
It's Value That's Virtual: Bartles, Rubles, and the Place of Gazprom in the Russian Economy

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Abstract: An American specialist on Russia's political economy critically analyzes the "virtual economy" model pioneered by Clifford Gaddy and Barry Ickes. Particular focus is on the model's characterization of the allegedly value-destroying sectors of the Russian economy. An analysis of Gazprom tests propositions about rationality embedded in the model. An algebraic appendix reinforces the article's conclusions with the results of a more formal methodology.

If Oscar Wilde didn't say that an economist is a person who knows the price of everything and the value of nothing, he should have (Mirowski, 1990, p. 689).

In two papers released first via the Internet in mid-1998, Clifford Gaddy and Barry Ickes (1998a, 1998b) advanced the thesis that post-Soviet Russia has built a "virtual economy," in which the incredible prevalence of non-monetary transactions conceals vast subsidies to value-destroying enterprises. Even before "Russia's Virtual Economy" became the lead article in the September/October issue of *Foreign Affairs*, the Gaddy-Ickes argument had drawn unprecedented media attention to the issue of barter and non-monetary exchange in Russia and transformed the discussion of market reform.² "Most of the Russian economy has not been making progress toward the market.... It is actively moving in the other direction," Gaddy and Ickes argue. Industrial enterprises have adapted "to protect

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themselves against the market rather than join it." Avoiding money payments facilitates this flight from the market because it allows "illusion" and "pretense" regarding the true value of exchanged goods. In particular, illusion and pretense surround the sale of key natural resource inputs to industry at less than their market price. If forced to pay full price for its inputs, the bulk of Russian industry would fail to cover its costs and would have to go out of business.

By introducing the discussion of price factors in non-monetary exchange to a wide audience, Gaddy and Ickes have performed an important service, especially in revealing the incoherence of the absolutist approach to tax obligations long advocated by the IMF. Their intervention promises to reinvigorate a discussion hopelessly mired in the unhelpful categories of "market reform" and "political will." Yet in other regards the virtual economy thesis muddies the waters of debate. The ultimate problem is the way they treat the category of "value" as self-evident. What is interesting about the multiple means of payment circulating in Russia is precisely the way they have disorganized the institutions that define and manage value (Woodruff, forthcoming b). Reifying "value" and assuming that Russians pretend to ignore it obviates any investigation into these institutions. As I demonstrate in the first section of this article, disorganization of the price mechanism by multiple means of payment can generate the chronic wage and tax debts Gaddy and Ickes describe without any presumption that Russian manufacturing is in the main "value-subtracting." The assumption of value subtraction is simply superfluous to their formal model.

Of course, to show that factors other than a desire to conceal value subtraction *could* generate non-monetary exchange and a chronic struggle over debts is not to show that they in fact did so. It could still be the case that Gaddy and Ickes are right that Russian industry continued to be "subsidized by underpriced raw materials" just as Soviet industry was. In particular, they argue that the enormous parastatal natural-gas supplier Gazprom lies at the heart of the virtual economy, sustaining the whole system by injecting value into it.³ This role is secured by a political bargain: in return for funding the virtual economy, Gazprom receives the right to pursue profitable export opportunities. The empirical record demonstrates, though, that this is a fundamental misreading of Gazprom's relationship to its markets and to the government. As I argue in the second section of this article, Gazprom is pursuing a coherent strategy on domestic and external markets driven by a thoroughly commercial logic: it wants to

²Unreferenced quotations in the text are from this article (Gaddy and Ickes, 1998a). I also rely on Gaddy and Ickes (1998b). Although this latter paper is still a draft, the earlier version has already become quite influential through the Internet and it seemed best to make use of it to avoid criticizing Gaddy and Ickes for positions they no longer hold.

³Although Gaddy and Ickes use Gazprom as a metonymy for the whole value-adding sector of the Russian economy (especially in 1998b), they leave no doubt as to its central empirical importance.

make a profit by making sales to customers at prices they can afford. It wants Russian firms to be among those customers, and indeed views them as critical to its future. For reasons that turn out to be completely comprehensible in profit-seeking terms, Gazprom's strategy involves selling gas at lower prices to domestic customers than to foreign ones.

Because of their rigid and naïve notion of economic value, based on the flatly unsustainable notion that goods have a single market price, Gaddy and Ickes have mistaken the firm's desire to charge Russian manufacturers prices they can afford for politically compensated philanthropy. In fact, Gazprom's main political problem has not been extracting compensation for *de facto* price cuts forced on it by a government reluctant to shut down value-subtracting firms; rather, it has been winning the autonomy to pursue its pricing policy through the monetary system rather than non-monetary exchange. It is regulations that make nominal prices rigid that have forced Gazprom, and other Russian firms, to resort to non-monetary exchange.

I am not arguing that politicians do not pressure Gazprom to provide cut-rate or even free gas for key enterprises. They do, especially provincial governors. However, there is simply no evidence that Gazprom is passively accepting this situation in return for the sorts of compensations Gaddy and Ickes discuss: rather, the firm is making active efforts to change it—not by moving away from a market economy, but by moving toward one.

BARTLES AND RUBLES

On one critical point, I do agree with Gaddy and Ickes: when Russian firms engage in non-monetary exchange, nominal prices are attached to the goods involved, but these prices are "inflated." The ruble is formally the unit of account, but the nominal price on the goods is higher than it would be *were it possible* to hold an open auction for cash rubles (remember this assumption!). This important fact is amply supported by the 1998 Karpov commission report on the finances of large budget debtors, which was the key inspiration for the Gaddy-Ickes argument, and had emerged in other studies as well (Woodruff, 1996, forthcoming a, forthcoming b). Gaddy and Ickes use the fact that prices in non-monetary exchange are inflated to investigate the implications of assuming that Russian manufacturing (M) subtracts value from the inputs it buys from value-adding resource producers (R) and households (H):

Suppose M is a single plant that takes 100 rubles of labor from H and 100 rubles of resources from R and makes a product worth 100 rubles. It subtracts 100 rubles worth of value, but it pretends it is a value-adder. To do that, it overprices its output. It claims it is worth not 100, but 300. And everyone else accepts that pretense because they can use the overpriced output in barter with one another or to pay their own taxes.

The example assumes that 100 rubles is the *value* of inputs bought from R (and H), whereas 300 rubles is only the *price* of M's output.

To avoid prejudging the issue it is helpful to abandon the notion of "value" and describe the entire situation in terms of prices, defining "price" as the nominal amount actually paid for a good in some units. Then the formal numeric price that M demands for his goods is denominated not in rubles, but in some other units: call them "bartles." Gaddy and Ickes develop an example in which the exchange rate is effectively 3 bartles to the ruble. For M the price of R's resources is 100 bartles, not 100 rubles. More generally, if a seller asks one customer to pay 100 rubles and allows another to pay 100 bartles (*i.e.*, to pay in kind), the second customer has gotten a price discount. Similarly, when Russian firms pay their workers in goods, as often happens, they are cutting worker salaries, although formally the wage bill has been paid in full. When the government takes in non-monetary taxes, it is reducing taxes for firms by permitting payment in bartles rather than rubles.

If one reformulates the Gaddy-Ickes argument in terms of this language, it becomes clear that "value subtraction" is not necessary to explain the phenomena they describe. Gaddy and Ickes model the Russian economy as consisting of four sectors: R, M, and H as already mentioned, plus the government budget (G).⁴ Government accepts bartles in taxes as if they were rubles, because of its unwillingness to admit that revenues will not allow it to deliver all that it has promised under the budget, and because of its desire to preserve industrial jobs. Gazprom – which stands in for the whole value-adding resource sector – is indifferent between being paid in bartles and rubles because it can pass some bartles on to the budget at face value, and because it views the *de facto* price breaks it gives to manufacturing industries as the political price of permission to export resources it won in the "privatization lottery."⁵ Manufacturers, for their part, exploit the willingness of Gazprom and fiscal authorities to pretend that there is a one-to-one exchange rate between bartles and rubles to conceal (perhaps even from themselves) how they subtract value.⁶ Comparing input costs (in rubles) to output sales (in bartles) makes production appear to add value.

But while government and Gazprom are willing to go along with this pretense, households are not. They demand that wages and government transfers be paid in rubles. Unfortunately, there are not enough rubles to pay these obligations, because M's receipts and R's tax payments are in bartles. It is this obstreperousness of households that gives rise to wage and pension arrears. Similarly, when the government temporarily refuses

⁴This is the notation of the Gaddy and Ickes (1998a); in (1998b) the notation is slightly different.

⁵Here I have incorporated the more fleshed-out argument of Gaddy and Ickes (1998b).

⁶"The director [of the value-subtracting enterprise] presumably gains utility from his position. He will prefer to stay in an enterprise that everyone pretends is successful than to concede failure" (Gaddy and Ickes, 1998b, p. 13).

to accept bartles, the result is tax arrears when enterprises don't begin to pay in cash or increased wage arrears when they do.

In the words of Gaddy and Ickes, "There is less value produced than there are claims on it." Yet what they have really shown is that there are fewer *rubles* produced than there are claims on them. To demonstrate this point, let us slightly recast the Gaddy-Ickes example to consider a firm that adds 100 rubles of value, but for some reason chooses to price its output in bartles rather than in rubles. So the cash value of M's output is 300 rubles, but it prices it at 900 bartles, assuming the same exchange rate of three rubles to the bartle.

	Gas (R)	Wages (H)	Output	Profit (=Taxes)
Nominal prices	100 (rubles)	100 (rubles)	900 (bartles)	700 (units?)
Ruble prices	100	100	300	100

Now, if we retain the assumption that the tax authorities are unable to tell the difference between bartles and rubles, they calculate profits using the nominal prices, and M shows a profit of 700. On the Gaddy-Ickes assumption of a 100 percent tax rate, M owes 700 units in tax. Even if M pays this tax in bartles, it is left with $900 - 700 = 200$ bartles, or 66.66 rubles, to pay debts of 200 rubles for wages and gas: not enough! When output is priced in bartles but some inputs are priced in rubles, fictional profits appear, leading to inflated tax obligations and insufficient funds for payments even for firms that add value, and even when bartles can be used to pay taxes.

Thus the language of bartles and rubles allows us to see that "value subtraction" is a sufficient, but hardly necessary, condition for the phenomenon of "too few rubles to go around" that Gaddy and Ickes describe. All that is necessary is that in calculating nominal obligations, the tax authorities are unable to distinguish between bartles and rubles, and that there are at least some bartles in receipts. Nothing else is required; in fact, firms can be adding an arbitrarily large amount of value and still show a ruble shortfall—as you can see by trying the preceding example with a firm adding any amount of value you like; the tax authorities always tax away all but 200 bartles, too few to pay 200 rubles in debts.⁷ If "pretense" drives the system, then it is only the pretense that firms earn more value than they do; whether or not they in fact subtract value is irrelevant. Gaddy and Ickes write that their model "captures much of the contemporary Russian econ-

⁷In the Gaddy-Ickes model, M has no tax obligation, because it just covers its nominal costs, so it is not clear whether the assumption of a 100 percent tax rate was also meant to apply in this case and not just to R. However, it makes no difference. One could apply the analysis just given to R itself. To do so it would be necessary to dispense with the assumption that R's production is cost-free.

omy—not only the wage arrears, but also the unrealistic budget, the pension arrears, and the apparent increased output.” What they neglect to mention is that *their model would have generated all of these features of the Russian economy even if one assumed that Russian firms were adding quintuple (etc.) the value of their inputs in the course of production. None of the striking implications of the model depend on the assumption of value subtraction. In the Appendix, I show algebraically that even with much more conservative assumptions, the tax consequences of the difference between rubles and bartles can generate a shortfall of rubles to cover obligations even when value subtraction is absent.*

Of course, the formal possibility sketched here might be empirically irrelevant. If it is not a desire to mask value subtraction, what prompts M’s decision to price output in bartles, given the negative tax consequences? Moreover, if the price of gas is 100 rubles, why is it that Gazprom is willing to give price cuts by accepting lower-valued bartles instead? Answering these questions requires an investigation into Gazprom’s commercial interests and the institutional environment in which it seeks to pursue them. Such an investigation is not possible, however, if we retain the unreflective use of “value” employed in this section.

SUBTRACTING “VALUE”

In “Russia’s Virtual Economy,” value receives no definition. Judging by the description of M’s activity offered above, the term appears to be defined in an accounting sense, as “profits at market prices,” but there is no specification of what we are to regard as market prices.⁸ Given that nominal prices for resources are assumed equivalent to their value, the suggestion seems to be that cash sales would be possible at these nominal prices. Thus, for instance, the claim that the owners of Gazprom “would prefer to export all the gas for hard currency. But this is politically impossible. In practice, Gazprom is legally permitted to export a certain share of its gas to keep it performing its role in the system.”

It is odd that these two economists reach for a political explanation before seeking economic ones. The idea that Gazprom could simply export all of its output is ludicrous.⁹ The firm’s present reserves would be enough for nearly 400 years of exports to Europe at existing levels (calculated from *Ekspert*, September 1, 1997; “Natural Gas,” 1998).¹⁰ In 1996, Gazprom sold

⁸Gaddy and Ickes (1998b, pp. 19–22) contains an appendix on value destruction: “The most basic notion of value destroying activity (negative value added) is that the market value of the purchased resources used to produce output exceeds the market value of the output itself” (p. 19). They also stress that “whether an enterprise produces value or not depends on market opportunities” (p. 20). However, the appendix stipulates that a strong version of value-subtraction does not include labor and capital among purchased inputs, which means that the M of the original example is no longer value destroying. They evidently intend to provide a definition of a less strict version accounting for these inputs as well but this does not appear to be complete in the draft available to me as of this writing. Therefore I focus on the implicit definition of value in the published *Foreign Affairs* article.

about 65 percent of its gas on the Russian market, exporting another 13 percent to former Soviet countries and about 22 percent to markets in Eastern and Western Europe (*Ekspert*, September 1, 1997). Gazprom already controls on the order of 30 percent of these European markets (*Ekspert*, November 17, 1997). So even if the firm were to conquer the remaining 70 percent of the European market it could still export only a little more than two-thirds of the gas it presently produces for Russia. Of course, the price consequences of a Gazprom effort to triple its deliveries to Europe would probably reduce any growth in profits to a minimum. The firm is seeking to expand capacity to make exports to Europe and other markets, but this is a very expensive and very long-term undertaking. The Yamal-Europe gas pipeline, for instance, is expected to be completed only by 2005, at a cost of some 36 billion dollars, and will have the capacity to transport only a sixth of the volume of gas presently delivered to Russia.¹¹ Perhaps these practical difficulties in expanding exports explain why I have been unable to turn up a single instance in which any Russian political actor called for restrictions on the firm's right to sell on foreign markets; certainly, it can be said with confidence that none of the loud public conflicts surrounding Gazprom have involved this issue.

Although Europe represents a relatively small share of Gazprom's deliveries, it looms much larger in the firm's receipts, accounting for approximately half of revenue (*Ekspert*, September 1, 1997). European customers are thus paying much higher prices than Russian ones. But this fact reveals not the transfer of value to Russian industry, but the ephemerality of the very notion of value as Gaddy and Ickes understand it.

If value is defined in terms of market prices, and goods have a definitive value ("it is really worth only 33 $\frac{1}{3}$ rubles"), then it follows that goods have a single market price. Yet economists have often criticized this position, especially in debates over "dumping" (Kenen, 1994, pp. 247-250). Anti-dumping legislation is meant to protect a country's producers from

⁹In a footnote, Gaddy and Ickes (1998b, p. 15) do gesture at commercial considerations: "Notice that even if *Gazprom* faces constraints on its capacity to export in hard-currency markets, it still has the option of keeping gas in the ground. Faced with the option of selling at a discount to domestic consumers or keeping the resource for the future when domestic consumers could pay a higher price or new export markets could be found, a secure private owner would certainly choose the latter." This is certainly less than obvious (especially given that Gaddy and Ickes appear to concede here that discount sales are not loss-making, since otherwise there would be no need to justify the decision to wait). Considering whether or not to leave gas in the ground, Gazprom doubtless bears in mind the enormous scale of its reserves: as of 1998, Gazprom's reserves are "sufficient for 80 years at current production levels," ("Natural Gas," 1998); or, to put it differently, its reserves were equivalent to nearly 20 years of the world's gas consumption in 1994 (calculated from Avati, 1995)! Gaddy and Ickes's "secure private owner" would have occasion to muse on Keynes's observations about the long run.

¹⁰Russian periodicals are cited from the electronic versions at www.securities.com, unless page numbers are given, indicating use of a paper version.

¹¹Share of Russian deliveries is calculated from *Ekspert* (September 1, 1997) and Bekker (1998); cost and completion date are from "Natural Gas" (1998).

predatory pricing by foreign competitors who seek to drive them out of the market and then reap monopoly profits. The problem is the difficulty in defining what price policy counts as predatory. One test often used compares the alleged dumper's prices for the home market with those for export markets, regarding lower export prices as *prima facie* evidence of predatory behavior (Kenen, 1994, pp. 247–248).

This test gives a dubious result if one makes the realistic assumption that in the vast majority of cases the costs of business can be divided into fixed costs and variable costs, and the former are large with respect to the latter, so that at least some levels of output marginal costs are lower than average costs. This jargon expresses the simple idea that it costs a lot to build a gas plant, but once it's up the cost difference between running at 60 percent of capacity and 61 percent of capacity is not very much. The marginal cost of moving from 60 to 61 percent of capacity is far lower than the average cost per unit at 61 percent, because the marginal cost doesn't include a share of the large fixed costs of building the plant.

Firms with this sort of cost structure may rationally engage in "dumping." They will want to practice price discrimination, charging each customer the maximum she is willing to pay as long as this amount is greater than marginal cost.¹² If domestic consumers are willing to pay more than foreign ones—say because they are wealthier and less price-sensitive, or because the home market is less competitive—then price discrimination will involve pricing exports below what home-market consumers pay (Kenen, 1994, p. 247). Such behavior would qualify as dumping in terms of the formal test, but it would not constitute predatory pricing.

Gaddy and Ickes's implicit position that goods' value is defined by a set of singular market prices detects subsidization of value subtraction any time one customer pays a lower price than another, just as the price-differential test detects predatory dumping whenever domestic prices are higher than export prices. They are mistaken for the same reason: commercial logic dictates that some consumers will pay higher prices than others. The unreasonableness of applying the language of subsidy in such cases may be brought out by a familiar example. American airline companies charge far higher prices for tickets purchased on the day of the flight than those purchased several weeks earlier. It is common to pay on the order of \$1000 at the last minute for a ticket that would only have cost \$300 if purchased in advance, and we can assume that a large part of the price difference is driven by the airlines' judgment that persons needing an immediate flight are willing to pay a premium since they do not have time to search for alternatives and are unable to adjust their schedule. This means that last-minute travelers can be used to fund a disproportionate share of the

¹²For a standard textbook treatment of price discrimination, see Lipsey, Steiner, and Purvis (1987, pp. 238–242). Price discrimination is possible, of course, only when firms they don't face a ferociously competitive market that forces them to price their entire output at marginal cost if they want to sell it at all.

fixed costs of the airplane's flight (fuel, equipment depreciation, etc.) whereas those making reservations earlier can be enticed with a price closer to the low marginal cost of an extra passenger (processing tickets and baggage, an extra meal, etc.). Imagine a business dependent on travel, but unable to turn a profit if it pays the high prices for last-minute tickets. Instead, it continues profitable operation by planning travel ahead so as to pay cheaper prices. Would there be any utility in considering this business a "value subtractor" because it is not paying the highest price for its airplane tickets (and, for that matter, is paying less than the average cost per passenger of the service it is receiving)? It is certainly very hard to imagine economists looking at this example and concluding that airlines would obviously prefer to sell all their seats at the high last-minute price but this must be politically impossible, and searching for the political bargain that forces them to subsidize customers buying earlier.

Given that Gazprom is a firm with enormous fixed costs for exploration, production facilities, and pipelines, and relatively far lower variable costs, it would be surprising if it did not pursue a similar strategy of price discrimination.¹³ And indeed, there is unambiguous evidence that such commercial reasoning has driven Gazprom's policy regarding external and internal markets. The firm wishes to charge lower prices to domestic consumers than to foreign ones, on the grounds that domestic consumers simply cannot pay the prices foreigners do.¹⁴ There is no indication, however, that the prices Gazprom charges domestic consumers are lower than marginal costs, since it is seeking to expand sales at these prices. Thus Gazprom seems to be engaged in "reverse dumping," in which exports are priced higher than sales on the home market. Just as ordinary dumping does not always reflect predatory pricing directed at foreign competitors, so too does Gazprom's reverse dumping not reflect unjustified subsidies for its Russian customers.

The logic of Gazprom's position has been especially clearly expressed by Pyotr Rodionov, Minister of Fuel and Energy in the second half of 1996 and early 1997. Prior to assuming this position he was head of a Gazprom subdivision, and since leaving it he has become one of the company's vice-presidents. Shortly after assuming his ministerial post, Rodionov told an interviewer that in the context of large non-payments for fuel "it is unambiguously necessary to lower the general level of prices on all fuel and energy resources.... And here I would particularly like to stress that when discussing fuel one can't speak of abstract 'world prices,' to which we are encouraged to orient ourselves" (*Nezavisimaya gazeta*, October 3,

¹³It might be suggested (as it was to me in an informal conversation) that this analogy is imperfect, since the airplane seat that flies empty has no alternative uses, whereas natural gas might. But gas-delivery capacity also has no alternate uses, and there are marginal costs to putting a passenger in the empty seat. The question is whether marginal costs exceed marginal revenue.

¹⁴To employ the term of art, the domestic and foreign markets have different price elasticities of demand.

1996).¹⁵ Lower prices, he argued, would allow Russian industry to grow and make more profits, enabling them to pay for energy and ending fiscal dependency on gas and oil exports. Similarly, in late 1998, as a Gazprom official pleading the company's case before the government, Rodionov argued for freezing domestic gas prices until 1999, which, given rapid renewed inflation, amounted to a call for effectively lower prices. In a journalist's retelling, Rodionov argued that "for Gazprom higher prices only mean more non-payments" (*Neftegazovyy kompleks*, December 5, 1998).

These political vignettes reveal an important fact: Gazprom is not able to set prices for its domestic consumers just as it wishes. Its prices are set by regulators, most recently by the Federal Energy Commission. Gazprom has far more often complained that regulators set its prices too high than it has complained that its prices are too low (Woodruff, forthcoming b, chapter 6). As Rodionov hinted, part of the pressure on Gazprom to charge higher prices than it wishes to comes from foreign pressure. In 1997, for instance, the International Monetary Fund included among its conditions for extension of aid that gas prices within Russia be differentiated on the basis of the distance gas is transported, to take better account of costs. Gazprom, though, loudly and publicly resisted this demand for fear that the policy would raise prices for Russian consumers distant from the gas fields to unsustainable levels (*Kommersant*, February 18, 1997; April 10, 1997; *Ekspert*, April 21, 1997; *Finansovaya Rossiya*, December 4, 1997). As company president Rem Vyakhirev put it, higher gas prices for industry would mean that "whatever is still showing signs of life will shut down once and for all" (*Kommersant*, April 10, 1997).¹⁶ It is more than a little ironic that in this conflict, Western economists conceived cost as something intrinsic to physical production processes (more transport, more cost), an engineering mindset reminiscent of the Soviet style, whereas former command-economy managers were defending a commercial notion of minimizing costs through maximizing sales.

Gazprom's efforts to win permission to charge lower prices to Russian consumers give new perspective on the role of rubles and barter. Rather than seeing barter as enabling covert price subsidies, we can view them as a way Gazprom charges its valued Russian customers prices they can afford, despite being forced by regulators to charge high nominal prices. This logic can be generalized to answer the question of why the firm in the modified example provided above would choose to price its output in

¹⁵Gazprom chairman Rem Vyakhirev later directly confirmed that the proposal to lower prices on gas and other resources had originally been developed by Gazprom itself (*Nezavisimaya gazeta*, March 25, 1997). In the same interview, Vyakhirev gave the firm's commercially motivated policy a populist spin: "We are conducting a people-oriented [*narodnaya*] and socially directed policy, whose meaning transcends a narrow economic framework. We see that the population and industry are not capable of paying for gas in full, and therefore we are maintaining stable prices." Interpretation of these remarks is aided by understanding that the firm was at the time being pressured to raise its prices; see below.

¹⁶In the original, Vyakhirev said "To, chto yeshcho shevelitsya, vstanet okonchatel'no."

bartles, despite the negative tax consequences of so doing: if nominal prices are sticky downwards but customers cannot afford them, accepting barter payment might be the only way to effect the price cut commercial considerations dictate. Although unlike Gazprom most Russian firms do not have their prices directly set by regulators, they *are* obliged by tax authorities to price their output at no less than cost plus a markup for profit, which, given a definition of costs as average costs, leads to similar effects (Woodruff, 1996; forthcoming b, chapter 4).¹⁷ From this perspective, bartles reflect not Russian firms' desire to pretend that they create value when they do not, but their effort to achieve formal compliance with government demands that they charge higher prices than they wish to.¹⁸ An analogy may be drawn with devaluation of a currency against gold or one or more foreign currencies, a policy measure economists have suggested helps realign price levels in the presence of sticky prices (Sachs, 1993, p. 688). Bartles then appear as devalued rubles, but this devaluation has been organized at the subnational level and is local to particular networks of exchange (Woodruff, forthcoming b, chapter 5).

The case that Gazprom uses bartles to achieve *de facto* price reductions is strengthened by the firm's efforts to win changes in regulations that would allow it to implement price cuts directly. By charging nominally lower prices but collecting payments in money, Gazprom can avoid the tax consequences and organizational hassles of barter.¹⁹ In the summer of 1997, Gazprom successfully lobbied for a presidential order allowing it to give substantial discounts to customers that pay on time and in cash (*Kommer-sant*, July 1, 1997). The firm did report some increase in the share of its cash receipts in 1997, and in April of 1998 the head of its marketing arm called for the presidential discount order to be extended (*Rabochaya tribuna*, April 1, 1998, p. 2).

To complete the picture of a Gazprom participating in Russia's barter economy for reasons of commerce rather than politics, we may consider a testable implication of the Gaddy-Ickes vision of the politics underpinning the virtual economy. If Gazprom conceived the lower prices it makes available to Russian consumers through barter as subsidies compensated by its right to export, then there should be no qualitative difference between the firm's attitude to in-kind payment and its attitude to the many

¹⁷Pricing lower than costs is a second common test for dumping, which also turns out to give perverse results in the presence of large fixed costs (Kenen, 1997, p. 249).

¹⁸In this context of price discrimination, it makes no sense to say bartles are "overvalued." Take the example of the price-discriminating airline: if for some reason its price policy were implemented by asking last-minute customers to pay, say, 300 pounds while earlier purchasers paid only 300 dollars, it would be unlikely that anyone would care to argue that the dollars involved were "overvalued." On the other hand, tax authorities indifferent as to whether nominal assessments are paid in dollars or pounds would find few takers for the latter.

¹⁹As Gaddy and Ickes note, Gazprom regularly pays its taxes in non-monetary form. However, its ability to do so has been the result of continual political struggles in which it is not always successful. Indeed, in the summer of 1997 Gazprom borrowed a billion dollars on Western financial markets in order to pay taxes in money ("Colossus," 1997).

industrial and power-generating consumers that do not pay their gas bills. Free gas is only the limiting case of subsidized gas, after all. However, Gazprom officials are very clear that they make a distinction between being paid less and not getting paid at all. In the interview already cited, Rodionov prefaced his call for lower gas prices with sharp criticism of governors he claimed were advocating free access to natural gas (*Nezavisimaya gazeta*, October 3, 1996).

Since by early 1996, domestic customer debts to Gazprom were already greater than their receipts from exports to Western Europe (*Segodnya*, February 20, 1996), the reason for the firm's concern was obvious.²⁰ Explaining the origins of Mezhregiongaz, Gazprom's new marketing arm set up in 1997, its head noted that "a completely abnormal situation has arisen, in which an entire sector of the economy has become a practically unpaid [*besplatnyy*] donor for the economy of the entire country" (*Rabochaya tribuna*, April 1, 1998, p. 2). He also welcomed a presidential order expanding the firm's right to cut off non-paying customers. Indeed, at least if we are to judge by its aggressive public relations campaign, Mezhregiongaz has pursued a very vigorous carrot-and-stick policy against its debtors. On the carrot side it offers price cuts for payment in money, and assistance in arranging barter deals to assure sales. On the stick side the key measure is reduced gas supplies.²¹ Central to Mezhregiongaz's strategy is negotiated agreements with provincial governors about levels of supplies and payment, including the share of payment in money or in kind.²²

Such agreements specifying means of payment are part of a broader effort to fight the "Gresham's law" effects that result from the nominal equivalence of bartles and rubles: able to pay identical nominal amounts in either, customers will naturally offer bartles rather than rubles (Woodruff, forthcoming b, chapter 5). For instance, although consumers of gas for home use pay local gas distribution companies in cash rubles, these companies have generally sought to pay Gazprom in bartles and keep cash rubles for local use. As a result, Mezhregiongaz has tried to set up new collection centers that immediately split cash payments by domestic consumers among various claimants according to a pre-agreed formula (*Rabochaya tribuna*, September 18, 1998, p. 2; September 23, 1998, p. 2; October 2, 1998, p. 2). These measures can also be regarded as evidence of a conscious policy of price discrimination among Russian consumers

²⁰In November 1998, Vyakhirev claimed that outstanding debts for gas of 101 billion rubles were equal to 1.8 times annual Russian deliveries (*Rabochaya tribuna*, November 11, 1998, p. 2).

²¹Mezhregiongaz's activity may be followed in *Rabochaya tribuna*, a paper close to Gazprom, where it gets extensive sympathetic coverage, naturally focusing more on the "carrot" side of its policy (e.g., April 22, 1998, p. 2; September 9, 1998, p. 4). For the "stick" side, see the interview with Mezhregiongaz's director in *Rabochaya tribuna* (April 1, 1998) or the description of reduced gas deliveries to Tomskenergo in *Neftegazovyy kompleks* (October 17, 1998).

²²A representative example from Nizhnyy Novgorod may be found in *Birzha* (October 22, 1998).

through barter; limiting who can pay in kind ensures that price cuts intended for one set of consumers do not leak over to others.

Some readers may feel that evidence that Gazprom does care about its receipts from the domestic consumers does not impugn the virtual economy thesis. Although the firm must subsidize the Russian economy for political reasons, the reasoning might run, surely it is only natural to expect that it would want to hold these subsidies to a minimum. However, this argument also fails to make sense of Gazprom's behavior. If the firm were trying to minimize losses from forced sales at subsidized prices, then it would be fighting for maximal payments while minimizing deliveries. Yet even after the August–September 1998 collapse of the ruble's exchange rate made domestic consumers still poorer compared to foreigners, Vyakhirev told a conference of investors that increasing supply to the Russian market and winning a bigger share of the domestic power-generation market were important priorities (*Rabochaya tribuna*, October 9, 1998, p. 1). The inveterate skeptic might dismiss such statements as rhetorical concessions to political necessity (though the forum would have been chosen oddly for such a purpose), but they are borne out by behavioral evidence as well. In particular, much of Mezhhregiongaz's activity appears to focus on using barter deals and price cuts to *expand* production at debtor enterprises (e.g., *Rabochaya tribuna*, October 16, 1998, p. 2; November 12, 1998, p. 3). With the political situation in any event turning in its favor, the fall of 1998 would have been an odd time for Gazprom to use increased provision of subsidized gas to buy support.

CONCLUSION

By formalizing the insights of the Karpov commission in their accounting model, Gaddy and Ickes have made possible a substantial advance in the quality of the Western debate on barter and other forms of non-monetary exchange in Russia. If this possibility is to be realized, however, the conclusions they draw from their model must be rejected. "The virtual economy," they state, "has arisen for two fundamental reasons: most of the Russian economy, especially its manufacturing sector, takes away value, and most participants in the economy pretend that it does not." Even if we grant for the sake of argument the existence of clearly defined and singular market prices for goods, prices that define their value, nothing in their model or evidence supports this conclusion. As the first section of this article and the Appendix demonstrate, all of the effects Gaddy and Ickes specify can also be derived by assuming that Russian manufacturing enterprises do not subtract value, but are merely regarded for tax purposes as having added more value than they do.

One can only speculate as to what prompted Gaddy and Ickes to build their case on the superfluous assumption of value subtraction. It appears that they were struck by the fact that prices nominally equal in principle could be so widely varying in practice. In his fascinating and provocative history of economics, Philip Mirowski notes that the fundamental problem

of value theory is to find a way to explain how it is that commodities wildly various in all their sensible attributes can be somehow encompassed by a single numerical measure. Mirowski argues that in the nineteenth century, economists conceived value metaphorically as "an embodied substance, shuttled hither and yon by the market" (Mirowski, 1990, p. 698). In the late nineteenth and early twentieth century, however, economists "displaced value from the commodity itself and located it within the mind as a field of preferences" (Mirowski, 1990, p. 697).

Gaddy and Ickes employ an image of value far closer to that of nineteenth than of twentieth century economics. For their value is substantial: it is "redistributed," "shifted," "produced," and even "leaks" — all of these verbs have "value" as an object in Gaddy and Ickes (1998a). This substantiality of value stems from taking "market prices" as given and singular, allowing value to appear as a property of a commodity rather than finding its origin in the preferences of consumers. In a September 1997 interview, Pyotr Karpov summarized his view of the origins of non-monetary exchange: "When a price is too high, *the market* [emphasis added] does not accept it and does not pay for it with money. It says: you have expensive coal, I have, accordingly, expensive electricity: let's swap" (*Rossiyskiy Neftyanoy Byulleten'*, September 1997). It is this focus on price as driven by supply and demand that is missing in "Russia's Virtual Economy," which substitutes a notion of value that gestures at disembodied market prices far more "virtual" than anything the authors purport to describe.²³

Along with the notion of value subtraction and its unsustainable implication that commodities have a single price, we ought to reject the term "virtual economy," which is by now irrevocably linked to Gaddy and Ickes's patronizing image of a Russia complacent in self-delusion, content with a system that imposes misery on workers and enormous costs on businesspeople. At a fateful moment in Russian history, one that presents the West with policy choices of enormous consequence, scholars of an intricate and in many respects tragic situation have an obligation to resist the temptation to explain "why the Russians prefer it" before inquiring into whether they actually do. Even the very brief and partial sketch of the politics of non-monetary exchange possible here has demonstrated that far from suiting all participants, the prevalence of barter in Russia has generated sharp political struggles that often center on issues quite divergent

²³In their more recent appendix on value subtraction, Gaddy and Ickes (1998b, pp. 18–19) nod at the importance of supply and demand: they suggest that sometimes in the Russian context "the nominal wage rate exceeds the opportunity cost of labor"; that enterprises may have production assets whose costs are sunk, so that "the opportunity cost of using these resources in production is zero"; and that in general "it is important to emphasize that whether an enterprise produces value or not depends on market opportunities." Yet none of these insights are applied to the setting of prices in non-monetary exchange, which is still understood as motivated solely by the desire to conceal value subtraction.

from those Gaddy and Ickes discuss in looking for the political roots of the virtual economy.

Gazprom's efforts to offer its customers a price they can afford despite crippling Russian regulations and the ham-fisted and misguided interventions of international financial bodies have another important lesson to offer as well. Even for this most powerful and politically influential of Russian firms, a consumer-driven theory of value is not optional. Despite occasionally extravagant promises, the shrunken Russian state can do very little to aid those enterprises unable to sell their output. In this unforgiving environment, pretense is a luxury few can afford. For the catastrophic effects of wishful thinking, one might look to the shared pretense of the IMF and the Kiriyenko government that a currency devaluation could be avoided in the summer of 1998; on this backdrop, the private devaluations accomplished by multiple barter look like the epitome of realism.

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APPENDIX

The purpose of this appendix is to use some extremely simple algebra to show more formally how the nominal equality between bartles and rubles for tax purposes can create a shortage of rubles to cover obligations by causing excess taxation of firms. Overcounting of value added – which I will define for this section as ruble-denominated receipts minus ruble-denominated costs – occurs when bartles are more prevalent in receipts than in costs. However, as shown below, even when the prevalence of bartles is uniform, their use creates a tax penalty. In the body of the article, I illustrated how the Gaddy-Ickes assumption of a 100 percent tax rate renders value subtraction completely superfluous to explaining the phenomena they describe. Here, using somewhat more realistic assumptions, I show that the ruble shortfall phenomenon provides *no* evidence for value subtraction.

Assume that a firm has output (O_r) and costs (C_r) with a determinate value in rubles (thus the subscript r). The firm's value added expressed in rubles is $V_r = O_r - C_r$. The exchange rate, E , gives the number of bartles per ruble, and is assumed to be greater than 1. S represents the share of bartles in sales, and I represents their share in inputs. Let's also use a subscript n to represent nominal amounts, in which one bartle and one ruble are regarded as equivalent. The firm's nominal value added can be calculated by converting the bartle portion of output and costs into nominal amounts, using the exchange rate E .

$$V_n = O_n - C_n = ESO_r + (1 - S)O_r - (EIC_r + (1 - I)C_r)$$

Some algebraic manipulations allow us to rewrite this expression in terms of the ruble value added:

$$V_n = ESO_r + O_r - SO_r - EIC_r - C_r + IC_r$$

$$V_n = O_r - C_r + (E - 1)SO_r - (E - 1)IC_r$$

$$V_n = V_r + (E - 1) [SO_r - IC_r]$$

The second term represents the excess value added that results from the equivalence between bartles and rubles; call it X . It becomes easier to interpret if we assume that the firm adds value in rubles at a rate P , so that $V_r = PC_r$, or equivalently $O_r = (1+P)C_r$:

$$X = (E - 1) [S(1+P)C_r - IC_r]$$

$$X = (E - 1) [SC_r + SPC_r - IC_r] = (E - 1) [(S - I)C_r + SPC_r] = (E - 1) [(S - I)C_r + SV_r]$$

Excess value added increases faster the more bartles there are to a ruble. There are two components to excess value added. The first depends upon

how much more prevalent barter is in sales than in input costs ($S - I$). But even if they are equally prevalent ($S - I = 0$), there is still excess value equal to $(E - 1) SV_r$. Firms that add more value if all prices are calculated in rubles—firms with a higher V_r —show a greater excess value added.

Because Gaddy and Ickes assume that their model manufacturing firm just covers its costs in nominal terms, it has no tax obligation. Thus it is not clear whether they meant the 100 percent tax rate would apply to this firm were it a value adder, and it could be that the ruble shortfall phenomenon is still dependent on value subtraction if more realistic assumptions are used. This possibility does not prove to be realized, however. Assume that firms are taxed on value added at a rate T . Net receipts R_r are equal to V_r less taxes on V_r and the tax on the excess value added, X .

$$R_r = V_r - T(V_r + X) = V_r - T V_r - T(E - 1) [(S - I)C_r + SV_r]$$

Note that this equation assumes that *nominal* value added ($V_r + X$) is not negative, since that would imply negative taxes (grants to nominal loss makers). Simplifying:

$$R_r = (1 - T - TS[E - 1]) V_r - T(E - 1)(S - I)C_r$$

Using the assumption that value is added at a rate P , so that $PC_r = V_r$, we can ask at what level of P net receipts will be less than zero. In other words, at what rate of ruble value-addition will we still see a shortfall of rubles to cover obligations? There turn out to be two cases in which $R_r < 0$ (the straightforward derivation is not reproduced here).

Case 1: $1 - T - T(E - 1)S < 0$

In this case, there will be a ruble shortfall implied when

$$P > (S - I) / ([1 - T]/T(E - 1) - S)$$

However, the denominator of the expression is negative by the condition for this case, and the numerator positive if we assume that barter is at least slightly more prevalent in receipts than in costs; this implies that expression as a whole is negative. Thus *any* positive rate of value-added will result in a ruble shortfall. (The implication that negative value added would overcome the ruble shortfall is specious because it relies on negative taxes—*i.e.*, tax grants proportional to value subtraction.) How empirically relevant is this result? The figures required are high but not inconceivable. For instance, if barter is 70 percent of sales, and the barter-ruble exchange rate is 3-1, then the expression will be true if the tax rate is 41 percent or higher. These assumptions are either consistent with or more modest than the figures cited by Gaddy and Ickes. If true, they would imply that all value-adding firms, *independent of how much value they add*, will have a shortfall of rubles for obligations (as long as barter receipts are equal to or

greater in prevalence than barter costs). In effect, the impact of barter makes the tax rate higher than 100 percent, and the issue of value-added is simply not germane to the ruble shortfall phenomenon at all.

Case 2: $1 - T - T(E - 1)S > 0$

In this case,

$$P < (S - I) / ((1 - T)/T(E - 1) - S)$$

This inequality has the right intuitive features. Value added makes a difference, but higher rates of value added still lead to a ruble shortfall when: (1) the relative prevalence of barter in sales versus input costs is greater; (2) the tax rate is higher; (3) barter is more overvalued with respect to rubles. How relevant is it empirically? The following table shows the rate of value added below which there will be a ruble shortfall, given various assumptions. Note that $E - 1$ is the amount by which the barter is overvalued with respect to the ruble; if the exchange rate is 2-1, the overvaluing is 100 percent. In all cases I have assumed a tax rate of 30 percent. The prevalence of barter assumed is in fact quite modest by Russian standards.

Bartles in Sales (S) and Inputs (I)	S = 60 percent, I = 50 percent	S = 60 percent, I = 40 percent	S = 70 percent, I = 60 percent
Overvaluation of barter (E - 1) (in percent)	Rate of value-added below which deficit (in percent)	Rate of value-added below which deficit (in percent)	Rate of value-added below which deficit (in percent)
300	56	113	129
250	30	60	43
200	18	35	21
150	10	19	12
100	6	11	6
50	2	5	3
25	1	2	1
10	0.4	0.9	0.4

Note first that it appears that even a very slight overvaluation of barter still leaves some marginally value-adding firms with a ruble deficit. This turns out to be true algebraically, not just for these examples (as can be seen by inspection of the expression for X): *if any barter is present in receipts, at least some value-adding firms will have a deficit of rubles to pay obligations.* In fact, if we accept the 200 percent overvalued barter implied by Gaddy and

Ickes's example, firms that are adding value at quite a healthy clip will still have a ruble deficit, even when the tax rate is only 30 percent.

Another interesting feature is that, at least at relatively low levels of overvaluation of the bartle, it is the relative prevalence of bartles in receipts and costs that imposes the biggest extra tax burden on firms, rather than the absolute share of bartles in output. This means that firms whose sales are in bartles have a strong incentive to spend bartles as well, rather than converting them to cash (leaving aside the question of the costs of this procedure and institutional barriers to it). Firms with in-kind receipts must also try to make payments in kind if they do not wish to bear an excess tax burden.

Tax rates also turn out to be quite important, especially when the bartle is fairly heavily overvalued, as the following table demonstrates. This table uses the assumption that the share of barter in sales is 60 percent and in costs is 50 percent.

Tax Rate	T = 30 percent	T = 25 percent	T = 35 percent
Overvaluation of bartles (in percent)	Rate of value-added below which deficit (in percent)	Rate of value-added below which deficit (in percent)	Rate of value-added below which deficit (in percent)
300	56	25	525
250	30	17	70
200	18	11	30
150	10	7	16
100	6	4	8
50	2	2	3
25	1	1	1
10	0.4	0.3	0.6

It is not possible to judge whether most Russian firms fall under case 1 or case 2, though it appears likely that both are present. However, in either event, a ruble shortfall *per se* gives no evidence of value subtraction, even on assumptions substantially more conservative than those used by Gaddy and Ickes.

NOTE FROM THE EDITOR: ERRATUM

In issue #2, 1999, *Post-Soviet Affairs* published an important article by David M. Woodruff, "It's Value That's Virtual: Bartles, Rubles, and the Place of Gazprom in the Russian Economy." Due to an oversight on my part, the article failed to incorporate several changes made by the author in his final version.

As a result, two erroneous statements that the author had detected and removed were wrongly retained in the published version. Readers are asked to disregard footnote 7 on page 134. Also, the passage beginning "Because Gaddy and Ickes assume..." and concluding "...does not prove to be realized, however," at the top of page 146 should be struck, and replaced with the phrase: "We are now in a position to see why a ruble shortfall does not imply value subtraction." The substance of the article is otherwise unaffected.

I deeply regret this oversight and apologize to Professor Woodruff for it.

— George W. Breslauer