuses on a single year, 1985. It is during this year alone that we test the conclusions of our initial scenario with numerous alternative assumptions and scenarios.

The accounting framework for this balance of payments (Appendix Table A.12) does not follow conventional standards. Here, total trade revenue comprises fuel exports, "other merchandise exports," and net invisibles and arms sales. Fuel receipts were taken to be limited by domestic supply elasticities, CMEA countries' consumption (their GNP growth rates), and world price trends. Receipts for "other merchandise exports" (see Table 3, footnote c) were considered to be exogenously determined by the foreign trade constraints and thus were based upon OECD GNP growth estimates, their average income elasticity of import demand, and world price projections.

Total noncompressible expenditures are defined as grain imports, "other noncompressible merchandise imports" (which include all nongrain food, raw materials, fuel, and 40 percent of imported Western machinery in 1980),[9] interest payments, amortization, and errors and omissions. The first two components are structurally determined. Grain import volume projections are based upon recent Soviet agricultural production trends. Projected world price levels were combined to yield value estimates. The volume of "other noncompressible merchandise imports" was projected by multiplying the GNP growth variants by the estimated income elasticity of import demand. Price projections used a composite price index of individual commodity subgroups (see Table 3). Two additional components of noncompressible imports are interest and amortization payments. These outflows are determined by the foreign trade and liquidity constraints, and their magnitudes reflect the country's past borrowing record. Finally, the deficit on errors and omissions was assumed to remain constant and noncompressible as a conservative estimate in the face of informed ignorance (see Appendix Table A.12, footnote g).[10]

The sum of total trade revenue and total noncompressible expenditures yields the balance for compressible imports (Appendix Table A.12, line 3). This entry measures the net balance (surplus or deficit) emanating from the economy's three separate constraints. Internal

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[9]See Appendix B for an explanation of the cutoff value for the inclusion of Western machinery in noncompressible imports.

[10]The 1981 errors and omissions figure from Zoeter (1983) is very large and, in part, reflects the preliminary nature of the balance-of-payments data. By maintaining this value in our projections through 1985, we in effect assume that the price erosion in the "permanent" components of this category (i.e., hard-currency trade and assistance to CMEA, Western suppliers' credits, etc.) is compensated for by the inclusion of the "preliminary" component.

Table 3

Assumptions for Projections of Balance of Payments: Initial Scenario, 1982-85

(Percent growth per year)

		1982	1983	1984	1985	Average 1982-85
1.	GNP OECD[a]	0.8	2.5	3.5	3.7	2.6
2.	"Other noncompressible import" volume[b]	3.5	5.3	4.9	4.8	4.6
3.	"Other merchandise exports" volume[c]	1.2	3.8	5.3	5.6	4.0
4.	Oil prices[d]	-3.5	0.0	9.5	9.0	3.6
5.	Grain prices	-13.3	30.8	5.9	5.6	6.1
6.	Manufactures prices[e]	0.5	4.8	7.0	7.0	4.8
7.	Food prices[e]	-3.5	6.5	6.0	5.0	3.4
8.	Raw materials prices[e]	-7.8	3.0	8.0	10.0	3.1
9.	"Other noncompressible exports" unit value[f]	-5.8	3.5	7.7	9.1	3.5
10.	"Other merchandise exports" unit value[g]	-6.1	3.5	7.8	9.2	3.4
11.	"Other noncompressible imports" value	-2.3	8.8	12.6	13.9	8.1
12.	"Other merchandise exports" value	-4.9	7.3	13.1	14.8	7.3
13.	Terms of trade[h]	-0.3	0.0	0.1	0.1	neg.

[a]IMF (1982), Table 43.

[b]Noncompressible import volume was computed as the product of the growth rate of NMP (net material product) and the historic income elasticity of import demand, less 13 percent. The growth rate of NMP was calculated as a product of the GNP growth rate (Appendix Table A.10, line 4) and a scalar (1.5) representing the average (1966-79) relationship between these two trends. Next, the NMP growth trend was multiplied by the recent historical income elasticity of import demand value at 1.4 (see Fink, 1981). Finally, this growth rate for noncompressible import volume was lowered by approximately 13 percent to reflect the retrenchment of the role which hard-currency imports have played in the USSR since 1976.

[c]Calculated as the product of line 1 and the (1966-79) income elasticity of export demand valued at 1.5 (see Fink, 1981).

[d]Prospective oil prices changes for 1982 to 1983 from OECD (1982b); price projections for 1984 and 1985 assume an annual real increase of 3.5 percent (Lichtblau, 1982) over projected industrial country GNP deflator (see IMF, 1982, Table 43).

[e]Prospective price rates for 1982 and 1983 from OECD (1982b), Table 22; projected price changes for 1984 and 1985 incorporate a relative improvement in raw-materials price reflecting the expected business cycle upturn.

[f]"Other noncompressible imports" were defined as the sum of 40 percent of imported Western machinery, all nongrain food, fuel, and all raw-material import expenditures in 1980. The price index was computed by combining the individual price trends of manufactures, food, and raw materials by their trade share of "other noncompressible imports" from the developed West in 1980, which equalled 20, 5, 2, and 73 percent, respectively.

[g]"Other merchandise exports" were defined as all nonfuel merchandise exports to the developed West. The price index was computed by combining the individual price trends of manufactures, food, and raw materials by their trade share of nonfuel merchandise exports to the developed West in 1980, which equalled 18, 5, and 77 percent, respectively.

[h]Calculated for "other merchandise exports" and "other noncompressible imports" only.

and external disturbances, which are channeled through the external account, directly affect the size of this balance. According to the constraint/policy response process, the decisionmakers then determine the amount of asset reduction (gold sales and reserve depletion) or gross foreign borrowing required to meet a targeted level of "net compressible-import capacity" (NCIC). When the coincidence of the economy's constraints is severely binding (as signified by a deficit on the compressible import balance), the reserve level is at a minimum, and capital access is limited, the original terms of the borrowing agreement are jeopardized. A cash-flow liquidity squeeze is in effect. In such a situation, reducing noncompressible imports (at the expense of GNP growth momentum or basic living standards) is the penultimate policy option to avoid a debt rescheduling.

Below we consider the debt-service capacity constraints and the corresponding policy responses specific to the Soviet Union. On the basis of the structural characteristics of the Soviet economy and the conduct of both its economic and financial management, we present an *initial scenario* comprising two prospective growth variants leading to two separate balance-of-payments projections to 1985. Each of these subsections concludes with an assessment of the financial implications of the balance-of-payments variants, baseline growth and low-productivity growth.

INITIAL SCENARIO

Introduction

Soviet ability to mobilize a large proportion of output for reinvestment has been consistently high. Although this capacity has played a fundamental role in the historically strong GNP growth, more recently declining marginal returns on capital inputs have limited the effect of new investment. Labor inputs have also been a declining impetus to GNP growth in the 1970s. Labor input in the 1980s is growing at less that 1 percent per year.[11] Thus, the growth of factor inputs will not be the engine of growth it has traditionally been. In the future, Soviet economic growth must originate from improved aggregate factor productivity: land, labor, and capital taken together.

Although, or perhaps because, the decline in capital productivity has acted to severely restrain the growth of the economy, this component necessarily attracts attention in any projection of Soviet GNP.

[11]Feshbach (1978b), Table 1.

The rapid growth of capital stock, predominantly domestically produced, has led to a severe absorptive capacity constraint as evidenced by rapidly declining capital productivity and a rising incremental capital-output ratio (ICOR). (See Appendix Table A.5.) The reduction of the share of investment in GNP planned for 1981-85 may be intended to lower the economy's high ICOR and arrest the decline in productivity.[12] However, merely scaling back the volume of investment will not alleviate—indeed, may exacerbate—the concomitant endemic problems of poor innovative ability and insufficient factor-saving technology embodied in the present capital stock, both of which also contribute to the absorptive capacity constraint. Finally, the late 1970s and early 1980s have seen certain major bottlenecks (such as railroad carrying capacity) noticeably worsen, as well as further shortages of producer goods, a development that seems to have had a negative effect on the construction industry and on capital formation generally. Thus, we assume that no substantial improvement of capital productivity growth rates will occur in the foreseeable future.

By increasing reliance upon imported capital equipment and machinery for certain industries, Soviet planners have probably been able to lower the ICOR in these sectors. However, the application of foreign technology, which embodies more efficient production techniques, must also face the additional impediments of the Soviet economy's capital constraint (long gestation periods, poor maintenance, rapid depreciation, and cannibalization). Although it may act to reverse the decline in capital productivity growth rates, it would not be as efficient as it would be under more favorable operating conditions. Notwithstanding these limitations, imported Western equipment and technology remain one of the more important alternatives within a limited range of solutions. The efficacy of this growth strategy will depend on the ability to finance such purchases (the foreign trade and liquidity constraints).

Two other major steps might have a favorable effect on capital formation during the period in question: a far-reaching and properly executed reform of the economic mechanism and a large cutback in the resources flowing into the defense sector. The former would have the effect of raising overall economic efficiency (total factor productivity), the latter of helping bottlenecks and shortages in the civilian econ-

[12]It has been argued that the decline in capital productivity may be less than indicated because of inflation in the official values of the capital stock. However, this could be partially or entirely negated by an equivalent or even greater inflation rate in the noninvestment sectors of the economy.

omy and possibly also of augmenting the volume of investment. We do not assume either of these developments to take place by 1985.

Turning to structural problems of Soviet foreign trade, we note that the low price and income elasticity of export demand results from a high concentration of a few primary commodities in hard-currency exports. This fact increases the susceptibility of net export revenue to cyclical or random external disturbances. Moreover, the most important merchandise export (oil) also faces a low supply elasticity (see Appendix Table A.11). Absence of market-determined savings precludes the potential benefits from the export revenue volatility. Thus, future economic growth could be occasionally restrained by the structural foreign exchange gap as it limits export-based import capacity.[13]

On the import side, the lag of domestic agricultural output behind effective demand, aggravated by four successive years of bad weather, necessitates large grain purchases. In addition, the role Western technology and machinery must play in mitigating the defects of domestic equipment and offsetting the aging of the capital stock further increases secular import requirements. In addition, imports of nongrain food, capital equipment, and raw materials alleviate other domestic sectoral shortages. The result is a high ratio of *noncompressible imports* to total foreign purchases. In sum, domestic inefficiencies have created rigidities in the structure of import demand whereby hard-currency import volume plays an increasingly important role in influencing sectoral growth rates and basic living standards.

The USSR is a developed country primarily exporting raw materials for hard currency. This fact constrains its earning potential. Value-added and product diversity of its hard-currency exports remain limited. Although the terms of trade for oil, the primary hard-currency export product, have greatly benefited from the pricing policy of the OPEC cartel, Soviet oil export supply elasticity is low at this juncture. Other raw-material exportables (gold, diamonds, timber, cotton, etc.) exhibit higher supply elasticities but face lower price-elasticities of world demand. A concerted attempt to increase the export volume of these products would depress their world prices and possibly even diminish export revenue.

Manufactured products have not—and in the foreseeable future will not—be a major hard-currency earner for the USSR. The one exception to this trend is military hardware. With the growing wealth of the largely Arab customers, identified hard-currency revenues from such sales grew from $80 million in 1970 to an estimated $3.7 billion in 1981.[14] Prospects for continued growth of arms sales in the 1980s

[13]Solberg (1982), pp. 3-15.

[14]Zoeter (1983), Appendix F; these data include only identified sales to LDCs, omitting certain arms receipts included in merchandise exports.

are considered good, although not at the high rates of the 1970s when sales started from a low absolute level.

If imports of foreign equipment and technology hold an important key to improvement in Soviet economic performance in the 1980s, and given the current low price levels of the main Soviet exportables (oil, gold, diamonds), import-stimulated growth by borrowing from the West for capital goods imports emerges as an attractive strategy for the Soviet Union for the first half of the 1980s (assuming sufficient credit access). The increase in Soviet gross hard-currency debt in 1981 by nearly $3 billion (the largest yearly increase since 1975) is an indication of sorts (see Appendix Table A.13).

BASELINE VARIANT

GNP Growth

According to the baseline variant, combined factor inputs—taking into account the growth rates of labor, capital, and land—are to advance an average 2.8 percent per year during 1981-85 (see Appendix Table A.10). This continues a long downward trend: from 1961-65 to 1976-80, average annual growth of combined factor inputs decelerated from 4.4 percent per year to 3.6 percent (see Appendix Table A.5).

In 1981-85, the increase in *manhours* contributes an average 32 percent of the total growth of factor inputs. The average annual increment to the labor force falls sharply from 2.3 million during the 1970s to approximately 550,000 during the 1980s,[15] and the growth of employment (adjusted for participation rates) is expected to average only 0.9 percent per year during 1981-85 (see Appendix Table A.10).[16] The effect of this slowdown on industry will be somewhat blunted by continued, albeit decelerating, labor movement from agriculture and households (i.e., housewives).[17]

One of the most striking provisions of the 11th Five-Year Plan is the reduction in the growth of new gross fixed capital. The official fixed investment target has been set at only 2 percent per year, which

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[15]Feshbach and Rapawy (1976).

[16]Projections in CIA (1979) are set at 1.1 percent per year and in Bergson (1978) at 1.0 percent per year for 1981-85.

[17]The political dimension of this problem is that most of the new entrants into the workforce will originate from the Moslem populations in Soviet Central Asia (Feshbach, 1978a). Their resistance to migrating to the industrial areas may necessitate a costly relocation of industrial infrastructure to Central Asia. Such a widening of the geographic distribution of industry will probably erode traditional power bases and exacerbate social and ethnic tensions.

represents a considerable reduction from the 3.7 percent per year during 1976-80 (itself a much lower rate than seen in any previous Five-Year Plan period).[18] The 2 percent average annual increase in investment, even if realized, may in fact amount to no increase in real terms because of cost inflation.[19] In part owing to the intended deceleration of new investment spending, the growth of capital stock is expected to decline from 6.9 percent per year in 1976-80 to 5.6 percent per year during 1981-85.[20]

The net addition of arable *land* has averaged only 0.3 percent per year since 1966 and was nil during the 10th Five-Year Plan (1976-80; see Appendix Table A.5). For 1981-85, it is projected at 0.1 percent per year; and its contribution to GNP growth will be negligible.

The 11th Five-Year Plan depends heavily on an upturn in total factor productivity for the continuation of economic growth at even the moderate rates (by past Soviet standards) that the Plan decrees. But in view of recent trends in productivity, the success of this strategy appears quite uncertain. During the 1960s, total factor productivity grew at an average pace of 0.9 percent per year. In 1971-75, it *declined* on the average 0.5 percent per year, thus actually reducing GNP growth, and in 1976-80 it dropped further to *minus* 0.8 percent per year (Western calculations; see Appendix Table A.5).

Our baseline projection for total factor productivity for 1981-85 is an average annual *decline* of 0.4 percent per year, or slightly better performance than in 1971-75. This estimate breaks down as follows, in terms of labor and capital productivity.

The 11th Five-Year Plan expects improvements in *labor* productivity to play a fundamental role in achieving the Plan's objectives. However, a major upturn in the growth rate of labor productivity is unlikely; the rate has been falling steadily for the past two decades (as shown in Appendix Table A.5), and, in fact, longer. Although a

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[18]"Growth Targets for Main Economic Indicators" (1982); CIA (1981), Table 38.

[19]Gosplan's research institute has identified a tradeoff between the rate of new investment and both gestation periods and rates of capital depreciation (Hanson, 1982a). Accelerating gross investment spending has tended to lengthen construction lead times and retard the retirement of outmoded capital stock. As the number of investment projects has become excessive, lack of economy-wide coordination has disrupted sectoral supply bottlenecks, lowering capacity utilization and adversely affecting technological advance and overall productivity growth. Soviet planners expect that the slowdown in investment spending will be compensated for by a reduction in the growth rate of unfinished construction, which averaged 8.2 percent per year of new projects between 1971 and 1979 (CIA, 1980c).

[20]CIA (1981), Table 43. The small decline in the growth rate of capital stock, given the large cut in investment growth, is due in part to the conventional lag between the change in a flow and the resulting change in the stock value. In addition, the small decline in the growth rate of capital stock also assumes an improvement (i.e., reduction) in the growth rate of the volume of unfinished construction.

far-reaching economic reform might perhaps reverse the trend, we do not expect such a reform to occur during 1981-85. Nonetheless, we do project some improvement over the especially poor growth performance during 1979-80, and when labor productivity declined an average 0.3 percent per year. Under the baseline GNP variant, we project an average growth of labor productivity of 1.5 percent per year during 1981-85, which represents a small improvement over the rate achieved (1.4 percent) in 1976-80 (see Appendix Table A.10).

If GNP growth rates cannot be bolstered by a reversal of labor productivity rates, past experience suggests that neither can this be achieved through *capital* productivity growth. Capital productivity *declined* an average 3.9 percent per year during the 1970s and an average 4.6 percent per year during 1979-81 (see Appendix Tables A.5 and A.10).

Constant channeling of 20 to 26 percent of total output back into the economy as fixed investment over the last two decades has been associated with rapidly diminishing returns to new additions to capital stock. Rather than producing faster growth, incremental amounts of investment have been accompanied by a rising ICOR (lower capital productivity). The ICOR averaged 5.2 per year during the 1960s, but sharply increased to an average 12.8 per year in the 1970s (see Appendix Table A.5). In particular, it has been cited that:

> Compared with the preceding five-year period, the amount of investment required in 1981-85 to achieve an increase of one ton in output of oil has risen by almost 800%. The amount of investment required to raise coal output by one ton has gone up 21%, and that needed to achieve an extra one ruble's worth of equipment, by 39.3%.[21]

Poor innovative ability, a severe limit on absorptive capacity, inadequate incentives, slow progress in conservation, and other systemic difficulties have made a major turnaround in the capital-productivity trend unlikely. Thus, in our baseline GNP variant, aggregate capital productivity is projected to decline at an average rate of 3.0 percent per year during 1981-85, equal to its average decline during the mid-1970s (see Appendix Tables A.10 and A.5).

Bringing together the projected growth of total inputs and total factor productivity yields the baseline projection for GNP growth. As mentioned, combined factor inputs are projected to grow at an annual average of 2.8 percent, and total factor productivity to decline at 0.4 percent per year. Consequently, GNP growth is projected to advance at the modest average rate of 2.4 percent per year during 1981-85.

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[21]Kroncher (1982c).

This would represent the slowest growth of GNP during any Five-Year Plan period in Soviet history and would allow only a meager 1.5 percent average annual increase in per capita output during the five years. Even so, judging by the lackluster results of the first two years of the quinquennium, this projection may well prove to be optimistic.

Balance-of-Payments Projection

The Soviet hard-currency balance of payments has been projected to 1985 on the basis of the methods and concepts detailed above and the quantitative assumption presented in Table 3 and Appendix Table A.11. The results of the balance-of-payments projection are presented in Appendix Table A.12, and the projections (both variants) for 1985 only are summarized in Table 4.

As might be expected, various factors, including growing systemic deficiencies within the economy, combine to bring about a decline in hard currency available for compressible imports over the projection period (Appendix Table A.12). Although growth of total trade revenue (particularly fuel receipts) remains sluggish, total expenditures on noncompressible imports advance more rapidly. Continued sizable gold sales coupled with substantial borrowing are projected to 1985, but these two important sources of foreign exchange will not suffice entirely to offset the rapid decline in the current balance for imports. Thus, the *volume* growth of net compressible-import capacity is projected to exhibit an average decline of 5.0 percent per year during 1981-85, thereby reducing the efficacy of the hard-currency foreign-trade policy option as a potential solution to the Soviet growth slowdown, short of large borrowing above the level postulated (*net* borrowing of $2.6 billion per year on the average, excluding credit for the gas export pipeline).

Total current trade revenue is projected to grow from $29.4 billion in 1980 to $35.0 billion in 1985. This modest average annual growth of 4.0 percent is affected primarily by the large contribution of fuels to total receipts (55.2 percent in 1981) and our expectation that such receipts will increase only 3.4 percent per year during the period. Earnings from other merchandise exports, net receipts from invisibles, and arms sales are projected to grow more quickly, but their smaller share limits their contribution to overall revenue.

Total noncompressible expenditures, comprising the total cost of grain imports, "other noncompressible merchandise imports," principal repayments (amortization), interest payments, and errors and omissions are projected to increase from $27.8 billion in 1980 to $38.5 billion in 1985, an average annual advance of 7.0 percent. Growth of

Table 4

Balance-of-Payments Projections for Initial Scenario, 1985
(Millions of U.S. dollars)

	Baseline Variant[a]	Low-Productivity Variant[b]
1. Total Trade Revenue	35,066	38,729
Energy exports	17,435	21,098
Other merchandise exports	10,012	10,012
Net invisibles and arms sales[c]	7,619	7,619
2. Total Noncompressible Expenditures	-38,509	-37,702
Grain imports	-4,750	-4,750
Other noncompressible merchandise imports[d]	-20,429	-19,622
Interest payments[e]	-3,874	-3,874
Amortization[f]	-4,391	-4,391
Errors and omissions[g]	-5,065	-5,065
3. Balance for Compressible Imports (1 + 2)	-3,443	1,027
4. Near-Term Policy Response	8,418	8,418
Gold sales	1,418	1,418
Gross foreign borrowing[d]	7,000	7,000
5. Net Compressible-Import Capacity (3 + 4)	4,975	9,445
(% change) Value	-14.7	6.7
Unit value	7.0	7.0
Volume	-21.7	-0.3
Note: Net capital inflow[d]	2,609	2,609

[a]Average annual GNP growth over 1981-85: 2.4 percent.
[b]Average annual GNP growth over 1981-85: 1.9 percent.
[c]Includes arms sales to LDCs only. Additional receipts from arms sales are included in "other merchandise exports." See Zoeter (1983).
[d]Excluding both imports of equipment for the export natural gas pipeline and borrowing for same.
[e]Interest payments of total gross debt (including short, medium, and long-term maturities).
[f]Amortization of medium- and long-term maturities only. Short-term debt is assumed to be entirely rolled over on a yearly basis.
[g]Includes: hard-currency trade and assistance to CMEA, net credits granted to LDCs, net suppliers' credits to the developed West, hard-currency transfers to clandestine activities in the West.

debt-service payments and of "other noncompressible merchandise imports" are projected to rise more quickly, and grain expenditures are expected to advance at a slower rate.

From an estimated surplus of $1.1 billion in 1980, the *balance for compressible imports* is projected to decline to a $3.4 billion deficit in 1985, contributing an average deficit of $2.0 billion per year from 1981 to 1985, although with yearly fluctuations. The deterioration in 1981 and subsequent improvement in 1982 and 1983 are primarily due to fluctuations in expenditures on grain, which rise by 41 percent in 1981, then decline by an average 21 percent in each of the following two years. The renewed deterioration in the balance for compressible imports during 1984 and 1985 results from a combination of higher grain prices, expanded purchases of other noncompressible imports, and sluggish fuel receipts.

Soviet *gold sales* are projected to contribute average hard-currency revenue of $1.2 billion per year from 1982 to 1985. Capital receipts by the USSR on account of new or rolled over loans ("loan disbursements," hereafter simply "disbursements"), estimated at $6.0 billion in 1981, are projected to drop marginally in 1982 and then rise steadily to $7.0 billion in 1985.

Net compressible-import capacity, estimated to have been $6.0 billion in 1980 and $5.9 billion in 1981, is projected to fall to $5.3 billion in 1982, then to return to an average of approximately $5.7 billion per year during 1983-85. Taking into account the price increases assumed here, the *volume* of NCIC will thus undergo an average annual *decline* of 5.0 percent during 1981-85. However, this average rate masks marked fluctuation in the real net import capacity of compressible goods and service, which ranges from an 11.2 percent increase in 1983 to a 20.3 percent decline in 1985.

Prospective Creditworthiness

The baseline GNP variant projection incorporates a moderately heavy amount of debt accumulation. From its level of $18.1 billion in 1980, gross debt outstanding (short, medium, and long-term maturities) is expected to increase to $31.0 billion by year-end 1985 (see Appendix Table A.13). (Debt incurred in connection with the gas export pipeline is not included in our estimates.) This is equivalent to an average net capital inflow of $2.6 billion per year, which in constant dollars is not dissimilar to the inflow of $1.7 billion per year during the 1970s (see Appendix Table A.7).

Debt service, measured against total trade revenue (excluding gold sales), shows a concomitant rise from 16.2 percent in 1980 to a pro-

jected 23.6 percent in 1985 (Table 5). As a measure of actual debt-service burden during the 11th Five-Year Plan, this ratio is within the realm of manageability; however, it does not indicate the prospective burden of debt service implied by gross debt accumulation through year-end 1985 (because of the conventional lag in repayment of principal). As an indicator of the future debt-service burden, the ratio of debt outstanding to export revenue must be examined.

Relating gross debt to total trade revenue reveals a rapid and steady rise from 62.9 percent in 1980 to 88.4 percent in 1985. This upward trend is a reversal of the experience during 1976-80, when the prospective debt burden declined from a historical peak of 122.4 percent in 1976 to the recent trough in 1980 (see Table 2). Although the growth of debt in excess of the growth of export receipts does violate an "equilibrium condition" of sound debt management, the projected *debt-to-export* ratio in 1985 is not unusually high compared with corresponding values for countries with debt rescheduling experience.[22] Unless this trend continues throughout the decade, it should not seriously infringe Soviet creditworthiness.

Despite the moderately heavy Soviet dependence upon debt, there is no reliance upon foreign capital to finance expanded import capacity. The ratio of the *net financial transfer* (disbursements minus debt service) to imports has been negative since 1977 except in 1981 (see Table 2) and is projected to remain so through 1985. Thus, new capital disbursements are projected to be insufficient to entirely cover debt-service payments, implying no incremental import capacity from this source of foreign exchange. Under these conditions, the projected hardening of *debt terms* (debt-service/debt) should not preclude an easy rollover process. Although the ratio of debt service to total debt is projected to increase marginally from 25.7 percent in 1980 to 26.7 percent in 1985, the *rollover ratio* (debt-service/disbursements) becomes more favorable. The ratio of debt service to disbursements is projected to fall from 150 percent in 1980 to 118 percent in 1985. As this ratio falls, a constant level of disbursements will effect a larger net transfer.

Although debt terms (only interest rates) are projected to harden somewhat through 1985, and although the level of indebtedness is also expected to rise, the absence of any dependence upon new capital inflows to finance enlarged import capacity will result in an improved rollover situation by 1985. If either increased expenditure on compressible imports or the continuation of a high rollover ratio necessitated raising gross disbursements, the market would probably respond with sufficiently elastic financial capital supply. Otherwise,

[22]Dhonte (1975), p. 24.

Table 5

Debt Burden and Liquidity Ratios for the Initial Scenario, 1980-85[a]

(Percent)

	Actual	Estimate	Baseline Variant				Low-Productivity Variant			
	1980	1981	1982	1983	1984	1985	1982	1983	1984	1985
Debt Burden										
Debt/export-revenue	62.9	71.2	77.7	84.1	86.6	88.4	77.7	81.2	80.3	80.0
Debt-service/export-revenue	16.2	18.3	19.0	20.1	21.8	23.6	19.0	19.4	20.2	21.3
Net-transfer/imports	-6.0	+2.2	-1.4	-1.3	-2.6	-4.1	-1.3	-1.2	-2.0	-2.9
Borrowing Terms										
Debt-service/total-debt	25.7	25.6	24.5	23.9	25.2	26.7	24.5	23.9	25.2	26.7
of which:										
Amortization/total-debt	16.8	15.1	13.5	12.4	13.2	14.2	13.5	12.4	13.2	14.2
Interest/total-debt	8.9	10.5	11.0	11.5	12.0	12.5	11.0	11.5	12.0	12.5
Rollover ratio (debt-service/disbursements)	150.0	89.6	106.9	106.1	111.6	118.1	106.9	106.1	111.6	118.1
International Reserves										
Import cover (in months)	19.8	13.3	13.8	16.7	18.1	19.2	13.5	14.5	14.0	13.7

[a]Computed from Appendix Tables A.12 and A.13.

asset reduction or some other form of real merchandise transfer would have to occur to maintain the original terms of the borrowing policy.

Continued Soviet reluctance to accumulate further debt since 1977 has softened the inherent tradeoff between debt involvement, debt terms, and the rollover process. The projected increase in both the stock of gross debt and its growth rate should not prove to be incompatible with timely payment of debt-service obligations under the present capital disbursement assumptions. In addition, international liquidity (including the gold stock), as measured by *import cover*, is expected to remain more than ample, despite its decline from 19.8 months in 1980 to 13.3 months in 1981 and subsequent recovery to 19.2 months in 1985. Thus, according to the baseline balance-of-payments variant, the Soviet economy is expected to remain creditworthy in the usual banker's sense through 1985.

LOW-PRODUCTIVITY VARIANT

GNP Growth

Unlike our baseline variant, the "low-productivity" GNP growth variant postulates a further deterioration in aggregate factor productivity (see Appendix Tables A.5 and A.10) and provides the basis for an alternative balance-of-payments and creditworthiness projection (see Table 4 and Appendix Table A.12).

In the low-productivity variant the growth rates of individual *factor inputs* are identical to those in the baseline rates, as their near-term prospective trends are fairly certain. Again, the growth of combined factor inputs is projected to decelerate from 3.1 percent in 1981 to 2.6 percent in 1985, an average 2.8 percent per year growth rate during 1981-85.[23]

A major uncertainty in near-term Soviet GNP growth rates arises from the prospective performance of *aggregate factor productivity*. Our baseline variant assumes a marginal improvement over the recent factor productivity growth trend, still a *negative* contribution of 0.4

[23]The growth of capital stock is assumed to be identical under each of the two variants. Although the 0.5 percent per year forgone output in the low-productivity variant could result in a corresponding reduction of net investment (and in capital formation), it could equally lead to a decline in military procurement, subsidies to EE/SH, or increased Western net credit as well. Even if the low-productivity variant led solely to a reduction of net investment, the lag with which this would reduce the growth of capital stock renders the cumulative effect in 1985 small. Thus, this interconnection was ignored.

percent. In contrast, the low-productivity variant assumes an annual average 0.9 percent decline in aggregate factor productivity.

Output per manhour in the low-productivity variant is projected to grow at an average rate of 1.0 percent per year. This rate represents a continuation of the secular decline in labor productivity, which slowed from an average rate of 3.3 percent per year in the 1960s to 1.7 percent per year in the 1970s (see Appendix Table A.5). Thus, in the low-productivity variant, it is assumed that the Soviet economy will resist even the small improvement in labor productivity that was incorporated in the baseline variant.

In consequence, the growth rate of Soviet GNP in the low-productivity variant was projected to fall from an estimated 2.1 percent in 1981 to 1.8 percent in 1985. This is equivalent to an average annual rate of 1.9 percent during the 11th Five-Year Plan (see Appendix Table A.10).

Balance-of-Payments Projection

The second balance-of-payments projection is constructed by replacing baseline GNP growth with the low-productivity GNP growth in the underlying computations (Appendix Table A.12). By changing this sole assumption, both fuel receipts and "other noncompressible merchandise import" expenditures are considerably altered in the balance-of-payments projections.

With slower GNP growth—but still the same elasticity—*fuel* consumption (both oil and gas) diminishes and the gross fuel surplus available for export increases correspondingly (Appendix Table A.11). It is assumed that the additional exports are directed entirely to non-CMEA markets. With the proportion of potential hard-currency sales directed to LDCs assumed to decline from 32 percent in 1981 to 15 percent by 1985 (identical to the baseline projection), the bulk of additional fuel exports was assumed to be sold to the OECD.[24] Thus from 1981 to 1985, oil export volume to the OECD declines from 43 mmt to 30.5 mmt, while gas exports advance from 26.7 billion cubic meters (bcm) to 60.0 bcm.[25]

Price trends for both oil and gas are assumed to remain unchanged from the baseline scenario. Combined fuel export receipts from crude oil and gas are projected to increase from $16.2 billion in 1981 to $21.1 billion in 1985. This represents an average 7.4 percent per year

[24]The assumed decline in LDC fuel exports from 32 percent to 15 percent of potential hard-currency sales is projected on the assumption that the Soviets will want to increase the hard-currency proportion of the (declining) non-CMEA oil export volume.

[25]Estimated hard-currency exports of gas are constrained by pipeline capacity rather than the production levels in this scenario.

rise of fuel receipts from 1981 to 1985, more than double the sluggish 3.4 percent annual growth rate under the baseline assumptions.

In a similar manner, the projected growth rate of "*other noncompressible merchandise imports*" under the low-productivity growth variant is lower than the baseline rate. The alternative volume growth rate of "other noncompressible merchandise imports" averaged 2.7 percent per year during 1982-85, compared with an annual average of 4.6 percent for the baseline scenario during the same period. Price trends were assumed to remain identical. Accordingly, the growth of "other noncompressible merchandise import" expenditures ranged from a decline of 2.3 percent in 1982 to an advance of 12.3 percent in 1985.

The combination of higher total trade revenue (from larger fuel receipts) and lower "noncompressible merchandise import" expenditures results in a modest nominal surplus on the *balance for compressible imports* (Appendix Table A.12, line 3). It rises from a deficit of $2.9 billion in 1981 to a surplus of $1.0 billion in 1985. This represents a marginal improvement over the baseline trend, which remains in deficit throughout the projection period.

Gold sales and *gross foreign borrowings* are assumed to occur at the same level as in the baseline GNP variant. The level of borrowing in the baseline variant was considered to be near the country's access limit, as set by the international capital markets. As this level results in a volume reduction of net compressible-import capacity under the baseline variant, it was assumed that under the low-productivity variant the disbursements would be used to expand compressible import capacity rather than reduce net debt. Thus, the average volume growth of *net compressible-import capacity* records a rapid advance of 6.5 percent per year during 1981-85, whereas the baseline assumption showed an average annual decline of 5.0 percent.

Prospective Creditworthiness

As the projected rising surplus on the balance for compressible imports is assumed to result solely in an equal increase in net compressible-import capacity (no reduction in gold sales or gross foreign borrowings), the resulting financial projections are identical to those of the baseline GNP variant (see Appendix Table A.13). However, because both export revenue and import expenditures are changed under the low-productivity variant, the financial ratios that incorporate these two items also change (see Table 5).

The growth rate of total trade revenue is much more rapid under the low-productivity variant, while the increase in debt (and thus debt

service) remains identical to the baseline variant. As a result, the two indicators of debt stock involvement (debt/export-revenue and debt-service/export-revenue) rise less rapidly. The ratio of *debt service to export revenue* is projected to increase from 18.3 percent in 1981 to 21.3 percent in 1985. Similarly, the rise in the prospective burden of debt service, as measured by the ratio of *debt to export revenue*, was also moderated. It is to increase from 71.2 percent in 1981 to a peak of 81.2 percent in 1983, followed by a decline to 80.0 percent in 1985. The corresponding larger ratios in the baseline variant were assessed to be manageable, and these indicators represent an even lighter debt burden.

Although expenditures for noncompressible imports grow less under the low-productivity GNP variant, net compressible-import capacity increases more than proportionately compared with its increase in the baseline variant. Thus, total merchandise import expenditure in the low-productivity variant is greater than in the baseline variant. With an unchanged *net financial transfer*, the flow dependence on foreign capital, as measured by the ratio of the net transfer to imports, also declines in the low-productivity variant from −1.3 percent in 1982 to −2.9 percent in 1985, signifying an absence of dependence on capital inflows for financing expanded import capacity.

Import cover declines more rapidly under the low-productivity variant because of the faster growth of compressible imports, falling from 19.8 months in 1980 to 13.7 months in 1985. The 1985 figure represents over five months less import cover than the baseline variant. However, it still remains ample by Western financial standards.

Debt involvement measured against export revenue in the low-productivity variant is less than that in the baseline projection. The reduction in capital-flow dependence is less under the low-productivity variant compared with the baseline variant, but still remains negative. As the financial dependence under the low-productivity variant was less than the baseline variant (which was not considered excessive), both are considered to be manageable. Import cover declines more rapidly under the low-productivity variant than under the baseline variant, but it, too, is projected to be more than adequate. On balance, the debt burden and liquidity ratios in the low-productivity variant are virtually unchanged from the baseline projection, presenting a creditworthy *initial scenario* for the Soviet economy through 1985.

LESS FAVORABLE ASSUMPTIONS FOR THE INITIAL SCENARIO

General Observations

The succession of leadership in the USSR that took place following Brezhnev's death may bring about various alternative internal politico-economic situations by 1985. The new leadership's power may be less or more consolidated domestically; the leader(s) may be less or more impelled to conciliate the public in terms of material conditions; he (they) may be less or more responsive to the pressures of powerful domestic interests in quest of additional means. The consequent differences in policy and domestic resource allocations may have substantial effects on the hard-currency balance of payments.

A regime that senses its weakness with the general public may choose to step up imports (reduce exports) of consumer goods and raw materials for their manufacture, as well as imports of equipment for a quick expansion or modernization of consumer-serving sectors and industries. (A considerable portion of such imports may of course be from non-hard-currency areas, say EE, but this may in turn entail Soviet counter-deliveries of "hard goods" and even hard-currency funds to the EE countries.) Likewise, major concessions to interest groups, or the launching of the new leaders' pet projects, may raise the short-term need to import capital goods and materials from the West.

A politically unconsolidated leadership is more likely to formulate ambitious economic plans in order to facilitate consensus within the ruling coalition. The larger the pie expected for some future date, the larger the slices that can be promised to various claimants. In consequence, resources are spread thinner, shortages and bottlenecks multiply, repressed inflation may be aggravated, leading to additional imports from the West (increasing the noncompressible component of merchandise imports).

Popular disturbances or the threat of disturbances in EE, or simply the inability of EE countries to meet their export commitments to the USSR because of hard-currency difficulties, or crop failures in EE, or danger of major defaults on debts to the West by EE are all instances in which the Soviet Union may feel impelled to transfer additional resources to EE, at least in part at the expense of its hard-currency balance of payments or reserve position. What has just been said about EE can be said in principle also about the other client states (SH).

Finally, there is doubtless a wide range of possible developments in world markets that could cause the Soviet hard-currency balance of

payments to deviate substantially from our projections for 1985 under the initial scenarios.

We now examine a series of alternatives to the assumptions so far in constructing the initial scenarios. Critical variables can obviously move in directions that are either favorable or unfavorable to the Soviet hard-currency balance of payments. Our task is to examine the conditions under which the Soviet balance of payments in 1985 will experience difficulty, so we restrict our attention to possible unfavorable developments in this sense, leaving the favorable ones aside.

Less Favorable Assumptions

Our two variants of hard-currency balance-of-payments projections to 1985 are expressed in terms of the amount of hard currency available for the purchase of *compressible imports* of merchandise and services. The two magnitudes were derived in Appendix Table A.12; see line 5. In the case of baseline GNP growth (2.4 percent per year), it is $4,975 million at "1985" prices; in the case of low-productivity GNP growth (1.9 percent per year), it is $9,445 million. These figures are also entered at the top of Table 6.

The paradox of low growth generating a much larger hard-currency amount for compressible imports than baseline growth is explainable, it will be remembered, by the larger exportable surplus of energy and lesser demand for noncompressible imports.

Table 6, then, proceeds from these two basic figures to consider the effect of each alternative assumption involving certain economic variables in the USSR, EE, SH, and the world market. The table indicates separately for the baseline and low-productivity GNP growth variants the effects of each particular assumption on the USSR's net compressible-import capacity in hard currency.

The first assumption to be considered is that *energy production* will grow to 1985 more slowly than postulated in the initial scenario. This leaves a smaller surplus for export to the West after the needs of the Soviet economy itself, EE, and SH, have been met and hard-currency earnings fall. Accordingly, the compressible import capacity is diminished by low growth in energy output as follows: under the baseline GNP variant by $10,000 million and under the low-productivity GNP growth variant by $9,450 million. (The assumptions underlying the alternative energy growth computations are presented in Appendix Tables A.11 and A.14.)

Larger grain imports. The two variants of our basic scenario assume grain imports of 25 million metric tons (mmt) per year. In this alter-

Table 6

Effects of Less Favorable Assumptions on Net Compressible-Import Capacity, 1985

(Millions of "1985" U.S. dollars)

	Baseline Variant	Low-Productivity Variant
Net compressible-import capacity (NCIC) for the initial scenarios	+4,975	+9,445
Effects of alternative assumptions on hard-currency NCIC[a]		
Low growth of energy production	-10,000	-9,450
Larger grain imports; price - $190/mt		
35 mmt (additional 10 mmt)	-1,900	-1,900
50 mmt (additional 25 mmt)	-4,750	-4,750
Larger hard-currency imports/smaller exports of:		
Consumer goods and materials therefor (other than grain)	-2,500	-3,000
Capital goods	-6,500	-6,500
Other industrial materials	-3,000	-3,000
Rumania to receive more Soviet oil	-1,600	-2,600
Enhanced economic aid to EE and SH	-3,000	-3,000
"Opening the umbrella"	-2,500	-2,500
Reduced sales of arms for hard currency	-2,000	-2,000
World prices move adversely		
Oil price at $274/mt		
Baseline energy output	-1,000	-1,600
Low energy output	-10,000[b]	-9,500[c]
Gold price at $333/oz.tr.	-350	-350
Grain price		
25 mmt imported; price - $210/mt	-500	-500
35 mmt imported; price - $220/mt	-2,950	-2,950
50 mmt imported; price - $240/mt	-7,250	-7,250
Western refusal to lend:		
No net lending	-2,600	-2,600
No lending at all	-7,000	-7,000
OECD GNP less by 3 percent in 1985[d]	-1,100	-1,500

[a]Figures below indicate change (deterioration) of the hard-currency balance on the NCIC at the top of the column.

[b]Whole effect is from loss of oil exports; no effect from price.

[c]All but $100 million of the effect is from decline of exports; $100 million loss from lower prices, on the much lower quantity exported.

[d]Soviet hard-currency exports less by 4 percent in 1985.

native we consider two less favorable possibilities occasioned by crop failure and inadequate reserves of grain:

Very large grain imports of 35 mmt in 1985—i.e., 10 mmt more than in the initial scenario. The additional cost at the expected price of $190 per metric ton (mt) comes to $1,900 million.

Extremely large grain imports in 1985, amounting to 50 mmt.

This figure, jarring to one's eyes, is not outside the realm of possibility. Consider that Soviet imports in 1981 and 1982 are estimated at 46 and 42 mmt, respectively. A 1985 grain harvest as low as those of the early 1980s, together with intervening population growth and (more important) continued rise of the public's disposable income at about 4 percent per year, a lasting monetary overhang, and an enduring commitment to low, unchanging meat and dairy prices could easily compel the importation of 50 mmt of grain, port capacity permitting. This is 25 mmt over grain imports in the initial variants. Valued at $190/mt, the additional quantity would require an additional outlay of $4,750 million. (At this point we still ignore the probable reverse effect of the very large and extremely large Soviet purchases on the world market price of grain, considered in Table 6.)

Larger hard-currency imports (smaller exports) of consumer goods, capital goods, and other producer goods. As already noted, certain internal political and economic conditions may impel the Soviets to seek larger imports from the West. At the same time, Soviet ability to divert for export certain traditional primary and semi-finished goods (other than fuels) may decline for the same reason.[26]

Consumer goods (other than grain) and materials therefor. In 1980, such imports accounted for approximately one fourth of all imports from nonsocialist sources and amounted to about $5 billion; both the share and the absolute value may have been considerably higher in 1981.[27] In view of this, and bearing in mind the intervening price change, a determined program of importation of consumer goods and materials (other than grain) in 1985 could cost $2.5 billion in addition to the amount already included in our baseline GNP variant. Under the low-productivity GNP variant the appeal of importing consumer goods may well be even higher, for both political and economic reasons; for this variant we suppose additional imports of $3.0 billion.

Capital goods (excluding those for the gas export pipeline). The peak of Soviet importation of machinery and equipment in real terms

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[26]The export of some traditional commodities has been declining lately. An important example is wood and wood products, chronically in short supply domestically. In 1980, this category accounted for about 5 percent of total exports to nonsocialist countries, or about $1.5 billion. Exports of the major component of this category, round timber, reached their peak in 1973 at 18.7 million cubic meters (to all destinations); the 1980 figure was 13.9 mcm, with a further, as yet unspecified, decline in 1981.

[27]Klochek (1982).

from the hard-currency area was in 1976-77, when almost $3 billion worth (in 1970 prices) was imported per year.[28] This amount apparently caused absorption problems within the Soviet economy and may have contributed to the machinery-import decline that followed. But pressing need plus a somewhat larger economy may cause the USSR to import a similar quantity of capital goods again in 1985 (not counting equipment for the pipeline).

Assuming a threefold increase in the average price of imported machinery[29] between 1970 and 1985, one gets imports of $9 billion. This figure is entered in Table 6 as a net deduction from Soviet hard-currency resources, although one might bear in mind that in the past capital goods imports of such magnitude were heavily financed by Western credits and may be so in the future.

Other industrial materials. The hard-currency effect under this rubric, as just indicated, consists of both additional imports and a shortfall in exports. Even the roughest estimates of the size of the effect are difficult to make. Quite arbitrarily we assume $3 billion for both variants. Under the low-productivity variant compared with the baseline variant, there will presumably be more need to import materials to alleviate shortages, but also more exports of other materials thanks to lower domestic requirements.

Rumania to import more Soviet oil. Rumania's oil production, 11.5 mmt in 1980, has been falling since 1976, which has already occasioned sharply rising imports in recent years. In 1980, she imported 15.9 mmt of oil (of which only 1.5 mmt were from the USSR; the rest were obtained for hard currency and barter with OPEC), and exported 9 mmt of petroleum products. As domestic oil production will almost certainly continue to decline, imports will presumably continue to rise in the 1980s. At the same time, Rumania's hard-currency position has deteriorated greatly in recent months, with little prospect of radical improvement in the foreseeable future. Might Rumania attempt to increase her imports of oil from the USSR and at what economic and political price? As an alternative assumption we assume that in 1985 Rumania will be buying an additional 5 mmt of Soviet oil under the baseline (Soviet) GNP variant and 8 mmt under the low-productivity GNP variant and paying with something other than hard currency.[30] (Recent purchases from the USSR may have been paid in hard currency.) Thus, a corresponding amount of hard-currency earnings will be forgone by the USSR: at $327/mt, $1,600 million under the

[28]Zoeter (1983), Appendix B. Cf. Hanson (1982), Table 2.

[29]During 1970-80, prices for imported hard-currency machinery and equipment increased 270 percent (Zoeter, 1983, Appendix B).

[30]Of course, it remains possible that the USSR will insist upon hard-currency payments in which case the burden of transfer is shifted to Rumania.

baseline GNP variant and $2,600 million under the low-productivity GNP variant.

Enhanced economic aid to EE and SH. An unknown amount of net hard-currency payment to EE and SH, either as financial transfers or in payment for goods and services, is incorporated in the typically large "errors and omissions" item in Western estimates of the Soviet balance of payments. This is the case with errors and omissions figures used in the present study, Appendix Table A.12 (from Zoeter, 1983), as outlined in footnote g. The 1981 figure, $5,065 million, is especially high, over $2.0 billion higher than the 1980 figure and $2.5 billion higher than the 1979 figure. Apart from its preliminary nature, it almost certainly reflects some of the hard-currency burden to the USSR in connection with the events in Poland that began in mid-1980, as well as the general economic deterioration in EE and SH in the last two years. For our projection we retain the nominal 1981 value of errors and omissions, $5,065 million, for all later years until 1985, thus in a sense building into our basic calculation an implicit large element of hard-currency payment (transfer) from the USSR to the countries within its political sphere. However, this amount need not be roughly the same each year, and in any case it suffers some attrition in real terms, owing to the likelihood of some inflation.

Consequently, what we have in mind is the *additional direct or indirect* hard-currency cost of its empire to the USSR, a cost that may be occasioned by general aggravation of the economic condition of countries in EE and SH, by economic efforts to quiet rising political tension, or by other compelling considerations. For this item we assume the entirely arbitrary figure of $3 billion (under both initial variants).

"Opening the umbrella." Despite the recent history surrounding the Polish debt, it is not excluded that in a future year, such as 1985, the USSR will "open the umbrella"—contribute from its hard-currency resources to meeting of debt obligations by some EE countries. If we limit our attention to interest payments alone, assuming an average interest charge of 12.5 percent and a gross debt of the six EE countries at the end of 1981 of about $60 billion, the aggregate annual interest payment comes to about $7.5 billion. This, then, is our minimum value for interest liability of the six EE countries in 1985. It may be considerably higher because of some intervening growth of the debt and higher interest rates. Fink's study of the East European debt in 1985 and 1990 arrives at the total interest liability in 1985 in the range of $8.7 to $16.1 billion.[31] If we further cautiously assume that the Soviet umbrella will cover only one-third of the interest liability, we obtain the figure of $2.5 billion, which appears in the table.

[31]Fink (1981), pp. 33-38.

Reduced sales of arms for hard currency. Such sales are estimated at $3.7 billion in 1981.[32] We reduce them arbitrarily by $1.7 billion and enter $2 billion in Table 6.

Less favorable world prices—Oil: Our assumed price for oil in 1985 is $327/mt. Should the price, for whatever reason, fall back to its 1982 level—here taken to be $274/mt—the shortfall of hard currency will be $53/mt. This works out to the following shortfalls of revenue with regard to the initial scenario:

Baseline GNP/Baseline energy output:
19.3 mmt × $53/mt = $1.0 billion

Baseline GNP/Low energy output:
($11.0 bill.* + 0 mmt × $53/mt) = $11.0 billion

Low-prod. GNP/Baseline energy output:
30.5 mmt × $53/mt = $1.6 billion

Low-prod. GNP/Low energy output:
($14.1 bill.* + 1.6 mmt × $53/mt) = $14.2 billion

*From Table 6.

Gold: Assumed 1985 price—$443/oz.tr. Should it be instead at its 1982 level—here taken as $333/oz.tr.—the shortfall will be $110/oz.tr. With an assumed export of 3.2 million oz.tr. in 1985, the revenue shortfall would be $352 million, rounded to $350 million. The lower gold prices also affect the value of the Soviet gold stock at the end of 1985 from $41,385 million down to $31,109 million (Appendix Table A.13). The last point, however, is academic, because it is unlikely to affect the Soviet liquidity position to any substantial extent.

Grain: Assumed 1985 price—$190/mt. Our basic scenario expects imports of 25 mmt in 1985. Hence, for every $10 increment in price, the increment in hard-currency outlay under the basic scenario is $250 million. Given a modest price increment of $20 (10.5 percent), the deterioration in the Soviet hard-currency position is $0.5 billion.

Above we considered two alternative larger quantities of grain imports: 35 mmt and 50 mmt; but the larger imports are likely to have upward effects on the world market price of grain. Assuming a $30 price increment in the first case (a price of $220/mt) and a $50 increment in the second case (a price of $240/mt), the deterioration of the Soviet hard-currency position with regard to the initial scenario (both variants) works out as follows:

[32]Zoeter (1983), Appendix F.

35 mmt imported:

$$25 \times 30 + (35-25) \times 220 = \$2{,}950 \text{ million}$$

50 mmt imported:

$$25 \times 50 + (50-25) \times 240 = \$7{,}250 \text{ million}$$

Western refusal to lend. We first assume not an absolute Western embargo on new credits or rollovers but a cessation of new net capital inflow from the West to the USSR, which appears in the amount of $2.6 billion under both variants of the initial scenario. Second, we assume a cessation of *all* lending, which, per Appendix Table A.12, represents a diminution of inflow of $7.0 billion.

Alternative Scenarios

The preceding subsection enumerated a number of major adversities ("alternative assumptions") that might befall the Soviet hard-currency balance of payments in 1985 and provided rough and often quite arbitrary value estimates of their effects. But adversities rarely come singly, so the present subsection groups them in several ways to explore the balance-of-payments effects, providing alternative scenarios to the initial one.

At first we group individual adversities on the basis of a common geographic locus of the difficulties or constraints underlying them—namely, whether the locus is the USSR ("domestic difficulties scenario," SD); or Eastern Europe or the "Soviet hegemonion" ("EE/SH difficulties scenario," SE); or the West ("Western constraints scenario," SW). Next we group adversities of diverse geographic origin into two additional alternative ("mixed") scenarios, SX and SY.

In the case of each alternative scenario our starting points for computations are the net compressible-import capacities of the initial scenario, namely, $4,975 million for the baseline GNP variant and $9,445 for the low-productivity GNP variant (see Table 4).

Domestic Difficulties Scenario (SD). We assume here a coincidence in 1985 of three of the alternative assumptions regarding the Soviet economy discussed above: low growth in energy production, the need for 35 mmt grain imports, and the need for larger (than in the initial scenario) hard-currency imports or smaller exports of consumer goods and materials therefor, other than grain (see Table 6). The low growth in energy production, especially crude oil, would of course not be an event specific to 1985 alone but rather the result of a trend of several years' duration. The enhanced needs for importation of grain and consumer goods, however, may well be a phenomenon primarily

of 1985, although possibly aggravated by previous crop failures and shortages of consumer goods. We further assume that the larger grain import requirements are associated with a higher world market price of grain of $220/mt. The numerical results are as presented in Table 7. The generally very high *negative* values of NCIC under this scenario will be noted, particularly those pertaining to the baseline GNP variant.

Similarly, one can postulate the need for extraordinarily large pressing requirements for capital goods and industrial materials; see Table 6.

Table 7

DOMESTIC DIFFICULTIES SCENARIO D, 1985
(Millions of dollars)

NCIC	Baseline GNP variant	Low-Productivity GNP variant
Initial Scenario	+4,975	+9,445
Effects of		
Low growth of energy production	-10,000	-9,450
Additional 10 mmt grain imported at $190/mt	-1,900	-1,900
Grain price increase from $190 to $220/mt	-1,050	-1,050
Larger imports of consumer goods and materials	-2,500	-3,000
Scenario SD.1 (rounded)	-10,500	-6,000
Scenario SD.1 with only *one half* the effect of low growth of energy production:		
Scenario SD.2 (rounded)	-5,500	-1,200
Scenario SD.1 but with 50 mmt of grain imported (i.e., additional 25 mmt over initial scenario) at $240/mt:		
Scenario SD.3 (rounded)	-14,800	-5,500
Scenario SD.3 with only *one half* the effect of low growth of energy production:		
Scenario SD.4 (rounded)	-9,800	-800

EE/SH Difficulties Scenario (SE). In Table 6 we listed three kinds of hard-currency assistance that Eastern Europe and—probably to a lesser extent—the "Soviet hegemonion" may require from the USSR in 1985: much increased shipments of crude oil to Rumania in exchange for something other than hard currency, general increase in economic aid to EE and SH owing to deteriorating economic conditions and threat of political instability in those countries, and more specifically assistance to some EE or SH countries with their service on hard-currency debt falling due in 1985. A recapitulation of these assumptions and the consequent scenario (in several variants) are found in Table 8.

Western Constraints Scenario (SW). Turning from the East to the West, we note that the events in the Western world that might

Table 8

EE/SH Difficulties Scenario E, 1985

(Millions of dollars)

NCIC	Baseline GNP variant	Low-Productivity GNP variant
Initial Scenario	+4,975	+9,445
Effects of		
Rumania to receive more Soviet oil	-1,600	-2,600
Enhanced aid to EE and SH	-3,000	-3,000
"Opening the umbrella"	-2,500	-2,500
Scenario SE.1 (rounded)	-2,100	+1,300
Scenario SE.1 but with full effect of low growth of energy production in the USSR (subtract 10,000 and 9,450 for baseline and low-productivity variants, respectively):		
Scenario SE.2	-12,100	-8,200
Scenario SE.1 with *one half* the effect of low growth of energy production in the USSR:		
Scenario SE.3	-7,100	-3,400

SOURCE: Table 6.

impair the hard-currency earning capacity of the USSR fall into two broad categories: general Western market phenomena, which affect the demand for Soviet goods and the prices fetched by them; and public or private policies aimed specifically or largely against the USSR. Table 9 presents the corresponding scenario.

In the first category, one immediately thinks of the possibility of a level of general business activity in the OECD countries lower than that postulated under our initial scenario. We assumed an average annual rate of growth of the aggregated real GNP of OECD countries of 2.6 percent during 1982-85 (four years). Should it be, say, as much

Table 9

WESTERN CONSTRAINTS SCENARIO W, 1985
(Millions of dollars)

NCIC	Baseline GNP variant	Low-Productivity GNP variant
Initial Scenario	+4,975	+9,445
Effects of		
Slower OECD GNP growth	-1,100	-1,500
Oil price decrease from $327 to $274/mt with baseline energy output	-1,000	-1,600
Gold price decrease from $443 to $333/oz.tr.	-350	-350
Grain price increase from $190 to $240/mt	-1,250	-1,250
Scenario SW.1 (rounded)	+1,300	+4,700
Scenario SW.1 but with no Western net lending:	-2,600	-2,600
Scenario SW.2 (rounded)	-1,300	+2,100
Scenario SW.1 but with no Western lending at all:	-7,000	-7,000
Scenario SW.3 (rounded)	-5,700	-2,300
Scenario SW.1 but with low energy output:		
Scenario SW.4	-7,700	-3,200

SOURCE: Table 6.

as 0.7 percent per year less, by 1985 the aggregate GNP of OECD countries will be 3 percent lower. Applying as before an elasticity of demand for imports from the USSR of 1.5 (see Table 3), we obtain a *volume* of Soviet hard-currency exports to the OECD, and—let us say—also to the West as a whole, 4.2 percent lower than under the initial scenario. Assuming no difference in prices for the moment, the hard-currency loss to the USSR thus comes to $1.1 billion under the baseline (Soviet) GNP variant and $1.5 billion under the low-productivity variant, altogether perhaps a surprisingly modest effect.[33]

Working in price differences that may be associated with the lower level of Western business activity, we next consider lower prices for oil and for gold (as in Table 6). These, too, have moderate effects. It is only when we further assume higher grain prices (perhaps somewhat inconsistently with the lower level of Western activity) that we obtain a substantial effect on Soviet hard-currency earnings. The above assumptions yield SW.1.

We then proceed to examine the effects of particular policy decisions: alternatively, no *net* increase in Soviet indebtedness to the West in 1985 (SW.2) and no Western lending at all in 1985 (reduction of indebtedness by the amount of debt maturing that year—SW.3). For comparative reasons, we bring in once again a domestic Soviet development—namely low growth in energy production—which, as before, has a very large effect (SW.4).

Mixed Scenarios, SX and SY. Finally, we look at the possibility that in fact the shocks to the Soviet hard-currency balance of payments can come from all three directions simultaneously: the domestic economy, EE/SH, and the West. The next two scenarios, SX (Table 10) and SY (Table 11) are of this nature. SX is the more moderate of the two scenarios, if only relatively speaking. It contains only one extremely large cause of hard-currency shortfall, low growth of energy production. By contrast, SY contains three major shocks: low growth of energy production, extremely large grain imports at higher prices, and cessation of all Western lending.

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[33]Using long-term income elasticities of export demand may underestimate the immediate effect from a growth slowdown, as the short-term policy response in Western markets may diverge from longer-run behavior (e.g., inventory decumulation).

Table 10

MIXED SCENARIO X, 1985
(Millions of dollars)

NCIC	Baseline GNP variant	Low-Productivity GNP variant
Initial Scenario	+4,975	+9,445
Effects of		
Low growth of energy production	-10,000	-9,450
Additional 10 mmt grain imports (total--35 mmt) and grain price increase from $190 to $220/mt	-2,950	-2,950
Enhanced aid to EE and SH	-3,000	-3,000
Oil price decrease from $327 to $274/mt with low energy output	0	-100
No Western net lending	-2,600	-2,600
Scenario SX.1 (rounded)	-13,600	-8,700
Same with only *one half* the effect of low growth of energy production:		
Scenario SX.2 (rounded)	-8,600	-4,000

SOURCE: Table 6.

Table 11

MIXED SCENARIO Y, 1985

(Millions of dollars)

NCIC	Baseline GNP variant	Low-Productivity GNP variant
Initial Scenario	+4,975	+9,445
Effects of		
Low growth of energy production	-10,000	-9,450
Additional 25 mmt grain imports (total--50 mmt) and grain price increase from $190 to $240/mt	-7,250	-7,250
Enhanced aid to EE and SH	-3,000	-3,000
Oil price decrease from $327 to $274/mt with low energy output	0	-100
No Western lending at all	-7,000	-7,000
Scenario SY.1 (rounded)	-22,300	-17,400
Same with only *one half* the effect of low growth of energy production:		
Scenario SY.2	-17,300	-12,700

SOURCE: Table 6.

IV. DISCUSSION AND CONCLUSIONS

Our scenarios are projections—not predictions—derived from simple and stylized assumptions. They show hypothetical outcomes, not necessarily probable ones. Nonetheless, they may help one gain or reinforce insights into the problems that the USSR may encounter in its hard-currency balance of payments and the conditions that may impair the country's creditworthiness in Western money markets.

Our initial scenario, baseline variant, which postulates some continued retardation of economic growth but no major new shocks, finds the USSR in a strong financial position in 1985 (Table 5). All the ratios usually considered by the banking community, and the hard-currency import cover (measured in months), look good by accepted standards. Beyond these ratios looms the reputedly large gold stock, and beyond gold the resources of that vast and rich land. And yet there are problems, of which two stand out: the heavy dependence for hard-currency earnings on energy carriers and the possibility of major shocks, partly encompassed by our less favorable assumptions and alternative scenarios.

Looking back for a moment: thanks to the sharp rise of fuel prices as well as the increases in quantities exported, by the mid-1970s oil exports came to dominate Soviet hard-currency receipts from merchandise exports (Table 1). By 1981, according to preliminary estimates, crude oil and oil products accounted for 52 percent of all hard-currency merchandise exports, and all fuels for 68 percent. The USSR became, it is fair to say, a single-commodity country in regard to its hard-currency trade. Yet oil is a commodity with a very low price-elasticity of output in the USSR. Its sale in Western markets is at the mercy—so far, mostly benign—of world prices and economic fluctuations. Its output in the USSR in the near future is likely to remain level. Furthermore, the USSR exports only a small surplus of oil over its own needs and those of CMEA; in 1981, exports for hard currency (excluding possible sales for hard currency within CMEA) claimed a mere 7.1 percent of domestic oil output. This points up the importance of production of oil and of the other energy carriers and sources that can be substituted for oil domestically, and of energy conservation, for the Soviet hard-currency balance of payments in the near future. The rapid expansion of natural gas production (lately, 7 to 8 percent per year) and of the pipeline to deliver the gas to Western Europe are also crucial.

Implicit in this situation is a serious dilemma for domestic economic growth, for in the short run growth eats into the exportable oil sur-

plus and soon may also eat into the exportable gas. With GNP growing at an average of 2.4 percent per year during 1981-85 (baseline variant), with prices as we initially assumed and with oil production leveling off at 619 mmt, in 1985 the USSR stands to earn $17.4 billion from all energy exports, in nominal terms slightly more but in real terms somewhat less than in 1980. But with GNP growth just one-half of a percentage point per year lower, and domestic demand correspondingly lower, it stands to earn as much as $21.1 billion (Appendix Table A.11). The positive effect on net compressible-import capacity is the same (Table 6).

Yet with oil production declining to 585 mmt in 1985, as in our low energy productivity scenario, oil exports vanish and gas exports drop to the very low figure of $7.4 billion below the baseline GNP growth variant (Appendix Table A.14). Under the low-productivity GNP variant, hard-currency oil exports almost vanish at $0.5 billion in 1985, and all energy exports are at the low level of $11.7 billion. In 1985, at the assumed price of $327/mt, every percentage point of oil produced or conserved will be worth about $2.0 billion in additional exports, while every percentage point of GNP added will *cost* in terms of oil somewhat over that in hard currency.

Under the initial scenario and with *low* GNP growth, the Soviet Union will have a historically rather comfortable hard-currency balance of payments, with some $9.4 billion available for the purchase of "compressible" imports of goods and services.

The following tabulation summarizes the corresponding effects on NCIC from Table 6 (millions of "1985" dollars, rounded figures):

	Energy Production Growth	
	Baseline	Low
GNP growth:		
Baseline (2.4% per year)	+4,975	-5,025
Low-productivity (1.9% per year)	+9,445	0

The effects of a delay in the delivery of Urengoi natural gas to Western Europe are not considered here as it is assumed that, in any case, such delivery would not begin before the end of 1985.

Conclusion 1: Even a small leveling off, not to say decline, in the production of exportable fuel, especially oil, can have a severe effect on the Soviet hard-currency balance of payments. But so can lack of success in domestic energy conservation or a compelling need to divert more oil or gas to EE and SH. (This and all "conclusions" to follow pertain primarily but not exclusively to our target year, 1985.)

Conclusion 2: There is a sharp tradeoff between GNP growth and hard-currency earnings through fuels (and other raw materials as well). In this sense energy may become a major limiting factor for Soviet growth, if it is not one already.

The costs of higher than average grain imports, here assumed at 25 mmt per year, are appreciable but do not become very large until *extremely* large (50 mmt) imports are reached (Table 6) and become extremely large if these are combined with a considerable rise in grain prices, which may well be brought about by the Soviet import requirements. Thus, with 50 mmt of imports and price at $240/mt ($50/mt higher than assumed under the initial scenario), the *additional* hard-currency outlay (above the $4.75 billion envisaged by the initial scenario for 1985) reaches $7.25 billion. This leaves less than nothing for compressible imports under the baseline GNP variant and claims nearly half the net compressible-import capacity under the low GNP growth variant.

Conclusion 3: Even "normal" grain imports may claim 10 to 13 percent of current hard-currency earnings in 1985 and in extreme circumstances may claim one-quarter to one-third.

A potentially major claim on Soviet net compressible-import capacity in 1985 may arise from a need to step up imports of merchandise: consumer goods and their raw materials (other than grain), capital goods, and industrial materials. Such a situation might arise from one of a set of economic and political developments, and especially from several of them, such as: (1) the need of a not yet fully consolidated post-succession leadership to improve its image with the public at large and "buy off" certain powerful domestic interests; (2) aggravation of repressed inflationary situations in the household and production sectors (bottlenecks, shortages) or the malfunctioning of the economy in other respects; (3) the acceleration of physical deterioration and economic obsolescence of the existing capital stock; (4) the launching of some major pet project(s) by the new leadership (calling for large one-time imports of capital goods), and the like. The figures in Table 6 are mostly not very high and of course conjectural; but the probability of some such needs occurring may not be too low, the confluence of several cannot be entirely dismissed, and under certain politico-economic conditions they may even be likely.

Simultaneous adverse developments in several of these respects could be extremely costly to the USSR in foreign exchange terms, as the several variants of our Scenario SD show. The more adverse of the scenario's variants imply not only no capacity for compressible imports but also heavy inroads into noncompressible imports. Clearly, the USSR would have to take protective steps or policy changes by that point.

Conclusion 4: A conjuncture of domestic politico-economic developments may lead to major requirements for hard currency on short notice. The feasibility of this policy may in considerable measure depend on the USSR's access to Western credits.

Table 6 contains several lines relating to the possibility of further economic aid to EE and SH: rescuing Rumania from its mounting energy crisis, enhancing "general" economic aid to EE and SH, and rescuing friendly countries on the brink of insolvency with regard to Western debtors. Of course, in question here are only the hard-currency effects of consequences to the USSR because, in the first instance, much of this aid could be in the form of Soviet goods. Yet, to be particularly effective, they would have to be primarily "hard goods," and these usually have implicit hard-currency costs. Nor would it matter whether Soviet assistance was given openly, secretly, or as hidden subsidies concealed in the intra-CMEA price structure; it is the hard-currency implications that count here.

Conclusion 5: Serious political and economic difficulties in EE and SH in the mid-1980s, a not altogether fanciful prospect, may directly and indirectly impose substantial costs on the USSR in hard currency as well as in other terms; see Scenario SE. The possibility that the Soviet Union may exercise the "military option" to maintain control and order, as it did in 1956, 1968, and 1981, need not relieve the hard-currency costs; indeed, such an option may even help justify the costs in Soviet eyes.

Conclusion 6: Adverse events in the West can have considerable negative effects on the Soviet hard-currency balance of payments. Even moderate downward movements of oil prices (and, in the future, of natural-gas prices) do and will cut into the balance for compressible imports, provided of course the domestic and EE balance of energy-use, as well as the pipeline carrying capacity, permit the export of substantial quantities of oil and gas to hard-currency markets in 1985. But the danger to the Soviet hard-currency balance of payments probably stems much more from the reduced availability of quantities for export than from the uncertainty of world market prices. The volatility of the world gold price offers prospects of considerable gain to the Soviets, but not of major loss because of the low price of $443/oz.tr. assumed for 1985. A fall of the price to as low a figure as $333/oz.tr. will result in a hard-currency shortfall of only $350 million. On the import side, very large grain purchases combined with a considerable but not implausible concurrent rise in world grain prices would constitute a major blow to the Soviet hard-currency position, however. Finally, fluctuations in levels of business activity in the West are not likely to have a major effect on Soviet hard-currency prospects in terms of the quantitative levels of use of Soviet raw materials and

energy carriers by Western economies, except that in the short run, such fluctuations, because they affect inventory decumulation (or accumulation) and market prices, may have a considerable influence. (See Scenario SW.)

Potential interconnections between the various events assumed for our scenarios should be noted. In some cases, several adverse events may well occur and move together; thus, a grain crop failure at home may adversely affect grain prices in the world market, putting the USSR in double jeopardy. The same high world market prices may also negatively affect the economic position of the grain-importing countries in EE and SH, thereby occasioning more Soviet aid to its friends—hence, triple jeopardy. However, although lower world oil prices would hurt the USSR, they would help some of the EE and SH countries and lighten the burden of Soviet aid to them. Many other interconnections can be cited. We have already taken account of some, but it would take us outside the scope of this report to pursue them systematically.

How would the Soviets respond to a heavy drain on their hard-currency funds? Probably in many directions at once: review the priorities for the expenditure of hard currency; step up exports (although possibilities for a major effect on this account are limited, especially under conditions assumed by our scenarios); dip into the gold stock; borrow more; liquidate some salable assets.

Sharply stepping up exports to the West on fairly short notice would not be easy. The goods in question would almost certainly have to be confined to raw, crude, and semi-finished materials (other than energy carriers, already taken into account for the present purpose) such as ores, minerals, metals, and wood and wood products. But these are exactly the kinds of goods that are at present—and likely to be for some years—already in short supply in the Soviet economy, and whose production cannot be rapidly expanded except at extraordinarily high cost.

The Soviet position in regard to gold is both a conundrum and an irony. It is a conundrum insofar as Western estimates of the size of the Soviet gold stock, officially unrevealed since 1928, are at best guesses. It is ironic, because when the West adhered to a gold parity and demand by Western central banks was perfectly elastic, the Soviets would not sell off owing to the very low price (until 1971), awaiting the price rise that they deemed inevitable. The price rise came, but it was accompanied by a demonetization of gold and therefore a transition from perfectly elastic to probably fairly inelastic demand, occasioned as it is primarily by hoarding and speculative motives. And now the Soviets cannot sell off very much for fear of breaking their own market. So if the Soviet gold hoard is small, it is small; if it

is large, it may be mostly uncashable—and probably even unhypothecatable—in the short term. Still, when in a tight spot, the Soviets may increase their gold sales and take their risks on the price, as they have done on occasion in recent years.

Borrowing for balance-of-payments reasons—rather than for specific projects, such as the export pipeline or the Kama truck plant—would normally be the solution to a temporarily tight hard-currency situation. The Soviets seem to have so acted in 1981. Indeed, in our initial scenario we assumed borrowing in each of the years leading up to 1985 (Appendix Table A.12). The assumption for 1985 under the initial scenario (both variants) is that the Soviets would, in effect, roll over $4.4 billion of their debt and add $2.6 billion worth of debt, net, for a total gross borrowing of $7.0 billion. This is of course before our alternative scenarios take over with their large demands on hard-currency resources. A denial of the $2.6 billion and particularly of the $7.0 billion or a large portion of it, owing to some concerted refusal to lend to the Soviets on the part of the West, would put the Soviets into a very difficult position under the baseline GNP growth variant ($5.0 billion net compressible-import capacity) but less under the low-productivity GNP variant ($9.5 billion NCIC). If, in addition, several of the more adverse alternative scenarios played themselves out, and if the refusal to lend stuck, the Soviets would find themselves in a position in which they might be forced to take extreme economic measures, not excluding failure to service their debt to the West.

The last-named eventuality would hardly seriously undermine the economies of the industrialized West—our projections show Soviet debt service[1] in 1985 of $8.2 billion—but it is not conducive to better international relations to have an insolvent debtor country with a nuclear arsenal. Moreover, such an event may bring in its train a good deal of public anxiety, division among the Western allies, calls for appeasement, and Soviet attempts to derive political profit from an economic disaster. In other words, the existence, and especially establishment, of a major creditor-debtor relationship with the USSR carries a substantial risk of *external diseconomies of a political nature* for Western nations and for the world as a whole. As with externalities generally, and especially in the case of a debtor-superpower, such political risks cannot be satisfactorily accounted for by a profit-and-loss calculus or by "normal" measures of the creditworthiness of sovereign states.

Conclusion 7: The governments of major Western countries might give serious study not only to the creditworthiness of the USSR as a borrower, and to near-term international and domestic economic ben-

[1]The figure excludes debt service on the export gas pipeline.

efits, but also to the substantial long-term risk of external diseconomies of a political (as well as economic) nature for individual Western countries and the world as a whole, which may attach to longer-term loans to the USSR.

Appendix A

APPENDIX TABLES

Table A.1

GROWTH OF POPULATION AND GNP (ACTUAL) BY SECTOR, 1966-80
(Average annual change, in percent)

	1966-70	1971-75	1976-80
GNP[a]	5.2	3.7	2.7[b]
Population[c]	1.0	0.9	1.0
Per capita GNP[d]	4.2	2.7	2.0
Agriculture[e]	3.9	-0.4	1.0
Nonagricultural sectors[e]	5.7	5.1	(3.1)[f]
Industry	6.3	5.9	3.6
Construction	5.8	5.6	2.4
Transportation	6.7	6.5	3.4
Communication	8.9	7.3	5.7
Trade	7.0	4.6	3.0
Services	4.2	3.4	2.8
Other	3.6	1.9	0.9

[a]CIA (1981), Table 13. The absolute levels of GNP, population, and per capita GNP in mid-year 1980 (converted at U.S. purchasing power equivalents) were $1,392.5 billion, $265.5 million, and $5,420, respectively.

[b]Preliminary estimate.

[c]Feshbach and Rapawy (1976), Table 1.

[d]CIA (1981), Table 14. Lines 2-4 are not mutually consistent due to the use of disparate sources.

[e]CIA (1981), Table 40; calculated at factor cost.

[f]Authors' estimate.

Table A.2

CRUDE OIL, 1970-81
(mmt)

	1970	1975	1976	1977	1978	1979	1980	1981
Production[a]								
Actual	353.0	490.8	519.7	545.8	571.4	586.0	603.0	609.0
Percent change	-	7.0	5.8	5.1	4.7	2.6	2.9	1.0
Imports[b]	3.5	6.5	6.5	6.6	8.7	(7.0)	(7.0)	(8.0)
Total supply	356.6	479.3	526.2	552.4	580.1	593.0	610.0	(617.0)
Exports[c]	95.8	130.4	148.5	152.5	165.6	158.1	161.5	(153.0)
(Crude and products)								
CMEA[d]	N.A.	71.7	77.5	80.9	85.2	87.1	92.3	(90.0)
Non-CMEA[e]	N.A.	58.7	71.0	71.6	80.4	71.0	69.2	(63.0)
Apparent consumption[f]	260.7	266.9	377.7	399.9	414.5	435.0	448.5	(464.0)
Percent change	-	5.7	2.9	5.8	3.6	4.9	3.0	3.5
Hard-currency oil export earnings ($ billion)[g]	0.4	3.2	4.5	5.3	5.7	9.6	12.0	12.3

[a] *Narodnoe Khoziaistvo* (annual issues, 1970-80); *Pravda*.
[b] Vaňous (1979); *Vneshniaia torgovlia* (1970-76).
[c] *Vneshniaia torgovlia* (1970-76, 1976-79); Hewett (1982).
[d] Hewett (1981), p. 21; *Vneshniaia torgovlia* (1970-76).
[e] A large portion of this export volume is transacted on a clearing agreements basis.
[f] Apparent consumption is computed as a residual from total supply and exports.
[g] Zoeter (1983), Appendix E.
( ) = Authors' estimates.

Table A.3

NATURAL GAS, 1970-81

(bcm)

	1970	1975	1976	1977	1978	1979	1980	1981
Production[a]	197.9	289.3	321.0	346.0	372.2	406.0	435.0	465.0
Percent annual growth	-	46.2	10.9	7.8	7.5	9.2	7.0	6.9
Imports[b]	3.6	8.1	11.8	13.0[c]	9.3[c]	2.1[c]	2.1[c]	4.1[c]
Total supply	201.5	297.4	332.8	359.0	381.5	408.7	437.1	469.1
Total exports[d]	3.3	19.33	25.78	31.23	37.1[c]	48.4	57.1	59.7
EE[d]	2.3	10.69	12.44	15.42	15.71	22.22	30.5	33.0
Hard currency[d]	1.0	8.64	13.34	15.81	21.39	26.18	26.6	26.7[c]
Apparent consumption[e]	198.2	278.0	307.0	327.8	344.4	359.7	380.0	409.4
Natural gas earnings[f] ($ million)	12	220	347	566	1,063	1,404	2,706	3,956

[a] *Narodnoe Khoziaistvo* (1970-80); *Pravda*.

[b] CIA (1978b), Tables J-1, J-6, J-24.

[c] CIA (1982), p. 25.

[d] U.S. Congress, Office of Technology Assessment (1981), p. 289.

[e] Apparent consumption is computed as a residual from total supply and total exports.

[f] Zoeter (1983), Appendix E.

Table A.4

GRAIN PRODUCTION AND AGRICULTURAL IMPORTS, 1975-82

	Actual						Estimate	
	1975	1976	1977	1978	1979	1980	1981	1982
1. Production[a] (mmt)	140.1	223.8	195.7	237.4	179.2	189.2	N.A.	N.A.
2. Grain import volume[b] (1,000 mt)	15,909	20,638	10,608	22,376	24,181	28,335	(46,000)[c]	(42,000)[c]
3. Grain import unit value[d] ($/mt)	168.0	143.8	129.2	108.0	141.7	172.6	(150)[e]	(130)[e]
4. Grain import expenditure[f] ($ million)	2,673	2,968	1,371	2,417	3,426	4,891	(6,900)	(5,460)
5. Other agricultural imports[g] ($ million)	1,760	1,665	2,005	1,721	2,854	4,400	(5,134)	N.A.
6. Total agricultural import expenditure ($ million)	4,433	4,633	3,376	4,138	6,280	9,291	(12,034)	N.A.

[a]U.S. Department of Agriculture (1982b), Table 2.
[b]USDA (1982b), Table 13.
[c]USDA (1982a).
[d]Inferred from lines 2 and 4.
[e]Estimated according to a trade-weighted average of current corn and wheat prices, plus 4 percent for cost, insurance, freight (c.i.f.); confirmed by a price quote from "Soviet Grain Pact is Expected to Get a Year's Extension," *The New York Times*, July 27, 1982, p. 1.
[f]USDA (1982b), Table 14.
[g]Zoeter (1983), Appendix B.
( ) = Authors' estimates.

Table A.5

Growth of GNP, Factor Inputs, and Factor Productivity, 1961-80

(Average annual change, in percent)

	1961-65	1966-70	1971-75	1976	1977	1978	1979	1980	Plan 1976-80	Actual 1976-80
GNP	5.0	5.2	3.7	4.8	3.2	3.4	0.8	1.4	5.0	2.7
Combined factor inputs[a]	4.4	4.1	4.2	3.5	3.7	3.7	3.6	3.3	3.5	3.6
Manhours	1.6	2.0	1.7	1.1	1.5	1.7	1.5	1.2	1.5	1.4
Capital	8.7	7.4	7.9	7.2	7.0	6.9	6.8	6.5	6.5	6.9
Land	0.6	-0.3	0.8	0	-0.2	0	0	0	0.5	neg.
Total factor productivity[b]	0.6	1.1	-0.5	1.2	-0.4	-0.3	-2.7	-1.9	1.4	-0.8
Manhours	3.4	3.2	2.0	3.6	1.7	1.7	-0.7	0.2	N.A.	1.3
Capital	-3.4	-2.1	-3.9	-2.3	-3.5	-3.3	-5.6	-4.8	N.A.	-3.9
Land	4.4	5.6	2.9	4.8	3.4	3.4	0.8	1.4	N.A.	2.7
Incremental capital output ratio (ICOR)[c]	5.1	5.3	8.0	6.7	10.0	9.4	40	22.0	N.A.	17.6

[a]CIA (1981), Table 43. (Inputs of manhours, capital, and land are combined using weights of 55.8 percent, 41.2 percent, and 3.0 percent, respectively.)

[b]CIA (1980c), Table 9.

[c]The ICOR is expressed as a ratio, not as a percentage change. As a proxy indicator, it is defined as the ratio of average intra-period total investment/GNP to the average annual rate of GNP growth. See CIA (1981), Tables 37 and 38.

Table A.6

UTILIZATION OF RESOURCES, 1960-80
(Percent of GNP at factor cost)

	1960	1965	1970	1975	1976	1977	1978	1979	1980
1. GNP	100	100	100	100	100	100	100	100	100
2. Consumption[a]	58	54	54	54	53	52	52	53	53
3. Investment[a]	24	27	28	31	32	32	32	32	33
a. New fixed investment[a]	20	22	23	25	25	26	26	26	26
4. Other[a]	18	19	18	16	16	15	16	14	14
of which:									
a. Net exports[b]	-2.5	-2.8	-1.8	-6.5	-6.5	-9.3	-11.8	-9.2	-10.3
Note:									
a. Total trade turnover[c]	1.7	2.2	2.4	5.5	5.8	6.4	7.6	8.9	-10.4
b. Total trade turnover (adjusted)[c]	9.2	9.5	11.5	16.4	16.5	22.8	19.6	19.6	20.8

[a]CIA (1981), Table 37. Line 4 includes defense, administration, R&D, inventory change, net exports, and outlays.
[b]Treml and Kostinsky (1982).
[c]CIA (1981), Tables 9 and 58.

Table A.7

Hard-Currency Debt Structure, 1970-80

(Year-end, millions of U.S. dollars)

	1970	1975	1976	1977	1978	1979	1980[a]
1. Gross debt to West[b]	1,515	10,574	14,849	15,724	16,423	17,283	18,116
A. Commercial debt[c]	401	6,943	9,663	9,854	9,512	9,583	10,030
i. Liabilities to Western banks[d]	N.A.	5,432	7,617	5,261	7,673	8,012	7,800
a. Short-term[d]	N.A.	N.A.	N.A.	6,475	5,386	5,002	5,625
b. Medium and long-term[d]	N.A.	N.A.	N.A.	5,261	7,673	8,012	7,800
ii. Other commercial debt[e]	N.A.	1,511	2,046	4,593	1,839	1,571	2,230
B. Official export credits[f]	1,114	3,631	5,186	5,870	6,911	7,700	8,086
(undrawn commitments)	(691)	(5,394)	(6,395)	(7,166)	(6,816)	(6,748)[a]	(7,471)
2. Assets with commercial banks[g]	N.A.	3,127	4,738	4,498	6,010	8,806	8,570
3. Net debt to West	N.A.	7,447	10,111	11,226	10,413	8,477	9,546

[a]Zoeter (1983).

[b]CIA (1981), Table 47. There is a minor discrepancy between the stock debt numbers in line 1 and the corresponding capital flow numbers in Table 1, arising from the use of disparate sources.

[c]Inferred from rows 1 and 1.B; almost identical to data from CIA (1980a), Table A-1.

[d]Data for 1971-76 from CIA (1980a), Table A-1; data for 1977-79 from Bank for International Settlements (various issues).

[e]Inferred from rows 1.A and 1.A.i.

[f]CIA (1980a), Table A-4.

[g]Data for 1971-78 from CIA (1980a), Table A-1; data for 1979-80 from Bank for International Settlements (various issues).

Table A.8

EXTERNAL FINANCE: SELECTED DATA, 1970-80

(Millions of U.S. dollars)

	1970	1975	1976	1977	1978	1979	1980[a]
1. Export revenue[b]	2,861	9,720	12,135	14,615	16,388	25,320	28,808
2. Loans received (disbursements)[c]	450	6,371	5,661	2,850	3,051	3,660	3,103
3. Gross debt to West[c]	1,515	10,574	14,849	15,724	16,423	17,283	18,116
4. Total debt service:	242	1,773	2,398	3,115	3,571	4,230	4,654
a. Amortization[d]	159	969	1,386	1,975	2,352	2,800	3,034
b. Interest[e]	83	804	1,012	1,140	1,219	1,430	1,620
5. Net financial transfer	208	4,598	3,263	-265	-520	-570	-1,551
6. Total merchandise imports[f]	2,701	14,257	15,316	14,645	16,951	21,585	26,017
7. Total international liquidity	1,959	11,694	12,523	13,524	17,102	34,831	42,893
a. Gold reserve valuation[g]	1,959	8,567	7,785	9,026	11,092	26,025	34,321
($/oz.tr.)[h]	(37.37)	(140.25)	(134.75)	(164.95)	(226.0)	(512.0)	(589.5)
b. Commercial assets	N.A.	3,127	4,738	4,498	6,010	8,806	8,572

[a]Zoeter (1983).

[b]Data include hard-currency merchandise exports to capitalist countries; hard-currency arms sales; and net invisibles income (excluding interest payments); from Ericson and Miller (1979).

[c]CIA (1981), Table 47; debt at year-end.

[d]Repayments of principal on medium- and long-term debt only; CIA (1981), Table 47.

[e]Interest payments on total debt outstanding (including short-term maturities); CIA (1981), Table 47.

[f]Data include total hard-currency merchandise exports only, from CIA (1978a); (1980b), Table 48; and (1981), Table 46.

[g]CIA (1981), Table 48 (for data on reserve stock volume only).

[h]IMF, *International Financial Statistics*, 1981.

Table A.9

PROSPECTIVE GRAIN IMPORTS, 1981-85

	Estimate		Projected			Annual Average
	1981	1982	1983	1984	1985	1981-85
Baseline Scenario						
Import volume[a]	46,000	42,000	25,000	25,000	25,000	32,600
Import unit value[b] ($/mt)	150	130	170	180	190	159
Import expenditures ($ million)	6,900	5,460	4,250	4,500	4,750	5,172
Low Output Scenario						
Import volume (thousand mt)[c]	46,000	42,000	35,000	35,000	35,000	38,000
Import unit value[b] ($/mt)	150	130	170	180	190	162
Import expenditures ($ million)	6,900	5,460	5,950	6,300	6,650	6,252

[a]Volume estimates for 1981 and 1982 from U.S. Department of Agriculture (1982a); prospective volumes for 1983 through 1985 from the London-based International Wheat Council (1982), p. 1, given as "at least 25 mmt per annum."

[b]Grain unit values for 1981 and 1982 are estimates based on a trade-weighted average of corn and wheat spot prices plus 4 percent for c.i.f.; prospective prices for 1983 through 1985 are constructed from recent historical grain price performance.

[c]Volume estimates from U.S. Department of Agriculture (1982a); prospective volumes for 1983 through 1985 are based on USDA projections (see USDA, 1982b, p. 16). These magnitudes are based upon continued poor harvests and are consistent with a broad consensus (see Desai, 1982, pp. 312-322; and also Schoonover, 1981, pp. 18-32).

Table A.10

GNP Growth Variants for Initial Scenario, 1980-85

	Actual	Estimate	Projected									
			Baseline Variant				Annual Average	Low-Productivity Variant				Annual Average
	1980	1981	1982	1983	1984	1985	1981-85	1982	1983	1984	1985	1981-85
GNP	1.4	2.1	1.9	2.9	2.7	2.6	2.4	1.9	2.1	1.9	1.8	1.9
Combined factor inputs[a]	3.3	3.1	2.9	2.9	2.7	2.6	2.8	2.9	2.9	2.7	2.6	2.8
Manhours	1.2	1.1	1.0	1.0	0.9	0.7	0.9	1.0	1.0	0.9	0.7	0.9
Capital	6.5	6.0	5.7	5.7	5.4	5.4	5.6	5.7	5.7	5.4	5.4	5.6
Land	--	--	0.1	0.2	0.1	0.1	0.1	0.1	0.2	0.1	0.1	0.1
Total factor productivity	-1.9	-1.0	-1.0	0.0	0.0	0.0	-0.4	-1.0	-0.8	-0.8	-0.8	-0.9
Manhours	0.2	1.0	--	--	--	--	1.5	--	--	--	--	1.0
Capital	-4.8	-3.7	--	--	--	--	-3.0	--	--	--	--	-3.5
Land	1.4	2.1	--	--	--	--	2.3	--	--	--	--	1.8

[a]Combined factor inputs of manhours, capital, and land are calculated using weights of 55.8 percent, 41.2 percent, and 3.0 percent, respectively, in a Cobb-Douglas (linear homogeneous) production function. See CIA (1981), Table 43.

Table A.11

Energy Projections for Initial Scenario, 1980-85

	Actual		Estimated or Projected							
			Baseline GNP/ Baseline Energy Production				Low-Productivity GNP/Baseline Energy Production			
	1980	1981	1982	1983	1984	1985	1982	1983	1984	1985
Crude oil (mmt)										
Production	603.0	609.0	613.0	615.0	617.0	619.0	613.0	615.0	617.0	619.0
Change, percent per year	2.9	1.0	0.7	0.5	0.3	0.3	0.7	0.5	0.3	0.3
Imports[a]	7.0	8.0	7.0	8.0	8.0	8.0	7.0	8.0	8.0	8.0
Total supply	610.0	617.0	620.0	623.0	625.0	627.0	620.0	623.0	625.0	627.0
Consumption[b]	448.5	464.0	473.7	488.8	503.3	517.7	473.7	484.6	494.7	504.5
Total export (crude & products)	161.5	153.0	146.3	134.2	121.7	109.3	146.3	138.4	130.3	122.5
CMEA[c]	92.3	(90)	86.6	86.6	86.6	86.6	86.6	86.6	86.6	86.6
LDC[d]	(22.2)	(20)	16.7	8.1	5.6	3.4	16.7	8.8	7.0	5.4
OECD (hard currency)	(47)	(43)	43.0	39.5	29.5	19.3	43.0	43.0	36.7	30.5
Hard-currency export, unit value, $/mt	256.0	284.0	274.0	274.0	300.0	327.0	274.0	274.0	300.0	327.0
Hard-currency revenue from oil ($ million)	12,028.0	12,287.0	11,782.0	10,823.0	8,850.0	6,311.1	11,782.0	11,782.0	11,010.0	9,973.5

Table A.11—Continued

	Actual		Estimated or Projected							
			Baseline GNP/ Baseline Energy Production				Low-Productivity GNP/Baseline Energy Production			
	1980	1981	1982	1983	1984	1985	1982	1983	1984	1985
Natural gas (bcm)										
Production	435.0	465.0	501.0	538.0	580.0	625.0	501.0	538.0	580.0	625.0
Change, percent per year	7.0	6.9	7.7	7.6	7.8	7.8	7.7	7.6	7.8	7.8
Imports[e]	2.1	4.1	4.0	5.0	5.0	5.0	4.0	5.0	5.0	5.0
Total supply	437.1	469.1	505.0	543.0	585.0	630.0	505.0	543.0	585.0	630.0
Consumption[f]	380.0	409.4	428.8	459.0	490.0	526.8[h]	428.8	458.1[h]	487.5[h]	526.8[h]
Total export	57.1	59.7	76.2	84.0	95.0	103.2	76.2	84.9	97.5	103.2
EE[g]	30.5	33.0	38.4	39.9	42.5	43.2	38.4	39.9	42.5	43.2
Hard currency	26.6	26.7	37.8	44.1	52.5	60.0	37.8	45.0	55.0	60.0
Hard-currency export, unit value ($ million/bcm)	101.7	148.2	125.6	125.6	155.5	185.4	125.6	125.6	155.5	185.4
Hard-currency export revenue from gas ($ million)	2,706.0	3,956.0	4,749.0	5,539.0	8,163.8	11,124.0	4,749.0	5,652.0	8,552.5	11,124.0
Total hard-currency energy export revenue ($ million)	14,734.0	16,243.0	16,531.0	16,362.0	17,013.8	17,435.1	16,531.0	17,434.0	19,562.5	21,097.5

[a]Assume 8 mmt oil imports per year.
[b]Growth of oil use calculated from a constant oil-consumption/GNP elasticity of 1.1 through 1985.
[c]In 1982 the USSR will cut oil deliveries to the CMEA by 3.4 mmt (Vanous, 1982b). Assume that the Soviets will compensate the CMEA with additional natural gas deliveries equivalent in kilo-calories to the 3.4 mmt fewer oil deliveries.
[d]Assume that the share of Soviet oil exports to LDCs in total non-CMEA oil exports decreases from 32 percent in 1981 to 15 percent by 1985. Further assume total value of LDC trade is conducted on a clearing agreement basis (i.e., not in hard currency).
[e]Assume 5 bcm per year gas imports.
[f]Growth of gas use calculated from a constant gas-consumption/GNP elasticity of 2.5 through 1985.
[g]Soviet natural gas deliveries to the CMEA increase by 4 percent per year over the one-time compensatory increase.
[h]Includes inventory accumulation owing to physical limits on pipeline capacity for hard-currency exports.
( ) = Authors' estimate.

Table A.12

Balance-of-Payments Projection for Initial Scenario, 1980-85

(Millions of U.S. dollars)

	Actual	Estimate		Projected						
				Baseline Variant[a]			Low-Productivity Variant[b]			
	1980	1981	1982	1983	1984	1985	1982	1983	1984	1985
1. Total trade revenue	+28,808	+29,403	+29,766	+30,605	+32,790	+35,066	+29,766	+31,677	+35,339	+38,729
A. Energy exports	+14,734	+16,243	+16,531	+16,362	+17,014	+17,435	+16,531	+17,434	+19,563	+21,998
B. Other merchandise exports	+ 8,764	+ 7,557	+ 7,187	+ 7,711	+ 8,722	+10,012	+ 7,187	+ 7,711	+ 8,722	+10,012
C. Net invisibles and arms sales[c]	+ 5,310	+ 5,600	+ 6,048	+ 6,532	+ 7,054	+ 7,619	+ 6,048	+ 6,532	+ 7,054	+ 7,619
2. Total noncompressible expenditures	-27,750	-32,320	-30,829	-31,397	-34,646	-38,509	-30,829	-31,177	-34,179	-37,702
A. Grain imports	- 4,891	- 6,900	- 5,460	- 4,250	- 4,500	- 4,750	- 5,460	- 4,250	- 4,500	- 4,750
B. Other noncompressible merchandise imports[d]	-15,147	-14,985	-14,640	-15,929	-17,936	-20,429	-14,640	-15,709	-17,469	-19,617
C. Interest payments[e]	- 1,620	- 2,200	- 2,543	- 2,958	- 3,406	- 3,874	- 2,543	- 2,958	- 3,406	- 3,874
D. Amortization[f]	- 3,034	- 3,170	- 3,121	- 3,195	- 3,739	- 4,391	- 3,121	- 3,195	- 3,739	- 4,391
E. Errors and omissions[g]	- 3,058	- 5,065	- 5,065	- 5,065	- 5,065	- 5,065	- 5,065	- 5,065	- 5,065	- 5,065
3. Balance for compressible imports (1 + 2)	+ 1,058	- 2,920	- 1,063	- 792	- 1,856	- 3,443	- 1,063	+ 500	+ 1,160	+ 1,027
4. Near-term policy response										
A. Gold sales	+ 1,818[h]	+ 2,840[h]	+ 1,066	+ 1,171	+ 1,290	+ 1,418	+ 1,066	+ 1,171	+ 1,290	+ 1,418
B. Gross foreign borrowing[i]	+ 3,103	+ 5,995	+ 5,300	+ 5,800	+ 6,400	+ 7,000	+ 5,300	+ 5,800	+ 6,400	+ 7,000
5. Net compressible-import capacity (3 + 4)	+ 5,979	+ 5,915	+ 5,303	+ 6,179	+ 5,834	+ 4,975	+ 5,303	+ 7,471	+ 8,850	+ 9,445
(% change) Value	-	- 1.1	- 10.3	+ 16.5	- 5.6	- 14.7	- 10.3	+ 40.9	+ 18.5	+ 6.7
Unit value	-	- 4.5	+ 0.5	+ 4.8	+ 7.0	+ 7.0	+ 0.5	+ 4.8	+ 7.0	+ 7.0
Volume	-	+ 3.6	- 10.8	+ 11.2	- 11.8	- 21.7	- 10.8	+ 34..	+ 10.7	- 6.3
Note: Net capital inflow[d]	+ 69	+ 2,825	+ 2,179	+ 2,605	+ 2,661	+ 2,609	+ 2,179	+ 2,605	+ 2,661	+ 2,609

[a]Average annual GNP growth over 1981-85: 2.4 percent.

[b]Average annual GNP growth over 1981-85: 1.9 percent.

[c]Includes arms sales to LDCs only. Additional receipts from arms sales are included in "other merchandise exports." See Zoeter (1983).

[d]Excluding both imports of equipment for the export natural gas pipeline and borrowing for same.

[e]Interest payments of total gross debt (including short, medium, and long-term maturities).

[f]Amortization of medium- and long-term maturities only. Short-term debt is assumed to be entirely rolled over on a yearly basis.

[g]Includes: hard-currency trade and assistance to CMEA; net credits granted to LDCs; net suppliers' credits to the developed West; and hard-currency transfers to clandestine activities in the West.

[h]The numbers for 1980 and 1981 include reductions of commercial bank assets of $238 million and $142 million, respectively.

Table A.13

EXTERNAL FINANCIAL PROJECTIONS FOR INITIAL SCENARIO, 1980-85

(Year-end, millions of dollars)

	Actual	Estimate	Projected			
	1980	1981	1982	1983	1984	1985
Gross debt to West	18,116	20,940	23,120	25,725	28,386	30,995
Short-term debt	5,625	8,163	8,163	8,163	8,163	8,163
Net debt to West	9,546	12,510	14,690	17,295	19,956	22,565
Total debt service	4,654	5,370	5,664	6,153	7,145	8,265
Amortization	3,034	3,170	3,121	3,195	3,739	4,391
Interest	1,620	2,200	2,543	2,958	3,406	3,874
Net financial transfer	-1,551	625	-364	-353	-745	-1,265
Total international liquidity	42,893	33,155	31,547	36,656	42,733	49,815
Gold stock valuation	34,321	24,725	23,117	28,226	34,303	41,385
($/oz.tr.)	(589.50)	(397.50)	(333)	(366)	(403)	(443)
Commercial assets	8,572	8,430	8,430	8,430	8,430	8,430

Table A.14

Energy Projections with Alternative Assumptions, 1980-85

	Actual		Projected							
			Baseline GNP/ Low Energy Production				Low-Productivity GNP/ Low Energy Production			
	1980	1981	1982	1983	1984	1985	1982	1983	1984	1985
Crude oil (mmt)										
Production	603.0	609.0	613.0	609.0	600.0	585.0	613.0	609.0	600.0	585.0
Change, percent per year	2.9	1.0	0.7	-0.5	-1.5	-2.6	0.7	-0.5	-1.5	-2.6
Imports[a]	7.0	8.0	7.0	8.0	8.0	8.0	7.0	8.0	8.0	8.0
Total supply	610.0	617.0	620.0	617.0	608.0	593.0	620.0	617.0	608.0	593.0
Consumption[b]	448.5	464.0	473.7	488.8	503.3	517.7	473.7	484.6	494.7	504.5
Total export (crude & products)	161.5	153.0	164.3	128.2	104.7	75.3	146.3	132.4	113.3	88.5
CMEA[c]	93.2	(90.0)	86.6	86.6	86.6	75.3	86.6	86.6	86.6	86.6
LDC[d]	(22.2)	(20.0)	16.7	7.1	2.9	0.0	16.7	7.8	4.3	0.3
OECD (hard currency)	(47.0)	(43.0)	43.0	34.5	15.2	0.0	43.0	38.0	22.4	1.6
Oil price ($/mt)	256.0	284.0	274.0	274.0	300.0	327.0	274.0	274.0	300.0	327.0
Hard-currency revenue from oil ($ million)	12,028.0	12,287.0	11,782.0	9,460.7	4,561.2	0.0	11,782.0	10,415.8	6,720.0	528.0

Table A.14—Continued

	Actual		Projected							
			Baseline GNP/ Low Energy Production				Low-Productivity GNP/ Low Energy Production			
	1980	1981	1982	1983	1984	1985	1982	1983	1984	1985
Natural gas (bcm)										
Production	435.0	465.0	496.0	529.0	564.0	600.0	496.0	519.0	564.0	600.0
Percent per year	7.0	6.9	6.7	6.7	6.6	6.4	6.7	6.7	6.6	6.4
Imports[e]	2.1	4.1	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0
Total supply	437.1	469.1	501.0	534.0	569.0	605.0	501.0	534.0	569.0	605.0
Consumption[f]	380.0	409.4	428.8	459.0	490.0	521.8	428.8	451.3	472.7	501.88
Total export	57.1	59.7	72.2	75.0	79.0	83.2	72.2	82.7	96.3	103.2
EE[h]	30.5	33.0	38.4	39.9	42.5	43.2	38.4	39.9	42.5	43.2
Hard currency	26.6	26.7	33.8	35.1	36.5	40.0	33.8	42.8	53.8	60.0
Hard-currency export, unit value ($ million/bcm)	101.7	148.2	125.6	125.6	155.5	185.4	125.6	125.6	155.5	185.4
Export revenue from gas ($ million)	2,706.0	3,956.0	4,245.3	4,408.6	5,675.8	7,416.0	4,245.3	5,375.7	8,366.0	11,124.0
Total hard-currency energy export revenue ($ million)	14,734.0	16,243.0	16,027.3	13,869.3	10,237.3	7,416.0	16,027.3	15,791.5	15,086.0	11,652.0

[a]Assume 8 mmt oil imports per year.

[b]Growth of oil use calculated from a constant oil-consumption/GNP elasticity of 1.1 through 1985.

[c]In 1982 the USSR will cut oil deliveries to the CMEA by 3.4 mmt (Wharton, "CPE Analysis," February 22, 1982, p. 4). Assume that the Soviets will compensate the CMEA with additional natural gas deliveries equivalent in kilo-calories to the 3.4 mmt fewer oil deliveries.

[d]Assume that the share of Soviet oil exports to LDCs in total non-CMEA oil exports decreases from 32 percent in 1981 to 15 percent by 1985. Further assume total value of LDC trade is conducted on a clearing agreement basis.

[e]Assume 5 bcm per year gas imports.

[f]Growth of gas use calculated from a constant gas-consumption/GNP elasticity of 2.5 through 1985.

[g]Includes inventory accumulation owing to physical limits on pipeline capacity for hard-currency exports.

[h]Soviet natural gas deliveries to the CMEA increase by 4 percent per year over the one-time compensatory increase.

Appendix B

DETAILS OF THE BALANCE-OF-PAYMENTS PROJECTIONS OF THE INITIAL SCENARIOS

This appendix sets forth the details of the methodology and assumptions used to construct the balance-of-payments projections of the initial scenario. These projections comprise both the baseline and low-productivity variants of the initial scenario. The sections of this appendix that follow refer to lines in Appendix Table A.12.

FUEL EXPORTS

Future earnings from fuel exports are the only sub-category in total trade revenue considered to be primarily structurally determined. Thus, a supply-side approach to forecasting was utilized for this variable.

The 11th Five-Year Plan reflects diminished expectations for Soviet oil production. The 1985 target of 630 mmt implies only 1.0 percent per year growth over the 1980 level of production. Indeed, oil production for the first ten months of 1982 was only 0.4 percent higher than for the same period of 1981, which may indicate leveling off in oil production.

In general, differing Western estimates of 1985 Soviet oil projection are based on different assumptions about Soviet ability to overcome the problems of a decreasing proven oil reserve base and slowing rates of growth in oil production.

Western estimates of Soviet proven oil reserves range from about 4.1 to 15.1 billion mt of oil (Stern, 1981). Our estimate is that proven reserves currently equal about 8 to 9 billion mt. In the early 1970s the Soviets estimated that about 65 percent of their ultimately recoverable reserves had been found in giant fields. Assuming that the giants established thus far originally contained some 81 billion barrels (a modest estimate), the total quantity of recoverable oil would appear to be 125 billion barrels (*Petroleum Economist*, July 1981). Cumulative production up to 1981 reached about 72 billion barrels, indicating that less than 53 billion barrels (7.2 billion mt) would be left in the ground. Given the low estimate of oil in giant fields and the continued discov-

eries of smaller fields in recent years, a reasonable estimation would be about 59 to 66 billion barrels (8 to 9 billion mt). These apparent reserves are equivalent to only 15 to 16 times the volume of 1981 output, and a good proportion of them remain to be proven definitely.

The prospects for greatly increasing known oil reserves by 1985 are not promising. Soviet oil and gas exploratory activities are afflicted by an incentive system that favors production over exploratory drilling. The CIA maintains that the Soviets do not have the capacity to expand rig supply and that diverting rigs and crews from production to exploratory drilling would result in a drastic falloff in production (CIA, 1977c). Moreover, any large oil fields discovered in Eastern Siberia, the Soviet Far East, and offshore will require at least ten years to bring into production (Stern, 1981). Any addition to reserves in the next five years will have to come from finds near already established sites. Given recent extensive exploration, the likelihood of important discoveries in those areas is slim.

Since 1960, rig productivity in all drilling activities has decreased by 15 percent (CIA, 1977c). In 1980, Gosplan announced that the average flow per new well was likely to drop from 93 mt per day in 1967-80 to only 38 mt per day in 1981-85 (*Petroleum Economist,* March 1981). To some extent, these trends represent the harmful effects of the Soviet practice of water injection. Pumping water into wells helps to maintain and increase pressure, facilitating oil recovery. However, with time, wells become flooded and increasing volumes of water are lifted with the oil. Eventually, wells must be re-drilled or abandoned. Many analysts believe that such practices severely limit the amount of fully recoverable oil and inflict permanent damage on major oil reserves. Soviet oil production is also limited by the inadequacy of Soviet technology and equipment in harsh environmental conditions, by the difficulty of building an infrastructural base to support an already tautly distributed labor force, and by the usual organizational problems peculiar to the Soviet system.

By 1985 oil production will probably reach 619 mmt, representing 0.4 percent per year growth over 1981 production of 609 mmt. This projection is based on the assumption that sufficient investment will continue to be channeled to the oil industry to maintain the present modest rate of growth for as long as possible. Investment in the oil industry in 1976-80 was 50 percent greater than in 1971-75 (*Petroleum Economist*, March 1981) and reached about 13 percent of total fixed industrial investment in 1980 (compared with 9 percent in 1970) (*The Economist*, July 9, 1981). It appears that the Soviet commitment to expand oil infrastructure (pipelines, refinery capacity, etc.) is compatible with (the modest) oil production targets, indicating an inten-

tion to continue emphasis on oil production according to Plan (Hardt, 1981).

Despite the importance of oil exports in Soviet hard-currency trade and oil's increased opportunity cost in the post-OPEC era, the Soviets have made few important gains in oil use conservation during the past decade. The elasticity of oil consumption with respect to GNP reached about 1.5 during 1975-80. European oil consumption, in comparison, was essentially level (Hewett, 1981). However, as a consequence of the gradual replacement of oil in domestic energy consumption with natural gas, it is probable (although perhaps somewhat optimistic) that the oil consumption/GNP elasticity will fall to 1.1 during 1980-85. This income elasticity has been combined with the two GNP growth variants to project oil consumption through 1985.

Resulting from the preceding assumptions on energy production and consumption, total exports of crude oil plus products will fall from 153 mmt in 1981 to a range of 122.5 mmt (Low-Productivity-GNP/Baseline-Energy-Production) to 75.3 mmt (Baseline-GNP/Low-Energy-Production) in 1985. Of these totals, oil deliveries to the entire CMEA are assumed to fall from an estimated 90 mmt in 1981 to 86.6 mmt in 1985 (and to 75.3 mmt in the Baseline-GNP/Low-Energy-Production case). This decline is predicated on the Soviet announcement that deliveries of oil to Eastern Europe (except Poland) would be reduced by 10 percent (about 3.4 mmt) in 1982 (Vanous, 1982b). It is additionally assumed that further reductions in oil exports to the CMEA will be politically infeasible, except when necessitated by a limited export surplus as in the Baseline-GNP/Low-Energy-Production case.

Owing to the growth of domestic demand as well as to the continuing Soviet commitment to meeting Eastern European energy needs, the remaining surplus of oil available for total hard-currency export will fall from an estimated 63 mmt in 1981 to a range of 35.9 mmt (Low-Productivity-GNP/Baseline-Energy-Production) to nil (Baseline-GNP/Low-Energy-Production) by 1985. Soviet oil exports to LDCs, assumed to be traded entirely on a clearing agreement basis, account for a decreasing share of this total. The proportion sold to this group falls from an estimated 31.7 percent (20 mmt) in 1981 to 15 percent (ranging from 5.4 mmt to 0.0 mmt) in 1985. Soviet oil exports to the hard-currency market will thus decline from an estimated 43 mmt in 1981 to between 30.5 mmt (Low-Productivity-GNP/Baseline-Energy-Production) and 0.0 mmt (Baseline-GNP/Low-Energy-Production) in 1985 (Tables A.11 and A.14).

Oil price estimates for 1982 and 1983 are from OECD fuel projections (OECD, 1982b). Oil price projections for 1984 and 1985 assume

a real 3.5 percent annual increase over the prospective industrial country GNP deflator (Lichtblau, 1982). These projections amount to an average annual oil price increase of 3.6 percent during 1982-85, resulting in an oil price equivalent to $327/mt in 1985.

Projections for the natural gas industry were calculated in an analogous manner.

The 11th Five-Year Plan illustrates the importance of natural gas in Soviet energy plans. Although oil will retain its position as the largest source of primary energy in 1985 (at 39 percent of the total), natural gas will constitute some 60 percent of the planned increment of total energy production, compared with a planned increment in oil of roughly 10 percent (*Ekonomicheskaia gazeta*, January 1981).

The constraints on natural gas production do not rest on the availability of resources. Western estimates of proven Soviet reserves lie between 25 and 33 trillion cubic meters, or about 40 percent of the world's proven reserves (Stern, 1981). However, the bulk of Soviet natural gas reserves lie in fields subject to extreme environmental conditions and at great distances from centers of consumption. Fulfillment of the 11th Five-Year Plan's natural gas plans is contingent on Soviet ability to rapidly expand its pipeline network to deliver gas to consumers in the USSR and in Eastern and Western Europe. Whereas 30,000 km of pipe were laid during the previous Five-Year Plans, during the 11th the gas pipeline network is to be expanded by 48,000 km (*Pravda*, November 18, 1981).

The total expansion program will involve some 13 million tons of steel pipe and about 170 compressor stations (Hewett, 1981). In the past, the Soviets have been unable to produce sufficient quantities of high-quality large-diameter steel pipe and have had trouble developing reliable compressor stations. Consequently, the Soviet gas pipeline network has benefited extensively from Western imports of these items. Soviet energy-related imports from the West have been projected to reach $20 billion by 1985 (Vanous, 1982b).

It is not likely that these ambitious pipeline targets will be met entirely by 1985. The export pipeline may not be delayed because of its importance in Soviet hard-currency earnings and its symbolic political importance. Nevertheless, the lag in the early 1980s will be determined, above all, by Soviet ability to import pipe and compressors from the West.

The Soviet natural gas industry is also restricted by a number of organizational problems similar to those affecting the oil industry. These problems include insufficient deliveries of materials, poor coordination between the different organizations involved, and a severe labor shortage.

There is very little disagreement between Soviet and Western projections of 1981-85 gas output. In 1982, natural gas output reached 501 bcm, representing a 7.7 percent increase over 1981. Assuming that the Soviets are able to fulfill the bulk of their pipeline plans, it is likely that 1985 natural gas output will reach 625 bcm.

Historically, Soviet natural-gas-consumption/GNP elasticities have been near 2.0 for the past 10 years (Hewett, 1982). This figure will probably rise to about 2.5 in the 1980s, as natural gas gradually replaces a substantial proportion of oil in domestic consumption. Consequently, an elasticity of 2.5 was used to project gas consumption in the two GNP variants.

Combining the two growth variants of GNP with the preceding analysis on gas production and consumption leads to the result that the amount of Soviet natural gas available for export should rise from an estimated 59.7 bcm in 1981 to a range of 83 bcm (Baseline-GNP/Low-Energy-Production) to 103.2 bcm (all other scenarios) in 1985. It is assumed that the Soviets will have to compensate for the 1982 reduction in oil deliveries to Eastern Europe by increasing natural gas deliveries by an equivalent kilocalorie value. (A conversion factor of 1 mmt of crude oil equivalent to 1.2 bcm natural gas was used in this calculation.) In addition to this one-time compensatory increase, a 4 percent per year increase in natural gas exports to Eastern Europe is assumed after 1981 to meet growing energy needs. Assuming an average 2 percent annual GNP growth rate for the EE countries until 1985, and the recent historic natural-gas/GNP elasticity of 2.0, EE gas consumption will rise at a rate of 4 percent per year. As a consequence, in 1982, Eastern Europe should receive 16 percent more natural gas than in 1981 and 4 percent more each year thereafter. Despite the rise in deliveries to Eastern Europe, the Soviets will still be able to increase hard-currency gas exports to Western Europe from an estimated 26.7 bcm in 1981 to a range of 40.0 bcm (Baseline-GNP/Low-Energy-Production) to 60 bcm (all other scenarios) in 1985.

Natural gas prices for 1980 and 1981 were obtained from published value and volume statistics. Estimates for natural gas hard-currency export revenue were obtained from Zoeter (1983, Appendix E). Natural gas price projections for 1984 and 1985 are based on future contractual prices agreed upon by the USSR and Western Europe (Vanous, 1982). Price projections for 1982 and 1983 were lower than the 1981 estimate and the 1984 and 1985 contractual prices, reflecting the present weakness in global energy demand. These projections translate into an average annual natural gas price increase of 5.8

percent during 1982-85, resulting in a unit price of $185.4 million per bcm in 1985.

OTHER MERCHANDISE EXPORTS

In contrast to fuel earnings, future receipts from "other merchandise exports," net invisibles earnings, and arms sales were assumed to be primarily demand determined (cyclically constrained). Accordingly, the elasticity of the volume growth of Soviet "other merchandise exports," with regard to OECD GNP growth, calculated over the period 1966-79, was employed. This income elasticity, estimated to be 1.5 (Fink, 1981), was combined with IMF (1982) estimates of prospective industrial country growth to yield volume growth projections of "other merchandise exports." According to the methodology, growth of this item is projected to accelerate from 1.2 percent in 1982 to 5.6 percent in 1985, averaging 4.0 percent annually over the 11th Five-Year Plan, which may prove to be optimistic in view of a tightening domestic supply-demand balance.

The change in unit prices for "other merchandise exports" ranges from a decline of 6.1 percent in 1982 to an advance of 9.2 percent in 1985, averaging 3.4 percent annually from 1982 to 1985. These price projections were constructed as a composite index of individual price trends for major commodity sub-categories weighted by their share in 1980. During that year, Soviet "other merchandise exports" consisted of manufactures (machinery and consumer goods), food, and raw materials with trade shares of 18 percent, 5 percent, and 77 percent, respectively. These proportions were assumed to remain constant through 1985. Price projections through 1983 for these sub-categories were taken from OECD (July, 1982). Projected changes for 1984 and 1985 incorporate a relative improvement in prices of raw materials with regard to manufactures, reflecting the OECD business cycle trend (see Table A.9). Combining these volume and price projections yields an average increase of 7.3 percent per year for receipts from "other merchandise exports" during 1982-85. Reflecting the present volatility in world prices and the real growth of the Soviet Union's Western trading partners, these receipts range from a 4.9 percent decline in 1982 to a 14.8 percent advance in 1985.

These growth rates were applied to preliminary balance-of-payments data for 1981 obtained from Zoeter (1983). All the trade and financial data from this source refer to the Soviet's hard-currency position with regard to noncommunist countries only, unless otherwise specified.

NET INVISIBLES AND ARMS SALES

Disaggregated data on invisibles' components[1] are extremely poor. Moreover, the two largest items in net invisibles—arms sales and interest income—cannot be projected using the elasticity approach. Accordingly, growth of net invisibles' receipts and arms sales were projected at an average annual rate of 8 percent from 1982 to 1985. This rate is considerably below the 10th Five-Year Plan annual average of 31 percent, when these receipts grew from a small absolute level (see Table 8).

Data from Zoeter (1983) on arms sales include hard-currency sales to LDCs only. The data may not be complete as some arms sales may also be included under merchandise exports (machinery component).

GRAIN IMPORTS

The cost of grain imports is projected to add an average $5.2 billion per year to noncompressible import expenditures during the 11th Five-Year Plan, although better harvests after 1982 should result in lower yearly expenditures. Although the volume of grain imports is expected to fall to an average 25 mmt per year during 1983-85, soft world prices will doubly ease the future import bill (see Table A.9). Provisional estimates of import volume for 1981 and 1982 originate from the U.S. Department of Agriculture (1982b). Projections for imported grain volume for the duration of the plan period originate from the International Wheat Council (1982). The latter's estimates were set at a minimum of 25 mmt per year, which assumes a moderate improvement in grain harvests from 1983 through 1985 over the past four poor crops (1979-82). Thus, average grain import volume is projected at 32.6 mmt annually for 1981 through 1985.

Grain prices for 1981 and 1982 are estimates based on an (import) trade-weighted average of corn and wheat spot prices, plus 4 percent for cost, insurance, freight (c.i.f.).[2] Prospective prices for 1983 through 1985 are constructed from recent historical grain price performance relative to total world grain supplies. During 1981-85, growth of grain

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[1]Earnings from net invisibles include interest income from deposits with Western banks, net income from tourism and merchandise freight, arms sales to LDCs, and official transfers. Interest payments on gross outstanding debt (including short-term maturities) are treated separately (see Table A.12, line 2.C). Gold sales are included on line 4.A of the same table.

[2]The following conversion factors were employed: 1 mt of grain is equivalent to 36.7 bushels of wheat or 39.4 bushels of corn. Trade shares for wheat and corn, assumed to remain constant during 1981 and 1982, were equal to 44 and 56 percent, respectively, of total purchases.

prices average a sluggish 1.8 percent because of bountiful world supply outpacing world demand.

OTHER NONCOMPRESSIBLE MERCHANDISE IMPORTS

Soviet expenditures on other noncompressible merchandise imports, also considered to be structurally determined, equalled an estimated $15.1 billion in 1980. They are projected to advance to $20.4 billion and $19.6 billion in 1985, under the baseline and low-productivity variants, respectively. The base year (1980) value was defined as the sum of expenditures on 40 percent of imported Western machinery, as well as all nongrain food, fuel, and raw-material imports during that year.[3] In constant 1970 prices, total Soviet machinery imports in 1980 equalled 243 percent of their level one decade earlier (Zoeter, 1983). Accordingly, 40 percent of the 1980 expenditures are roughly equivalent to the 1970 level of machinery imports. Moreover, as the capital equipment imports in 1970 were purchased before increased Soviet credit access, the demand for these requirements was considered to be fairly income-inelastic. Thus, the 1970 real level of capital equipment imports, equivalent to 40 percent of 1980 purchases, was defined to be noncompressible. As the need for capital equipment replacement and modernization will grow during the 1980s, this proportion is considered to be a conservative estimate.

It was assumed that noncompressible merchandise import requirements arise from structural deficiencies in the domestic economy (see Sec. III). Accordingly, its volume growth was projected by combining the Soviet income elasticity of import demand, estimated to be 1.4 over the period 1966-79 (Fink, 1981), with the respective projections of Soviet net material product growth. The growth of NMP was calculated as the product of the projected growth of GNP (see Table A.10) and a scalar (1.5) representing the recent historical relationship (1965-80) between the two trend rates. Finally, the projected NMP growth rate was reduced by 13 percent to reflect the deemphasis since 1977 of the import-stimulated growth strategy. This import category was projected to exhibit average growth of 4.6 percent per year between 1982 and 1985, fluctuating in proportion to the projected growth of Soviet output.

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[3]Capital equipment imports for the export gas pipeline are excluded from our balance-of-payments projections as their cost is assumed to be fully financed by capital imports, which will be self-liquidating. Accordingly, capital disbursement calculations also exclude this item.

The change in unit prices for "other noncompressible merchandise imports" ranged from a change of −5.8 percent in 1982 to an advance of 9.1 percent in 1985, averaging an increase of 3.5 percent per year during that period. These projections were constructed as a composite index of individual price trends for the three commodity groups used to estimate unit prices for "other merchandise exports" (plus fuel prices) and followed identical methodology. Their trade shares in 1980 of 20 percent, 5 percent, 73 percent, and 2 percent were assumed to remain constant throughout 1985.

INTEREST PAYMENTS

Interest payments are also determined by the foreign exchange and liquidity constraints. However, unlike amortization, this category includes outflows on total gross debt (it includes payments on short-term liabilities). Payments of interest are projected to increase from an estimated $2.2 billion in 1981 to $3.9 billion in 1985 (see Table A.13). This rise in outflows represents both higher magnitudes of gross debt throughout 1985 and an assumed increase in the average cost of borrowing. The increase in the borrowing rate from 11 percent in 1982 to 12.5 percent in 1985 is predicated on an increasingly higher cost for new official disbursements (as outlined at the Versailles Summit, 1982).

AMORTIZATION

Amortization of foreign debt outstanding, unlike the first two components of noncompressible imports, is determined by the foreign trade and liquidity constraints (the country's past borrowing experience). The historical data refer solely to repayment of principal on medium- and long-term debt.[4] Repayments are projected to remain virtually flat from 1981 to 1983 at approximately $3.2 billion, reflecting the leveling off of medium- and long-term liabilities during 1979-81. Thereafter, amortization is projected to rise to $4.4 billion in 1985 as gross debt comprises longer average maturities after 1981. These projections are based on an assumed debt structure equivalent to an average six-year maturity (two-year grace period) for medium-

[4]This definition is continued throughout the projection period for purposes of direct comparison with the historical debt-service burden. This is tantamount to assuming that all short-term debt (liabilities with a maturity of less than one year) is entirely rolled over each year; CIA (1981), Table 47.

and long-term liabilities. This assumed structure was based upon the historical payments record of the USSR during the 1970s. (CIA; 1981, Table 47; Zoeter, 1983. Table 6.)

ERRORS AND OMISSIONS

The estimated deficit on errors and omissions of $5.1 billion in 1981 comprises: (1) hard-currency trade and assistance to the CMEA, (2) net trade credits to LDCs to finance Soviet exports (including military deliveries) to this group, (3) net short-term supplier's credits to the developed West, and (4) hard-currency transfers to clandestine organizations in the West (Zoeter, 1983). In part, because the 1981 balance-of-payments is a preliminary one, the errors and omissions figure may capture certain outpayments that will eventually be shifted to other categories. Although it is conceivable that this large net deficit could be somewhat reduced over the projection period, it is just as likely to widen (see Sec. III). Hard-currency outflows (both trade and assistance) to the CMEA will most likely remain high, reflecting the increasing economic difficulties of the CMEA countries and the Soviet desire to maintain control of its "hegemonion." Continued hard-currency trade credits to the LDCs and developed West will also remain necessary in order to increase the attractiveness of what otherwise is fairly noncompetitive merchandise. In the absence of additional information, this deficit has been assumed to remain constant in the initial scenario through 1985.

BALANCE FOR COMPRESSIBLE IMPORTS

The balance for compressible imports (Table A.12, line 3) is defined as the difference of total hard-currency receipts and total noncompressible expenditures. As such, it represents the hard-currency residual available for the purchase of compressible imports after noncompressible expenditures have been netted out from total hard-currency receipts. This hard-currency residual is determined by the confluence of the three debt-service capacity constraints (see Sec. III). The hard-currency balance represents one of three components (along with gold sales and gross foreign borrowing) that contribute to net compressible-import capacity (Table A.12, line 5).

GOLD SALES

Gold sales include the sum of the change in assets on deposit with Western commercial banks and gold sales (i.e., the entire change in total international liquidity). However, it has been assumed that there will be no change in assets deposited with Western commercial banks after 1981 because (1) in order to obtain new long-term credits it is customary for the borrower to maintain substantial deposits with the creditor, and (2) the historically wide fluctuations on Soviet commercial assets on deposit with Western banks preclude any systematic basis for projecting future levels. Therefore, line 4.A of Table A.12 represents only receipts from gold sales after 1981.

In 1980 Soviet gold production was estimated at 316.2 mt.[5] Of this amount, 229.1 mt were added to reserves, 80 mt were sold abroad, and 7.1 mt were used as industrial inputs. During the 10th Five-Year Plan annual gold production increased an average 4.3 percent per year. As growth of production decelerated markedly over this period, it is assumed that this declining trend will continue into the 1980s. It is projected that production will average 2.9 percent per year during 1981-85. It is assumed that industrial use remains at a constant 7.4 mt per year during 1981-85. It is additionally assumed that 100 mt will be annually sold abroad for hard currency. This leaves a residual, averaging 218 mt annually, added to reserves. The unit price for gold is projected to increase an average 10 percent per year from 1983 to 1985, reflecting the broad increase in the world price level that should accompany the industrial countries' economic recovery. Accordingly, Soviet gold sales are projected to contribute average hard-currency revenue of $1.2 billion annually from 1982 to 1985.

GROSS FOREIGN BORROWING

Gross foreign borrowing (Table A.12, line 4.B) represents the third and final component contributing to net compressible-import capacity. Historical data on capital disbursements include gross drawings of medium- and long-term capital as well as net short-term inflows. This definition has been maintained in the projection period for comparative purposes. However, after 1981, the short-term debt level is assumed to remain constant as grain import requirements fall to lower average levels. The initial scenario assumes continued Soviet resort to foreign capital markets (particularly medium- and long-term maturities) near the same level of the previous five years. Accordingly, from

[5]A conversion rate of 1 million troy ounces equals 31 metric tons was employed.

an estimated disbursement of $6.0 billion in 1981 (Zoeter, 1983), capital inflows are projected to drop marginally in 1982 and then rise steadily to $7.0 billion in 1985.

NET COMPRESSIBLE-IMPORT CAPACITY

Net compressible-import capacity (Table A.12, line 5) represents the net surplus remaining available in each year to import additional merchandise and services over and above those imports considered to be noncompressible (necessary for the economy's normal functioning). This category equals the sum of the preceding three components in the baseline balance of payments: (1) the balance for compressible imports, (2) gold sales, and (3) gross foreign borrowing.

Although the latter two categories both exhibit a steady nominal increase over the projection period, the rapid decline in the balance for compressible imports dominates, producing stagnation in the nominal growth of NCIC under the baseline variant. By contrast, the low-productivity variant incorporates a much more rapid growth rate of the balance for compressible imports, producing a rising nominal surplus for NCIC.

By definition, compressible imports include compressible machinery imports (60 percent by value of the 1980 level) and all manufactured consumer goods. Thus, to determine the prospective volume growth of compressible imports under the two variants of the initial scenario, the nominal growth rate was deflated by the projected unit price increase of imported manufactures (see Table 3).

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