
How Large is the Oil and Gas Sector of Russia? A Research Report

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Abstract: Two noted Japanese economists join forces with a Russian statistician to assess and analyze the size of Russia's oil and gas sector. The authors discuss the methodology favored by Goskomstat Rossii that is based on the System of National Accounts (SNA) and data supplied by enterprises, and introduce their alternative calculations to approximate the sector's share in the country's GDP. Their method is based on a modification of input-output tables, utilizing enterprise groups as units of statistical observation. Both methods are then compared and the resulting discrepancy traced to the sector's specific characteristics rather than to faulty methodological treatment by Goskomstat Rossii. *Journal of Economic Literature*, Classification Numbers: C67, C82, E23, L71, Q43. 7 tables, 21 references. Key words: Russian oil and gas, Russian GDP, value added, input-output tables, System of National Accounts.

INTRODUCTION

It is difficult to overstate the importance of the Russian oil and gas sector, both to the Russian economy and to world hydrocarbon markets. Possessing 6 percent of proved world reserves of oil and 27 percent of natural gas, Russia accounted for 9 percent of global oil exports and 29 percent of gas exports in 2003.² Major customers included the European Union, China, and Japan, with considerable post-9/11 attention to the prospects for penetrating the U.S. market (e.g., see Aron, 2002; Butler, 2002). And internally, in the words of Clifford Gaddy (2004, p. 346), "It is becoming increasingly clear that Russia's oil sector has been and will for the foreseeable future continue to be the key to the country's economic performance." That being said, there is a considerable range of views as to the size of the sector, and there is a need to assess more critically what is actually being measured in the official statistics.

The World Bank (2004a, 2004b) only recently concluded that the share of oil and gas sector in Russian GDP was underestimated in the official GDP statistics compiled by Goskomstat Rossii (Federal State Statistics Service of Russia) due to the prevalence of the transfer pricing.³ In this brief paper we revisit the specific treatment of value added created in

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²All figures are derived from the British Petroleum 2004 Statistical Review of World Energy (BP, 2005) and Russian Oil (2005); Russia's corresponding world shares of oil and natural gas production were 11 and 22 percent, respectively.

³We should like to note here that this observation was made in the writings of Kuboniwa (2002, 2004a, 2004b) and Tabata (2002), as acknowledged by Sagers (2002), Ellman (2004), and OECD (2004, p. 20); preliminary observations were first published in Kuboniwa and Tabata (1999).

Table 1. Value Added at Basic Prices (percent of total GDP at market prices)

Component	2000	2001	2002	2003	2004
Industry	28.0	25.3	24.5	23.9	24.9
Oil and gas sector	7.8	6.7			
Transportation and communications	8.0	8.0	8.1	8.0	7.7
Transportation margins of oil and gas	1.0	1.1			
Trade and catering	21.2	19.9	19.9	19.9	19.5
Trade margins of oil and gas	10.7	7.7			
Net taxes on products	11.4	12.3	11.5	11.9	
On oil and gas	4.6	5.0			
Total contribution of oil and gas sector	24.1	20.5			

Sources: Compiled by the authors from *Osnovnyye*, 2004; *Kratkosrochnyye*, No. 11, 2004; *Sistema*, 2003, 2004; and unpublished Goskomstat Rossii data.

the oil and gas sector in Russian statistics and offer an alternative method of calculation based on the use of input-output tables, with “enterprise groups” serving as the units of statistical observation.

The official figure for the share of the oil and gas sector in Russian GDP can be derived only from the input-output tables compiled by Goskomstat Rossii. The most recent input-output tables available at present cover the year 2001 (*Sistema*, 2004). The problem with the official Russian figure is that it is very low, namely 7.8 percent in 2000 and 6.7 percent in 2001 (see Table 1). As discussed below, when we add a part of the value added attributed to the trade and transportation sectors (as trade and transportation margins and net taxes on oil and gas) to the official figure, we obtain substantially different figures: 24.1 percent in 2000 and 20.5 in 2001. If this is the case, the share of industry should be increased by some 10 percent, and the share of the trade sector should be reduced accordingly (here, we neglect net taxes on products). This outcome completely changes the structure of Russian GDP, and the contribution of the oil and gas sector to Russian economic growth must be reconsidered. We begin by outlining the relevant methodology employed by Goskomstat Rossii, and follow by presenting our alternative calculations and a comparison of the two methods.

THE METHODOLOGY OF GOSKOMSTAT ROSSII

Goskomstat Rossii’s official SNA data are essentially based on international standards incorporated in the System of National Accounts (1993) as well as on Russian data detailing enterprise characteristics, prices, and employment. Value added of the oil and gas sector is recorded in the industries in which it is created, and is not “transferred” to the trading sector in order to inflate the weight of services in GDP.

The issue here is not “transfer pricing” (a specifically Russian practice), but rather the presence of large holdings in the oil and gas sector, which include the following two types of enterprises: (1) producing enterprises that extract and process oil and gas; and (2) trading enterprises that sell the oil and gas in domestic and international markets. Both types are independent legal entities that generate their own statistical reports. Because the main activities of the first type comprise either extraction or processing, the value that they add is not

large. The value by the second type (sales) is considerably larger than that of producing enterprises, because the gross profit of trading enterprises is the difference between international and domestic price levels. Thus, for example, in 2002 the average export price of gas (2,192 rubles per 1,000 m³) was more than 11 times higher than the gas producers' price (194 rubles per 1,000 m³). Such considerable price differentials accounted for the main income of the country's largest wholesale trading enterprise, Gazprom,⁴ which for all practical purposes has been the exclusive exporter of natural gas since 1994.

Russia's enterprise holding groups include independent enterprise units that are legal entities engaged in a variety of activities. Each unit creates value added that is attributed to its main activity stipulated in the enterprise unit's registry. However, if one proceeds to classify all enterprises in a vertically integrated holding by the broad type of their industrial activity (e.g., as oil or gas), then the trading and intermediation activities will be materially underestimated. Moreover, the share of trade in the country's GDP will also decrease. In fact, such reclassification of trade and intermediation enterprises constitutes a redistribution of parts of value added from the trading sector to the oil and gas industries, in essence raising producers' prices for oil and gas. Thus, for example, if to the cost of natural gas produced in 2001 (63.3 billion rubles) one were to add the output of trading and intermediation enterprises that sell gas in the domestic and international markets (386.5 billion rubles), then the producers' price of gas would rise from 118 rubles per 1000 m³ (the official enterprise price statistic) to 839 per 1000 m³. Hence, a contradiction will arise between price statistics tracking real producers' prices (and their dynamics), on the one hand, and the data of national accounts, on the other.

Moreover, value added is not an abstract indicator that can be moved from one industry to another. When calculated in terms of income generation, it represents real value formed by labor income and net taxes (taxes minus subsidies) on production, and gross profit. Thus, a transfer of the value added by trade to the oil and gas industries instantaneously raises the average wage of an oil or gas worker in Siberia several times. As a result, average wage and profitability indicators for enterprises in this industry will reflect highly distorted values, differing significantly from official labor statistics. And the industrial structure of the Russian economy would thus take on a "virtual" character that is unfamiliar to those who live and work in Russia.

There is also a regional aspect that deserves to be mentioned in this brief report. In addition to the country's GDP, Goskomstat Rossii calculates Gross Regional Product (GRP) values for each constituent entity of the Russian Federation. Inasmuch as most Russian holding groups (particularly the largest ones) are registered in Moscow and other large cities, most taxes are correspondingly collected and paid there. Thus a redistribution of value added among Russia's regions would be required to reflect the actual contribution of each region to the country's GDP.

Let us now have a look at specific calculations involving data based on input-output tables for the year 2001—the most recent statistics released by Goskomstat Rossii (*Sistema*, 2004). If one were to include in the oil and gas sector only that sector's production enterprises, the share of its value added to GDP, at market prices, would amount to 6.7 percent, as shown in Table 2. However, if one then includes the value added by enterprises that transport and sell oil and gas, as well as net taxes levied on the sector's output and paid into the state budget, the share rises to as much as 20.5 percent. Such calculations are routinely made at

⁴Gazprom has been registered as an economic unit in the foreign trade sector (Tabata, 2002, p. 612).

Table 2. Share of Oil and Gas Sector Output in Aggregate GDP, 2001 (in percent of GDP)

Components	Oil extraction products	Oil processing products	Gas sector products	Total
Total	10.0	4.6	5.8	20.5
Producers	5.1	0.9	0.7	6.7
Transport enterprises	0.5	0.4	0.2	1.1
Trading and intermediation enterprises	2.7	1.9	3.1	7.7
Net taxes on products	1.7	1.4	1.9	5.0

Sources: Compiled by authors from *Sistema*, 2004 and unpublished Goskomstat Rossii data.

Goskomstat Rossii, which submits the resulting statistical data to ministries, agencies, and other interested users.⁵

ALTERNATIVE CALCULATIONS

We now offer here an alternative method of calculating the contribution of the oil and gas sector to Russia's GDP. The method is based on a modification of the input-output tables (i.e., supply and use tables),⁶ involving a different approach to the units of statistical observation. In the input-output tables for 2001, as well as in calculations of each industry's production, the unit of statistical observation is the "enterprise." An "enterprise" in this context is an organizational and legal entity producing output and enjoying a certain degree of autonomy in decision-making related to the distribution of resources at its disposal. However, because most if not all enterprises in the oil and gas sector are vertically integrated,⁷ the "enterprise group" rather than the "enterprise" can be used as the statistical observation unit. Such an expanded unit incorporates a small number of organizational and legal entities, each constituting an independent legal nucleus involved in a different type of activity, all grouped together within a single legal or financial framework. Formally, although the enterprises in an enterprise group possess a certain degree of decision-making authority, they are in practice controlled by the headquarters of the enterprise group. Linked within a single vertically integrated technological chain, the enterprises become dependent on each other and lose the capacity to function independently.⁸

The aforementioned method allows us to modify the matrix of outputs of the supply table so that sales and specialized transportation, which support the shipping and marketing of the sector's products, are treated as secondary activities in oil extraction, oil processing, and gas industries. It follows that corresponding modifications also need to be made in the use table; Table 3 presents a fragment of the modified supply table for the year 2001.

We can now attribute the following to the oil-extracting sector: (1) a part of the output of wholesale, external trade, and intermediation activity (corresponding to the volume of trade

⁵We similarly used data based on input-output tables in our calculations in the past (Kuboniwa, 2002; 2004a, 2004b, Tabata 2002).

⁶The supply and use tables of the input-output system are explained in *System* (1993, pp. 351-361).

⁷As for the vertically integrated companies in the oil industry, see Dienes (2004, pp. 322-324).

⁸For example, oil and gas cannot be sold "in the ground" and must first be extracted and transported.

Table 3. Fragment of the Modified Supply Table for 2001

Product and services	Oil extraction sector		Oil processing sector		Gas sector	
	Mill. rubles	Pct. of total	Mill. rubles	Pct. of total	Mill. rubles	Pct. of total
Oil extraction products	647,458.2	62.3	—	—	591.7	0.1
Oil processing products	2,159.0	0.2	572,889.7	69.4	12,989.5	1.6
Gas industry products	3,312.2	0.3	167.3	0.0	98,366.7	12.1
Other industrial products	3,749.3	0.4	11,007.9	1.3	3,213.2	0.4
Pipeline transport services	67,520.3	6.5	1,706.6	0.2	220,092.7	27.1
Trading & intermediary services	315,692.8	30.4	239,815.0	29.0	386,478.6	47.6
Real estate services	—	—	—	—	89,841.5	11.1
Total	1,039,891.8	100.0	825,586.5	100.0	811,573.9	100.0

Sources: Compiled by the authors from unpublished Goskomstat Rossii data.

and intermediation price margin on oil); and (2) the output of oil pipeline transportation.⁹ We can also attribute the following to the oil-processing sector: (1) a part of the output of wholesale, external, and retail trade, as well as a part of intermediation activity (corresponding to the amount of the trade and intermediation margin on oil products);¹⁰ and (2) the output of pipeline transportation of oil products.¹¹

Finally, within the framework of our approach, one can attribute to the gas sector: (1) a part of the output of wholesale and external trade, and of the intermediation activity (corresponding to the amount of the trade and intermediation margin on gas); (2) the output of gas transportation enterprises; and (3) the revenue from renting the pipeline (owned by Gazprom) to transportation enterprises.¹²

The analysis of the structure of the sector's output presented in Table 3 indicates that the share of trading and intermediation services (which are essentially secondary types of

⁹Oil transportation is controlled by AK Transneft', a large monopoly with 12 regional subsidiaries. As an essential component in the delivery to domestic and international users, Transneft' handles pipelines through which the flow of exports generates the lion's share of revenues of the major oil enterprises. The pipeline transportation margin amounts to ca. 80 percent of the total transportation margin on oil, with the balance divided among railway, marine, and, marginally, highway transport. However, the output of these transportation sectors (as measured by the transportation margin on oil) is not included in the output of the vertically integrated structure of the oil-extracting sector. For example, railway transportation is handled by another large Russian monopoly, Russian Railways (RZhD), whereas marine transport is in the hands of independent shipping enterprises. Moreover, these transportation industries handle a variety of cargo in addition to products of the oil sector.

¹⁰Attribution of a part of retail trade (corresponding to the amount of the retail margin on oil products) to the sector is due to the ownership of fuel-retailing enterprises (gas stations, etc.) by giants such as Lukoil, Sibneft', Slavneft', and still in part by the now largely dismantled Yukos.

¹¹As in the case of oil, railroad, marine, domestic shipping, and highway transportation (as measured by the margin on oil products) are not attributed to the oil processing sector.

¹²It should be noted that a part of the retail trade conducted outside of the Gazprom system has not been attributed to the gas sector (i.e., the retail margin on gas processing products, namely 708.2 mln. rubles). It should also be called to the reader's attention that although a part of railway transportation (the gas price margin) was not attributed to the gas sector, pipeline transportation services (220.1 billion rubles) exceed the entire transportation margin on gas (28.4 billion rubles), because the bulk of these services is neither treated nor recorded as a margin, but rather as intermediation input costs incurred by wholesale and external trade enterprises engaged in the selling of gas.

Table 4. Value Added of the Oil and Gas Sector Industries in 2001

Components	Oil extraction sector		Oil processing sector		Gas sector	
	Mill. rubles	Pct. of total	Mill. rubles	Pct. of total	Mill. rubles	Pct. of total
Industrial producers	453,963.1	60.6	78,815.1	29.6	64,070.4	14.6
Pipeline transportation	31,033.9	4.1	810.0	0.3	105,160.0	24.0
Trade and intermediation activities	264,534.8	35.3	186,253.3	70.1	179,729.8	41.0
Real estate operations	—	—	—	—	89,841.5	20.5
Total	749,531.9	100.0	265,878.4	100.0	438,801.7	100.0

Sources: Compiled by authors from unpublished Goskomstat Rossii data.

Table 5. Value Added in Basic Prices Created by Industries of the Oil and Gas Sector in 2001 (in percent of GDP)

Industry/sector	Producers	Transportation	Trade and intermediary services	Real estate	Total
Official input-output tables					
Oil extraction	5.8	—	—	—	5.8
Oil processing	1.0	—	—	—	1.0
Gas	0.8	—	—	—	0.8
Oil and gas sector	7.6	—	—	—	7.6
Modified input-output tables					
Oil extraction	5.8	0.4	3.4	—	9.5
Oil processing	1.0	0.0	2.4	—	3.4
Gas	0.8	1.3	2.3	1.1	5.6
Oil and gas sector	7.6	1.7	8.0	1.1	18.5

Sources: Compiled by authors from *Sistema*, 2004 and unpublished Goskomstat Rossii data.

activity) in the oil-extracting and processing industries amounts to around 30 percent of their output. At the same time, the share of such services in the gas sector (at 47.6 percent) is almost four times higher than the output of the sector's main activity (i.e., extraction and processing at 12.1 percent). From the perspective of SNA theory, such a modified output matrix may look unusual. One should remember, however, that it does reflect the realities of the Russian economy.

After appropriate modifications of the supply table, we also made changes in the use table.¹³ The structure of input consumed by the oil and gas industries was calculated by using data on individual enterprises as well as data on corresponding transport and trade industries

¹³More specifically, parts of the output and intermediation inputs in the trading and intermediation sectors as well as those in transportation and real estate operations were added to the corresponding industries comprising the sector.

Table 6. Structure of GDP in Basic Prices for 2001 (in percent of total)

Sector	Official input-output tables (a)	Modified input-output tables (b)	Difference (b-a)
Electric power	2.8	2.8	—
Oil extraction	5.8	9.5	3.8
Oil processing	1.0	3.4	2.4
Gas industry	0.8	5.6	4.8
Coal industry	0.5	0.5	—
Other fuel industries	0.0	0.0	—
Ferrous metallurgy	1.5	1.5	—
Nonferrous metallurgy	3.1	3.1	—
Chemical and petrochemical industry	1.5	1.5	—
Machine-building and metalworking	4.7	4.7	—
Forestry and wood-processing ^a	1.2	1.2	—
Construction materials industry ^b	0.9	0.9	—
Light industry	0.5	0.5	—
Food industry	3.6	3.6	—
Other industries	0.7	0.7	—
Industry, total	28.7	39.6	10.9
Construction	7.5	7.5	—
Agriculture and forestry	6.9	6.9	—
Transportation and communications	9.6	7.9	-1.7
Trade, intermediation, and catering	30.3	21.2	-9.1
Other goods and services production	0.8	0.8	—
Housing maintenance and other services ^c	2.9	2.9	—
Medicine, education and culture ^d	5.6	5.6	—
Science and scientific services ^e	1.5	1.5	—
Finance, credit, insurance, and administration ^f	7.9	7.9	—
Financial intermediation services ^g	-1.6	-1.6	—
Total in basic prices	100.0	100.0	0.0

^aIncluding pulp and paper.

^bIncluding glass and porcelain production.

^cIncluding non-productive services for individual consumers.

^dIncluding social services and sports.

^eIncluding geology, resource prospecting, land surveying, and hydrometeorology.

^fIncluding social organizations.

^gIndirectly measured.

Sources: Compiled by the authors from *Sistema*, 2004 and unpublished Goskomstat Rossii data.

derived from input-output tables. Value added was determined as the difference between the output and intermediate input consumed by these industries. Table 4 shows the value added by industries of the oil and gas sector, calculated on the basis of modified input-output tables for the year 2001. The table indicates that most of the value added to oil extraction sector is

Table 7. Purchasers' Prices for Products of the Oil and Gas Sector in 2001 (in percent)

Commodity	Basic price	Trade and intermediation margin	Transport margin	Net taxes on products	Purchasers' price
Oil	100.0	47.7	13.0	23.3	184.0
Oil processing products	100.0	37.6	8.4	19.8	165.8
Gas	100.0	372.1	27.3	164.1	663.6

Sources: Compiled by the authors from *Sistema*, 2004, p. 62.

created by industrial producers, while in the oil processing and gas sectors, the bulk is added by trade and intermediation activities.

COMPARING THE TWO METHODS

We can now compare the shares of value added in Russia's GDP that are based on official input-output tables with those based on modified tables. The results are presented in Table 5. As one can readily ascertain, the GDP's share of value added to the oil and gas sector in basic prices is 10.9 percent higher in the modified input-output tables than in the official ones. The increase is largely due to the inclusion in the modified tables of trade and intermediation activities (8 percent of the increase), and to a relatively minor extent, to the inclusion of transportation (1.7 percent) and real estate operations (1.1 percent).

In Table 6 we present the change (in basic prices) in the structure of GDP across all industries of the Russian economy caused by modification of input-output tables.¹⁴ The table shows that even after our modification of the input-output tables, the share of trade and intermediation activities in GDP (in basic prices) remains high, amounting to 21.2 percent.

It should be noted that there is no difference between both sets of tables in 2001 in the value of trade and transportation margins and in other components of purchasers' prices for products of the oil and gas sector. Thus, Table 7, detailing purchasers' prices for oil and its products, shows that they are almost twice as high as their basic prices. For natural gas, the purchasers' prices are more than six times as high as the basic. All such considerable differences between the purchasers' and basic prices are due to the size of the trade and intermediation margins and taxes¹⁵ on these types of products.

CONCLUDING NOTE

The alternative calculation presented in this research report sheds some additional light on specific features of the oil and gas sector's contribution to Russia's GDP. The sector's uniqueness is rooted not only in its magnitude and undisputed importance, but also in the presence and role of enterprise groups that command and control its workings. We argue that these specific characteristics, rather than faulty methodological treatment by Goskomstat Rossii, are largely responsible for the material discrepancy between official statistics and the figures discussed above.

¹⁴While the modification based on the notion of enterprise groups is presented here solely for the oil and gas sector, similar problems exist (albeit considerably less pronounced) in such sectors as aluminum and steel.

¹⁵Export, excise, and value-added taxes.

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