

ECONOMIC SYSTEM AND THE VALUATION OF NATIONAL INCOME¹

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Lead: Economic System and National Income Valuation

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Abstract. This paper analyses the methodology by which Western estimates of the size and growth of the Soviet economy were derived - Adjusted Factor Cost Standard (AFCS). The main assumption underlying AFCS, cost minimization, is examined in light of the evidence of producer behavior in the Soviet economy. It is demonstrated that production enterprises were striving to maximize cost within the constraints imposed by the planners. If so, AFCS is not an appropriate method of valuation of the Soviet national product.

1. Introduction

Economists have been studying markets for several centuries, and hierarchical organizations for a much shorter period. This creates a methodological dilemma for students of centrally planned economy or intra-firm organization. When faced with a particular issue, they can adopt a model from the rich arsenal developed for the analysis of markets, or build a model tailored specifically for the problem at hand starting from the basic assumptions. The former strategy produces definite results at the risk of missing or distorting important characteristics of the object of study. The latter strategy means working with the embryonic conceptual apparatus that does not yield many results, but promises greater accuracy down the road.²

The practical need to assess Soviet economic performance arose when the systematic study of centrally planned economies was still in its infancy. National income accounting techniques developed for market economies were adapted for the institutional peculiarities of central planning in early 1950s under the name of Adjusted Factor Cost Standard (AFCS; see Bergson, 1953, Chapter 3). AFCS won broad acceptance and was used by the CIA over several decades for regular compilation of the Soviet national income accounts.

The CIA estimates have recently been disputed by critics offering alternative, lower numbers for both the size and growth rates of the Soviet economy.³ The major weakness of the alternative estimates is that they are all derived by *ad hoc* methods. By contrast, CIA estimates are based on an explicit methodology rooted in neoclassical production theory (i. e., AFCS). So far, this methodology has escaped the controversy.⁴ Without committing to any of the contending estimates, this paper examines the assumptions underlying the AFCS in light of the evidence of producer behavior in the Soviet economy.

2. What AFCS does and why

It was admitted early on that the welfare concept of national income was inapplicable in the Soviet case, because consumers did not have much of a say in what was being produced, and prices bore no relation to consumer preferences. While the institutional setup of production in the USSR was also quite different from that of market economies, it was argued that it conformed to the key assumption of the neoclassical production theory - cost minimization. This made the production capacity concept of national income, with products valued at their resource cost, applicable to the Soviet economy.

AFCS, based on the latter concept, requires the proportionality of wages to marginal productivities of labor in different occupations (Bergson, 1953, p. 66, and 1961, p. 105). For this to be the case, it has to be that "The employing enterprise or superior agencies seek systematically to economize money costs." (Bergson, 1953, p. 66). Cost minimization is justified by reference to the Soviet planning and management procedures: "the individual enterprise as well as superior agencies are expected to concern themselves with cost economy. ... the government seeks to sharpen this concern by paying premiums to managerial staff which are calculated on the basis of cost economies achieved; at all levels, cost reduction is one of the bases for appraising success." (*ibid.*, p. 67).

The well known argument that the realism of assumptions is irrelevant for the theory's appraisal (Friedman, 1953) does not apply here, even if it is accepted as a general principle.⁵ AFCS was originally justified by claiming that its assumptions reflected the actual workings of the Soviet economy. Therefore additional evidence on producer behavior can be brought to bear on the validity of AFCS.

3. Why producers maximized cost

Production enterprise managers' job was to execute numerous plan targets relating to different aspects of their enterprises' activity. The targets had different priorities for the higher authorities. Rewards and punishments to managers were tied to success or failure in meeting the targets and varied according to their priority. Output targets were the most important ones, because of their role in planning and enforcing the flow of supplies throughout the economy, the planners' main concern (Grossman, 1963). The most severe punishments, such as expulsion from the party and dismissal, were used to enforce output targets. The most important output targets were set in physical terms. Output targets of some products were set in value terms.

Gross value of output target ranked as high as those of physical output. It served as the aggregate indicator summarizing the most important aspect of the enterprise's performance. Meeting this target was one of the main objectives of the managers. Increasing value of output by producing more required managers to expend extra effort to procure more inputs and organize production. The payoff to this additional effort was highly uncertain, given the vagaries of supply system. In situations when prices could be increased by the producer (delineated in the next section), this was the preferred way of reaching gross value of output target (Kremianskii, 1981, p. 61). Taut planning frequently made price increases the only way to meet gross value of output targets (Kraft, 1988; Vainberg, 1988).

Two major additional benefits were tied to the magnitude of gross value of output. It served as a basis for determining the planned wage fund, the amount producers were allowed to pay to their workers. When planned value of output could be increased effortlessly (e. g., by using a more expensive material), managers would even welcome higher (and re-

sist lower) gross value of output targets, the reversal of their usual behavior in target setting.⁶

Higher prices also brought higher profits. This made it easier to meet the profit target (one of the lower ranking targets) and increased the pool from which bonus fund could be drawn. For all these reasons, enterprises had a strong interest in higher prices of their output.⁷ And raising prices necessarily required raising costs (Ash, et al., 1988, pp. 88, 104-105, 129).

4. How cost was maximized

The main purpose of cost maximization was to set a higher price for one's output. Therefore, price setting policy and practice determined the form and extent of cost maximizing behavior. A product's price had to be administratively set equal to its average sectoral production cost plus profit. The latter was calculated as a fixed markup over production cost.⁸ In practice, the task of establishing and updating tens of thousands of prices annually overwhelmed the authorities' capacity to collect and process information. This created areas of managerial discretion in price setting.

Price setting for one-of-a-kind products - most of nonresidential construction and the manufacture of custom-made equipment - was officially delegated to the producers. In setting their prices, producers were still bound by the official formula, i. e., they had to establish the cost and then add on a fixed markup for profit. Obviously, the cost in question was the individual cost of a given producer, rather than the sectoral average. In construction, the price (i. e., the "estimate cost") of a project could be repeatedly revised during its progress to accommodate cost overruns (Kontorovich, 1989, p. 322).

Cost maximization was a general mode of behavior in nonresidential construction ("Valovoe ...", 1989, p. 41).⁹ Starting with the design, and all the way through the completion of the project, the contractor was trying to use larger quantities of materials, more expensive materials, and concentrate on material-intensive stages of construction.¹⁰ (Due to the accounting methods, the material cost was driving the "estimate cost" of the project.) This accounted for such peculiar features of the construction sector as the wide use of prefabricated armored concrete parts and the preference for digging foundation pits over all other stages of the project, especially the finishing ones (Kontorovich, 1990, pp. 20-25).

In other sectors, prices of established products were fixed, and cost maximization proceeded differently. The official encouragement of innovation by producers created opportunities for price increases the sectors with high rate of product innovation and/or heterogeneous output (instruments, some sectors of machinebuilding). An old product would be discontinued and a new one introduced. The improvement embodied in the new product may be fictitious or trivial; still, it needed a new price.

Prices of new products were proposed by the producers and approved by the authorities. While the latter tried to check the calculations behind all the proposals, they lacked both the resources to deal with all the new cases, and the information necessary to check the enterprises' calculations and claims of novelty. The approval turned out to be largely *pro forma*.¹¹ Since all the producers were facing the same incentives to raise prices by inflating costs, the users did not resist higher input prices, and may have actively preferred the more expensive ones.¹²

The prices of new products were officially considered to reflect higher quality, and therefore entered the official time series in "comparable prices" without any adjustment.

Hence “concealed inflation”, a process at the center of the 1980s Western controversy about Soviet growth estimates mentioned above.

Enterprises did not have a completely free reign in setting new product prices. Adherence to the formal rules of price-setting, such as the relation of profit to reported costs, was easy to verify, so few violations should be expected in this area. Price proposals generally had to indicate higher cost in order to support a higher price.¹³ (Obviously, it was the individual cost that served as the basis for new product prices.) Hence cost maximization by the producers.

Such understanding of the workings of concealed inflation helps to explain a peculiarity in the machinebuilding output data that was noticed by several authors. Concealed inflation was thought to arise from the managers’ drive to boost enterprise profits (Steiner, 1978, pp. 12-13; Pitzer, 1982, p. 37). It was also thought to be significantly more pronounced in machinebuilding than elsewhere, and to accelerate in the late 1960s and the 1970s (Khanin, 1991, p. 219). A sector that raises prices faster than the others should have had an increasing profit margin. Yet the ratio of profit to the cost of the machine-building’s final output in 1960-1975 showed no trend (Bergson, 1987, p. 417; Fal’tsman, 1980, p. 129). Unit prices in machinebuilding in 1966-75 trailed the average unit costs and in 1976-85 increased at the same rate as the costs (Gogoberidze and Deriabin, 1987, pp. 14-15). If prices were inflated by inflating costs, as argued here, then this is the picture one would expect to see.

The strategies described above were practiced in most of the investment goods and services sector.¹⁴ Cost maximization cannot be dismissed as an aberration occurring in spe-

cial situations, unless this whole sector, the most dynamic in the Soviet economy, is declared such a special case, where AFDC does not apply.

Prices of consumer goods were more effectively controlled than those of producer goods just discussed. Here, yet another method of raising prices and costs was common. Producers shifted the product mix away from the lower priced (hence lower cost) products without the regard for demand ("washing out" of cheap products; see Komin, 1988). This is not to say that "washing out" was unknown in producer goods sectors and the introduction of new costlier products - in consumer goods sectors (Borozdin, 1988, pp. 45-46).¹⁵

A cautionary note is in order. The arguments that prices of new products rise out of proportion to the improvement in their useful characteristics, and that product mix is divorced from consumer demand, are common among the critics of AFDC. They are also irrelevant, since AFDC is not intended to measure the welfare aspect of national income. My argument here, while invoking exaggerated product innovation and changes in product mix, has nothing to do with consumer evaluation of output. The managers' conduct is shown to be directed towards piling up costs of whatever they are doing, which does contradict the stated assumptions of AFDC.

The strategies of cost maximization discussed so far were observed in the sectors where heterogeneous output and product innovation made centralized price setting ineffective. These sectors have long been suspected of concealed and/or open price inflation, and therefore studied closely. It is from these studies that I draw the evidence on cost maximization. Sectors with homogenous output or with infrequent product innovations presented less of an information processing problem for the price authorities, allowing them to set

prices in the centralized fashion. Accordingly, these sectors attracted less scrutiny from the economists suspicious of the official Soviet data.

Yet cost maximization took place in the sectors with homogenous output and stable product mix as well, albeit within narrower constraints. While producers in these sectors had little chance of deceiving the price authorities in ways outlined above, they petitioned for special consideration in setting the price of their particular output. Price surcharges, subsidies, and tax rebates were granted to regions, sectors, and to individual plants.¹⁶ As a result of such favors, identical products made at different plants often carried different prices. Non-uniform pricing in itself violates one of the assumptions of AFCS (Bergson, 1953, p. 42). It also shows how prices could be changed to accommodate the cost in the sectors where authorities exercised effective control over pricing. At least one source blames part of the cost escalation in mining on the cost maximizing behavior in that sector, noted for product homogeneity and infrequent price changes (Lukinov, 1989, p. 26). (Cost maximization in such sectors need not lead to concealed inflation. When prices rose to accommodate cost, statistical authorities could have handled them adequately.)

Not all the costs claimed by the enterprises were actually incurred. Some represented pure falsification.¹⁷ The scope for such falsification is suggested by the assertion that the payroll of industrial enterprises was padded by about 10% as a means of avoiding wage ceilings (Belanovskii and Kuznetsov, 1994, pp. 119-120). Some of the extra inputs claimed for a new product went to a variety of other uses. Still, cost maximization had a clear impact on the technology and product characteristics, as the case of construction, mentioned above, demonstrates.

5. Constraints on cost-maximization

The scope for cost-maximization was broader where managers had more discretion, or, to put the same thing differently, planners constrained cost-maximizing behavior to the degree that they exercised effective control over the producers. Two such constraints were already mentioned in the previous section: the ability of price authorities to effectively set prices, which varied with complexity of products and the rate of product innovation, and their willingness to resist individual producers' pleas for special consideration.

Even when enterprises had significant discretion in price setting, there were likely to be limits on how much cost could be inflated without provoking the intervention of the authorities. Price proposals containing unusually high rates of cost and price increase for new products were more likely to trigger an audit by the State price committee. There must have also been a point after which making a product more material-intensive caused a sharp deterioration in performance. This could have provoked user complaints loud enough to attract the attention of one's superiors.¹⁸

Planners' actions in areas other than price setting also restricted the scope for cost maximization. Construction of new plants and production of new equipment based on resource-saving technologies were centrally planned. Once such plants were commissioned and machines installed, they lowered the production cost.

Enterprises were issued direct commands to reduce cost, such as plan targets for monetary cost reduction and norms for the use of specific resources. The ranking of these targets has been changing over time, but always remained lower than that of output targets. Correspondingly, cost reduction was stimulated by awarding monetary bonuses, while gross

value of output target was supported by both bonuses and the much more important administrative sanctions.¹⁹

Production planning "from the achieved level" forced more intensive utilization of some resources. Faced with a shortage of an input and an exacting output target, enterprises had to economize on that input (but not the others; see Granick, 1959, p. 116). Thus, it has been hypothesized that labor-saving innovations were getting warmer reception from producers than material- or energy-saving ones because of the relatively more inelastic supply of labor (Fal'tsman, 1990a, p. 25).

Cost reduction and output targets had two important side effects on the enterprise behavior. Planning from the achieved level and cost reduction targets applied to established ("comparable") products. New products had no "achieved level", and therefore offered an escape from these constraints. Cost and production commands also created an incentive for the producers to set planned cost high and to overorder inputs during plan construction (Belousov, 1965, p. 82; Veikov, 1989). If the producers of established goods with fixed prices were unable to maximize cost, they were not interested in lowering it, either. References to inflated labor norms suggest that the slack built in during price setting was preserved afterwards ("Valovoe ... ", p. 41, 1989). Inflated cost provided a cushion for fulfilling cost reduction targets. Too high a profitability rate invited an official price cut (Kushnirsky, 1986, p. 31). The cost of established products has been declining in industry (Kushnirsky, 1986, pp. 82-83). Writings on technological change suggest that most of the decline occurred in the first few years after the product's introduction.²⁰

The organization of supply making it difficult to substitute one input for another was a constraint on cost maximization, but no more than it would have been on cost minimization.²¹

6. Antecedents

New terms should not be introduced lightly. But neither should new phenomena be neglected because the existing vocabulary does not have the right word for them. “Cost maximization”, as used here, summarizes a range of behavior that has long been observed in the Soviet and other centrally planned economies.

Soviet economic institutions have been changing over the lifetime of the system. However, the motives and opportunities for cost maximization - the primacy of output targets, broad reliance on the gross value of output target, and cost plus pricing with incomplete central control - were always part of the centrally planned economy. For this reason, the argument of this paper, based on the Soviet evidence from the 1970s and 1980s, applies to other periods, as well.

The dysfunctional consequences of the gross value of output (*val*) target were being described by the Soviet economists since the 1920s.²² Gross value of output was by far the most important target in the 1930s (Granick, 1954, p. 153). Unauthorized price increases by producers were widespread in that period.²³

Alec Nove, using evidence from the 1950s, showed how the stress on the gross value of output target induced enterprises to use more expensive inputs and to shift product mix towards the more expensive models (Nove, 1958, p. 5-7). Labor productivity target, calculated as gross value of output per worker, strengthened this incentive. Cost reduction targets and commands to reduce the use of specific materials were used to counteract the

bias of gross value of output indicators. However, they were being bypassed through shading of product quality. Also, their usefulness depended on comparability of the current output with that in the previous year.

Nor was cost maximization an exclusive feature of the Soviet economy. Upward sloping input demand curves of the enterprises and other symptoms of cost maximization were observed in Poland (Zielinski, 1973, pp. 151-152, 188-189, 221).

This is not to say that the extent of cost maximization did not vary over time and across economies. While some of the organizational changes had no apparent effect on it (see notes 6 and 11), others may have influenced the strength of the motives for cost maximization, and the scope allowed for such behavior. Thus, cost reduction target had a higher rank, and profit target a lower rank before the 1965 reform. Other things being equal, this must have made cost maximization both easier and more attractive in the post-1965 period.

In the recent literature, two strands dealt with cost maximization or related phenomena. One, broad but shallow, emerged in the USSR in the late 1980s, as economic discussion was getting freer. The planning system itself was dubbed an "expenditure mechanism" (*zatratnyi mekhanizm*), i. e., one creating incentives to pile up costs without regard for the usefulness of the result. Schemes for introducing market-like behavior were said to promote the "anti-expenditure principle", i. e., cost minimization (Twigg, 1991).²⁴

Another strand is the literature on "soft budget constraint", producer behavior built on the expectation that any shortfall of expenses below receipts will be, with high probability, covered by the state. Soviet economy presents the clearest case of such behavior (Kornai, 1986, p. 13). The four ways of softening the budget constraint - cost-plus administrative prices, individualized tax rates, soft credit, and soft subsidies (*ibid.*, pp. 5-6) - coincide with

the ways in which cost is maximized (section 3 above). In Kornai's theory, soft budget constraint, combined with managers' interest in expansion, creates "runaway demand" for inputs (*ibid.*, p. 11). Such behavior appears to be close to cost maximization as de-scribed in this paper.

Soft budget constraint is formulated in very general terms, so as to apply across different economic systems. Cost maximization is a special case of soft budget constraint, with managerial incentives tied to gross value of output.

7. Conclusion

Though cost-maximizing behavior of producers under central planning has been known for a long time, its consequences for output valuation have not been developed. Critics of the CIA estimates asserted that the prices of new products increased faster than their quality, and termed this excessive growth of prices "inflation" (Nove 1981 and 1981a; Hanson 1984 and 1987). Defenders of the estimates noted that most of the hidden inflation was due to increases in real resource cost, which under AFCS represent real growth (Cohn, 1981, p. 297; Bergson, 1987, p. 417; CIA, 1988, p. 3). Yet this valuation procedure itself is justified only as long as its underlying assumption, cost minimization, is valid.

If it is not (as this paper argues), then the reason for identifying any expenditure of resources with production capacity disappears. Unfortunately, many other useful tools disappear, as well. Decomposition of nominal growth into real growth and price inflation, production possibility frontiers, and practically everything else in the neoclassical production theory is based on the assumption of cost minimization.

By their nature, theoretical assumptions cannot exactly correspond to observed behavior. Such correspondence has never been claimed for AFCS (see Bergson, 1996), and its

absence cannot be used as an argument against AFCS. Fruitful assumptions in economics are only true “on average”, “as if”, or “as a tendency”. While the approximation is a matter of degree, there may be so poor a match between the assumption and the empirical data as to make the assumption irrelevant. Otherwise, any arbitrary assumption will do. The argument of this paper is not that an assumption underlying AFCS does not exactly match every instance of observed behavior. It is that the observed behavior is a polar opposite of what is assumed.

This is not to say that the CIA estimates of the size or growth of the Soviet economy were too high or too low, or that an alternative set of estimates is to be preferred. Such a conclusion can only be made on the basis of a valuation methodology grounded in a theory of producer behavior in a command economy. The latter, essentially, a general theory of bureaucracy, is, of course, unavailable. The practical conclusion is that CIA estimates of the Soviet GNP cannot be preferred to the alternative ones on the basis of their methodological soundness.

Cost maximizing behavior is not limited to centrally planned economies. It occurs when output cannot be valued independently, because no market exists for it (as in bureaucracy), or in the market for one-of-a-kind, complex products, and when producer's rewards are tied to the amounts of inputs expended. Market economies present many cases of such activities (i. e, fee for service medical care).²⁵ Factor cost valuation of these activities is as problematic as it is for the Soviet economy.

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NOTES

¹ This paper originates from a report prepared for the CIA in 1988-89. I am indebted to Michael Ellman, Richard Ericson, Gregory Khanin, Laurie Kurtzweg, Fyodor Kushnirsky, James Noren and Boris Rumer and many anonymous referees at various journals for helpful suggestions, and to E. V. Kontorovich for editing the text.

² Oliver Williamson has been a prominent advocate of the latter approach (e. g., Williamson, 1991).

³ Critics of the CIA growth rate estimates include Nove (1981), Hanson (1984, 1987), Ericson (1990), and Khanin (1993). Some of the alternative estimates belong to Khanin (1991) and Eidel'man (1992). For the responses to critics, see Bergson (1991) and Alexeev and Walker (1991).

⁴ AFCS was debated after its unveiling in the mid-1950s (see references in Bergson, 1961, p. 104fn). More recently, Nove (1987, p. 433) suggested a reexamination of AFCS, and Rosefielde (1991, pp. 598-600) and Rosefielde and Pfouts (1995 and 1996) .

⁵ See Blaug, 1980, pp. 104-111, and Hausman, 1989, pp. 119-122 for reasons not to accept "the irrelevance of assumptions" as a general principle.

⁶ Al'perovich, 1989, p. 116; Khachaturov and Krasovskii, 1982, p. 12; Kremianskii, 1981, p. 61; Parfenov, 1988; "Argumenty...", 1988; "Planirovanie ...", 1989, pp. 19, 20, 28; "Valovoe ...", 1989, p. 40.

⁷ See an overview in Gogoberidze and Deriabin, 1987, p. 81.

⁸ This was a straightforward rule of price setting before 1967. In 1967 and in 1982, price setting rules were changed so as to tie the volume of profit to the stock of production as-

sets. However, the relationship between profit and cost in the price still holds. See Plotnikov and Gusarov, 1971, pp. 157, 177-9; Kushnirsky, 1986, pp. 32-34.

⁹ Dyker (1985, p. 118) uses the term in his discussion of the sector.

¹⁰ Designers' incentives were generally in tune with those of contractors (Krasovskii, 1979, p. 68).

¹¹ High officials of the State price committee, Gogoberidze and Deriabin (1987, p. 78) described their organization's informational disadvantage compared to the enterprise insiders when checking price proposals. See also Ash, et al, 1988, pp. 131, 154.

¹² Gogoberidze and Deriabin, 1987, pp. 17 and 77-78; Gogoberidze and Lakhov, 1986, p. 92; Fal'tsman, 1989, p. 28 and 1990a, p. 26.

¹³ Since 1965, producers were allowed to add a surcharge based on the product's projected "economic effect" to its price. But until 1979, it was used on a very small scale. See Kontorovich, 1989a, pp. 35-37. The existence of quality surcharge did not alter the incentives to inflate cost.

¹⁴ Fal'tsman (1990, p. 33) and (1990b, p. 50) confirms that price inflation in investment sector went hand in hand with cost inflation.

¹⁵ On product mix shifts in producer goods sectors, see Borozdin, 1988, p. 51 and Timofeev, 1986, pp. 45-48.

¹⁶ Belousov, 1965, p. 83; Gogoberidze and Deriabin, 1987, pp. 40-42; Zielinski, 1973, p. 189fn. While two of the three references here are from machinebuilding, the practice applied to other sectors, as well.

¹⁷ Ash, et al., 1988, p. 104 say that all the extra cost claimed at the shop level (i. e., by the plant's structural units) was just on paper.

¹⁸ This is analogous to Kornai's argument that hoarding of resources is limited by storage capacity and by the embarrassing visibility of huge piles in the factory's yard.

¹⁹ On the comparative strength of monetary bonuses and "administrative" rewards and punishments, see Shmelev, 1987, p. 156 and Timofeev, 1986, p. 44.

²⁰ Dronov and Shatokhina, 1970, p. 60; Gatovskii, 1971, pp. 350-351; Iampol'skii and Galuza, 1976, pp. 330-331; Iakovets, 1974, pp. 158-9.

²¹ While justifying AFCS, Leggett (1981, pp. 182-3) noted that incentives for cost-minimization for Soviet firms were much weaker than in the market economy, and possibilities to pursue this course were narrowly circumscribed.

²² See a brief historic survey in Valovoi, 1989, pp. 20-25. That author's career has been devoted to documenting resource waste resulting from the use of gross value of output targets.

²³ For a review of contemporary evidence, see Khanin, 1987.

²⁴ These schemes failed. The inertia of cost-maximizing behavior has been alleged to survive the radical changes of 1992 and contribute to the enterprises' perverse initial reaction to price liberalization (Ieltsin, 1992; Zhuravlev, 1992, p. 99).

²⁵ Soft budget constraint, a concept broader than cost maximization, is applicable to many activities in market economies, with health care being an outstanding example (Kornai, 1986, pp. 21-24). See also Eggertson (1995, p. 203) on cost maximization in social science.

