Chapter 3

Economy-wide Influences of the Russian Oil Boom: A National Accounting Matrix Approach

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INTRODUCTION

The ongoing high price in the world oil market gives Russia large windfall export revenue. There is not much room to argue against the assertion that the high oil price has been contributing to the recent good performance of the Russian economy. At the same time, the menace of the "Dutch disease" has been discussed more and more intensively: the large trade surplus leads to appreciation of the ruble and brings additional funds to be spent. The ruble appreciation hampers export by the non-oil industries and makes imports cheaper. The additional funds may be spent on non-tradables and imports, while the demand for domestic tradables decreases. On the supply side, the stimulated oil and non-tradable sectors pull resources at the cost of the other export manufacturing sectors. In short, the Russian economy grows and turns into an "oil-monoculture" economy instead of a developed industrial and service economy. This "Dutch disease" scenario is undoubtedly one of the theoretically possible growth paths of Russia; we need, nevertheless, to carefully and comprehensively examine the economic relations between the oil sector and the Russian national economy before diagnosing the reality of the symptoms leading to the disease.

To explore all aspects of financial and real influences of an oil boom on a national economy is a complicated task. For Russia, the lack of economic data, the shortness of the time series, and the ongoing structural reforms increase the difficulty. In this chapter, we use a Russian national accounting matrix (NAM) instead of a full-fledged economy-wide model and limit our object to answering only one question: how much demand for domestic tradables can the Russian oil sector create? Our working hypothesis is that the Russian oil industry creates demands for domestic tradables as much as do the other sectors and, in this respect, the oil industry is able to contribute to growth of the Russian manufacturing sector. The other fundamental questions, that is, how much will the ruble be appreciated by the boom and what kind of real and financial effects will the appreciation bring, should be analyzed later, after constructing a Russian macroeconomic model including the financial and monetary sphere.

The input-output (I-O) methods have long been applied to analyze resource booms (see Davis, 1995, p. 1767). The conventional I-O methods are, however, not sufficient because these methods can neither consider the multiplier effects diffused through consumption and investment expenditures nor examine the economic influences of additional financial funds brought by the increasing oil export. Most importantly, they cannot take the price effects into account. These limitations are particularly serious for the present Russian oil boom, where a large part of the initial impact of the boom on the economy takes the form of an increase in financial funds denominated in foreign currency. To overcome the defect of the I-O analysis, we compile a Russian NAM and calculate the "accounting multipliers."

A NAM differs from a conventional input-output table (IOT) in that a NAM includes income and expenditure accounts of the institutional sectors; a NAM, therefore, can show production, income, and expenditure as a complete circular flow. By setting any number of the accounts in a NAM to be exogenous, we can calculate the accounting multiplier matrix, which is equivalent to the Leontief inverse matrix of the I-O analysis. Because consumption and investment usually have large weights in the economic flow of a national economy, endogenising income and expenditure flows is a clear advantage of the NAM method. Using the Russian NAM, we can estimate the influences of the oil boom on the national economy through the consumption and investment linkages. On the other hand, the above procedure implies that we assume linearity of consumption and investment behaviors and ignore the effects of changes in the prices and the exchange rate. The linearity assumption hardly holds true, and the ignorance of price changes reduces the value of the NAM method. This method is, nevertheless, useful for studying the structural features of an economy and may be the only feasible method under the present circumstances to investigate economy-wide influences of the Russian oil boom.

The rest of the chapter is organized as follows: Section 2 gives a brief survey of the Dutch disease economics and the resource curse theory to confirm why we need to be cautious to directly apply the general theory to a particular resource boom. Section 3 explains the NAM methods and examines the data. Section 4 reports the results followed by a discussion of those results.

CONSIDERATION OF DUTCH DISEASE AND RESOURCE CURSE

The role of extractive industries in economic development has long been discussed, receiving mixed evaluations. From a historical point of view, the extractive sector seems to have contributed to the Industrialization of many developed economies, including that of Japan. Davis (1995) reports that developing economies with significant extractive industries recorded better growth performance than that of other developing economies in the period of 1970 to 1990. Askari and Jaber (1999) admit that there were negative influences of the oil boom in the 1970s on economic development of the oil-exporting countries of the Persian Gulf; they, nevertheless, concluded that the countries made great strides in terms of enhancing the overall welfare of their citizens during the period. There seems to be little room to argue that Indonesia, which has a large extractive sector, has recorded an impressive growth of the export-oriented manufacturing sector during the last thirty years (see Usui, 1996; Rodgers, 1998).

On the other hand, the “Dutch disease” economics suggests that extractive industries may contribute to economic development not only at a lower level than expected, but also negatively. The Dutch disease economics tends to more or less relate negative influences of an expanding extractive industry to large and sudden economic shocks such as the natural gas boom in the Netherlands and the oil shocks in the 1970s. The “resource curse” thesis further suggests that it is normal and usual for the extractive sector to impede economic growth. Discussions of the resource curse appear in Amuzenger (1982), Gelb (1986, 1988), Auty (1994), Davis (1995), and Sachs and Warner (1995, 2001). Their arguments are as follows.

First, the Dutch disease economics suggests that the expanding extractive sector can adversely affect the manufacturing sector mainly through real exchange rate appreciation (increase in relative price of non-tradable to tradable goods).

Second, assuming that "learning by doing" is one of the most important factors to increase manufacturing productivity, and that the effectiveness of learning by doing depends on the volume of the activity, even a temporal contraction of manufacturing production can result in an irrevocable loss of competitiveness. A resource boom which impedes the development of the manufacturing sector is, therefore, highly undesirable.

Third, extractive industries usually generate large rents, most of which go to the government. This affluence tends to induce rent-seeking activities, mismanagement of the public fund such as over-ambitious public investment projects, and lax social and economic policies.

Fourth, the extractive sector is supposed to induce little demand for domestic tradables. Most mineral income may be spent on non-tradables through government spending, or repatriated. The extractive sector can be regarded as an "enclave" in an economy in terms of demand creation of tradables (see Bosson and Bension, 1977), while it may induce excessive demand for non-tradables.

Finally, volatile and often violent changes in the conditions of mineral production and marketing might cause economic and political problems, particularly when a mining recession forces the government to tighten its lax policies. Moreover, the eventual depletion of mineral deposits may cause large structural adjustment costs.

These arguments seem more or less valid in the light of historical experiences of oil-exporting developing economies during and after the two oil shocks in the 1970s, analyses of which the resource curse thesis is mostly based on. It is, however, not clear to what extent the historical experiences can be accounted for by the general characteristics of the extractive sector and to what extend by other particular factors in each case. From this perspective, the following points should be noted.

First, the theoretical framework of the Dutch disease economics, which is often referred to as the "core model," is undoubtedly valid. The problem addressed by the core model is, however, not a property of the extractive sector, but adjustment problems accompanying structural changes in general. The core model explains Dutch disease as follows (see Corden, 1984; Wijnbergen, 1984; Neary and Wijnbergen, 1986b; Sitz, 1986). A booming extractive industry pulls production factors and resources (resource movement effect) and increases income mostly through export of the mineral products. The increased mineral income is thought to expand demand for non-tradables, mostly through government spending (spending effect). The increase in demand for non-tradables raises relative prices of non-tradables (real exchange rate appreciation effect). Consequently, non-tradable sectors pull more resources, and fewer resources are available for non-extractive tradable sectors. This causal relationship obviously holds true not only for a mineral boom but also for any expansion of an export-orientated tradable sector, although magnitudes of the effects may differ among the extractive and the other tradable sectors.

Second, volatility and unpredictability are inherent in extractive industries; they are, however, not exclusive to the extractive industries. If the future course of a resource boom could be perfectly foreseen, Dutch disease effects would be no more than rational changes in the economic structure. The changes would claim adjustment costs and would be brought in only when the costs could be covered with the returns from the changes. The future is, however, not perfectly foreseeable in the real world. The changes could cause adjustment costs that would not bring any benefits. It might be true that uncertinities of extractive activities are so intensive that only an extractive sector can cause irrational structural changes and infertile adjustments costs to such an extent that the oil shocks have done. The negative influences of the property of the extractive sector, nevertheless, seem manageable in the long run. If this were not the case, the extractive sector would have disappeared long ago.

Finally, it is certain that problems of efficient and effective distribution of mineral rents and spending of government revenue arise on a large scale if the boom increases them on a large scale. Moreover, a large amount of mineral rents may tempt people to undertake rent-seeking activities and even criminal activities. Bad governance and mismanagement of government spending are, however, neither a problem inherent in the extractive sector nor a problem caused by the extractive sector only. We are certainly able to find a number of cases of bad governance among countries that have never experienced any export boom.

In summary, it would not be very fruitful to evaluate a particular case of export boom based on the general theory of “Dutch disease” and “resource curse." Before concluding our study of the outcome of a resource boom, we need to carefully analyze the economic relations of the booming sector to the national economy in the conditions specific to the economy.

DATA AND METHOD

To analyze the economy-wide influences of the Russian oil boom, we use a NAM, which can be regarded as an extended IOT including endogenous income and expenditures flows (see Table 1). The 2001 Russian NAM was compiled, based on the 2001 IOT (*Sistema*, 2004) and the 2001 national accounts (*Natsional'nye*, 2004). Nakamura (2004) explains the details of the compilation procedure. Nakamura (2004) refers to a 1999 Russian NAM, but the frameworks of the 1999 and 2001 NAMs are almost identical, except that the 2001 NAM does not have the institutional accounts separated for the oil and gas companies. Unlike the case of 1999, discrepancies between the IOT and the national accounts were small in 2001. If we move the amount equal to the secret wage in the 2001 national accounts from the gross operating surplus in the 2001 IOT to the labor income in the 2001 IOT, most discrepancies between the IOT and the national accounts disappear. This may simply reflect the fact that the 2001 IOT was updated from the 1995 benchmark IOT with some 2001 data (*Sistema*, 2004, p. 4). Discrepancies and inconsistencies remained nevertheless, and they were eliminated by a mathematical adjustment method (see Nakamura, 2004, p. 159).

We also compiled NAMs of the four OECD-member countries, namely, Australia, Canada, the Netherlands, and the United Kingdom, in the period of 1970–1990 to use them as a yardstick against the Russian NAM. The NAMs for Russia and the four countries have a common framework (see Table 1); however, it is not possible to directly compare the Russian NAM with the NAMs of the four OECD countries because of the methodological differences. The NAMs for the four OECD countries were constructed from the IOTs at current prices, which were included in the OECD I-O database (OECD, 1995), and the national accounts (UN, various years). Nakamura (1999) explains the details of the compilation procedure and the data. The four countries were chosen from ten countries included in the OECD I-O database, because they had a relatively large extractive sector (see Table 2). The extractive sector in the NAMs of the four OECD countries corresponds to code 2 of ISIC rev. 2, "mining and quarrying." For the Russian NAM, it is an aggregated sector of oil drilling and gas mining. The oil refinery sector, which is included in the "fuel-energy sector" of the Russian industry classification, is a manufacturing sector in our analysis as it is by the ISIC. Both for Russia and for the four OECD countries, the tradable sectors correspond to manufacturing plus electricity, while the non-tradable sectors include services and utility industries such as construction, trade, communication, and transportation. The Russian NAM includes the Use table (products by sectors table) and the Make table (sectors by products table), while the NAMs of the four OECD countries include symmetric IOTs (products by products table). This is, however, not a serious obstacle, because we can calculate influences of a change in a production account on other production accounts easily in the Russian NAM. Hereafter, we use the terms of "sector" and "product (or goods)" interchangeably for simplicity.

The NAMs were analyzed as follows.

First, the direct input structure of the extractive sector was examined. The input coefficients of labor (*L*), capital (*C*), tradables (*T*), non-tradables (*N*), and imports (*M*) of the extractive (*R*) sector were compared with those of the average tradable (*T*) and non-tradable (*N*) sectors to identify technological characteristics of the extractive sector. The capital (*C*), or capital income, is defined as the sum of gross operating surplus; it is difficult to compare the capital shares between the countries because of different treatments of indirect taxes.

Second, the standard sensitivity and power of dispersion analysis was applied to the production accounts part of the Russian NAM to investigate the economy-wide influences conducted only through the production linkages.

Third, the accounting multipliers of the NAMs were analyzed. The accounting multiplier matrix corresponds to the Leontief inverse matrix in the I-O analysis and the accounting multipliers to the complete input coefficients. In the following analysis, the export and the financial transactions with the Rest of the World in the NAMs were exogenized to calculate the accounting multiplier matrix; Import was endogenized. The accounting multipliers in our NAM analysis can therefore be regarded as complete input coefficients of a "closed model." The accounting multipliers of the extractive sectors were compared with those of the tradable (*T*), non-tradable (*N*), and production (*P*) sectors. The accounting multipliers of those aggregated sectors were the simple average of the accounting multipliers of the sectors included in each aggregated sector.

RESULTS

Technological Features of the Extractive Sector

Table 3 compares the input structures of the extractive sector and the other production sectors. From Table 3, the following facts can be identified:

(1) Labor and Capital. The labor input coefficient of the extractive sector (E_{LR}) was smaller than that of the tradable (T) and the non-tradable (N) sectors (E_{LT} and E_{LN}, respectively) except for *U68* and E_{LT} of *A68*. The Netherlands cases were excluded because the Netherlands NAMs did not show labor and capital separately. On the other hand, the capital input coefficient of the R sector (E_{CR}) was larger than that of the other sectors (E_{CT} and E_{CN}) except for E_{CN} of *U68*, *R01b*, and *R01p*; the differences were small in the Russian cases. Comparison of the capital input coefficient between the R sector and N sector did not show a clear tendency. Regarding the total value added (labor and capital income), the share of total value added of the R sector was larger than that of the T sector for all cases.

The input coefficients of labor and capital (E_{LR} and E_{CR}) of the extractive industry seem to be smaller in Russia than in the four OECD countries. There is no OECD case where the labor income share is smaller than that in Russia. For the capital income share, *U68* is the only clear opposite case, and *C71* and *C90* are the vague cases.

(2) Domestic Tradables and Non-tradables. The extractive (R) sector used fewer domestic intermediates per unit of output than the tradable (T) sector except for the non-tradable (N) inputs in the three Canadian cases and the *R01b* case. In comparison between the R and N sectors, the input coefficients of domestic intermediates of the R sector seem to be smaller than those of the N sector.

(3) Imports. The input coefficient of imports (M) for the R sector (E_{MR}) was small in comparison with that of the T sector (E_{MT}) for all cases. The small E_{MR} apparently reflects that the R sector uses relatively few tradables as intermediate inputs. On the other hand, E_{MR} is at a similar level of the input coefficient of imports for the N sector (E_{MN}).

(4) Private Consumption and Gross Fixed Capital Formation (GFCF). The composition of private consumption and the GFCF seems to be common in the four OECD countries. Compared to the four OECD countries, the share of the non-tradables for Russia looked very small. It is, however, difficult to judge because of the large transaction costs, which consist of transportation and trade services. If we move the transaction costs, which account for the greatest part of the difference in the shares of the tradables between at basic prices and at purchaser prices ($31 = 50 - 19$) to the non-tradables, then the Russian share of the non-tradables in private consumption does not seem to be very small. One notable difference is that the share of imports in private consumption in Russia is larger than that in all four OECD countries.

The compositions of the GFCF expenditure had showed some tendency within a country but varied between the four OECD countries. For Russia, the share of imports in the GFCF expenditure seemed to be large in comparison with the share of the domestic tradables; the magnitude of the imports share is, however, not particularly large in comparison with the four OECD countries.

In summary, there seems to be little difference in the input and expenditure structures in Russia and the four OECD countries. The *R* sector uses less labor and fewer intermediates and generates more capital income than does the *T* sector in terms of unit of output. Nakamura (1999) identified that the input structures of the *R* sectors in the four OECD countries were highly similar after calculating correlation coefficients between the input coefficient vectors of the *R* sectors in the four OECD countries. The input structure of the *R* sector in Russia also seems to be not very different from that in the four OECD countries. On the other hand, the *R* sector was more or less similar to the non-tradable (*N*) sector in the input structure. The *R* and *N* sectors differed in the composition of value added: labor income was small and capital income was large for the *R* sector.

Economy-wide Influences of the Extractive Sector

Figure 1 indicates the result of the sensitivity and power of dispersion analysis using the production part of the Russian NAM. The figure shows the oil drilling, oil refinery, and gas mining sectors separately. Both indicators of the oil refinery sector were relatively high. The indices of the gas mining sector were almost at the average level. They may be a little smaller than those of the manufacturing sectors; most of the less than average sectors are non-manufacturing sectors. The sensitivity of the oil-drilling sector is higher than the average level, while its power of dispersion is significantly smaller than the average level. The small input coefficient for tradable intermediates seems to lead to the low power of dispersion of the oil-drilling sector. In summary, the Russian extractive sector creates less demand than the manufacturing sectors do, mostly because the extractive sector uses domestic tradables relatively little. It is arguable whether the differences of 10–20 percent in the power of dispersion index between the oil-drilling sector and the manufacturing sectors are economically significant. From the inverted point of view, we can say that the oil-drilling sector creates demand to 80–90 percent of the level of the manufacturing sectors.

The sensitivity and power of dispersion analysis concerns the demands induced through the production linkages. Table 4 summarizes the result of the accounting multiplier analysis, which enable us to examine the ripple effects defused through not only production linkages, but also income and expenditure flows. Table 4 indicates the following features of the economy-wide influences of the extractive (*R*) sector.

(1) Influences on Tradable (*T*), Non-tradable (*N*), and Production (*P*) Sectors. The *R*, *T*, and *N* sectors were not very different in their influences on the *T* sector. For *A68*, *U68*, and *R01*, the *R* sector influences were even stronger than the average in terms of the percentage deviation. In terms of the absolute values of the accounting multipliers, however, the differences do not seem significant for all cases. This finding may be supported by Benjamin, Devarajan, and Weiner (1989) and Fardmanesh (1990, 1991), where it is empirically and theoretically suggested that the extractive sector can stimulate manufacturing sectors through creating demands for domestic manufactured goods.

Regarding influences on the *N* sector, we can find the tendency clearly: The *R* sector and *N* sector influence the *N* sector more strongly than the *T* sector does. The difference between the *R* and *N* sectors does not seem significant. From this, we can conclude that the *R* sector influences the average production sector more strongly than does the *T* sector, and almost as much as the *N* sector. Moreover, this tendency can be seen commonly both in Russia and in the four OECD countries.

(2) Influences on Labor Income (*L*) and Capital Income (*C*). The *R* sector seems to influence labor income more strongly than does the *T* sector; *U90* is the sole exception. The *N* sector may influence labor income more than the *R* sector; whether this is so is not very clear. For capital income, it is clear that the influence of the *R* sector is stronger than not only the *T* sector but also the *N* sector in terms of percentage deviation. It is, however, arguable whether the differences are economically significant in terms of absolute values of the accounting multipliers.

In summary, the *R* sector influences the average production (*P*) sector as strongly as the *N* sector does and slightly more strongly than the *T* sector does. The difference between the *R* and *T* sectors in the influence on the *P* sector is accounted for by the fact that the *R* sector influences the *N* sector slightly more strongly than the *T* sector does. One reason for the strong influence of the *R* and *N* sectors on the economy is that their shares of imports in their expenditure are small. Because imports and net lending are the sole leak from the NAM system, the smaller share of imports in expenditures implies larger multiplier effects. Another reason is that the shares of labor and capital income are large in the *R* and *N* sectors. Most labor and capital income is spent on consumption and investment, and the shares of non-tradable goods are relatively large for both household consumption and investment (see Table 3). Expanding *R* and *N* sectors, therefore, tend to induce more demands for non-tradable goods than an expanding *T* sector in the first stages of the multiplier process. Because the input coefficient of imports for the *N* sector is small and the input coefficient of non-tradable goods for the *N* sector is large, the *N* sector induces lasting and large multiplier effects when it is once stimulated.

Another notable point is that the extractive industries in Russia and the four OECD countries showed similar tendencies. Nakamura (1999) showed that the patterns of economy-wide influences in the four OECD countries are very similar between not only the *R* sectors, but also between the *R*, *T*, and *N* sectors, regardless of the years and the countries. The Russian NAM seems to share this feature. The reason for this phenomenon is the dominancy of household consumption and fixed investment in our NAM model. The share of labor income in production cost is large for any sector; it is also usual that a large part of capital income, another large component of production cost, flows to households through property income flows. Household consumption, therefore, played a decisive role in shaping the pattern of economy-wide influences, no matter which sector an exogenous demand is injected into (see Nakamura, 1999).

DISCUSSION

Our original assumption was that the pattern and magnitude of economy-wide influences of the Russian oil sector would be similar to those of other sectors. This hypothesis was partially accepted and partially rejected. The result of our analysis showed that the extractive sector could induce demand for tradables as much as other tradable sectors. This finding supports our assumption. The expanding oil industry can contribute to fostering domestic tradable sectors through creating demand for them. On the other hand, the oil sector tends to induce more demand for non-tradables than do other tradable sectors. This result disagrees with our hypothesis and confirms that the extractive sector is more likely to cause Dutch disease, and to cause it more strongly than non-extractive tradable sectors. It is difficult to judge how economically significant the difference is. The difference in terms of the absolute value, $A_{NR} - A_{NT}$, is 0.06 in *R01* and ranged from 0.021 to 0.065 in the OECD cases. Should an expansion of an extractive industry be avoided and an expansion of a non-extractive tradable industry welcomed because of these differences? To answer this question conclusively, we need to extend our model to include price and financial variables. The results can be very different, if we consider price-sensitive non-linear behaviors of economic agents (see Wijnbergen, 1984; Edwards and Ahamed, 1986; Harberger, 1986).

It is true that the Russian oil boom is causing appreciation of the ruble; the appreciation more or less hampers the export of Russian manufactured goods and directs the demand to the imports. Most of Russian manufactured goods are, however, not competitive in the world market with or without the appreciation. If the ruble appreciation does not completely eliminate the demand for domestic manufactured products and the oil boom increases the demand for the Russian manufactured goods, then the boom would turn out to be a help for the Russian manufacturing sector. So far, as Table 3 shows, the shares of imports in the intermediate inputs are small. At the same time, Table 3 indicates that the share of imports in the private consumption is high in Russia. This can be a first symptom of the Russian Dutch disease. We need to have a full-fledged model to consider price and financial effects and identify the outcome of the Russian oil boom.

Despite the limitations, our research showed clearly that the Russian extractive sector could create demand for domestic manufactured goods, hire workers, generate income, and finance economic growth if it was managed well. One more thing should be added: the Russian oil export is not particularly large. The ratios of the Russian exports of fuels and mining to the total merchandise exports of China, Japan, and the USA in 2003 were 19.8 percent, 18.4 percent, and 12 percent respectively (WTO, 2005). It may be an exaggeration if we say that the Russian oil sector generates an extraordinary amount of funds; the amount seems rather small for putting the huge Russian economy back on a sustainable growth path.

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Table 1. Structure of the NAM

		1[a]	*2*	*3*	*4*	*5*	*6*	*7*	*8*
1[a]	Goods	●[b]		●		●	●	●	
2	Value added	●						●	
3	Institutional Sectors	●	●					●	
4	Saving			●				●	
5	Inventory Investment				●				
6	GFCF				●				
7	ROW		●	●	●		●		
8	*Total*								

Notes:

[a] The blocks include the following accounts:

Block 1: labour, capital, net indirect taxes (mixed income in the Russian NAM); *Block 2*: 35 production accounts in the OECD NAM, 25 sector and 25 goods accounts in the Russian NAM; *Block 3*: households, government, corporations, direct tax, social security, property income, other current transfers; *Block 4*: saving, capital transfer, *Block 5*: 1 inventory investment; *Block 6*: 35 by 35 GFCF matrix for Canada and the Netherlands, one GFCF account for Australia, the U.K., and Russia; *Block 7*: an account corresponding to the balance of payments.

[b] The symbol "●" denotes that at least a part of the block has corresponding transactions.

Table 2. Basic Features of the Extractive Sectors and the I-O Tables

Country/Year[a]	*A68*	*A74*	*A89*	*C71*	*C81*	*C90*	*N72*	*N81*	*N86*	*U68*	*U79*	*U90*	*R01*[g]
Extractive sector[b]													
Gross Output	2.3	3.4	4.3	7.3	3.7	3.8	2.4	3.2	3.2	2.4	3.1	2.1	4.8
Value added	2.7	4.4	4.7	11.0	3.8	4.5	3.9	5.0	5.0	3.7	4.4	2.1	6.6
GFCF[c]	-	-	-	11.3	14.8	7.4	2.2	2.2	2.4	-	-	-	16.6
Export[d]	10.9	18.1	23.4	24.4	11.8	10.8	3.4	5.2	3.8	0.8	6.9	5.1	35.6 21.4
I-O tables													
Valuation[e]	B	B	B	P	P	P	P	P	P	P	P	P	B
Industries[f]	33	33	33	35	35	35	33	33	33	35	35	35	24

Notes:

[a] *A*: Australia, *C*: Canada, *N*: the Netherlands, *U*: the United Kingdom, *R*: Russia. The figures denote the years, such as 68 for the year 1968.

[b] The shares (in percent) of the extractive sectors for the OECD countries calculated from the I-O tables at fixed prices. For Russia, they were calculated from the Use table in *Natsional'nye* (2004).

[c] The Russian IOT does not show the gross fixed capital formation (GFCF) by sector. The figure is taken from *Investitsii* (2003, p. 27).

[d] For Russia, the top figure is at purchaser prices; the bottom at basic prices.

[e] *B*: at basic prices, *P*: at producer prices.

[f] The number of production sectors excluding the statistical discrepancy account.

[g] Including the oil refinery sector.

Sources: OECD (1995), *Sistema* (2004).

Table 3. Input and Expenditure Structures, E_{ij} (in percent)[a]

	Extractive sector					*Tradable sector*					*Non-tradable sector*				
	L	***C***	***T***	***N***	***M***	***L***	***C***	***T***	***N***	***M***	***L***	***C***	***T***	***N***	***M***
A68	28	30	12	12	2	26	15	32	15	10	38	25	12	22	2
A74	23	44	8	11	3	30	11	31	15	11	44	21	10	20	2
A89	15	44	8	16	6	19	19	29	17	12	38	23	10	22	3
C71	21	35	4	27	2	28	12	36	20	23	29	35	11	21	5
C81	14	40	6	39	4	24	13	26	18	16	32	32	8	20	3
C90	16	37	5	34	4	24	13	25	16	20	30	32	8	23	4
N71[b]	84	-	1	3	3	42	-	20	11	28	73	-	9	13	5
N81[b]	85	-	2	7	9	34	-	17	13	32	69	-	9	14	7
N86[b]	83	-	2	7	9	36	-	17	12	33	70	-	9	14	6
U68	54	12	12	7	2	28	10	36	10	11	43	24	15	10	3
U79	20	52	7	14	3	26	10	29	18	17	36	21	13	18	4
U90	17	46	7	10	9	27	13	21	16	33	34	20	10	29	12
Avg[c]	23	39	6	16	5	26	13	27	15	21	36	26	10	19	5
R01b[d]	10	26	6	13	2	20	15	34	9	8	27	27	18	16	4
R01p[d]	8	36	6	9	2	16	18	46	12	9	20	38	21	18	3

	Private consumption					*GFCF*				
	-	**-**	***T***	***N***	***M***	**-**	**-**	***T***	***N***	***M***
A68			36	59	5			22	68	09
A74			28	66	6			17	71	10
A89			20	63	7			17	64	15
C71			26	67	7			29	41	31
C81			24	67	9			25	47	28
C90			16	72	12			20	42	38
N71			27	51	12			23	41	31
N81			20	67	13			19	39	31
N86			18	69	13			18	34	38
U68			35	60	5			38	56	6
U79			29	59	12			32	52	16
U90			22	63	15			21	59	19
Avg[c]			25	64	10			22	41	33
R01b[d]			19	29	22			11	58	21
R01p[d]			50	29	22			15	64	21

Notes:

[a] The coefficients (E_{ij}) of inputs in terms of percentage of the total output and expenditure (i=L, C, T, N, M). L, C, T, N, and M denote compensation for employee, gross operating surplus, tradables, non-tradables, and imports, respectively. The totals are not equal to 100 because of exclusion of the extractive (R) sector products, different treatments of indirect taxes, and rounding errors. For private consumption and GFCF, the tradables include the products of the extractive sector; their shares are less than one percent for all cases.

[b] For the Netherlands, the entries of the column L show the share of total value added. The average is taken excluding the Netherlands figures.

[c] The simple averages of the column entries of the OECD NAMs.

[d] *R01b*: at basic prices, *R01p*: at purchaser prices.

Sources: The NAMs compiled by the author.

Table 4. Economy-wide Influences, A_{XY}[a]

	Influences on Tradable sector (A_{TY})[b]							***Influences on Non-tradable sector (A_{NY})***[b]						
	Multipliers				***Deviations (%)***[c]			***Multipliers***				***Deviations (%)***[c]		
from	***P***	***R***	***T***	***N***	***R***	***T***	***N***	***P***	***R***	***T***	***N***	***R***	***T***	***N***
A68	0.18	0.19	0.18	0.18	5.6	0.0	0.0	0.55	0.59	0.53	0.61	7.3	-3.6	10.9
A74	0.14	0.14	0.14	0.14	0.0	0.0	0.0	0.57	0.60	0.55	0.62	5.3	-3.5	8.8
A89	0.09	0.08	0.09	0.08	-11.1	0.0	-11.1	0.42	0.44	0.41	0.46	4.8	-2.4	9.5
C71	0.10	0.10	0.10	0.10	0.0	0.0	0.0	0.35	0.39	0.34	0.39	11.4	-2.9	11.4
C81	0.08	0.08	0.08	0.08	0.0	0.0	0.0	0.30	0.35	0.28	0.33	16.7	-6.7	10.0
C90	0.05	0.05	0.05	0.05	0.0	0.0	0.0	0.27	0.31	0.25	0.30	14.8	-7.4	11.1
N72	0.05	0.05	0.05	0.05	0.0	0.0	0.0	0.17	0.20	0.15	0.21	17.6	-11.8	23.5
N81	0.03	0.03	0.03	0.04	0.0	0.0	33.3	0.14	0.18	0.12	0.18	28.6	-14.3	28.6
N86	0.03	0.03	0.03	0.03	0.0	0.0	0.0	0.15	0.17	0.13	0.18	13.3	-13.3	20.0
U68	0.14	0.15	0.14	0.14	7.1	0.0	0.0	0.33	0.36	0.31	0.36	9.1	-6.1	9.1
U79	0.09	0.09	0.09	0.10	0.0	0.0	11.1	0.27	0.31	0.26	0.31	14.8	-3.7	14.8
U90	0.05	0.04	0.05	0.04	-20.0	0.0	-20.0	0.27	0.28	0.26	0.31	3.7	-3.7	14.8
Avg[d]	0.09	0.09	0.09	0.09	-1.5	0.0	1.1	0.32	0.35	0.30	0.36	12.3	-6.6	14.4
R01	0.15	0.16	0.15	0.15	6.7	0.0	0.0	0.28	0.32	0.26	0.31	14.3	-7.1	10.7

	Influences on Labor income (A_{LY})[b]							***Influences on Capital income (A_{CY})***[b]						
	Multipliers				***Deviations (%)***[c]			***Multipliers***				***Deviations (%)***[c]		
from	***P***	***R***	***T***	***N***	***R***	***T***	***N***	***P***	***R***	***T***	***N***	***R***	***T***	***N***
A68	2.97	3.12	2.85	3.24	5.1	-4.0	9.1	2.14	2.41	2.05	2.34	12.6	-4.2	9.3
A74	3.32	3.33	3.19	3.63	0.3	-3.9	9.3	1.63	2.01	1.55	1.80	23.3	-4.9	10.4
A89	2.04	1.99	1.93	2.30	-2.5	-5.4	12.7	1.71	1.99	1.66	1.84	16.4	-2.9	7.6
C71	2.58	2.68	2.49	2.78	3.9	-3.5	7.8	1.52	1.80	1.41	1.76	18.4	-7.2	15.8
C81	2.18	2.26	2.05	2.45	3.7	-6.0	12.4	1.29	1.72	1.19	1.50	33.3	-7.8	16.3
C90	1.87	1.94	1.76	2.10	3.7	-5.9	12.3	1.14	1.48	1.05	1.35	29.8	-7.9	18.4
N72	1.34	1.68	1.19	1.66	25.4	-11.2	23.9	0.69	0.86	0.61	0.85	24.6	-11.6	23.2
N81	1.05	1.43	0.89	1.37	36.2	-15.2	30.5	0.63	0.86	0.53	0.82	36.5	-15.9	30.2
N86	1.03	1.34	0.89	1.33	30.1	-13.6	29.1	0.74	0.96	0.64	0.95	29.7	-13.5	28.4
U68	2.59	2.97	2.48	2.85	14.7	-4.2	10.0	1.29	1.36	1.22	1.47	5.4	-5.4	14.0
U79	1.85	1.91	1.76	2.09	3.2	-4.9	13.0	0.97	1.45	0.90	1.15	49.5	-7.2	18.6
U90	1.50	1.42	1.43	1.66	-5.3	-4.7	10.7	0.85	1.16	0.80	0.96	36.5	-5.9	12.9
Avg[d]	2.03	2.17	1.91	2.29	9.9	-6.9	15.1	1.22	1.51	1.13	1.40	26.3	-7.9	17.1
R01	1.21	1.34	1.10	1.35	10.7	-9.1	11.6	0.33	0.39	0.30	0.36	18.2	-9.1	9.1

Notes:

[a] Net influences. The initial injection is excluded.

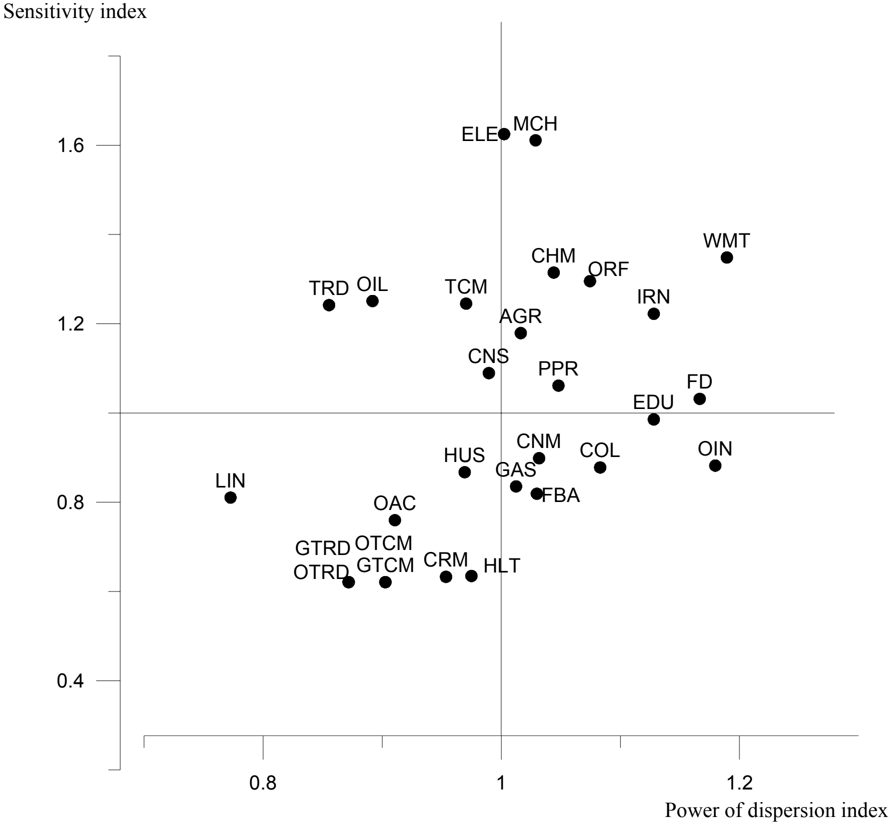
[b] A_{XY}: accounting multipliers (X=T, N, L, C; Y= P, R, T, N). P, R, T, N , L, and C stand for the average production, the extractive, the average tradable, the average non-tradable, labor income, and capital income, respectively.

[c] *Deviations* are defined as $100*(A_{XY}-A_{XP})/A_{XP}$ (X=T, N, L, C; Y=R, T, N)

[d] Simple averages of the column entries of the OECD NAMs.

Sources: The NAMs compiled by the author.

Fig. 1. Sensitivity and Power of Dispersion of the Russian Industries



Legends: *ELE*, electricity; *OIL*, oil drilling; *ORF*, oil refinery; *GAS*, gas; *COL*, coal mining; *CRM*, ceramic; *IRN*, iron; *WMT*, nonferrous metal; *CHM*, chemical; *MCH*, metal working and machine building; *PPR*, paper; *CNM*, construction materials; *LIN*, light industry; *FD*, food; *OIN*, other industries; *CNS*, construction; *AGR*, agriculture; *TCM*; transportation and communication; *OTCM* and *GTCM*, transportation and communication related to oil and gas products; *TRD*, trade; *OTRD* and *GTRD*, oil and gas products trade; *OAC*, other activities; *HUS*, housing and communal services; *HLT*, health, education, and culture; *EDU*, higher education and sciences; *FBA*, financial and administrative services.

Notes: The indices were calculated using the products by products section of the calculated Russian NAM. They may differ from those obtained from the original Russian IOT.

Sources: The 2001 Russian NAM compiled by the author.