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Energy Pricing in the Soviet Union

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Abstract

Energy exports, which are already the primary source of Soviet convertible currency earnings and an important contributor to the budget, could bring in much more revenue if the Soviet Union were to reduce its extremely high levels of energy consumption. To encourage this process, energy prices need to be raised substantially. Under plausible assumptions, it is shown that an increase in prices could yield sizable foreign exchange earnings. Large increases in energy prices could, however, threaten the solvency of industrial enterprises, precipitate major economic and social dislocation, and severely strain interrepublican economic relationships.

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Summary

During the 1980s, the Soviet Union became the world's largest energy producer, and, although it exported barely a fifth of its output, also the world's largest energy exporter. Despite marked declines in production and exports over the last two years, energy exports are still by far the largest single source of Soviet convertible currency earnings and make an important contribution to the Soviet budget. These foreign exchange and budgetary contributions could be significantly greater, however, if domestic energy prices were not so low relative to world market levels and if enterprise budget constraints were not so slack. The latter factors have contributed to a level of energy consumption relative to national income which, even using fairly generous estimates of Soviet GDP, is close to twice the OECD average.

Domestic Soviet energy prices are currently far below opportunity costs, perhaps by more than 80 percent. If prices could be raised towards world market levels as part of a larger market-oriented reform, and Soviet energy consumption became as responsive to energy prices as, say, Hungarian energy consumption in the 1980s (which is estimated to have been less than half as responsive to energy prices as energy consumption in the OECD countries), very substantial energy savings could be made.

Large increases in energy prices could, however, threaten the solvency of industrial enterprises, precipitate major economic and social dislocation, and--since most Soviet republics are large net energy debtors to Russia--severely strain interrepublican economic relationships. To soften the impact, energy price adjustment could be phased in over time. This would, however, dampen incentives for conservation and encourage hoarding and other evasive activities in the transition period, possibly at the expense of the credibility of reform. An alternative is to raise prices immediately to world market levels, but offer side compensation in the form of energy vouchers (the right to buy a given quantity of energy at the pre-reform price) to affected enterprises and/or republics. Vouchers, which should be freely tradeable, would be distributed as a designated fraction of the base year's consumption, with the fraction declining over time. A voucher system would leave the right incentives at the margin, but the transparency of the transfers might arouse more political resistance from energy producers. Also, since the aid is presumably intended to encourage production, distributing it according to a secondary criterion--past energy use--is not ideal. However, severing any direct link between energy prices and compensation, even if economically efficient, might for political reasons be unworkable.

I. Introduction

The energy sector plays a crucial role in the economy of the Soviet Union. 1/ Energy exports are by far the largest single source of convertible currency earnings and make an important contribution to the central government budget, even taking into account the huge government investments in energy. However, oil output, a major component of energy output, has been falling in the last three years, with a 10 percent decline predicted for 1991 alone. As a result, oil exports have been sharply curtailed, budgetary revenues have plunged, and industry has experienced significant disruption. Moreover, recent political developments have increased uncertainty regarding the availability of supplies from the Russian republic, which controls the bulk of energy resources, to other republics.

This paper analyzes a particular aspect of the energy sector, namely, the role of domestic energy prices and the economy-wide implications of price changes. Domestic energy prices have been notoriously low. Despite upward revisions earlier this year, they have declined further in relative terms on account of ruble devaluation and high inflation. Low energy prices, together with soft budget constraints for enterprises, have encouraged levels of energy consumption that are extremely high relative to national income. This high consumption has in turn exacted a significant toll on the Soviet economy in terms of real income and investment; at the same time it has led to significant problems of environmental pollution. Given these considerations, the discussion in the paper suggests that in the interests of both reform and modernization, Soviet energy prices must be adjusted to world market levels.

It is not so clear what the pace of adjustment should be, how it should be implemented, or what supporting or compensating measures should be put into place. Energy price adjustment has serious ramifications for Soviet external trade and payments, for enterprise finances, and for interrepublican relations. Developments in these spheres, none of which can be predicted with certainty, in turn bear on price adjustment.

This paper sketches, in a preliminary fashion, the main tradeoffs in the design of energy pricing policy. For the most part, it neither endorses nor rejects particular options. The aim is, rather, to lay a foundation for further discussion, in which Soviet energy pricing is seen as an essential component of both short-term stabilization and longer-term restructuring.

1/ The energy sector includes the production of oil, natural gas, coal, hydroelectricity, and nuclear electricity. The first three fuels, on which this paper focuses, account for nearly 95 percent of the domestic energy production. The term "Soviet Union" refers both to the former union of 15 republics and to emerging successor states.

The discussion is organized as follows. The next section provides some basic information on the production, consumption and exports of energy products. Section III examines the potential efficiency gains from energy repricing. Section IV considers various ways to ameliorate the financial effects on energy-using enterprises, while Section V looks at republican aspects of adjustment. The main conclusions are summarized in Section VI.

II. An Overview of Soviet Energy

1. Production and investment

The Soviet Union has long been a major energy producer, but production rose spectacularly in the 1970s with the discovery and exploitation of huge Siberian oil and gas reserves, making it the world's largest energy producer. In 1989, the latest year for which comprehensive data are available, total production of energy, including oil, natural gas, coal, hydroelectricity, and nuclear power, was nearly 1700 million tons of oil equivalent (MTOE). This was about 21 percent of global output, versus 20 percent for the United States, the world's second largest producer. Gas accounted for 38 percent of domestic output, oil for 36 percent, and coal for 20 percent. However, total energy output peaked in 1988. Since then, oil and coal production have decreased markedly. Preliminary estimates indicate that oil production in 1991 is likely to fall 10 percent below the 1990 level.

Aggregate investment in energy, as a proportion of total domestic investment, increased from 10 percent in the early 1970s to over 15 percent by the end of the 1980s. The figures relative to industrial investment are especially striking. Energy investment rose from 29 percent of total industrial investment in the early 1970s to 42 percent in 1988 (Kuhnert (1991)). However, energy output did not keep pace with investment, even before the recent production downturn.

The recent declines in energy output result from a combination of secular downward trend, a policy shift, and political/economic crisis. The secular trend is the depletion of low-cost energy fields, which reflects in part myopic attitudes to production and exploration, and in part the increasing remoteness and inhospitability of new fields. 1/ The policy shift has been a new emphasis on consumer goods production, which has come partly at the expense of new investment and capital repair in the energy sector. The crisis is that associated with *perestroika*. Worsening shortages restrict the opportunity to work productively, and dampen the

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1/ For example, water is often injected into oil fields at an early stage of operation, which increases current yields but reduces the total amount of oil that can be recovered. Soviet oil producers are aware of the tradeoff, but their incentives unduly favor current output.

permit more strikes and to incite them. Meanwhile, the old administrative structures are breaking down, without effective replacement. 1/

Additional energy supply constraints are seen in processing and distribution. Soviet oil refineries have difficulty producing the lighter, more valuable derivatives, such as gasoline. Storage facilities for natural gas are grossly inadequate, while gas pipelines are generally poorly built and poorly maintained. 2/ Outdated technology and capacity constraints in power generation cause frequent brownouts, power surges, and frequency oscillations, which increase wear and tear on electrical equipment and can permanently damage it.

2. Consumption

The most striking feature of energy consumption in the Soviet Union is its intensity. As a percentage of GDP, Soviet energy consumption in 1987 was 90 percent above the OECD average and 55 percent higher than the average for developing countries (Dobozi (1991)). 3/ This comparison is based on CIA estimates of Soviet dollar GDP, which many consider to be overstated. If, in place of CIA estimates, ruble GDP were converted to dollars at the official exchange rate in 1987, the measured Soviet energy intensity would roughly double, and at black market rates it would increase eight-fold.

Of total energy consumed in the Soviet Union, 77 percent is consumed in material production and transport (Kuhnert (1991)). This share is high by world standards, and very high compared with the OECD countries. Inefficiencies in energy use are a major contributor to pollution.

The high energy intensity of the Soviet economy stems in part from geography. The cold climate, the vast distances that freight must be transported over land, and the weight of energy production itself (a highly energy-intensive activity) demand higher-than-average energy use. Also, energy intensity naturally tends to peak at a middle stage of development, when the economy is, in a sense, mechanized but not automated; i.e, depends more on the processing of materials than on the processing of information.

1/ Management of the energy sector is divided among eight agencies, specialized according to fuel or function. Each agency has had its own producing enterprises, research laboratories, and construction concerns. Until recently, supply quotas, investment targets, and prices for energy products were set by the central government. There was little direct contact between the energy producers and energy consumers. State distribution monopolies bought and redistributed energy products according to state plans. Coordination across agencies fell to a central Bureau of Fuel and Energy.

2/ A major pipeline explosion in 1989 crippled distribution.

3/ On this scale, the energy intensity of GDP was 40 percent higher in the Soviet Union than in the United States and 180 percent higher in the Soviet Union than in Japan.

There are also factors peculiar to the Soviet planning system. The traditional preoccupation with gross output indicators combined with grossly low energy prices impart a significant energy bias to production. This bias is reinforced by two factors: first, the economy is dominated by energy-intensive heavy industry; and second, output in general tends to be produced in an energy-intensive manner.

The systemic factors leading to high energy intensity have become particularly evident since the oil price shocks of the 1970s. From 1960 to 1973, energy use in both the OECD countries and the Soviet Union grew about as fast as their respective GDP. However, since 1973, OECD energy consumption has grown only one-quarter as fast as GDP, while Soviet energy use has grown 16 percent faster than GDP. The calculations for the Soviet Union again rely on CIA estimates of GDP, which, as noted above, may be overstated. If they are, energy consumption trends would look even worse. In any case, it is clear that the oil price shocks of the 1970s, which fundamentally transformed patterns of energy use in OECD countries, did not trigger much conservation in the Soviet Union.

The fuel composition of energy consumption in the Soviet Union has, however, shifted profoundly in the 1980s. To free oil for exports, natural gas was substituted for oil in domestic uses. Whereas Soviet oil consumption in the 1960s and 1970s grew an average 6.7 percent per year, over the 1980s it declined 0.8 percent per year. Gas was also substituted for coal: average annual growth of coal consumption slipped from 1.6 percent in the 1960s and 1970s to -0.3 percent in the 1980s. The data show that Soviet consumption patterns are not as rigid as sometimes appears.

3. Exports

The Soviet Union exports barely one fifth of its energy production. Oil is the most heavily traded fuel, with nearly 35 percent of output exported in 1989. Gas and coal exports comprised, respectively, only 14 percent and 9 percent of domestic output. Nevertheless, the Soviet Union is the world's largest exporter of energy. It accounted for 16 percent of global traded supply, compared with less than 11 percent for Saudi Arabia, the next largest energy exporter. CMEA countries took almost half of energy exports, and Western Europe most of the rest.

Energy exports have been an extremely important source of convertible currency earnings, accounting for over 40 percent of the total during the last several years. Oil exports alone generated about 30 percent of foreign exchange earnings, although with the decline in oil production this share has dropped very sharply. In the past, oil exports varied so sharply and contrarily to the world price of oil as to suggest a backward-sloping export supply curve. 1/ At the same time, it appears that oil exports were

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1/ See, for instance, Wolf (1982) and Nissanke (1987).

adjusted to deal with the balance of payments problems arising, for instance, from higher volumes or prices of grain imports.

Over the last three years, the state monopoly on foreign trade has been relaxed. Energy exports remain tightly controlled, however, largely because they are so lucrative. Disputes over the ownership and taxation of energy resources are likely to impede liberalization.

III. Potential Effects of Energy Repricing

1. The dimensions of distortion

Energy is grossly underpriced in the Soviet Union, by almost any standard. For example, the domestic price of crude oil in 1990 was about 30 rubles per metric ton. At the pre-November 1990 official exchange rate of about 0.62 rubles to the US dollar, this amounted to $50 per ton, when the world market price was about $140 a ton. In November the exchange rate was devalued to 1.8 rubles to the dollar, so that the oil price implicitly fell to $17 per ton, or one-eighth the world market price.1/ Since the new exchange rate was probably still overvalued (black market rates, which had been 3-4 rubles to the dollar in the early 1980s, had risen to 8-10 by the end of the decade and by late 1990 exceeded 15), the effective dollar price of domestically-consumed oil was even less. Gas and coal were also grossly underpriced, though by not as much as oil.2/

In January 1991, energy prices were roughly doubled. 3/ However, wholesale prices of other products were also raised and/or decontrolled, so that by autumn 1991 the relative domestic wholesale price of energy was less than it had been one year earlier. Another price reform in April raised average retail prices by about 80 percent. By September 1991, the non-commercial exchange rate had been devalued to 32 rubles per dollar, about the same as the black market rate.

While domestic energy prices clearly fall far below opportunity costs, it is not clear how to evaluate those opportunity costs in rubles. Not only is the ruble not convertible freely to dollars, but also it can be difficult to spend rubles domestically at posted prices. Under these conditions, as Osband (1991) has shown, black market prices--including black market exchange rates--can considerably overstate the prices that would prevail

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1/ While the quality, and hence the price, of Soviet crude oil can differ considerably from othe internationally traded crudes, changes in prices of different crudes follow a fairly systematic pattern. (See Kumar (1991)).

2/ In general, energy prices in the Soviet Union have been considerably more distorted than prices in many developing countries. For some evidence on the latter, see Kumar (1987).

3/ Oil and gas prices were raised by 133 percent, coal by 70 percent and electric power by 73 percent.

after decontrol. As an illustration, it can be noted that at an exchange rate of 32 rubles per dollar, the value of Soviet oil output greatly exceeds total Soviet GDP.

An alternative approach to evaluating opportunity costs is to focus on relative domestic scarcities. Again, it is clear that domestic energy prices are too low, although the precise opportunity cost would vary with the choice of benchmark. Moreover, the domestic value might change dramatically once radical reform begins. Demand for domestically-produced heavy industry products and machine tools is likely to fall dramatically, while food prices will depend both on agricultural restructuring and on the quantities and costs of food imported from the West.

2. Potential conservation

The consumption impact of a given change in domestic energy prices depends on the associated institutional changes. Without competitive pressure on enterprises and harder budget constraints, input price increases would not necessarily reduce consumption. In an econometric analysis, Dobozi (1991) found that Soviet energy consumption has in the past been fairly insensitive to price changes. However, it should be remembered that price changes in the past were infrequent and typically small, and hence are likely to be a poor indicator of the future sensitivity of energy consumption to price changes.

If energy prices are raised as part of a larger market-oriented reform, the inducement to conservation should be much stronger. Admittedly, even reforming Soviet enterprises may respond less to price incentives than Western firms, due to softer budget constraints, limited substitution possibilities, managerial inertia, etc. A more reasonable benchmark might be Hungarian enterprises in the 1980s, which at that time faced a mixture of central planning and the market. Dobozi (1991) estimates that the elasticity of energy demand in Hungary with respect to price has been -0.10 in the short run and -0.32 in the long run. These are significantly less than the corresponding elasticities for market economies, which typically range from -0.30 to -0.50 for the short term, and -0.70 to -0.90 for the long term.

Below some preliminary estimates of the likely Soviet energy conservation are derived, assuming that Hungarian elasticities are broadly applicable. As discussed above, it is not clear what the magnitude of price adjustment should be. The equilibrium exchange rate is particularly uncertain, and depends to a significant degree on energy exports, and hence on energy prices. Also, for political or economic reasons, any chosen adjustment might well be staggered. In order not to exaggerate the impact of energy price changes, it should be emphasized that price increases examined, while very substantial (on the order of 50 to 400 percent), are still likely to leave domestic prices below world prices. The results of the simulation exercise are reported in Table 1.

Table 1. Potential Export Revenues from Increased Energy Exports

(In billions of U.S. dollars)

Energy Price Change (In real percentage terms)	Elasticity	
	Short-term	Long-term
	-0.10	-0.32
50	5.0	15.3
100	8.4	24.9
200	13.0	37.1
400	18.7	50.5

Source: Based on authors' computations. The analysis is based on separate calculations for gas and oil. In 1991, domestic consumption of gas, without price change, is expected to be 692 billion cubic meters, while consumption of oil is expected to be around 442 million tons. World market price of gas is expected to be $3.20 per million Btu ($89.0 per thousand cubic meters) and of oil $19.6 per barrel ($144.1 per ton) based on six month futures prices.

As Table 1 indicates, a doubling of oil and gas prices in real terms, assuming that all the saved energy was channeled to export and the world market price was unaffected, could potentially yield an additional $8 billion annually in the short run and $25 billion annually in the long run. 1/ Even if Soviet price elasticities were only half the Hungarian levels, $4 billion could be saved in the first year. Clearly, with larger price elasticities or larger price increases, the revenue impact would increase.

3. Potential supply impact

Traditionally, domestic energy prices have played essentially no role in energy supply decisions. Low energy prices may, however, have contributed to recent declines in production. To the extent that energy-producing enterprises have gained autonomy and can channel some profits to workers, low producer prices may have discouraged production. More precisely, low

1/ This calculation assumes, not unrealistically, no significant increase in the consumption of non-energy goods that would otherwise be exported for convertible currency. It also assumes that there would not be any increase in aggregate output, so that while energy consumption per unit of output declined sharply, total energy consumption might decline much less. To the extent that the latter occurs, export earnings would, of course, increase less than in the simulation.

producer prices may have made it more difficult to overcome supply shocks occurring for other reasons. Presumably, producer prices will have a much greater impact as reform deepens. Higher prices may be needed simply to prevent further deterioration. Thus, the underlying supply elasticity might be high even if higher prices leave output below peak 1988 levels. Unfortunately, it seems impossible to estimate likely supply elasticities.

IV. Financial Impact on Enterprises

1. Phased adjustment

If domestic energy prices rose immediately to world market levels, without any compensation, energy users would suffer an enormous shock and output and employment might plummet. To ease the transition for enterprises, energy price adjustment might be phased in over time.1/ To obviate price and quantity controls and devaluation-induced adjustment of nominal targets, it has been suggested that adjustment be implemented via a declining border tax. This approach was subsequently endorsed in the reform program, popularly known as the "Grand Bargain", proposed by Yavlinsky-Allison-Sachs-Fischer.

Phased adjustment is less threatening than immediate full adjustment, and could perhaps be adopted more quickly. On these grounds alone it might merit support. However, there are two drawbacks which also should be considered. First, phased adjustment, as compared with immediate full adjustment, dampens the incentives for conservation. Second, the proposed declining border tax may not work in the way hoped. As van Wijnbergen (1990) has pointed out, a commitment to raise the price of a durable good at a pace faster than the rate of depreciation (storage costs) plus interest, invites customers to hoard the good instead of using it in production, so that the output shock might be greater than if prices were liberalized. Black market prices will overshoot the official prices, which is likely to prompt renewed price controls and/or rationing. With output down, prices up, and markets still not clearing, confidence in price reform might evaporate, and the commitment might not be followed through. 2/

If the real interest rate is assumed to be 5 percent per annum, and if oil storage costs are also assumed to be 5 percent per annum, then in a three-year phased adjustment, initial oil prices should be at least 75 percent of expected future world market prices. As noted above, since

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1/ It has been suggested, for instance, that energy prices be immediately raised to, say, half of world market levels, with the remaining wedge eliminated over the next three years. (See IMF (1991)).

2/ Another weakness of a border tax is the need to supplement it with border taxes on energy-intensive products, like petrochemicals. Otherwise, enterprises would have an incentive to wastefully repackage energy for export.

Soviet oil prices are currently, depending on the exchange rate, somewhere between 1 and 25 percent of world market prices, most of the shock will have to be incurred up front. Even in a five-year adjustment, initial prices should start no lower than 62 percent of expected final prices.

2. Vouchers

It may be wondered whether alternative schemes, coupling immediate full price adjustment with side compensation, could ease the transition at less cost. One possible form of side compensation is an energy voucher. A voucher, which should be freely tradeable, would give the bearer to buy, say, one barrel of oil at the pre-reform price, adjusted for inflation and/or devaluation. (The adjustments need not be exact.) Each enterprise would receive vouchers for a designated fraction of the base year's consumption, with the fraction declining over time. For example, in a three-year adjustment, the fraction might be 75 percent the first year, 50 percent the second year, and 25 percent the third year.

With only 46,000 Soviet enterprises and exhaustive records of primary energy distribution, calculation and assignment of vouchers should not be administratively too difficult. Certainly they would be much easier to manage than the transitional voucher or rationing schemes for Soviet food envisaged by many reformers.

Vouchers need not interfere with conservation, as the full marginal savings can be pocketed by the enterprise. The vouchers could be financed completely out of royalties on energy producers, without leaving the latter any worse off than under phased price adjustment. However, there are potential disadvantages to a voucher-based scheme. Insofar as the scheme makes transfers more transparent, they may arouse more resistance from producers and more political opposition. Also, if the producers can be taxed, there may be better ways to spend the money, especially given the fiscal pressures faced by reforming governments. The latter theme is explored below.

3. Other options

It should, of course, be noted that cushioning enterprises from higher prices can be justified only if there are imperfections in capital and labor markets. Otherwise, permanently ailing firms should be shut down immediately, while temporarily ailing firms could borrow to ride out their difficulties. However, energy vouchers are not the most efficient way to address capital and labor market problems. They use a secondary criterion--past energy use--to allocate aid, and that aid need not encourage production or relieve unemployment. For example, a profit maximizing firm might redistribute aid in the form of higher dividends, without any changes in its production profile.

From a purely economic perspective, capital and labor market imperfections are better addressed through credit guarantees, retraining, and social safety nets. However, without a specific energy component to aid, political support for immediate full energy price adjustment may be difficult to garner.

The above discussion assumes that the Union stays together, or at a minimum, the individual republics retain an economic and monetary union. However, even if republics do not have such a union, a voucher scheme could still be implemented by each republic individually. All that would change would be that the energy-deficit republics would have to pay for the energy at world prices and then either finance the vouchers themselves, or find external financing. Such financing could possibly be obtained from energy surplus republics. These issues are examined in the next section.

V. Republican Aspects

1. Fuel distribution

Fuel reserves are predominantly concentrated in Russia and the heavily Russian-settled areas of the eastern Ukraine and northern Kazakhstan. On a caloric equivalent basis, Russia accounted for 78 percent of total fuel production in 1989, and together with the Ukraine and Kazakhstan accounted for over 90 percent. The imbalance is most striking in oil, where Russia produces 10 times as much as the other republics combined. The main reserves outside Russia are coal in the Ukraine and Kazakhstan and natural gas in Uzbekistan and Turkmenistan. Azerbaidzhan, once the center of Soviet oil production, is now a relatively minor producer.

Table 2. Soviet Fuel Production by Region, 1989

Fuel	Percent of Total Accounted by							
	Russia	(Siberia)	Ukraine	Kazakh.	Uzbek.	Turkmen.	Azer.	Other
Oil	91	(67)	1	4	1	--	2	--
Gas	77	(68)	4	1	11	5	1	--
Coal	55	(38*)	24	19	1	--	--	1
Total	78	(61)	7	6	5	3	1	--

* Figure for 1985.

Source: IMF (1991).

Over time the fuel balance is tilting even more to Russian-settled lands, and to Siberia (part of Russia) in particular. This reflects, on the

one hand, the gradual exhaustion of European and Caucasian reserves; on the other hand, the enormous finds in Siberia and growing investment there in extraction and transport. Tyumen *oblast* in Western Siberia--as large as the United Kingdom, France, Germany, and Italy together, but with only 3 million people--accounts for over two-thirds of Soviet oil and gas production. Tyumen holds 30 percent of confirmed world gas reserves, and its confirmed oil reserves could generate half a trillion dollars of revenue at current world market prices. Elsewhere in Siberia lie the world's greatest coal seams, but due to high extraction and transportation costs only the Kuznetsk basin in south-central Siberia is currently a major producer.

2. Scope for bargaining

Since fuel resources are distributed so unevenly, adjustment of fuel prices to world market levels would have an enormous impact on inter-republican and inter-regional terms of trade. At 1989 trading levels, the net transfers could run to tens of billions of dollars per year, mostly in favor of Russia. Exactly who benefits, and by how much, depends first and foremost on the ownership of Siberian fuel. The main claimants are the Soviet center, the Russian republic, and local authorities. With the failure of the recent coup, it seems that the Russian claim will dominate. The principle of republican ownership of natural resources is now widely accepted; Siberia is in no position to wrest independence from Russia; and the center lacks the authority to impose crushing royalties. However, to avoid further supply disruptions, Russia has had to make some tax concessions to Siberian authorities and to direct producers, and to pay larger transit fees to republics straddling the main pipelines. 1/ Also, Russia depends on other republics, particularly Azerbaidzhan, for oil and gas-related equipment. 2/

Another factor disposing Russia to make concessions to other republics is its desire, for both economic and political reasons, to preserve some kind of union. Most of the republics have become dependent on cheap Russian energy supplies. They would like to wean themselves from this dependence, which they feel was foisted on them by Russian-dominated Soviet rule, but feel that Russia should cushion the adjustment. If Russia were to refuse to give "energy aid", union negotiations might collapse.

With regard to the overall position of individual republics, Russia's own economic needs are pressing. Russian citizens see themselves as victims of Soviet rule too, and are reluctant to make further sacrifices for other republics' sake. Also, G-7 donors to Russia might be reluctant to finance Russia's aid to third parties, and prefer to deal directly with the other

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1/ Russia has already agreed to pay Latvia 4-5 dollars a barrel for use of the latter's oil port facilities. As for natural gas, almost all Russian exports to Europe are piped through Belorussia and the Ukraine.

2/ The Baku region of Azerbaidzhan produces roughly 70 percent of Soviet specialized equipment for the oil and gas industries.

republics. Hence, agreements for Russian "energy aid", however well-intentioned, might not be fully implemented.

Moreover, since successful economic reform and modernization require that energy prices eventually rise to world market levels, energy aid cannot permanently bind a new Soviet Union. At best, energy aid buys time for the consolidation of new economic and political arrangements. At worst, it wastes time and material resources without fostering stability.

The upside and downside risks vary with the type of energy aid. If the republics maintain an economic and monetary union, then a focus on enterprise adjustment could, in principle, address the main problems without any explicit republican slant. Unfortunately, disputes over burden-sharing are bound to take on republican and regional dimensions, and will have to be addressed partly on that basis. Regional diversity and frictions will probably make it very difficult to reach and hold a consensus on union-wide adjustment programs, especially in regard to financing.

3. Interrepublican transfers

If, as seems likely, complete economic and monetary union will not be preserved, some forms of energy aid may become impractical. A domestic energy price wedge enforced through a declining external tariff demands, at the very least, a common tariff policy. It is doubtful that this will be sufficient. Given the incentives to hoard energy when energy price hikes are phased, Russia and the other republics are likely to impose restrictions on sale and resale. Hence, republican considerations tend to reinforce the judgment, expressed earlier, that phased energy price adjustment is likely to entail quantity controls. Also, just as price wedges retard enterprise adjustment, so they retard republican adjustment. Politically, however, they are attractive, as they are familiar and involve less visible subsidies.

Coupling world market prices with vouchers offers better incentives at the margin, and demands less inter-republican coordination. Vouchers would be offered to republics, with each republic free to sell or redistribute them as it pleases. As with vouchers distributed at an enterprise level, however, two drawbacks remain. First, it is inequitable and not necessarily efficient to single out energy price windfalls for redistribution. Second, vouchers invite more public scrutiny and misgivings than price controls.

As with enterprise adjustment, republican adjustment could perhaps best be encouraged by setting price adjustment within a general aid and stabilization framework, without any special treatment for energy users. Credit guarantees for inter-republican trade, for example, might still provide a basis for republican cooperation. Again, however, such an approach might be difficult to sustain politically.

VI. Summary and Conclusions

This paper has emphasized the vital role that production and exports of energy products play in the economy of the Soviet Union. In recent years, earnings from energy exports have accounted for over 40 percent of convertible currency earnings, and investments in the energy sector have been nearly half of total industrial investment. Despite these investments, during the last three years, domestic output of oil and coal has begun to decline, with the oil output in 1991 to be expected to be nearly 10 percent below the preceding year.

The paper has focused mainly on the extremely high energy consumption in the economy, and the role which energy pricing could play in encouraging efficient utilization. Energy has been grossly underpriced in the Soviet Union for at least three decades. As reform deepens--in particular, as industrial enterprises become more market oriented and face harder budget constraints, an adjustment of energy prices towards international parities could play an important role in curbing consumption and in reducing energy intensity.

The paper undertook a simulation exercise, using plausible estimates of the price elasticity of demand, to analyze the potential foreign exchange earnings if the energy saved as a result of higher prices were channeled to exports. Even if elasticities are extremely low, the potential revenue contribution could be substantial. Large increases in energy prices could, however, threaten the solvency of many industrial enterprises, and precipitate major economic and social dislocation. Various strategies for ameliorating the impact were considered. The unpleasant side effects of energy price shock could be tempered through a system of compensating payments. However, the very visibility of these compensation schemes may, for political reasons, make them difficult to implement. Taking both economic and political factors into consideration, no specific policy is unambiguously superior to the rest. Finally, the paper emphasized that given the rapid dissolution of the Union, large changes in energy prices would have a significant impact on the economies of the individual republics and on inter-republican relations. Again, various strategies for cushioning the impact were considered.

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