Prices and Taxes in Soviet Economic Reform

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Economic reform in the USSR implies a transition from a directed economy with centralized control to an economy functioning according to market principles. One such principle is free price formation, in contrast to the principle of centralized price setting, in a directed, planned economy. Such a transition can be realized in a gradual process when, at the beginning, a small share of production is sold at free market prices, with this share being gradually increased. It is also possible to choose another form of the process : a faster transition to free price setting for the majority of items produced.

In any case, the transition to free market prices is one of the most difficult transformations, both in economic and socio-political terms. It must be the result of all the other reform measures rather than the initial factor. However, initial conditions are very important, both for the process of "freeing" prices and for the reconstruction of other economic mechanisms. In particular, the introduction of a tax system, payments for natural and other types of resources, adoption of a self-financing principle, rationalization of the pricing system, a correction of the sectoral levels and relations is necessary as a preliminary stage of reform.

This rationalization can be realized within the framework of a traditional price revision such as those which were carried out in 1949, 1967 and 1982. (In the USSR such price revisions are called "price reforms". The authors consider that the word "reform" should not be used in this context.)

Another basic requirement for economic reform is the introduction of a single system of taxes and payments which are regulated by law, in place of the system of individual norms of distribution of enterprise incomes set by sectoral ministries and other state agencies. It is obvious that the parameters of such a system of taxes and payments must be developed simultaneously and in connection with the parameters of a new price system.

1. Price dynamics in a centralized pricing system

It is not accurate to say that in a centralized price setting system (affecting most products and resources), that no uncontrolled, spontaneous change of prices takes place. The national economy can be broken down into two sectors according to the nature of the price changes, the efficiency of the price setting mechanism and the degree of control exercised by the planning authorities. This control is most efficient in single-product sectors or in industries involved in mass, uniform production (for example, electric power and other industries producing fuel and power). Price levels for such products are changed strictly in accordance with centralized decisions. On the contrary, in industries producing a variety of products which are characterized by a high degree of change, the possibility of centralized regulation of the price level is limited.

The replacement of one kind of production by another, which differs only in term of a higher price, cannot be controlled by a centralized agency. The "hollowing out" phenomenon of cheap commodities from the output of enterprises has spread on a large scale, both for

consumer goods and for the means of production. The situation is aggravated by the fact that the share of expensive goods offered to consumers increases, and an almost total replacement of cheaper goods by more expensive ones takes place.

The price indices published by the State Committee for Statistics (Goskomstat) demonstrate an amazing stability for both wholesale and retail prices. Essential changes in the wholesale price levels occur only during years of wide scale revision-1949, 1967, 1982. In other years the changes do not exceed 1 per cent, even for average industry indices. Is this an ideal situation? It seems to the authors that the opposite is the case. During the post-war decades gigantic changes took place in the sector structure of the national economy of the USSR. New industries appeared, many traditional industries reduced production, not only relatively but also absolutely, and in nearly all the sectors revolutionary changes in technology have occured. In practical terms, however, prices did not change over several decades. What does this imply?—It suggests, firstly (and it has already been proved by some indirect measurements described in [1]), that the methods applied by the Goskomstat lead to wrong results. Secondly, it means that the price setting system reacts to slowly ; if when the system reacts to higher output and efficiency of production, it does so with a great deal of delay and not always accurately.

Given this situation, price changes are not reflected in the official price indices for groups of products published by Goskomstat, because it calculates the annual price index changes only for products which have been previously produced. New production is taken into account by assuming that the price will be constant during a one-year period.

However, there are a number of methods for the indirect evaluation of price indices for large groups of products. These are based on the dynamics of the cost of production of uniform types of goods, or on the relationship of technical and economic indicators, the system in use in all industrially developed countries [1, 2]. Each of these methods has some shortcomings, but they allow for the evaluation of approximate rates of those price changes which do not correspond to changes in the consumption properties of products.

The results of a number of research efforts show that the prices of many kinds of machines and equipment increase at higher rates in comparison with their productivity. On the average, the growth rate of price index per unit of equipment production for the period 1964–1980 has been determined to be as high as 2 to 3 percent annually [34]. The growth of the calculated cost of construction of production enterprises (per unit of capacity) for 1970–1972 is evaluated as 5 to 6 percent annually [3]. The cost of one square meter of dwelling space has been increasing on average by 3.4 percent annually. At the same time, the prices for such products as power, energy and metals during the period between the wide-scale price revisions of 1967 and 1982 has remained practically stable.

The differences in price dynamics for the production of different industries of the national economy are confirmed indirectly by employing the dynamics of outlay and profit relative to the per unit of production for the periods between successive price revisions. Let us consider the indicator of profit share in commodity output (at current prices) for the last decade. While this indicator remained stable in such industries as engineering, light industry, the chemical and the petroleum-chemical industries (or, more precisely, it oscillated around a stable level) or even gradually increased, in coal mining, the oil and gas industry, the wood and pulp and paper industry, the construction materials industry, and the ferrous and non-ferrous metallurgy indus-

try this indicator steadily decreased.

Thus, in the coal industry from 1971 to 1980, a steady decrease in the ratio of profit to commodity output was taking place (since 1977 this industry has become unprofitable). This decrease corresponded to a rise in the prime cost per unit of production by 2.5 percent per year on the average. The prime cost of basic types of agricultural production was also rising (for the period from the 8th to 10th Five-Year Plan the rate averaged 3 to 3.4% per year). State purchase prices for this period were raised several times, but between the successive price rises profitability of production was decreased and these oscillations in profitability amplified the effect of significant oscillations in the profitability of agricultural production caused by natural phenomena, such as weather, rainfall, etc.

Sharp differences in the rates of changes of industry prices with respect to actual cost for production in different industries lead to an unjustified drop in profitability and even to the unprofitability of industries on the whole. These differences adversely affect accounting procedures, sharply reduce the efficiency and influence of rational economic managment and the stimulation of economic activity. A more serious consequence of these differences in price dynamics is the disproportions in price relationships which take a rather essential scale.

These disproportions, which can be thought of as an understated price level for the production of the fuel and raw materials sectors, are corrected only during mass price revisions.

Thus, in 1936, the prices of coal, oil and timber were raised. This increased the level of profitability of the extracting industries. Hewever, the prime cost of these products continued to rise. As a result, heavy industry again became unprofitable. In 1939 and 1940 prices in the extracting industries were raised anew. This allowed their accounts to be balanced without losses.

In 1949 a new price increase was carried out. Prices in heavy industries were raised by 1.6 times on the average [15, p. 251]. At the same time, prices in the coal mining industry were raised by 3.1 times, in the ferrous metals industry by 2.8 times, in the timber and wood processing industry by 4 times [5, p. 251]. Later, in 1950–1955 prices for the production of these industries were reduced several times. These reductions were not justified because they resulted in unprofitability.

In 1967, the price level in the fuel industries was raised by 40 percent on the average and in the ferrous metallurgy industry by 51 percent, and in the timber and wood processing industry by 57 per cent. It was assumed that a rise in cost in the manufacturing industries would be compensated for by an acceleration in the implementation of technological reduction of per unit input of prime resources by consumers, and a decrease in prices for machinery and equipment [6]. But all this did not take place. In 1982 a new price revision was carried out. One of the tasks of this revision was a liquidation of the unprofitability of the extracting industries. Although prices were raised (coal by 1.48 times, oil by 2.3 times [17, p. 342–348]), the profitability level of coal mining was not improved.

In these two cases prices for production of multi-product industries such as machinery or light industry changed slightly.

As is known, the state purchase prices for agricultural production during the 70's were raised several times, and this sector was, on the whole, profitable. A particularly essential price rise took place in 1982. At the same time, however, retail prices for major agricultural products were maintained practically unchanged over several decades. This generated serious disproportions in the retail prices system and a shortage of these products.

Thus, in 1983 the costs of producing and

processing 1 kg of beef exceeded the retail price by 2.8 times, mutton by 3 times, pork by 1.85 times, milk by 1.7 times, butter by 2.3 times [8]. A rapid price rise at the Kolkhoz market (particularly during the last decade) may be considered as an important indicator of imbalances and the latent price rise in the area of food-stuffs.

Even with these mass revisions, prices and pricing relatio ıships remained unsatisfactory Thus, profitability in coal mining remained negative after the introduction of new prices in 1982. Even if it is recognized that these relationships are acceptable, they remain unchanged only during the several years following the revisions. In 4–5 years they start to seriously distort the picture of real costs in the national economy. By the end of a fifteen-year period prices for fuel and raw materials become understated by 40–60 percent.

According to calculations made by G. I. Khanin [1] the index of latent growth of prices (for national income) has increased 2.85 percent annually. According to the data on the growth of 'national income utilized' in current and constant prices published in the yearbook "Narodnoe khozyaistvo" the corresponding official index was equal to 0.1 percent annually. The authors' evaluations (using different methods), proceeding from indices of mass revisions of wholesale prices, input-output tables and volumes of production of the primary fuel material resources (the decrease in quality is ignored) show that the price rise for production in the extracting industries averaged 2.5 per year for this period. State purchase prices for agricultural production (if quality is ignored) were raised by 4.5 percent a year on average. The price rise for agricultural products essentially exceeds the price rise in other sectors (except construction). For the manufacturing industries the real rate of price rise, apparently, did not essentially exceed the rise recorded by the fuel and raw material industries (by 2.5 to 3 percent annually).

In 1988–1989 an inflationary phenomenon began to quickly appear. It expressed itself in a strengthening imbalance between money and commodities (a deficiency in the state budget, a shortage of consumption goods, an extremely rapid rise of disposable income and so on). For the time being, these trends have influenced prices only slightly. According to different evaluations their growth rate has risen from 3 to 4 percent for the national income and from 4 to 6 percent for the consumption sector.

2. The principles of price revision

The transition to market principles, i. e. to the free setting of prices, production volumes and the requirements for various kinds of production may be successfully realised, if at the initial stage the economy is in a state which is close to equilibrium, i. e., in a state when production meets demand for most goods, and the prices for most goods cover their costs of reproduction on an expanded scale. However, in the actual financial system deductions are a form of allotment and are set according to the following principles: the required funds are left for the enterprise to use and the rest is transferred to the state budget (or, on the contrary, the deficiency is covered from the state budget). Therefore, it is rather difficult to determine the magnitude of demand, and respectively, the degree of economic equilibrium. On the other hand, a verification by the criterion of the correspondance of prices of goods to their production costs is not a difficult problem. In this sense the price system differs greatly from one which corresponds to equilibrium. In particular, the price level for fuel and raw materials is understated in this system.

One important condition for prices is that they form the basis for an evaluation of the efficiency of the decisions taken, the determination of which decisions should be taken, and the

degree of economic viability of the enterprises in terms of management accounting. They should not reflect the average cost for a given sector as they do now, but rather the incremental cost (or marginal cost), i. e., magnitude of the costs that are necessary for production of an extra unit of production or a saving that results from a refusal to produce it. This principle is most important for industries which consume mainly natural resoucres. Here a transition to prices based on incremental cost means the inclusion of natural resource rent into the price.

The principle of price setting on the basis of average cost of a given industry, including not only current outlay but also normative efficiency of production assets or outlays for reproduction on expanded scale, ensures self-financing only for this sector as a whole. Self-financing of each accounting production unit, when this principle is used, can be ensured only by means of a redistribution of money within this industry from enterprises working more effectively to those which are less effective. Self-financing of each productive item whose production costs are lower than a socially justified limit is possible only when prices are set at the incremental cost level.

At present, the prices for fuel and raw materials do not only, as a rule, include rent, but rather often do not ensure self-financing of a sector as a whole. The price level for coal, which determine prices in all fuel-and-power complexes does not cover even the prime cost of coal. Thus, for example, as early as 1982 (the year new prices were introduced) this industry was unprofitable.

Price revisions to correct the distortions indicated above are a necessary preliminary condition for carrying out radical economic reform. A transition to market principles without such revisions would lead to the need for exclusion of a share of unprofitable products from any new economic mechanism, an increase in fuel and raw material shortages, and would perhaps, generate sharp oscillations in price relationships.

At present, a great amount of data on the calculation of incremental (marginal) cost on the basis of optimization models for sectors has been gathered. This data is systematically calculated within the framework of the fuel-and-power complex and the results are used in planning and projections.

The questions of determination of marginal cost are considered in the works of L. A. Melentjev, A. A. Makarov, A. G. Vigdortchik [9, 10]. In 1974 "The Leading Instructions for Use of Marginal Cost for Fuel and Power" [11] were approved. Calculations are being carried out on a number of other sectors as well. The results of a determination of marginal cost for the timber industry and agricultural production are described in the works of K. G. Gofman, A. Ph. Moudretsov [12, 13]. In the works of N. K. Loukjantchikov [14, 16] and Moukhin [16, 17] investigations are being carried out to determine the incremental cost in the iron-ore industry.

3. Intersectoral model for calculated price level including natural resource rent

The most exact evaluations of incremetal cost can be found by means of dynamic intersectoral optimizing models including blocks of optimization in separate industries. Some experience has been gained in developing corresponding static models, as described by V. D. Belkin [18, p. 196–278]. An optimization block and optimal fuel and power balance and blocks for foreign trade were combined into a static model of intersectoral balances. The coordination of the plans was carried out by means of iterations.

The calculations by such models are rather unwieldy and require a great volume of information. Therefore, the authors propose to use only some of the parameters obtained

from the optimization block for separate sectors. One is the Z–incremental-average cost ratio. The dynamic factors can be reflected by means of dynamic rent coefficient D. Their use is connected with the assumption of equality of the present and future cost structures.

$$Z=\frac{P}{\overline{З}},$$

where P-incremental cost;

$\overline{З}$-average cost

Research [16, 17] regarding the extraction volume distribution, dependent on the cost level, shows great stability and, in particular, stability of its dispersion over long period of time is characterized by significant price changes. Hence, the ratio of marginal to average costs must also be stable.

Sectors mainly using natural resources have experienced a rapid growth in marginal costs, connected with the use of limited natural resources. Thus, the costs of exploration and extraction of oil have risen in the USSR at a rate of 5 to 6 percent annually. In this case the rent for use of natural resources being exploited has a component which is determined by the future costs to extract an extra unit of the resource. Let $З_i$–be the direct discounted costs ("dynamic rent") of producing an extra unit of output (or some substitution) in the moment t; P_t–the marginal cost (the optimal price) of the product or of the lot, E–standard (normative) rate of discount and ρ–the growth rate of the indicator P_t such that

$$P_{t+1}=P_t(1+\rho).$$

Then the costs $З_t$ in the moment t are justified if, and only if, their annual effect is

$$EЗ_t=P_t-\frac{P_{t+1}}{1+E}.$$

Thus we obtain

$$P_t=(1+E)З_t\frac{E}{E-\rho}$$

The coefficient $D=\dfrac{E}{E-\rho}$ characterizes the excess of marginal cost over direct cost in the year t at the extent of dynamic rent. For oil-extraction the coefficient turns out to be close to 2. For more detail regarding dynamic rent, see [20; 28, Ch. 8].

In the model proposed below the parameter Z is divided into two components: dynamic and static coefficients. The investment component in prices depends on price changes for production of sectors creating fixed assets. Models, which have been in use for a long period of time, are used for the calculations of sector price levels [18, p. 69–91; 19, p. 676], and were taken as a basis of this model. These models proceed from intersectoral balance input-output tables and represent a system of equations of the type:

$$P_j=\sum_i P_i a_{ij}+W_j+\Pi_j,\ j=\overline{1,\ n,} \qquad (1)$$

where i, j–indices of sectors;

n–the total number of sectors;

P_j–unknown price indices with respect to the actual prices (or more exactly to those used in the intersectoral balance);

a_{ij}–material input coefficients including amortization;

W_j–labor input per unit of output measured by per unit wages (including payments of kolkhozes and incomes in the private agricultural sector) plus social insurance deductions;

Π_j–profit per unit of output in the j-th sector.

Profit per unit of output is usually connected with capital costs of production and is set proportionally either to assets output ratio Φ_j

$$\Pi_j=\mu\Phi_j, \qquad (2)$$

where μ–profit rate with respect to the amount of fixed and circulating assets ("production price" model), or to net capital investment (average magnitude per unit of output in a given sector):

$$\Pi_j=\kappa K_j. \qquad (3)$$

The parameter κ may be interpreted as a profit tax rate. The self-financing principle ensures a higher profitability in quickly developing sectors. Assets-output Φ_j and capital-output K_j ratios are taken into account in the structure of assets-creating sectors (seperately for fixed and circulating assets and also for capital investment in fixed and circulating assets) and they are recalculated with unknown indices P_j:

$$\Phi_j=\sum_i P_i(d_{ij}{}^F F_j+G_{ij}Q_j), \qquad (4)$$

where $d_{ij}{}^F$–the share of output of sector j in fixed assets of sector j;
F_j–per unit fixed assets costs in sector j;
G_{ij}–share of output of sector i in circulating assets of sector j;
Q_j–per unit circulating assets costs in sector j.

$$K_j=\sum_i P_i(d_{ij}{}^K K_j+g_{ij}H_j), \qquad (5)$$

where $d_{ij}{}^K$–share of output of sector i in net capital investment of sector j;
K_j–net capital investment in sector j;
g_{ij}–share of output of sector i in increment of circulating assets of sector j;
H_j–increment of circulating assets of sector j.

To obtain sectoral levels of incremental cost in the model (1) it is necessary to replace the coefficients a_{ij}, W_j, H_j, F_j, K_j, reflecting average cost, by analogous ones reflecting incremental cost. According to the definition of incremental cost as cost at newly introduced capacities, it would be possible to obtain incremental variants of input-output coefficients proceeding from cost at these capacities. For the extracting sectors they should also be multiplied by the dynamic rent coefficient.

Within the framework of the first approximation it is feasible to use the assumption that the structure of incremental cost is approximate to the structure of sector average cost reflected in the intersectoral balance. Then the model for determining the incremental cost levels will be as follows:

$$P_j=Z_j(\sum_i P_i a_{ij}+W_j+\Pi_j),\ j=\overline{1,n}, \qquad (6)$$

where Z_j–incremental-average cost ratio in sector j, obtained from calculations for separate sectors. The indicators a_{ij} include amortization, and in case of the extracting sectors, they include costs to maintain extraction levels [20].

The assumption of a coincidence of structure of incremental and average cost is approximate. Therefore, a further improvement of the model (6) requires the determination of the incremental cost structure. Calculations with incremental and average cost structures allow us to evaluate the stability of a solution with respect to their variations.

Usually, there is no information regarding the structure of incremental cost in the nomenclature of intersectoral balances. At best, only the prime cost c_i and c_{ij} and per unit capital costs K_j of production and transportation of an extra unit of production (per one ruble of production in actual prices) are available. To form approximately columns of incremental cost and fixed assets to output ratios, the columns of average cost and fixed asset-output ratios are multiplied by the following coefficients

$$S_j{}^c=\frac{c_j}{\sum_i a_{ij}-a_{Tj}+W_j};\ S_j{}^K=\frac{K_j}{F_j+Q_j},$$

where a_{Tj}–average costs of transportation of production of sector j,
Q_j–fixed and circulating assets for production and transportation of production of sector j.

Thus, instead of the equality (6) the following relation was used [28, p. 214]:

$$P_j=D_j[S_j{}^c(\sum_i P_i a_{ij}-P_T a_{Tj}+W_j)+P_T c_{Tj}+ES_j{}^K\sum_i P_i(d_{ij}{}^E F_j+G_{ij}Q_j). \qquad (7)$$

The coefficient $S_j{}^c$ transforms the prime cost

level of average cost into the prime cost level of incremental cost. The coefficient S_j^K transforms the level of average assets to output ratio into the level of incremental capital cost-output ratio. It should be noted that instead of profit rate μ in the column of incremental cost rate of efficiency of capital investment is used (see equation (2)). It is connected with the fact that μ reflects the average profitability while normative efficiency of new investment can essentially differs from it. Moreover, real efficiency of assets can deviate from that which is reflected by the profit indicator. The indicator of average costs of transportation of production of sector j, a_{ij}, in (7) was replaced by incremental indicator c_{Tj}.

Interchangeability of products was taken into account in the model only with respect to gas and oil. In this case the equation (7) was replaced for a non-marginal power-resource by the following one [28, p. 215]:

$$P_y = \alpha P_z, \qquad (8)$$

where P_y and P_z–indices of transition from the actual prices to incremental cost for coal and gas, and α–coefficient giving their relations. For the European area of the USSR the relation of the acting price per ton of coal and gas is 1 : 0.95. For the Asian area in the USSR this relation is equal to 1 : 1.086. The relation of incremental cost of coal and gas per ton of conventional fuel was assumed in the calculations as being equal to 1 : 1.

Coal was assumed to be the marginal fuel in the Asian area. Therefore, the corresponding equations (7) for gas in the model are not used and are replaced by equation (8) with $\alpha = 0.92$ ($\alpha = P_{ac}/P_{ag}$–the relationship of the actual prices per one ton of conventional fuel-coal and gas). For the European area gas was considered to be the marginal power supply in the main variant, so equation (7) for coal is replaced by equality (8), $\alpha = 1.05$. It should be noted that the ancilliary variant of the calculations with coal being taken as the marginal power source in the two parts of the country gives very close magnitudes of incremental cost for all sectors. Oil-extraction incremental costs were computed on the basis of sectoral costs and interchangeability was not taken into account.

The initial values of S_j^c, S_j^K, c_{Tj}/a_{Tj}, D_j, Z_j for 1982 are given in Tables 1 and 2.

The investigation of cost differentiation in ferrous metallurgy carried out by A. V. Mounkin [16] allows the following conclusions to be drawn.

–all the rent from natural resources is concentrated in the ore industry ("ferrous metals" was broken down into two sub-industries: "iron ore" and "other sub-divisions of ferrous metallurgy");

–since different enterprises in the ore industry produce products differing essentially in composition and quality and their prices do not always reflect efficiency from the point of view of processing, the share of rent in the ore industry was evaluated from the difference of average and marginal costs for pig iron production (in regard to the share of cost for ore in the common cost for production of pig iron);

–Dynamic rent was not taken into account because of the relatively slow rise in costs and the difficulties in determining the rate of growth of the expenditure of stock extraction ($D = 1$).

On the basis of these conclusions and the analysis of the data given [16, p. 65–77] we have evaluated the magnitude of the parameters for iron ore industry Z_j as being equal to 1.3 (see Tables 1 and 2). The structure of average and incremental costs was assumed to be equal. Thus, the values of the parameters S_j^c, S_j^K, c_{Tj}/a_{Tj} coincide with that of Z_j.

A striking difference in the structure of incremental costs from the average ones is observed in the coal industry in the Asian part of the USSR. Thus, the capital outlay for an increment of production is 5.62 times more than its average assets-output ratio, and the incremental prime costs are 22 percent lower than the ave-

rage. This is explained by the fact that the share of discounted assets-product ratio ($E\Phi$) in the structure of average discounted costs for coal is low (only 11.6 percent), while the share of discounted investment-output ratio in the incremental cost is 49.7 per cent (for $E=0.1$). The change of value for the coal industry, when passing from $E=0.1$ to $E=0.08$ (see Tables 1 and 2) is explained by the higher investment required-output ratio of incremental cost (the normative E influences the average costs slightly, while the incremental costs here essentially change).

For the gas and oil extracting industries the prime costs in incremental and average costs are approximately equal. At the same time, the investment-output ratio is higher than the average assets-output ratio for the gas industry by 38 percent and for the oil extraction industry by 27 percent (see Tables 1 and 2). The main influence on incremental cost levels for these industries is exerted by the dynamic rent coefficients.

To determine parameters Z for the timber industry and agriculture, a series of levels of averages discounting the cost of production of the primary types (groups) of products in these sectors for different regions were formed. The value of incremental cost normatives and the parameter Z for each product was set at such a level that the share of production with higher costs would be not higher than 4 to 7 percent. Then the values of Z for separate groups of production were aggregated in sectors. As a result, the values shown in Tables 1, 2 were obtained. (See [21] and [28, p. 215].)

The method of calculating the incremental cost of production in this industry differs from the analogous calculations for agriculture, first of all, by a higher share of transportation expenditures in the total amount of discounted costs of production and the transportation of products. In agriculture this factors may be neglected in the first approximation and it is possible to arrange the data according to magnitude of costs of production. In calculations for the timber industry a production-transportation model must be used:

$$\sum_{ij}(c_i+d_{ij})\,x_{ij}\to\min.$$
$$\sum_{j}x_{ij}\leqslant a_i,$$
$$\sum_{c}x_{ij}\geqslant b_j\,;\ x_{ij}\geqslant 0,$$

where output is measured by one indicator: total bulk of timber; a_i–feasible amount in storage in district i; b_j–need for timber in district j; c_i–discounted cost of unit of production in district i; d_{ij}–discounted cost per unit of production in district i; d_{ij}–discounted cost of transportation of timber from district i to district j. Dual variables of the constraints of the first group (denoted as g_i) show the rent of timber resources per unit of stored timber, of the second group (let them be P_j)–marginal cost per unit of timber in the j–th district of consumption. Thus, total output at incremental costs is equal to $X=\sum_j P_j b_j$ and total amount of rent

$$R=\sum_i g_i a_i = X-\sum_{ij}(c_i+d_{ij})\,x_{ij}.$$

Calculations by such a model comprising 16 districts ($i, j=1, \cdots, 16$) were carried out by A. M. Kisseliov (CEMI) on the basis of data on the total timber harvested in 1976.

According to these calculations, the average marginal cost $\bar{P}=\sum P_j b_j/\sum b_j$ were equal to 27.47 rubles/m^3, average rent evaluntion $\bar{g}=\sum g_i a_i/\sum a_i=5.75$ rubles/m^3, average costs of production and transportation:

$$\overline{c+d}=\frac{\sum(c_i+d_{ij})\,x_{ii}}{\sum b_j}=21.74 \text{ rubles}/m^3$$

marginal-average cost ratio $Z=\bar{P}/(\overline{c+d})=1.26$.

Determination of the magnitude and structure of marginal costs for manufacturing industries, the infrastructure and sphere of services, is difficult even theoretically because of the large number of product types, rapid changes in the product mix and so on. When calculating sectoral price levels and incremental

costs for these sectors it is possible to use only average costs represented in intersectoral balances and asverage assets-output ratios. Since one of the main purpose of this research is determination of the influence of rent of natural resources on the system of incremental costs, a more detailed reflection of conditions in other sectors remain beyond the framework of the model.

For those industries, where average costs are not replaced by incremental ones(i. e., rent does not appear), profit was assumed according to either the production price principle (2) or the self-financing principle (3) with the normatives μ and κ being chosen so that the average rate of profitability for the whole economy, calculated in incremental costs, would coincide with the actual one.

The production price principle is more preferable from the point of view of agreement of the colculations by the proposed model with others based on intersectoral information (e. g. with intersectoral inter-regional models), and with optimizational sectoral models. A serious deficiency of this principle is connected with the imperfect information regarding the value of production assets, which has proven to be incompatable with the value of output produced using them because of inadequate calculation of price movement for the production of machinery and construction. In this sense a model using only information regarding per-year investment may be more reliable. It is natural to assume that when rigid limitations on volumes of investment are set (such as the conditions of 1982) their efficiency exceeds the average efficiency of the working production assets. It should be noted that for the period 1968–1982 average profitability of production assets in the national economy was steadily sinking. The ratio of the total amount of profit to the total amount of fixed assets and material stocks in 1968 was 12.6 percent [22, pp. 50, 743, 749], in 1972–11.5 percent [23, pp. 57, 58, 763, 768], in 1977–9.2 percent [5, pp. 40, 541, 547], in 1982–7.9 percent [24, pp. 46, 509, 515]. It is natural to assume that the actual efficiency of investment also sank essentially during this period. The normative $E=0.12$ recommended in "Standard methods for determination of investment efficiency" corresponded to the average profitability of assets in the early seventies, and by 1982 this normative had fallen to at least 0.09–0.10. The computations with the use of production functions lead to the same conclusions [26, p. 893; 27, p. 893]. Therefore, when calculating incremental costs by formula (7) the values $E=0.1$ and 0.08 were used. The use of value $E=0.08$ is determined by the following considerations. In actual prices, adopted for the evaluation of economic efficiency of investment, rent of natural resources is not taken into account. Therefore, the recommended normatives of investment efficiency and the normatives of profitability in prices which must correspond to production assets efficiency in comparison with labor efficiency turned out to be understated at the expense of the inclusion in the rental component. So, along with the value $E=0.1$ the value $E=0.08$ was used.

The indicators of per unit wages included all bonuses and other grants deriving from profits. Accordingly, by profitability and profits, the authors mean the volume of profit minus all these sums. Profitability was calculated as the ratio of profit to the amount of fixed assets and material stocks. For 1982 $\mu=0.072$, $\kappa=1.25$.

Social insurance deductions included in the indicators W_j were set at the level of 14 per cent from wages for industry, and also for all other sectors of the national economy. As a result, the total amount of social insurance deductions turns out to be slightly higher than the actual magnitude.

The level of average cost for sectors consuming mainly natural resources was determined

Table 1

The ratios of incremental to average prime cost (S_j^c) incremental capital coefficient to average assets coefficient (S_j^K), incremental to average transportation charges (c_{Tj}/a_{Tj}), the dynamic rent coefficient (D_j) and the ratio of incremental to average cost (Z_j) obtained when E=0.1 (for 1982).

Sector	S_j^c	S_j^K	c_{Tj}/a_{Tj}	D_j	Z_j
1. Iron-ore industry	1.3	1.3	1.3	1	1.3
2. Goal Industry (Asia)	0.78	5.62	0.78	1	1.34
3. Cas-extraction (Europe)	1	1.36	1	1.23	1.44
4. Oil-extraction	1	1.27	1	2.15	2.74
5. Timber industry	1.26	1.26	1.26	1	1.26
6. Plant-growing	1.3	1.3	1.3	1	1.3
7. Livestock-raising	1.2	1.2	1.2	1	1.2

Table 2

The ratios of incremental to average prime cost (S_j^c) incremental capital coefficient to average assets coefficient (S_j^K), incremental to average transportation charges (c_{Tj}/a_{Tj}), the dynamic rent coefficient (D_j) and the ratio of incremental to average costs (Z_j) obtained E=0.08 (for 1982).

Sector	S_j^c	S_j^K	c_{Tj}/a_{Tj}	D_j	Z_j
1. Iron-ore industry	1.3	1.3	1.3	1	1.3
2. Coal industry (Asia)	8.78	5.62	0.78	1	1.24
3. Gas-extraction (Europe)	1	1.38	1	1.31	1.45
4. Oil-extraction	1	1.27	1	2.74	3.43
5. Timber industry	1.26	1.26	1.26	1	1.26
6. Grain	1.3	1.3	1.3	1	1.3
7. Livestock-raising	1.2	1.2	1.2	1	1.2

according to either the self-financing principle or the production price principle adopted for other sectors. The share of rent was calculated as the difference between the levels of incremental and average costs computed in incremental indicators. Thus, the adopted price formation principle was retained for all sectors, including the sectors consuming mainly natural resources.

4. Calculations of sectoral levels of incremental costs

The ratios of sectoral levels of incremental costs (IC) to wholesale prices for 1982 are given in Table 3. The calculations were carried out on the basis of the model (6) with E=0.1 and 0.08 and κ=1.25 and 1.0. Let us consider the variant with E=0.1 and κ=1.25 as the primary one.

As is seen from Table 3, the general level of IC turns out to be 1.2 times greater than the level of actual wholesale price levels (including the turnover tax) at the expense of the rent included in them. The rent accounts for 17.8 percent of the national income calculated in IC.

IC-sharply exceeds the level of actual prices in those sectors for which rent is provided. For the iron-ore industry the index makes up 1.8. Accordingly the IC in the other ferrous metallurgy industries rise by 16 percent. For the coal industry the indices are: European part of the USSR-1.88, Asian part-2.17. A higher value of the IC-index for the Asian part is explained by a greater share of prime cost in coal mining which has received a higher evaluation in the IC than the investment component. For the European part the IC of coal was determined on the basis of interchangeability with gas, whose index is 1.99 (for the Asian part-1.98). The greatest difference in the IC from actual wholesale prices is observed for the oil-extraction industry-2.96. Therefore, for the oil-processiong industry the index is 1.72. In connection with the essential excess of IC-level over the level of actual prices for the organic fuel (about 90–95 percent on average), the IC for electric power also essentially exceeds the actual prices: 1.41 times larger for the European area and 1.45 times for the Asian.

For land-using sectors for which rent was provided, the difference between the IC and actual prices is also significant; for the timber industry the index is 1.4, grain-1.43, livestock-raising-1.49.

For the majority of manufacturing sectors the differences in IC from actual prices are slight. Thus, for assets-creating sectors the indices are: machinery and metalworking-1.02, construction-1.14. For other manufacturing sectors (with the exception of the light and food industries the excess is up 7 to 36 percent. The IC for the production of light industry is 20 percent lower than the actual prices and the index for the food industry is 1.33. This corre-

sponds to a significant share of the turnover tax and the high profitability in prices for the production of light industry and, also to the great amount of subsidies from the state budget to cover the difference between state purchase prices for agricultural products and low retail prices for the corresponding industrial production.

In order to determine the influence of the difference of the IC structure from the average cost on the level and structure of the IC-system, the authors have carried out calculations in model (7) with the same values of the parameters E and κ that were taken for calculations in model(6)(Table 3). The results of these calculations are given in Table 4. The analysis of both variants of calculations allows us to draw the following conclusions. The strongest difference in the variants is observed only in two industries : the coal industry in the Asian part of the USSR-2.17 and 1.98 and the gas industry in the Asian part. This is due to the striking differences in the structures of average and incremental costs for these industries. For the other sectors the differences do not exceed to 1 to 2 percent. The indices of the general level of the IC are also practically equal-1.21 and 1.2.

Thus, the substitution of the average cost structure for the IC slightly influences the level and relationships of the IC. It may be considered as an affirmation of the feasibility of using an intersectoral balance for calculation of sectoral IC levels. In principle, the magnitude of deviations obtained for the coal industry in the Asian part of the USSR is such that the marginal power-source in the optimal fuel-and-power balance could be changed. Nevertheless, in this case it does not occur. It would also slightly influence the IC-levels, because with a change in the marginal power-source the eraluations of the coal and gas obtained as a result of a slight change of costs from sectoral optimization models must be approximately close.

Let us consider how the share of rent in the IC changes when the interactions between sectors are taken into account. For coal it has fallen from 25 percent to 8.4 percent, for oil-extraction-from 63.5 percent to 56.8 percent, for gas-from 30 percent to 27.7 percent. The most significant is the change of rent share for coal. It is connected with the difference of the structures of incremental and average costs. However, these oscillations of the rent share (for the parameter Z–by 7.2 per cent) do not exceed the variations of evaluations of parameter Z at actual prices in sectoral models : 6–13 percent [17, p. 294].

The authors have also carried out calculations of the IC using different values for parameters E and κ. The results of the calculation of the IC with $E=0.1$ and $\kappa=1$ are shown in Table 5. This variant is characterized by a lower level IC : 1.14 in comparison with the variant given in Table 3. The structure of the IC for all the sectors is approximately the same as in Table 3, but the share of rent in the national income is higher: 18.9 percent. When $\kappa=1$, the share of the investment component in the price decreass. Therefore, the IC level falls for all the sectors.

Table 6 contains the calculation variant in which $E=0.08$ and $\kappa=1.25$; It is characterized by a higher IC level (1.24) in comparison with the variant of Table 3 and a higher share of rent in the national income (20.2 percent). The structure of the IC also changes slightly: for oil-extruction the index P_j is 3.74. It is connected with a higher share of dynamic rent for oil-extraction when $E=0.08$. For the other sectors the differences of indices from the variant of Table 3 are insignificant.

Table 7 contains the results of calculations by the model of "production price" with $E=0.1$ and $\mu=0.072$. The level of the IC for this variant exceeds the actual price level by 25 percent. This difference from the variant In Table 3 is caused by a higher share of profit IC

Table 3

IC-indices to actual wholesale prices in 1982 with turnover tax (1) and shares of rent in IC when $E=0.1$ and $\kappa=1.25$

Name of Sector	(1)	(2)
Iron-ore industry	1.38	2.28
The rest of ferrous metal industry	1.16	0
Coal (Europe)	1.88	16.3
Coal (Asia)	2.17	2.44
Oil extraction	2.96	5.68
Oil-ptocessing	1.72	0
Gas-extraction (Europe)	1.99	2.77
Gas-extraction (Asia)	1.98	27.7
Other kinds of fuel	1.3	0
Electric power (Europe)	1.41	0
Electric Power (Asia)	1.45	0
Engineering and metalworking indutry	1.02	0
Chemical industry	1.18	0
Timber industry	1.4	16.6
Woodworking and pulp-and-paper industry	1.07	0
Building materials	1.13	0
Light indutry	0.8*	0
Food industry	1.33*	0
Other industry	1.36	0
Grain 1.43**	16.0	0
Livestock-raising	1.49**	13.4
Forestry	13.4	0
Construction	11.4	0
Transportation and communications	12.4	0
Trade, material and technical supplies and state purchases	12.3	0
Other branches of material production	0.98	0
The whole of the national economy (national income)	1.21	18.0***

(*) To retail prices.
(**) To state purchase price of 1983.
(***) The share of rent in the national income.

Table 4

IC-indices to actual wholesale prices in 1982 with turnover tax (1) and shares of rent in IC (percent) to percent) (2), when $E=0.1$ and $\kappa=1.25$ calculated by the model with different structures of incremental and average costs (4.10)

Name of Sector	(1)	(2)
Iron-ore industry	1.38	22.8
The rest of ferrous metal industry	1.16	0
Caol industry (Europe)	1.88	16.2
Coal industry (Asia)	1.97	18.4
Oil-extraction	2.96	59.8
Oil-processing	17.2	0
Gas-extraction (Europe)	1.99	27.7
Gas-extraction (Asia)	1.81	21.1
Other kinds of fuel	1.3	0
Electric power (Europe)	1.41	0
Electric power (Asia)	1.41	0
Engineering and metalworking industry	1.02	0
Chemical industry	1.19	0
Timber industry	1.4	16.6
Woodworking and pulp-and-paper industry	1.07	0
Building materials	1.3	0
Light industry	0.8*	0
Food industry	1.33*	0
Other industries	1.36	0
Grain	1.43**	0
Livestock-raising	1.49**	13.4
Forestry	1.34	0
Construction	1.14	0
Transportation and communications	1.24	0
Trade, materials and technical supplies and state purchases	1.23	0
Other branches of material production	0.98	0
The whole of the national economy (national income)	1.2	17.7***

(*) To retail prices.
(**) To state purchase prices in 1983.
(***) The share of rent in the national income.

IC for the assets-creating sectors. It causes an excess of IC for machinery and metalworking (1.16), construction (1.24). The rise in the investment component have caused extra growth of the IC in the sectors using mainly natural resources. It has let to a rise of the general level of the IC. After calculating the IC levels the IC for the major items of production of the fuel-and-power complex can be determined. Table 8 contains the IC for coal, gas, oil, heavy fuel oil obtained on the basis of the calculations with $E=0.1$ and $\kappa=1.25$ (results are shown inTable 3).

Column 2 in Table 8 shows the values of the IC calculated from sectoral data in actual prices and column 3-the same magnitudes obtained as a result of intersectoral calculations (by multiplication of the actual prices determined in the place of consumption by the obtained indices P_j). The ratios of the second to the first are shown in column 3. They reflect the influence of intersectoral interactions. For all products, except coal in the Asian part of the USSR, this influence raises the IC level by 11 to 20 percent. For coal in the Asian part this excess makes up 2 percent. This is explained by the higher share of production and transportation cost for coal in comparison with the other power sources (for coal in the European par the IC was set according to the interchangeability with gas) the IC for heary fuel oil exceeds the IC ofr coal and gas in the European part of the USSR by 7 percent,

Table 5

IC-indices to actual wholesale prices of 1982 including turnover tax (1) and shares of rent in IC (2), when $E=0.1$ and $\kappa=1$.

Name of Sector	(1)	(2)
Iron industry	1.3	22.8
The rest of ferrous metal industry	1.07	0
Coal (Europe)	1.75	15.0
Coal (Asia)	1.86	18.2
Oil-extraction	2.77	56.8
Oil-processing	1.61	0
Gas-extraction (Europe)	1.85	27.8
Gas-extraction (Asia)	1.72	22.7
Other Kinds of fuel	1.22	0
Electric power (Europe)	1.22	0
Electric power (Asia)	1.24	0
Engineering and metalworking industry	0.66	0
Chemical industry	1.04	0
Timber industry	1.33	18.2
Woodworking and pulp-and-paper industry	1.01	0
Building industry	1.06	0
Light industry	0.76*	0
Food industry	1.25*	0
Other industries	1.27	0
Grain	1.88**	17.6
Livestock-raising	1.44**	15.4
Forestry	1.23	0
Construction	1.13	0
Transportation and communications	1.12	0
Trade, material and technical supplies and state purchases	1.12	0
Other branches of material production	0.99	0
The whole of the national economy (national income)	1.14	18.9

(*) To retail prices.
(**) To state purchase of 1963.
(***) The share of rent in the national income.

Table 6

IC-indices to actual wholesale prices in 1982 with turnover tax (1) and shares of rent in IC (2), when $E=0.08$ and $\kappa=1.25$.

Name of sector	(1)	(2)
Iron-ore indusry	1.4	22.6
The rest of ferrous metal industry	1.18	0
Coal industry (Europe)	1.93	17.7
Coal industry (Asia)	1.8	14.3
Oil-extraction	3.74	66.3
Oil-processing	2.11	0
Gas-extraction (Europe)	2.04	30.9
Gas-extraction (Asia)	1.66	16.5
Other kinds of fuel	1.35	0
Electric power (Europe)	1.44	0
Elecfric power (Asia)	1.38	0
Engineering and metalworking industry	1.05	0
Chemical industry	1.16	0
Timber industry	1.45	16.6
Woodworking and pulp-and-paperindustry	1.1	0
Building materials	1.18	0
Light industry	0.62*	0
Food industry	1.35*	0
Other industries	1.39	0
Grain	1.46**	26.0
Livestock-raising	1.52**	13.6
Forestry	1.32	0
Construction	1.17	0
Transportation and communications	1.3	0
Trade, material and technical supplies and state purchases	1.25	0
Other branches of material production	1.0	0
The whole of the national economy (national income)	1.24	20.4

(*) To retail prices.
(**) To state purchase prices in 1983.
(***) The share of rent in the national income.

which indicates the efficiency of reducing the use of heavy fuel oil as boiler-and-furnace fuel. Fro the Asian part of the USSR this excess makes up 100%. This difference means that the use of heavy fuel oil as boiler-and-furnace fuel is feasible ony in those regions where the use of other power-sources is not practical.

If gas in the Asian part of the USSR is not taken into account (because its IC was set according to that of coal), the influence of intersectoral interactions for different products is 5 to 31 percent. The difference between the IC of heavy fuel oil and coal and gas : 1.4 for the European part of the USSR and 2.93 for the Asian part. This confirms and strengthens the significance of the conclusions with respect to heavy fuel oil which were stated above.

The calculations of the IC for 1972 and 1990 using model (6) are given in Table 10. The parameters $E=0.1$, $\kappa=1.21$ (for 1972- the ratio of profit to total net investment was taken), $\kappa=1.25$ (for 1990). As is seen from Table 10, the relationships of the IC and actual prices for 1972 and 1990 are close and essentially differ from the IC in 1982. This is due to the fact that there is a 5 to 7 year gap between 1972 (1990) and the 1967 (1982–1984) mass price revision. Hence, the cost relationships for this period changed and actual prices are very differ ent from the IC levels than prices and IC in a year of price revision. For 1990 the calculations were carried out on the basis of a forecast made by the authors.

Table 7

IC-indices to actual wholesale prices in 1982 with turnover tax (1) and shares of rent in IC (2) calculated by the model of "production price", when $E=0.1$ and $\mu=0.072$.

Name of sector	(1)	(2)
Iron-ore industry	15.3	22.t
The rest of ferrous metal industry	1.36	0
Coal (Europe)	2.14	18.4
Coal (Asia)	2.13	18.2
Oil-extraction	3.35	56.8
Oil-processing	1.98	0
Gas-extraction (Europe)	2.26	27.7
Gas-extraction (Asia)	1.96	17.5
Other Kinds of fuel	1.69	0
Electric power (Europe)	1.65	0
Electric power (Asia)	1.62	0
Engineering and metalworking industry	1.16	0
Chemical industry	1.35	0
Timber industry	1.45	16.6
Woodworking and pulp-and-paper industry	1.11	0
Buildigng materials	1.3	0
Litht idustry	0.85*	0
Food industry	1.35*	0
Other industries	1.38	0
Grain	1.48**	37.6
Livesstock-raising	1.55**	15.7
Forestry	1.21	0
Construction	1.2	0
Transportation and communications	1.38	0
Trade, material and rechnical supplies and state purchases	1.17	0
Other branches of materiai production	1.08	0
The whole of the natio nal economy (national income)	1.25	19.4***

(*) To retail prices.
(**) To state purchase prices in 1983.
(***) The share of national income.

Table 8

IC for products of the fuel-and-power complex (rubles per one ton of conventional fuel) when $E=0.1$ and $\kappa=1.25$.

product	IC calculated from sectoral data in actual prices (1)	IC with reflection of intersectoral interactions (2)	The influence of intersectoral interactions (2) : (1)
1. Coal (Europe)	40.9	47.0	1.19
2. Coal (Asia)	20	25.1	1.2
3. Gas (Europe)	38.8	47.3	1.26
4. Gas (Asia)	22.6	25.0	1.11
5. Oil	55.3	6ℰ.4	1.17
6. heavy fuel oil	44.6	50.3	1.13

5. The use of IC levels for revision of wholesale and state purchase prices.

When revising prices it is necessary to take into consideration the inertness of structural

Table 9

IC for products of the fuel-and-power Complex (rubles per one ton of conventional fuel) when $E=0.08$ and $\kappa=1.25$

Product	IC calculated from sectoral data in actual Prices (1)	IC with reflection of intersectoral interactions (2)	The influence of intersectoral interactions (2) : (1)
1. Coal (Europe)	36.7	48.3	1.31
2. Coal (Asia)	18.1	22.9	1.26
3. Gas (Europe)	37.6	48.5	1.29
4. Gas (Asia)	21.9	22.9	1.05
5. Oil	67	81.4	1.22
6. heavy fuel oil	56	67	1.20

Table 10

IC indices to actual wholesale prices for 1972 and for 1990 ($E=0.1$)

Name of sector	1990	1972
Iron-ore industry	1.69	1.42
The rest of ferrous metal industry	1.32	1.28
Coal (Europe)	2.48	2.25
Coal (Asia)	2.44	2.09
Oil-extraction	4.t8	4.18
Oil-processing	1.83	1.76
Gas-extraction (Europe)	2.62	2.25
Gas-extraction (Asia)	2.24	2.09
Other kinds of fuel	1.28	1.25
sElectric power (Europe)	1.68	1.4
Electric power (Asia)	1.63	1.36
Engineering and metalworking industry	1.12	1.05
Chemical industry	1.26	1.1
Timber industry	1.62	1.61
Woodworking and pulp-and-paper industry	1.14	1.26
Building materials	1.24	1.18
Light industry	0.84*	0.97*
Food industry	1.41*	1.97*
Other industries	1.36	1.34
Plant-rgowing	1.48	1.75
Livestock-raising	1.58	2.16
Forestry	1.06	1.26
Construction	1.11	1.17
Transportation and communications	1.35	1.25
Trade, meterial and technical supplies and state purchases	1.11	1.04
Other branches of material production	1.15	1.11
The whole of the national economy (national income)	1.24	1.22

(*) To retail prices.

proportions of production. The volume of profits in the manufacturing sectors must ensure self-financing ; e. g.,together with amortization for full restoration of assets, they must cover the average annual volume of investment in a given sector. In those manufacturing industries which are characterized by a high differentiation of profitability(engineering,light

and food industry) a higher price level is provided so that when setting new prices the level of unprofitability of the enterprises does not increase. These are the principles of the price revision.

The authors have calculated the sectoral indices of a price system which may be used as the basis the revision. The calculations were carried out using model (6) with the following modifications. The normative $\kappa=1$ in manufacturing sectors having a high differentiation of profitability, except for the costs of self-financing, including an extra sum (an increment which is necessary for setting the level of profitability) after revision to a new pricing system. Thus, the profit in (6) is given as :

$$\Pi_j=K_j+\Delta\Pi_{ij},$$

where Π_{ij}–an increment in profits to maintain the level of unprofitable enterprises.

Agricultural prices were determined, not by the level of incremental costs but by using average costs.

Table 11 contains the results of the calculations. Prices for fuel rises on the average by two times (for oil by 4 times), for timber and metal by 1.5 times. Prices in the manufacturing sectors rise slightly. The general level rise : for national income by 5.2 per cent, for gross output by 17 cent, for industry by 22 per cent.

The most important limitation for possible variants of the price revision is imposed by the available break in the levels of production costs and retail prices for products of agricultural origin and very great volumes of subsidies for to cover the difference in retail and state purchase prices for these products.

The negative consequences of this break impose a strict constraint on the rise of the general level of wholesale and state purchase prices, and particularly in the level of state purchase prices for agricultural production, and accordingly, on variants of the revision of the system of financial flows.

With regard to this restriction, at the first stage, state purchase prices, apparently, can not be set at the level of the IC (which are 10 to 40 percent higher than average prices) and can be at best ensure only self-financing of a sector as a whole and liquidation of price allowances for delivery of power, fertilizers and technology to agriculture. The general level of state purchase prices must rise by 10 to 15 percent. When doing this the prices for various kinds of agricultural products must be brought to correspond with plans for expanding or cutting their production and to stimulate these processes.

Table 11

Indices of sectoral levels of calculated prices to actual wholesale and state purchase prices of 1990

Name of sector	
Iron-ore industry	1.53
The rest of ferrous metal industry	1.31
Coal industry (Europe)	1.9
Coal industry (Asia)	2.33
Oil-extraction	3.43
Oil-processing	1.85
Gas-extraction (Europe)	2.5
Gas-extraction (Asia)	1.95
Other kind of fuel	1.66
Electric power (Eurore)	1.43
Electric power (Asia)	1.42
Engineering and metalworki'ng industry	1.04
Chemical industry	1.15
Timber industry	1.51
Woodworking and pulp-and-paper industry	1.1
Building ma erials	1.2
Light industry	1.08
Food industry	1.0
Other industriers	1.12
INDUSTRY TOTAL	1.22
Plant-growing	1.15
Livestock-raising	1.12
Forestry	1.12
Construction	1.04
Transportation and communications	1.23
Trade, material and technical supplies and State purchases	0.9
Other branches of material pruduction	1.03
The whole of the national economy	
For the national income	1.052
For the gross output	1.172

6. Problems in the introduction of a new tax system in the USSR

The main tasks of economic restructuring in the USSR may be defined as follows : the over-centralized mandatory system of management,

with respect to state property, and "kolkhoz" property must be replaced by independent economic activity in state cooperatives and other enterprises and individual enterprises under market conditions, competition and full management accounting (self-financing) when economic indirect methods of state regulation are used.

The creation of a modern tax system must be considered as the most important part of any such restructuring.

At present, a tax system which plays such an important role in the state regulation of economic life in industrially developed countries is absent in the USSR.

When economic management does not rely upon market mechanisms, prices play an insignificant part in forming production and distribution plans for products ; labor payment levels, allotment of resources(including financial means) are set according to rates, or by direct administrative distribution ; the question of the withdrawal from the profit or wage fund is not of great importance. Financial means or wage funds are allotted in such volumes as are necessary for plan fulfilment. The financial system, therefore plays a fiscal role.

For the economy to adapt to a market mechanism for the economy in order to ensure management as a means of influencing the economy, a tax system becomes the main regulator.

One of the principal differences between the actual Soviet financial system and tax systems of developed countries is that the tax base of local budgets (including budgets of the Union Republics) is so limited that local taxes cover only a small part of expenditures. Soviet Union Republics receive 60 percent of their revenues from the state budget.

An essential share in (1987–21) percent of state budget revenues is produced by the turnover tax. It was instituted during the period of the NEP when prices and market relationships played a more essential role in influencing production. Its purpose was to ensure the means for accumulation and the carrying out forced industrialization by the State by reducing the wholesale price level for the means of production sold to state enterprises in comparison with the prices of the commodities sold to the non-state sector; to peasants and the general population. As a result of total collectivization, the peasantry was integreted into the system of administrative management. The turnover tax became a financial tool to the gap between retail and wholesale prices. In the thirties the rerenue tax was the main source of state budget revenues (in 1948–58.7 percent). While production costs and prices for non-food consumption goods were rising quickly, retail prices for food-stuffs were being artificially held back. This led, in the beginning, to a reduction in the turnover tax and then, in the sixties, to subsidies from the state budget, and retail prices for food arose.

At present, a considerable amount of the turnover tax is approximately balanced by the volume of subsidies to maintain retail prices for food. However, the price system supported by these financial flows has some essential deficinciees. The majority of economists recognize that maintaining the tax is not desireable except that its removal will cause difficulties in correcting historic distortions in the production, price and in come systems.

Some part of the turnover tax islevied on the means of production (from oil, for example). Thie is sometimes interpreted as a way of withdrawal of rent for use of natural resources. This share of the turnover tax will also lose its justification if payments for the use of natural resources are collected directly in some form or other. The only part of the turnover tax that is fully justified is that set on the sale of socially undesirable goods such as alcohol, tabacco and objects of luxury.

The adoption of a value added tax similar to those in the European Common market is

not a reasonable alternative because of technical difficulties and the limited possibilities of using it as a tool to influence the behavior of economic units.

Taxes from the population account for 7.5 percent of revenues in the state budget. An overwhelming share of these taxes (94 per cent) consists of income tax on wages and salaries whih have become practically "linear' with a single rate of 13 percent (the number of workers and employees paying this tax at a lower rate is 10 percent). If incomes from foreign trade are not taken into account, the major share of revenues (about 30 per cent) is received by the state in the form of deductions from the profits of state enterprises (approximately 20 per cent) and payments for production assets (10 percent). Payments for natural resources are practically nonexistant.

The main task in the reconstruction of the economic system may be defined as the transiion from mandatory administrative methods of management to economical, i. e., financial and credit methods. After this transition the State should retain the function of forming conditions for economical activity and regulating them by indirect means. Economic activity should be performed by independent economic organizations-state, cooperatives and mixed. Accordingly, state revenues and expenditures must be sharply reduced. Until recently, only enterprises were recognized as economic entities relatively independent of the State, and the need to extend their independence and self-financing was to be found in all documents of the Party and the State. In the Law on the State Enterprise adopted in 1985, the right to dispose of property has been granted to the enterprises, taking into consideration the broad rights of the working collective to which they pass, and to the working collective of the enterprise disposing of the property.

Under these conditions, the decision to grant full independence to the enterprises when the State's influence on them was limited mainly to the uniform tax system and credit regulation, evidently, would be far from reasonable. It would not be fair and, perhaps, not efficient as well. It is unfair because different collectives would receive a greater share of property rights (namely use and disposition rights) sharply affecting differing parts of public assets. It is also iefficient because the interests of working collectives are often limited by questions regarding labor payment and the organi zation of public service and amenities.

Since a high or low level of profitability is, as a rule, beyond the control of a working collec tive which is not economically independent, profits must also not be left at their disposal.

It should assumed that maintaining a part of the profits and some of the property rights to prevent the alienation of the workers is undoubtedly reasonable and is of great social and economic importance. In the USSR the following incentive funds are left at the enterprises'disposal : the material incentive funds, social development funds and production development funds. In 1987, deductions to these funds accounted for 20 percent of the state enterprises' profits.

Also reasonable is the opportunity of workers to buy stock shares in their enterprise' as is the case in many capitalist countries where privatization of state enterprises have taken place. This principle should also be taken into consideration when joint-stock companies are created in the USSR. The participation of workers in the ownership of the enterprise should be encouraged.

However, at first, it is reasonable to transfer to the possession of the collective a share of the property relative to the incentive funds share in the profits. Later, only a relatively small share of the profits should be left to the collective. As a matter of fact, the Law on State Enterprises is not presently being enforced. The right of disposal, and also property

rights such as (development of production programs, sale of production to other customers, use of incomes and so on), are rather strictly controlled by ministries and departments, state and local govermenal bodies.

Profits are withdrawn from the enterprises by means of payments for assets and deductions from profits, which are set by the relevant agencies for inclusion in the state budget. A question arises: how do we eliminate the arbitrary nature of the administrative system without resorting to an unfair and ineffective "distribution" of state property to working collectives?

The main problem of controlling the economy with the help of an administrative-mandatory system is that this system is irresponsible, its interests are not subordinated to the task of raising economic efficiency. The rights, responsibility, criteria of evaluation of activity of organizations-participants in the ecnomic process are not demarcated, defined, or formalized. Therefore, as it is, now state property has turned out to belong to "no one". In our opinion, these problems can be solved if the administrative system is replaced by a system of modern credit-financial institutions (banks, holding compnies), in a competitive situation, under the control of the market place.

Each state enterprise in this situation must be a joint stock company whose shares belong to the collective enterprise, partly a state bank or holding company and also partly to a local Council.

Under the actual economic mechanism, payments for assets may be considered as an analogy of incomes from state property. When it was introduced in 1965 it was assumed that a single rate would be set and this rate would ensure minimal efficiency of assets use. However, the initial value of the assets used as a measure of their value did not at reflect their real efficiency. Therefore, the single rate was immediately replaced and a reduced rate was set for some enterprises, and others were freed from this payment. Obviously, a substitution of dividends from state property for the normative payment for assets in the process of creating an investment market, provides the only a chance to efficiently coordinate these deductions from profits for assets with received gratis from the State. This will essentially allow us to equalize the starting conditions of different working collectives as the firms enter the competitive market.

The main advantage of a transition from the payments for resources to a clear division of joint-stock property (of ownership and disposition rights) between enterprises and the State is that the normative payments provided only a fiscal function and were under the control of the largely irresponsible bureaucratic system. A state holding company, or a bank-owner possessing the shares, can make the most efficient use of the shares and raise their value.

It is possible to try and determine what constitutes the actual mechanism of profit use in terms of the Western financial system: payment of a part of the profits to the State payment for production assets, investments in fixed assets and in development of science and technology, apart from incentive funds-incomes from state property; material incentives and social development funds plus covering the expenses for housing and public utilities, and maintenance expenditures for educational and cultural institutions-incomes from property of small shareholders (under our conditions-mainly of working collectives). In 1987, the first item accounted for 28 per cent of the profits, the second 23 percent, the third 17 percent. The remainder, 32 percent. They are used for increments of current assets, formation of insurance and reserve funds, interest charges, deductions to funds for the development of production, science and technology etc.

Another comparison is based on the fact that the material incentive funds should not be

considered as the income of small shareholders (working collectives) but as a fund to allow participation of the working collective in profits, formed independently of the distribution of joint-stock property. Then, the incomes from property will account for only 30 percent of the profit: 23 percent-the incomes of the State, 6 percent-the income of the working collective. This plan seems more acceptable as a starting point for the initial distribution of property: 75 percent for the State, 26 percent for sale to small shareholders and, perhaps, for a partial transfer to the working collective. The profit tax rate would be approximately 30 percent. It does not matter whether the state property is transformed into shares or not, since different variants of the profit tax system and payments for resources using a variety of price systems are available.

7. Variations of the financial structure of national income for different price systems

In this section, payments for assets may be interpreted as income from state property and payments for labor resources as a basis for a localized tax system.

The transition to new prices essentially changes the financial structure of national income and the state budget. The methods of evaluations of these changes and the results of the calculations are given below.

The indices obtained show the ratios of calculated to actual wholesale purchase prices or the gross output computed in calculated prices to the gross output in actual wholesale prices[1] (for agricultural production in state purchase prices, for services in actual tariffs). It differs from gross output in final consumption prices by the sum of the turnover tax levied in the non-productive consumption sphere. Gross output in calculated prices can be obtained from the following formula:

$$x_0^* = \sum_i P_i x_i \qquad (9)$$

where x_0^*–gross social output in calculated prices;
P_i–indices of calculated prices;
x_i–gross output of sector i in actual wholesale prices.

The final product calculated in actual wholesale prices differs from the final product in final consumption prices by the sum of the turnover tax levied in the non-productive sphere, and is obtained as follows:

$$Y_0 = \sum_i (y_i - N_i) \qquad (10)$$

where Y_0–final product calculated in actual wholesale prices;
y_i–final product of sector i calculated in final consumption prices;
N_i–turnover tax on production of sector i going to non-productive consumption.

The einal product in calculated prices is obtained as follows:

$$Y_0^* = \sum_i P_i (y_i - N_i) \qquad (11)$$

where Y_0^*–final product computed in calculated prices.

Total volume of material input in calculated prices is determined by the formula:

$$M^* = \sum_j \sum_i P_i x_{ij} \qquad (12)$$

where M^*–total volume of material input computed in calculated prices;
x_{ij}–volume of production of sector i consumed in sector j.

Structure of conventional net production computed in prices of the first stage changes as follows. The amount of profit is revalued by the formulas (2) and (3).

Amortization is revalued according to the technological structure of fixed assets:

$$A^* = \sum_j \sum_i P_i d_{ij}{}^F A_j \qquad (13)$$

1) Or, more exactly, in whloesale prices with the addition of commercial rebates and transportation charges.

where A^*–total amount of amortization computed in calculated prices;

A_j–amount of amortization in sector j.

National income is obtained by subtracting amortization from the final product:

$$H^* = Y^* - A^*$$

where H^*–national income computed in calculated prices.

Payment of labor including wages, payments of the wage-type, payment the labor in 'kolkhozes' and bonuses is maintained unchanged. Deductions for social insurance in calculated prices are set at the level of 14 percent of wages.

In net product computed in calculated prices a new element appears-rental income which is the difference between calculated prices and average costs:

$$R = \sum_j (p_j x_j - \sum_i p_i x_{ij} - W_j - \Pi_j - \sum_i p_i d_{ij}{}^F A_j) \tag{14}$$

where R is the amount of rent.

The proposed calculated prices should be used to change wholesale and state purchase prices. At the same time, a change in retail prices is not suggested. Therefore, the differences between retail and wholesale prices or between retail and state purchase prices, which coincide approximately with the magnitudes of turnover tax levied in the non-productive sphere and with subsidies to prices for agricultural production, must be changed. The last magnitude is not identical with the volume of "balance of relations with the state budget" indicated in the intersectoral balance, because this balance reflects subsidies for all production, not only that which is consumed in the non-productive sphere.

In order to evaluate the influence of change of actual wholesale prices by calculated prices on the amounts of turnover tax and balance of relations with the state budget, the following simplified assumptions were formulated:

1. All production making up non-productive consumption is realised at actual final consumption prices.

2. The total amount of turnover tax in the food industry remains unchanged because an overwhelming part of it is the turnover tax on alcohol drinks and tobacco.

3. In all other sectors the difference of volumes of nonproductive consumption computed in actual prices of final consumption and in calculated prices is interpreted as a new rate of turnover tax if this difference is positive, and as a subsidy if it is negative.

In other words, for computations of the new levels of turnover tax (N_i^*) and of the balance of relations with the state budget (D_i^*) in the non-productive sphere the following relations are used:

$$N_i^* = [Q_i - P_i(Q_i - N_i)]^+ \tag{15}$$

$$D_i = [Q_i - P_i(Q_i - N_i)]^- \tag{16}$$

where N_i^*–turnover tax on production of sector i levied in non-productive sphere;

D_i^*–subsidy for production of sector i going to non-production sphere;

Q_i–volume of production of sector i going to non-productive sphere in actual prices of final consumption;

N_i–turnover tax in actual prices.

$$[a]^+ = \begin{cases} a, & a > 0 \\ 0, & a \leqslant 0 \end{cases}; \quad [a]^- = \begin{cases} 0, & a \geqslant 0 \\ a, & a < 0 \end{cases}$$

Formulas (15) and (16) were used in all sectors except the food industry. For the food industry, according to the assumption stated above, the following relations were used:

$$N_n^* = N_n \tag{17}$$

$$D_n^* = Q_n - P_n Q_n - N_n^* \tag{18}$$

Gross output and final product computed in new prices of final consumption are obtained by the addition of the algebraic sum of the turnover tax and subsidies to the same levels in wholesale prices:

$$x_p^* = x_0^* + N^* + D^* \tag{19}$$

$$Y_p^* = Y_0^* + N^* + D^* \tag{20}$$

where x_p^*, Y_p^*–gross output and final product in new prices of final

consumption;

N^*, D^*–total amount of turnover tax and subsidies.

The total rise of national income in prices of consumption is 5 percent (see Table 11).

If retail prices characterize (under conditions of equilibrium of demand and supply)the utility of different kinds of goods (consumers consumption evaluations), then wholesale and state purchase prices characterize the production potentialities and costs(production evaluations).

In order to have a more demonstrative measure of the total volume of change in wholesale and retail prices, it seems reasonable to use national income, in which all the volume of production (including also personal consumption) is computed in these prices (production evaluations). The difference of national income in production and consumption evaluations is equal to the difference between subsidies to retail prices and the turnover tax imposed on consumption goods. Since price subsidies on the means of production must be liquidated, the total volume of price subsidies must rise by 10.9 billion rubles. The turnover tax on consumption goods decreases by 10.7 billion rubles.

On the whole, after a price revision, the change of national income in consumption evaluations is less than the change in production evaluations by 21.6 billion rubles. According to our calculations, the changes in elements of the national income in 1950 can be equal to the values shown in Table 13.

Raising the deductions for social insurance is connected with setting a single normative for all sectors of the national economy at the level of 14 percent of wages.

The reduction in the turnover tax is connected with two factors. More than half of the reduction is due to the transfomation of the turnover tax into rent assessed the oil-extraction industry. As was noted above, this type of tunover tax may be interpreted as an "oil rent" levy. The proposed raising of prices for oil will lead to the appearence of rent in an explicit form.

The raising in prices for oil will also lead to a reduction in income from foreign trade. At present, oil is delivered to exporting organizations at low prices which do not include rent for natural resources. Therefore, a part of the income from foreign trade may also be considered a form of rent. Setting prices for oil on the basis of the IC and calculating rent in an explicit form allows us to evaluate more accurately the volume of incomes resulting directly from foreign trade activity.

8. The calculations of variants of the system of payments to the state budget

Incomes and expenditures in the state budget will also change after the transition to a new system of prices and payments. These changes are shown in Table 14. When prices are revised, investment expenditures from the state budget will decrease, cutting the redistribution of profit for these purposes between sectors through the budget. Budget incomes will rise for deductions for social insurance. The turnover tax will fall as wholesale prices rise and some part of the turnover tax will be levied in the form of rent. The other items of budget revenues in different price systems are assumed to be equal.

From the point of view of the stimulatve influence of a tax system, the general rates of withdrawal, i. e., the ratio of the total amount of taxes and payments to total profits is very important. The levying of different rents for natural resources plays an essentially smaller part because these payments affect only enterprises in the extracting sectors and the size of the rental payment is mainly predeter mined by differences in the objectives and other natural conditions. The question of the relationship between payments for assets, labor resources and net profit tax should also be

noted. The ratios of withdrawal of the sum of these payments and the tax on profits minus rent are : in actual prices-44.7 percent, in calculated prices-58.9 percent. These rates also show the magnitude of the tax rate on profits minus rent when there are no payments for assets and labor resources.

The variations of price systems and payments may be assessed correspondingly to the profits remaining to the enterprises of a sector after taxes and other payments required for economic stimulation, financing of investments for development of production, scientific and technological development, increase of current assets, and so on are deducted.

When payments for assets and labor resources under actual prices are excluded, self-financing in such sectors producing raw materials such as coal, oil-extraction, the gas industry, agriculture and transportation and communicatons is not ensured. These industries would require essential tax advantages. On the contrary, industries such as the light, food, ferrous metals, and machinery would have many superfluous financial resources. The profits that these sectors would receive under the proposed price system would better correspond to their actual needs.

In the variation where the rate of payment for assets is 6 percent for all sectors in the sphere of material production (SMP), the total amount of payments for SMP totals 116 billion rubles and covers the amount of payments from profits which are necessary for the budget under both the actual and proposed systems. There is no need for any other payments and taxes. For the proposed price system, even a rise of the rate to 5.3 percent would be adequate. If such a high rate of payment for assets were set in actual prices, then additional support would be required for transportation, agriculture, the major fuel industries. At the same time, the machinery, light and food industries would have many superfluous financial resources. The transition to the proposed price system would change the situation only for fuel industries.

Table 12
Net Profit Tax Rate (percent)

Payment for labor resources (rubles)	Price system	
	Actual	Calculated
0	28.2	21.6
100	24.5	17.7
300	15.6	8.5

Table 13
Changes of Elements of National Income in Connection with Price Revison

	Billions rubles	Percent to national income
Produced national income (PNI)		
1. Rent	+84.8	+13.1
2. Profit	−10.5	− 1.6
3. Deductions for social insurance	+ 0.8	+ 1.4
4. Turnover tax	−25.2	− 3.9
inclucing		
on means of production	−14.6	− 2.2
on objects of consumption	−10.7	− 1.7
5. Subsidies to retail prices	+18.9	+ 3.0
6. Subsidies for means of production supplied to agriculture	− 8.0	− 1.3
7. Incomes from foreigh trade	−13.5	− 2.1
TOTAL		
PNI in consumption evaluations	+33.5	+ 5.2
PNI in production evaluations	+55.1	+ 8.6

The variation in the payments for assets with a rate of 6 per cent and for labor resources of 300 rubles for one worker may be adopted only under the following conditions : The normative rates are maintained only for industry. In the extracting industries revenues of payment for assets and labor resources are ensured at the expense of cutting the volume of rental payments. In other sectors of the national economy essential tax advantages are introduced.

The variation in the rate of payment for assets of 3 percent appears the most preferable (the sum of payments would be 58.8 billion rubles ; for agriculture this payment is not introduced). The following rates of payment for labor resources were assumed : O ; 100 rubles and 300 rubles for each worker. The absolute values of these payments for SMP would be O ; 9.8 billion rubles and 29.5 billion rubles. The net profit tax rate corresponding to

Table 14
Incomes and Expenditures of the State Budget and Profits in the Material Production Sphere

Indicators	in actual prices	in calculated prices
1. Incomes-Total	510	540.2
2. Real incomes (minus fund of loans and deficiency)	418.2	448.2
3. Turnover tax	109.1	72.0
4. Payments from profit including	129.6	183.6
payments from profit of SMP (including kolkhozes) including	114.6	168.6
rental payments	—	65.2
other payments	114.6	193.4
5. Deductions for social insurance	33.1	46.4
6. Incomes from foreign trade, taxes, revenues from citizens and others	146.4	146.4
7. Loan fund	58.3	58.3
8. Deficiency	33.5	33.5
9. Expenditures-total	510.0	540.2
Increase(+)decrease(−) of expenditures for:		
investment	—	−17.7
subsidies to agriculture	—	+10.6
for socio-cultural purposes	—	+36.3
TOTAL		
10. Profit in SMP	256.3	330.7
including rent	—	65.2
11. Profit minus rent	265.3	265.5
12. Profit left at the disposal of enterprises	141.7	162.1

them (minus payments for resources) are given in Table 12.

When comparing these variations it should be kept in mind that given the weakness of the working collectives in accumulating productive assets, essential tax advantages must be set for investment. Taxes on assets created at the expense of the enterprices' own investments must be low or no taxes will be generated.

Under these conditions, systems of payments and taxes with a rate of payment for assets of 3 percent for labor resources of 100 rubles for each worker and with great tax advantages for investment (the initial tax rate will be essentially higher than that in Table 12) and with the payment for assets affecting only assets received from the State are preferrable. A rise in the share of assets created at the expense of the enterprises, or borrowed from the enterprises can lead to a decrease in the increments of payments for assets. This process however, would be compensated for by a decrease in the requirements for budget investment.

An analysis of the variations from the point of view of correspondence of profit mass in sectors with their requirements for financial resources shows that under the proposed price system this correspondence is much better than under the actual prices system.

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