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Growth and Structure of the Russian Economy Then and Now

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Diagnosing the "Russian Disease": Growth and Structure of the Russian Economy Then and Now

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Abstract

This paper diagnoses the present Russian situation characterized as the "Russian Disease." First, it shows that a key symptom of the Russian Disease is a strong positive relation between the country's real growth and terms-of-trade-effects, which is different from the symptoms of the "Dutch Disease". This paper also presents three variants (oil prices, terms-of-trade, and trading gains) of the concept of terms-of-trade effects using the SNA framework. Second, it shows a strong positive impact of terms-of-trade effects on the Russian manufacturing, which markedly differs from one of the major symptoms of the Dutch Disease (slower growth of manufacturing through the booming mining sector and real appreciation of exchange rates). This paper also suggests the significance of the manufacturing industry for the Russian economy. Third, this paper shows that the appreciation (depreciation) of real exchange rates of Russia's rubles induced the boost (decline) of its imports. Fourth, this paper proves that the boost of imports, in turn, induced the GDP growth of the trade sector as one of the major sources of the Russian overall growth. We also present the impact of oil prices on two kinds of real exchange rates (CPI-based and GDP-based real exchange rates).

JEL classification E31, P24, P28, p59
Key words: Russian Disease, Dutch Disease, growth, oil price, terms-of-trade, trading gain, manufacturing, imports, real exchange rate, trade

1. Introduction

In general, the relationship between the oil curse and economic growth in resource-rich countries is elusive in the long run (Alexeev and Conrad, 2009). Nevertheless, the Lehman shock, combined with the collapse of the oil price bubble, clearly showed that Russian economic growth heavily relies upon oil price changes. We here characterize the present Russian situation as the "Russian Disease," the major symptom of which is a strong positive relation between the country's real growth and international oil price changes.

In the literature, the Russian Disease has often been considered as a variant of the Dutch Disease. The term Dutch Disease in the original context refers to the contrast between external health and internal ailments (*The Economist*, No. 26, 1977). It also refers to the negative impact of expansion of natural resources in a country with oil price rises on its manufacturing growth through the subsequent appreciation of the real exchange rate of its national currency (see Ellman, 1981 and Corden, 1984). Although the real exchange rate of the Russian national currency (ruble) appreciated along with increases in oil prices, it is clear that the Russian Disease is quite different from the Dutch Disease in many respects.

First, unlike the Dutch case in the 1970s, oil price rises for 1998-2008 resulted in relatively high overall growth in Russia. In addition, the impact of the marked fall in oil prices after the third quarter of 2008 on Russian growth was much greater than that in the Dutch case during the 1980s.

Second, in contrast to the case of the Dutch Disease, the negative impact of oil price increases on manufacturing growth was not observed in Russia for the 1998-2008 period. The manufacturing sector was one of the major sectors contributing to favorable growth in the 1998 (bottom)-2008 (peak) period, whereas its sectoral contribution to the great contraction of GDP in 2009 was the largest among sectors. Putin and Medvedev expected, and still expect, that the diversification of the economy, including developments of manufacturing, would contribute to establishing an economy that was not dependent on oil. Ironically, it is now obvious that the diversification itself is oil-dependent.

Third, the extraction of Russian oil and gas could not show any large expansion in physical terms during the favorable growth period. The oil and gas industry was the booming sector only in terms-of-trade. Putin seemed to expect the real expansion of oil and gas extraction through re-nationalization of the oil and gas industry. The Russian oil and gas industry has been stagnant in real terms since 2005, partly due to this re-nationalization. Although the fixed capital increment in the oil and gas sector showed subsequent increases, the value of its sectoral total factor productivity (TFP) remained negative, and, thus, the oil and gas GDP growth was also very low for the 2004-2009 period and negative for the 2006-2007 period (Rosstat HP as of September 8, 2010). The oil and gas sector will need tremendous capital replacement investments to raise its TFP. The marked oil price falls induced Russia's great contraction of the GDP in 2009, while the oil and gas GDP did not show such a decline. This stagnant sector only buffered the overall growth contraction in 2009. Ironically, Russia, with more than

10-million-barrel daily production, was the world's largest producer of crude oil in 2009 thanks to a remarkable output adjustment (an 11 percent reduction) by Saudi Arabia (BP, 2010). Russia, free from the OPEC output adjustments, has always escaped the restraints of oil price increases, while it has been forced to face reductions in oil prices head-on.

Fourth, the continuous appreciation of the real effective exchange rate of the ruble due to oil price rises induced the boost of imports in Russia, which, in turn, did not necessarily induce adverse effects on Russia's economic growth and competitiveness. Russia experienced servicization, as in advanced countries as well as former Soviet republics. It has particularly Russian features deriving from its specific path dependency, which includes economic players' strong preferences for imported goods and FOREX as well. The domestic distribution activities of imported goods are accounted for as a part of sources of the GDP. The boost of imports largely contributed to the high growth of the trade sector's value added, which was, in turn, one of the major sources of the overall high growth. In the Russian official statistics, the revenues from foreign trade of oil and gas are included not in the mining sector but in the trade sector. However, these special foreign trade revenues could not be the source of the rapid GDP growth because Russia's exports of oil and gas were also stagnant in real terms. Surprisingly, import substitution, including domestic assembling of foreign-make durable goods, appeared along with the boost of imports in Russia. The real appreciation of the exchange rate of the ruble boosted the imports of consumer goods and eased the imports of equipment and intermediate goods, which is considered to have contributed to improvements in the manufacturing TFP. Based on the unpublished Rosstat data on import matrix, the share of imports of manufacturing investment goods in the total gross demand for them amounted to 40 percent in 2006.

In this paper, we examine statistically some of these facts to diagnose the Russian Disease and focus on the terms-of-trade effects on the overall growth as well as the manufacturing development. First, showing the key differences between the Dutch and Russian Diseases, we prove that a key symptom of the Russian Disease is a strong positive relation between the country's real growth and terms-of-trade-effects. We also present three variants (oil prices, terms-of-trade, and trading gains) of the concept of terms-of-trade effects using the SNA framework. Second, it shows a strong positive impact of terms-of-trade effects on the Russian manufacturing, which markedly differs from one of the major symptoms of the Dutch Disease (slower growth of manufacturing through the booming mining sector and real appreciation of exchange rates). We also suggests the significance of the manufacturing industry for the Russian economy. Third, we show that the appreciation (depreciation) of real exchange rates of Russia's rubles induced the boost (decline) of its imports. Fourth, we prove that the boost of imports, in turn, induced the GDP growth of the trade sector as one of the major sources of the Russian overall growth. We also present the impact of oil prices on two kinds of real exchange rates (CPI-based and GDP-based real exchange rates).

2. Oil-Dependent Growth Path

Figure 1 summarizes the key differences between the Dutch and Russian cases.[1] The Netherlands experienced a boom in natural gas extraction in the 1970s. Its extraction level in 1980 (76.4 bcm) was 3 times the extraction level in 1970 (26.7 bcm), when the oil price in 1980 was 20 times higher than that in 1970. This gas extraction boom (the annual average change of 11.1 percent) led to a higher growth rate of the mining value added (the average annual growth rate of 8.2 percent). The Dutch manufacturing remained stagnant in the 1970s. Its annual average growth rate of the value added was 2.1 percent for 1970-1980.[2] This was slightly lower than the average annual growth rate of the overall GDP of 2.8 percent. As a result, the GDP share of the mining sector at current prices showed a marked increase from 1.2 percent in 1970 to 5.2 percent in 1980, whereas the GDP share of the manufacturing sector suffered from a marked decrease from 22.9 percent in 1970 to 16.6 percent in 1980. The presence of booming gas extraction and stagnant manufacturing production is obvious. As was stated, however, this booming sector with oil price rises did not produce higher growth of the overall GDP in the 1970s. Consistently, marked reductions of oil prices did not cause serious damage to the Dutch GDP in the 1980s. The elasticity of GDP growth to oil prices in this decade was 0.09, at the 1 percent significance level (without a trend term). A 10 percent increase in oil prices induced 0.9 percent of GDP growth.

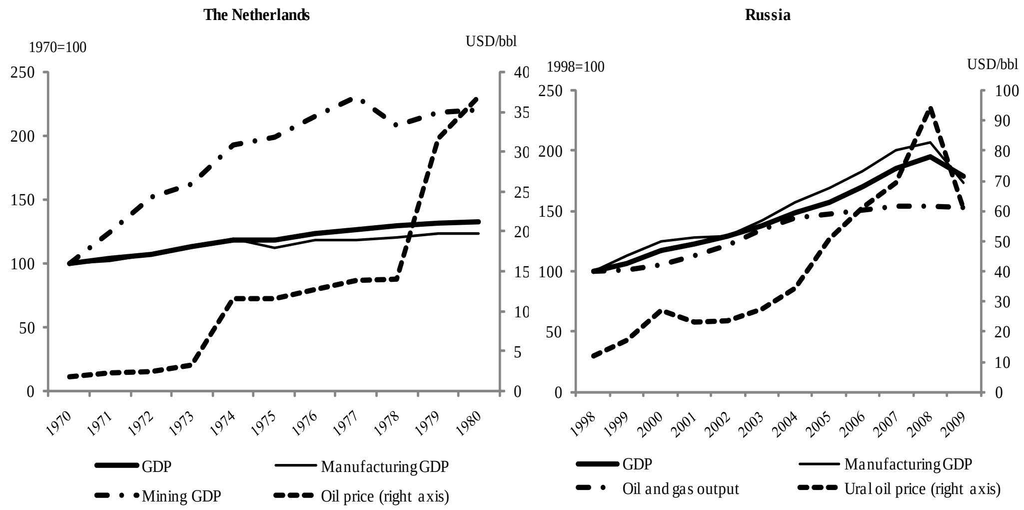
In contrast, it is obvious from the right-hand side of the chart in Figure 1 that oil price rises were coupled with the relatively high overall GDP growth. The annual average GDP growth rate was 6.9 percent in Russia for 1998-2008. The Ural oil price in 2008 was 8 times higher than that in 1998. The Russian manufacturing output also

[1] The data for the Netherlands are from the United Nations HP and BP HP. The GDP data were also provided from Statistics Netherlands upon my request. The data for Russia are from Rosstat HP and Bank of Russia HP, and the quarterly oil price data are from Bloomberg.

[2] There are considerable differences between manufacturing growth rates in the United Nations database (http://unstats.un.org/unsd/nationalaccount/) and in the data provided by Statistics Netherlands for the 1970-1986 period. Based on the UN data, the annual average growth rate of the manufacturing value added was 3.0 percent for the 1970-1980 period. Here, we employ the official data.

showed a large expansion with an annual average change of 7.5 percent for the decade, based on the official data of industrial production. On the other hand, the oil and gas output showed slower growth, with an annual average change of 4.3 percent for 1998-2008. Consistently, the marked fall of oil prices inflicted serious damage on the GDP as well as manufacturing output in 2009, whereas this did not happen in the oil and gas sector.

Figure 1. From Dutch to Russian Disease

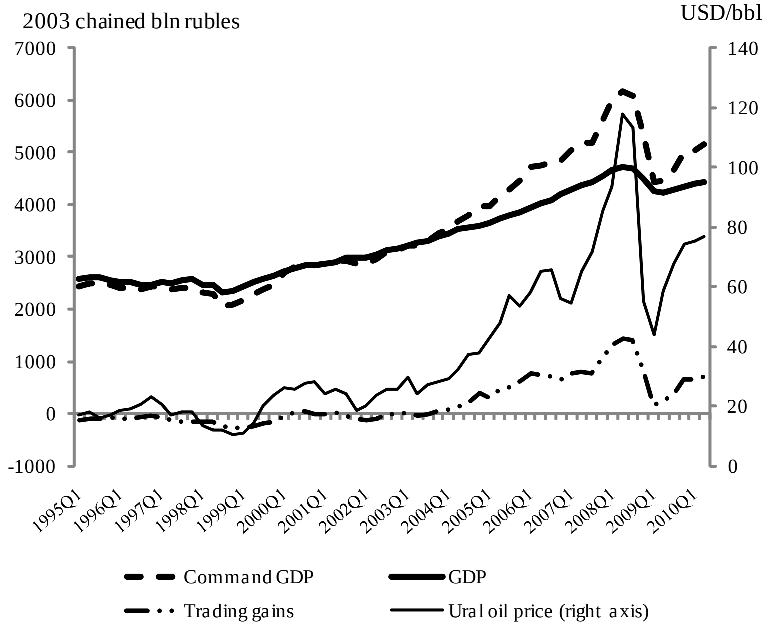


Needless to say, the starting point of the Russian Disease was quite different from the Dutch case. The Netherlands already had advanced manufacturing with quite a high per capita GDP (55 percent of the U.S. level in 1970), whereas Russia started its favorable growth of the GDP and manufacturing after it met the great contraction of GDP and the entire hollowing out of manufacturing due to the military conversion and the liberalization of imports. Russia's per capita GDP was only 1835 USD at current prices in 1998 (less than 6 percent of the U.S. level). It overtook 10,000 USD in 2008, which was still less than one-third of the advanced levels, and fell below this level in 2009. Nevertheless, the differences between the growth patterns of the Dutch Disease and the Russian Disease are noteworthy and help in the diagnosis of the current Russian economy.

Figure 2 displays Russia's GDP as well as the Ural oil prices for the 1995Q1-2010Q2 period. It also shows Russia's GDI as the command basis GDP (the real purchasing power of the Russian gross domestic income) and trading gains (command GDP *minus* real GDP) in real terms for 1995Q1-2010Q2. All quarterly data on GDP, command GDP, and trading gains are at chained rubles with the reference year

2003 and seasonally adjusted by using the so-called census X-12. [3]

Figure 2. GDP, Trading Gains, Command GDP, and Oil Prices in Russia



Let us first discuss the relationship between the GDP and oil prices or trading gains. We denote the growth rate of a variable X as g(X) = dX/X and log(X) as its italic small letter *x*. For instance, the logarithm of GDP, log(GDP) is denoted by *gdp*.

We employ the equation $Y = A\exp(\lambda t)P^{\alpha}$, where Y = the real GDP, λ = the "surrogate productivity (SP)" (the exogenous effect), P= the oil price, α= the elasticity of GDP to oil price, and A = a constant. It follows from this equation that

$$g(Y) = \alpha g(P) + \lambda$$

or

gdp = (the GDP elasticity to oil price) * *oil price* + the exogenous effect*trend.

The first term of the right-hand side of this equation shows the contribution of oil prices to GDP growth. The second term presents the contribution of exogenous productivity effects on GDP growth.

Following Rautava (2004, 2009) and based on the log-log type regression (OLS), for Russia (1995Q1-2010Q2), we can have the following GDP-oil price equation with all coefficients at the 1 percent significance level (adjusted R-squared of 0.968; and t-statistics in parentheses):

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[3] The data on GDP, exports and imports (not seasonally adjusted) at 2003 prices for 1995Q1-2002Q4 are derived from the official growth rates and values in 2003. The data for 2003Q1-2010Q2 (not seasonally adjusted) at 2003 prices are from Rosstat. All official data are from Rosstat HP as of October 1, 2010. All seasonally adjusted data used in this paper are derived from non-adjusted official data through X-12.

$g(Y) = 0.177*g(P) + 0.67$ percent (λ's annualized rate of 2.7 percent);

$$gdp = 0.177* \textit{oil price} + 0.0067*\text{trend}. \qquad (1)$$

(9.439) (10.339)

These variables are not spuriously related but cointegrated (all results of unit root tests for the variables and regressions in this paper are shown in the Appendix).

The GDP elasticity to oil prices, α, in the above equation shows that a 10 percent increase in oil prices induces a 1.8 percent increase in the Russian GDP. The value of the variable λ, which is here called "surrogate productivity (SP)," shows that the long-run trend growth rate annualized is 2.7 percent. The variable SP of λ corresponds to the TFP in growth accounting, which shows the effects of resource reallocations, modernization, technical progress, and catch-up efforts in the Russian economy, as Rautava (2004) suggested. It may also show the growth capacity in the absence of oil price changes.[4]

The average annual growth rates of the Russian GDP and the Ural oil price for 1995Q1-2010Q2 were 3.7 percent and 10.6 percent, respectively. The oil price contribution to the growth (0.177*10.6 = 1.9 percentage points) explains 51 percent of the overall growth rate. The residual 49 percent consists of the trend growth term SP of 75 percent and statistical error of -26 percent. About one half of the growth can be explained by the oil price impact, whereas much more than one half can be explained by the growth trend SP.

Here, it is noteworthy that the picture of the Russian growth path differs using the samples from the bottom of 1998Q3 to the peak of 2008Q2. For this period we have the following regression result with all coefficients at the 1 percent significance level (adjusted R-squared of 0.997):

$$gdp = 0.058*\textit{oil price} + 0.0144*\text{trend} \quad (\lambda\text{'s annualized rate of 5.9 percent}). \qquad (2)$$

(6.313) (31.480)

For the steadily growing period the underlying growth trend or the surrogate productivity is rather high. The annual average GDP growth rate of the Russian economy for this period was 7.7 percent whereas the annual average change in Ural oil price was 27.5 percent. Therefore, the share of the oil price contribution (0.06*27.5=1.65 percentage points) in the Russian growth amounts to only 21 percent.

[4] Omitting the trend variable, we have the following result with the coefficient at the 1 percent significance level (adjusted R-squared of 0.913) and the ADF at the 1 percent significance level.

$gdp = 0.351*\textit{oil price}$.

This regression without trend is also important for a comparative analysis because, in some oil-rich countries, the introduction of the trend variable may make the regression insignificant. This result implies that without considering any steady technical progress, a 10 percent increase in oil price induces a 3.5 percent increase in the Russian GDP.

The residual 79 percent consists of the trend of 77 percent and the statistical error of 2 percent. Indeed, high technical progress prevailed in Russia for this period. This result fits the production function estimates well when using the quarterly data, where TFP is estimated as the annual rate of 4.9 percent.[5] In the favorable period, the oil price dependency of the Russian growth was much smaller than that in the whole period, including the 1998 and 2009 crises. As peculiar as this may sound, it suggests the key problem inherent in the Russian Disease. Continuous increases in oil prices could contribute to the higher growth, whereas a drastic drop in oil prices could destroy the favorable growth trend in Russia.

Nevertheless, the GDP growth in oil-rich countries can be explained by oil price changes in a well-defined manner because international oil price changes have straightforwardly reflected the trading gains or losses from changes in the terms-of-trade for 1995-2009. Their imports and exports are large relative to GDP. Their commodity composition of imports and exports is very different. Their exports consist mainly of oil and/or gas, while their imports consist mainly of manufactured products. The present world competition does not induce the price rises of non-resource-base manufactured goods in response to oil price increases. In this situation, the trading gains or losses of oil-rich countries from the changes in the terms-of-trade can be large. They can use these trading gains or oil windfalls for additional domestic final expenditures on domestically produced goods as well as imported goods. The movements of trading gains and command GDP (real GDP plus real trading gains) went along with oil price changes, as is shown by Figure 2.

The GDP-oil price relation may be applicable to only major oil-exporting countries. If we employ the concepts of the terms-of-trade or trading gains (losses) in place of oil prices, we can have a more generalized relation in the framework of national accounts that can be applicable to oil-exporting countries as well as oil-importing countries.

According to the SNA 2008 (SNA 2008, section 15.187), the terms-of-trade are

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[5] Using the quarterly data (1999Q1-2008Q2), we estimated the Russian production function $Y=A\exp(\lambda t)\,K^{\alpha}L^{(1-\alpha)}$, where K and L: capital stock and employment; α: the capital distribution ratio; λ: TFP; A: a constant. Quarterly g(K) and g(L) are our estimations based on the official data. The result is as follows:

	coefficients	S.E.	t-Stat	P-value	Adj. R^2
α	0.524	0.137	3.833	0.001	0.995
TFP (λ)	0.012	0.001	16.662	0.000	

		t-Stat	MacKinnon P
ADF test statistic		-4.124	0.003
Test critica	1% level	-3.621	

defined as the ratio of the price of exports (P^e) to the price of imports (P^m). P^e and P^m are defined as $P^e = E_n/ E_r$ and $P^m = M_n/ M_r$ respectively, where E_n, M_n = exports and imports at current prices, respectively and E_r, M_r = exports and imports in real terms, respectively, in the conventional GDP calculations.

Let us define the terms-of-trade effects (F) as the terms-of-trade (P^e/P^m) in place of oil prices. For 1995Q1-2010Q2 we have the following equation with all coefficients at the 1 percent significance level (adjusted R-squared of 0.976).

$g(Y) = 0.370*g(P^e/P^m) + 0.75$ percent (annualized rate of 3.0 percent);

gdp = 0.370* *terms-of-trade* + 0.0075*trend. (3)

(11.885) (15.773)

This result implies that a 10 percent improvement in the terms-of-trade leads to a 3.7 percent annual growth of the Russian GDP. The underlying annual growth (SP) is estimated about 3 percent.

According to the SNA 2008 (SNA 2008, section 15.188), the real gross domestic income (real GDI) measures the purchasing power of a country's total income generated by its domestic production. The BEA in the United States (BEA HP) calls this real GDI as the "command-basis GDP" because due to improvements in the terms-of-trade caused by the rise in export prices relative to import prices, the purchasing power or "command value" of the country's GDP in international markets increases in relation to the real GDP (the value of the production of goods and services in the country's prices).

The trading gain (T) from the changes in the terms-of-trade can be defined as the nominal net exports deflated by the import price index *minus* the conventional real net exports.[6]

$T= (E_n - M_n)/P^m - (E_r - M_r)$.

It follows from this equation that

$T=E_n/P^m - E_r = E_r (P^e/P^m - 1)$.

Therefore, $T >=< 0$ if $P^e/P^m >=< 1$. If the terms-of-trade P^e/P^m improve (worsen), the trading gain should increase (decrease). At the base period $P^e = P^m = 1$ and hence T must be zero.

The real GDI (Z) or the command GDP is defined as the real GDP (Y) *plus* the real trading gain.

$Z = Y + T$.

We focus on the relation between the trading gain T and real GDP (Y). That is to say, we do not focus on the GDI (Z) concept as an alternative welfare measure in place

6 Here we use the so-called Nicholson method, as in BEA's national accounts. See Nicholson (1960), OECD (2006) and Kuboniwa (2007).

of the GDP concept. **S**ince the real GDI and trading gain are concepts that exist in real terms only, we measure the trading gain changes (*trading gain*) by changes in the real GDI-GDP ratios, g(Z/Y), which equals the difference of changes in the real GDI and real GDP, that is to say, g(Z/Y) = g(Z) - g(Y).

Now we are in a position to define the terms-of-trade effect (F) in Eq.(1) as trading gain changes in place of oil prices or terms-of-trade. For Russia (1995Q1- 2010Q2) we can compute the real trading gain and real GDI (command GDP) at 2003 chained rubles when the official data on exports and imports at current prices are also seasonally adjusted through X-12.

Thus we have the following regression with all coefficients at the 1 percent significance level (adjusted R-squared of 0.976)

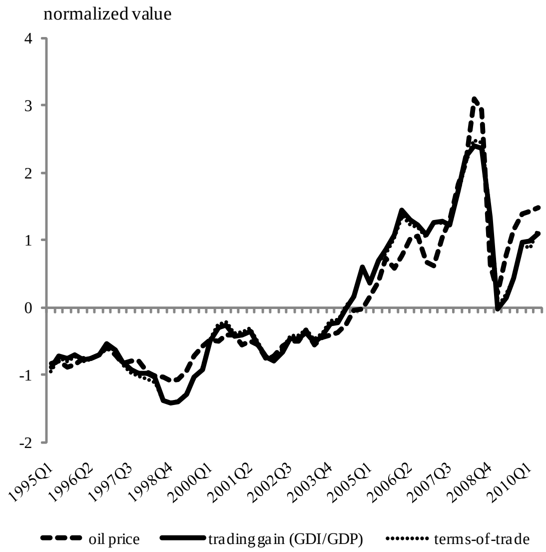
g(Y) = 0.950*g(Z/Y) + 0.78 percent (annualized rate of 3.2 percent);

gdp = 0.950**trading gain* + 0.0078*trend. (4)

(11.599) (16.990)

This result indicates that a 1 percent increase in the trading gain leads to an approximate 1 percent increase in the Russian GDP. The steady trend growth in this regression is slightly higher than it is in Eqs. (1) and (3).

Figure 3. Movements of Oil Prices, Trading Gains and Terms-of-Trade



Three variants of F, that is to say, P, P^e/P^m and Z/Y are closely related each other as is shown in Figure 3 which displays these variables as normalized data to have mean 0 and variance 1. The value of correlation coefficient between series $\{P^e/P^m\}$ and {Z/Y} is 0.999 whereas the value between series {P} and $\{P^e/P^m\}$ is 0.953. We have the following regression with the coefficient at the 1 percent significance level (adjusted R-squared of 0.931):

$$g(Z/Y) = 0.156*g(P) \text{ ; } \textit{trading gain} = 0.156*\textit{oil price.} \quad (5)$$
$$(28.650)$$

This equation implies that a 10 percent increase (decrease) in Ural oil prices induces a 1.6 percent increase (decrease) in trading gains.

Combining Eqs. (4) and (5) provides the following GDP-oil price relation which is indeed similar to Eq.(1):

gdp = 0.148**oil price* +0.0078.

We also have the following regressions for elasticity with the coefficient at the 1 percent significance level (adjusted R-squared of 0.945 and 0.989 for Eqs. (6) and (7) respectively):

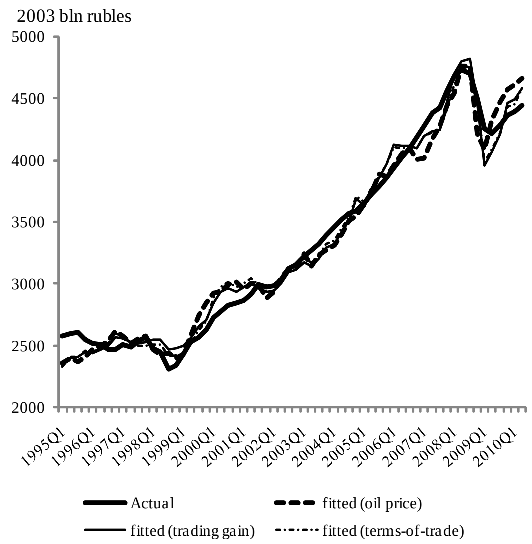
$$g(P^e/P^m) = 0.426*g(P); \textit{ terms-of-trade} = 0.426*\textit{oil price,} \quad (6)$$
$$(32.388)$$

and

$$g(Z/Y) = 0.367*g(P^e/P^m) \text{ ; } \textit{trading gain} = 0.367*\textit{terms-of-trade.} \quad (7)$$
$$(73.403)$$

From these equations it is now clear that an increase (decrease) in oil prices induces an increase (decrease) in trading gains, which, in turn, leads to the GDP growth (decline). Since the oil price is indeed a good proxy of the terms-of-trade effect on the Russian economy, in estimating the Russian growth then and now there is no essential difference between three variants of regressions Eqs. (1), (3) and (4). This can be seen by Figure 4 which displays the fitted and actual GDP for these regressions. What we can state is only a broader range of applications of Eqs. (3) and (4) in comparison with the GDP-oil price equation (1).

Figure 4. Actual and Fitted Values of the Russian GDP



For a comparative analysis of the Russian economy let us first consider the Norwegian economy as one of oil-dependent countries. All variants for the terms-of-trade effect can be applied to Norway. Using Brent oil prices (IFS), for Norway (1995Q1-2010Q2) we cannot have any meaningful regression with trend. Thus we have following regressions without trend (all coefficients at the 1 percent significance level):[7]

gdp = 0.149* *oil price*, (8)

(13.862) adjusted R-squared of 0.758.

gdp = 0.423* *terms-of-trade*, (9)

(18.147) adjusted R-squared of 0.843.

gdp = 1.161**trading gain*, (10)

(15.013) adjusted R-squared of 0.786.

trading gain= 0.124**oil price*,

(24.438) adjusted R-squared of 0.907.

trading gain = 0.348**terms-of-trade*,

(52.089) adjusted R-squared of 0.978.

In spite of the absence of the trend term the Norwegian value of elasticity of GDP with respect to oil prices is less than the Russian value. This is also reflected in the smaller value of elasticity of the trading gain to oil prices in Norway.

The average annual growth rates of the Norwegian GDP and the Brent oil price for 1995Q1-2010Q2 were 2.1 percent and 10.8 percent respectively. The oil price contribution to the growth (0.149*10.8=1.6 percentage points) explains the 75 percent of the overall growth rate. Norway's growth heavily relies upon oil prices, while this does not necessarily imply that it is more oil dependent than Russia's due to the absence of the trend term and the slower growth in Norway.

For Norway (1998Q3-2008Q2) with favorable increases in oil prices we can have the following results with trend (all coefficients except *trading gain* at the 1 percent significance level and the coefficient of *trading gain* at the5 percent significance).

gdp = 0.030**oil price* +0.004*trend (annualized rate of 1.8 percent) (11)

(2.919) (8.446) adjusted R-squared of 0.967.

gdp = 0.132**trading gain* + 0.0051*trend (annualized rate of 2.1percent) (12)

(2.182) (14.079) adjusted R-squared of 0.963.

trading gain = 0.114* *oil price*.

(18.133) adjusted R-squared of 0.894.

[7] The data for Norway are estimated by using the Statistics Norway HP data of non-seasonally adjusted series of GDP, exports and imports which are seasonally adjusted through X-12.

The annual average GDP growth rate of the Norwegian economy for this period was about 2 percent whereas the annual average change in the Brent oil price was 24 percent. Therefore, the share of the oil price contribution (0.03*24=0.7 percentage point) in the Norwegian growth accounts for 35 percent. The residual 65 percent consists of the trend 90 percent and the statistical error -25 percent. Although the contribution shares of oil prices and exogenous effects in the overall GDP growth in Norway were higher than in Russia for this period, their values of contribution rates in Norway were much less than those in Russia. The impact of the terms-of-trade effect on the GDP growth in Russia is much stronger than it was in Norway.

Let us next take a look at the U. S. economy as one of oil-importing countries.[8] For the United States (1995Q1-2008Q2) we have the following regression with all coefficients at the 1 percent significance level (adjusted R-squared of 0.986):

$$\underset{(5.043)}{gdp = 0.372*terms\text{-}of\text{-}trade} + \underset{(28.812)}{0.008} \text{ (annualized rate of 3.2 percent).} \tag{13}$$

We also have the following regression with all coefficients at the 1 percent significance level (adjusted R-squared of 0.986).

$$\underset{(5.271)}{gdp = 3.584*trading\ gain} + \underset{(57.722)}{0.008*\text{trend}} \quad \text{(annualized rate of 3.2 percent)} \tag{14}$$

These two equations are linked through the following regression with the coefficient at the 1 percent significance level (adjusted R-squared of 0.994).

$$trading\ gain = \underset{(91.197)}{0.108}\ *terms\text{-}of\text{-}trade.$$

The U.S. value of elasticity of GDP with respect to trading gains is much higher than the Russian value. As is shown by Figure 5, this is partly due to the narrow range of the U.S. movement of trading gains. The annual average GDP growth rate of the U.S. economy for this period was 3.0 percent whereas the annual average change in trading gain was only -0.06 percent. Therefore, the contribution of trading gain to the U.S. growth accounts for only -0.2 percentage point (3.584*(-0.06) = -0.02). The residual contribution rate of 3.2 percentage points is the contribution of the exogenous effect.

The elasticity of trading gains with respect to Brent oil prices for the United States is given by the following regression with the coefficient at the 1 percent significant level for 1995Q1-2010Q2 (adjusted R-squared of 0.562).

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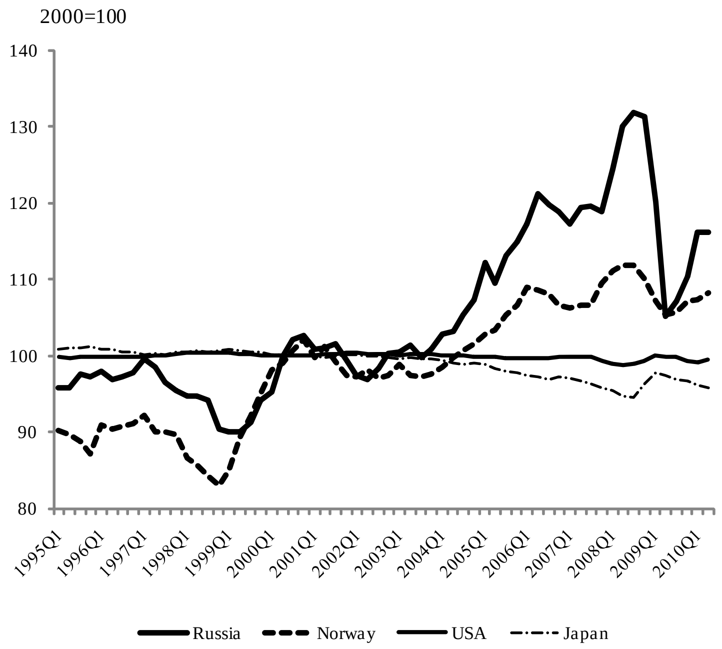
[8] The data for the United States are estimated by using the BEA HP data of seasonally adjusted NIPA series of GDP, exports and imports. The United States as well as Japan met opportunities of increases of trading gains due to decreases in oil prices after 2008Q3, while the Lehman shock seems to have deprived these opportunities of further economic growth in the United States and Japan.

trading gain = -0.041**oil price* .
(-10.148)

A negative relation between the U.S. trading gains and international oil prices can clearly be seen from this equation.

Figure 5. Trading Gains {GDI/GDP} in Russia, Norway, the United States and Japan



For Japan (1980Q1-2008Q2) as one of the largest oil-importers, we have the following regression with all coefficients at the 1 percent significance level (adjusted R-squared of 0.941):

gdp = 3.643* *trading gain* + 0.006*trend (annualized rate of 2.5 percent). (15)
(10.190) (42.365)

The Japanese level of elasticity of GDP with respect to trading gains is also sufficiently large.

The elasticity of trading gains with respect to Brent oil prices for Japan is derived from the following regression with the coefficient at the 1 percent significant level for 1980Q1-2010Q2 (adjusted R-squared of 0.903).[9]

trading gain = -0.028**oil price.*
(-33.616)

As is expected, the negative level of elasticity of trading gains to oil prices in Japan

[9] The data for Japan are estimated by using the ESRI HP (Japan's Cabinet Office) data of seasonally adjusted series of GDP, exports and imports. Since Japan experienced subsequent declines of trading gains under the slow (positive) GDP growth for 1995-2008, it is necessary to extend the samples so that we can obtain an economically meaningful result for the relation between its GDP and trading gains.

is much greater than it is in the United States.

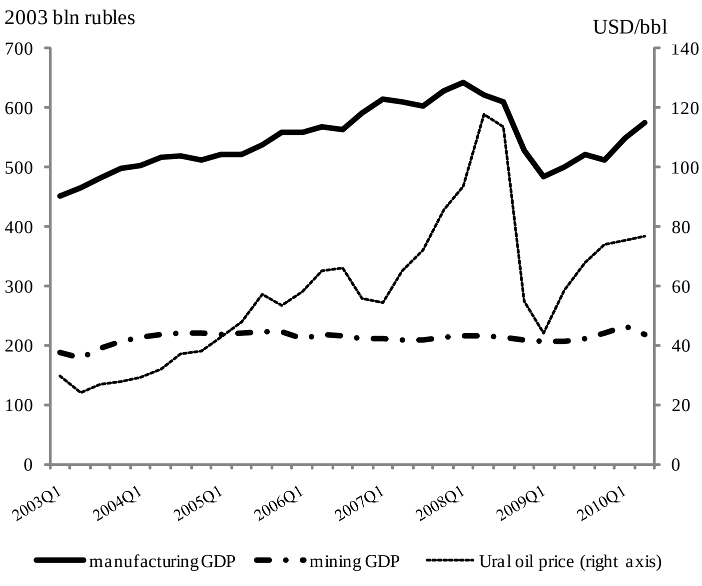
The value of correlation coefficient between the Russian trading gain series $\{GDI/GDP\}_{Russia}$ and the U.S. (Japanese) series $\{GDI/GDP\}_{USA}$ ($\{GDI/GDP\}_{Japan}$) for 1995Q1-2010Q2 is -0.803 (-0.935), while its value between Russia and Norway is 0.895. The patterns of changes in trading gains among oil-exporting countries have strongly positive relations. In contrast, those between the major oil-exporting and oil-importing countries have more or less negative relations. However, it is noted that the patterns of changes in trading gains between the major oil-exporters and emerging countries such as China, India and Brazil may not be determined in a simple manner because these rapidly growing countries' compositions of exports and imports are well diversified.

3. Oil-Dependent Diversification

As was shown by Figure 1, for the favorable period 1998-2008 Russia's manufacturing showed higher growth in contrast to the Dutch manufacturing in the 1970s.

Figure 6 shows the movements of the manufacturing GDP and the mining GDP for 2003Q1-2010Q2 (here, GDP means the value added at basic prices). All data are seasonally adjusted. This time span is very short due to the lack of data.

Figure 6. Manufacturing and Mining: 2003Q1-2010Q2



By omitting the trend, we have the following regression with the coefficient at the

1 percent significance level (adjusted R-squared of 0.641):

$$\textit{manufacturing gdp} = 0.181^{*}\textit{oil price}. \qquad (16)$$
$$(7.271)$$

Setting a trend only for 2003Q1-2008Q2 and introducing one dummy variable for 2009Q2-Q4, we have the following regression with the elasticity and trend coefficients at the 1 percent significance level (adjusted R-squared of 0.877 and coefficient of the dummy variable at the 5 percent significance level):

$$\textit{manufacturing gdp} = 0.151^{*}\textit{oil price} + 0.0053^{*}\text{trend} \qquad (17)$$
$$(11.456) \qquad (5.546)$$

(λ's annualized rate of 2.1percent).

For 2003Q1-2010Q2, the overall GDP elasticity to oil prices and the growth trend are 0.159 and 2.4 percent (annualized), respectively. The elasticity and the growth trend of the manufacturing GDP are slightly lower than the overall values.

Due to the lack of disaggregated quarterly GDP time series in the long run, we examine the elasticity of outputs of manufacturing subsectors to oil prices using annual industrial production data for 1995-2009. We have the following output-oil price relation with the coefficient at the 1 percent significance level (adjusted R-squared of 0.941):

$$\textit{manufacturing output} = 0.383^{*}\textit{oil price}.$$
$$(14.361)$$

For 1997-2007, we can introduce a significant trend variable into the regression and derive the following relation with all coefficients at the 1 percent significance level (adjusted R-squared of 0.993):

$$\textit{manufacturing output} = 0.206^{*}\textit{oil price} + 0.035^{*}\text{trend}$$
$$(6.601) \qquad (6.911)$$

The elasticity (growth trend) of the manufacturing output is slightly higher (lower) than that of the overall GDP.

Table 1 summarizes the results of the elasticity of all major manufacturing subsectors with respect to oil prices. As is evident in this table, all values of the elasticity of the subsectors with respect to oil prices are positive. This suggests that the impacts of oil prices on all manufacturing subsectors were positive. The manufacturing subsectors showed steady growth during the favorable period and markedly declined with the large drop of oil prices in 2009. In particular, the rubber and plastics sector and the electrical and optical products sector showed high values of elasticity because these two subsectors showed high growth for 1995-2009. The electrical and optical product sector showed the highest values of the elasticity and the output growth for 1998-2008.

This sector also showed the second largest decrease in outputs in 2009. The subsector that showed the largest decline in 2009 was the transport equipment sector, with the lowest value of elasticity. The average growth rate of this sector for 1998-2008 was relatively small because it suffered a large decline, a shocking 23 percent in 2001, for an unknown reason. When we take the period for 2001-2008 for the regression, the value of elasticity of this sector increases to a large extent. If we make a regression for the assembly of foreign-make cars in the Russian territory, which started in 2002, the value of the elasticity of this assembly to oil prices was extremely high (1.8). This assembly output showed large growth for 2003-2008 and a remarkable decline of 53 percent in 2009. Oil prices accurately reflect these changes in output.

Table 1. Elasticity of Manufacturing Growth to Oil Prices in Russia: 1995-2009

	Growth rates (percent)			Elasticity		
	1995-2009	1998-2008	2009	1995-2009		adj. R^2
Manufacturing	2.9	7.4	-15.2	0.383	**	0.936
food products	4.1	6.7	-0.6	0.374	**	0.886
textile and apparel	-0.1	4.8	-16.2	0.206	**	0.496
leather products	1.8	9.7	-0.1	0.408	**	0.738
wood products	0.4	6.3	-20.7	0.294	**	0.809
pulp and paper	4.0	8.1	-14.3	0.436	**	0.769
coke and refined oil	1.7	3.6	-0.6	0.181	**	0.925
chemicals	2.9	6.3	-6.9	0.321	**	0.784
rubber and plastics	8.6	15.1	-12.6	0.741	**	0.933
other non-metallic mineral	-0.3	6.8	-27.5	0.303	**	0.753
metals	2.7	6.3	-14.7	0.341	**	0.870
machinery and equipment nec	0.9	8.9	-31.5	0.399	**	0.833
electrical and optical products	6.7	14.9	-32.2	0.879	**	0.900
transport equipment	-1.3	3.5	-37.2	0.136	*	0.254
		(2001-2008) 6.2		(2001-2008) 0.316	*	0.931
assembling of foreign make cars	(2003-2009) 30.8	(2003-2008) 60.2	-52.6	1.833	**	0.930
manufacturing nec	2.1	7.9	-20.7	0.401	**	0.868

Sources: Author's calculations using data of Rosstat HP and Autostat.
**: significant at the 1 per cent level , *: significant at the 5 per cent level.

These estimates confirm that the impacts of oil prices on the overall manufacturing output as well as its subsector outputs were strongly positive. This is not a symptom of the Dutch Disease but a key characteristic of the Russian Disease. Needless to say, our regression analyses are insufficient due to the lack of data. Nevertheless, the Dutch Disease hypothesis (the slower growth of manufacturing in response to oil price rises or extraction increases) can be rejected for Russia. Our conclusion is quite different from suggestions in the preceding literature, including Oomes and Kalcheva (2007). Uses of quarterly or monthly industrial output data and controls over variables may not render our conclusion invalid. However, it is noteworthy that the recent data of annual disaggregated GDP for 2003-2009 (Rosstat HP as of September 8, 2010) may pose some challenges for our analysis based on the official industrial production data. The number of samples is too small to derive good analytical results. We provide only preliminary observations.

The new data include 36 subsectors of the manufacturing. Applying the data to our output-oil price equation, for 3 sectors, we have a clearly negative relation between sectoral GDP and oil prices at the 5 to 10 percent significance level. These sectors consist of (a) textile manufacturing (excluding apparel), (b) optical equipment manufacturing, photographic and film equipment, and watches and clocks, and (c) aircraft manufacturing (including space transport equipment). The overall manufacturing GDP and 16 subsectors show a significantly positive impact of oil prices on the overall output and their outputs for 2003-2009, while the correlation between oil price changes and output changes for the remaining 17 sectors is very weak for this period.

The clearly negative results mostly arise from the statistical discrepancies between growth figures of the industrial output statistics and the national accounts statistics in Rosstat. Table 2 illustrates some of these differences. As is shown, the overall manufacturing GDP growth is less than its output growth given by the industrial statistics, although the correlation coefficient of these short time series has a rather good value of 0.956. The growth of the textile and apparel sector GDP is much less than its output growth from the industrial statistics. The value of the correlation coefficient of these two time series is only 0.483. This is largely due to the discrepancy between the growth rates in 2005 when oil prices jumped 47 percent. The growth rate of the textile and apparel output based on the industrial statistics was 3.6 percent in 2005, whereas the growth rate of its value added from the national accounts statistics was markedly negative (-11.8 percent). In general, the growth rate of the gross output of a sector can differ from its value added. However, the Russian discrepancy for the textile and apparel industry may be beyond the possible allowance range. Within the framework of the Russian national accounts, there are only slight differences between the growth figures of sectoral gross output and value added (Rosstat, 2009), while, in some cases, including the mining sector and the crude oil and gas subsector, there are considerable differences between the growth figures of the industrial statistics and the national accounts statistics. Since the present Russian industrial production statistics are not based on the gross output shares at a base year (the Soviet practice) but on the value-added shares (the international standard), we can rely upon these statistics when considering output changes. We need further research on this problem. Nevertheless, the positive impact of oil prices on the overall value added of manufacturing cannot be rejected.

Table 2. Discrepancies between Growth Rates of GDP and Industrial Production

(annual growth rates; percent)

A from GDP statistics
B from industrial statistics

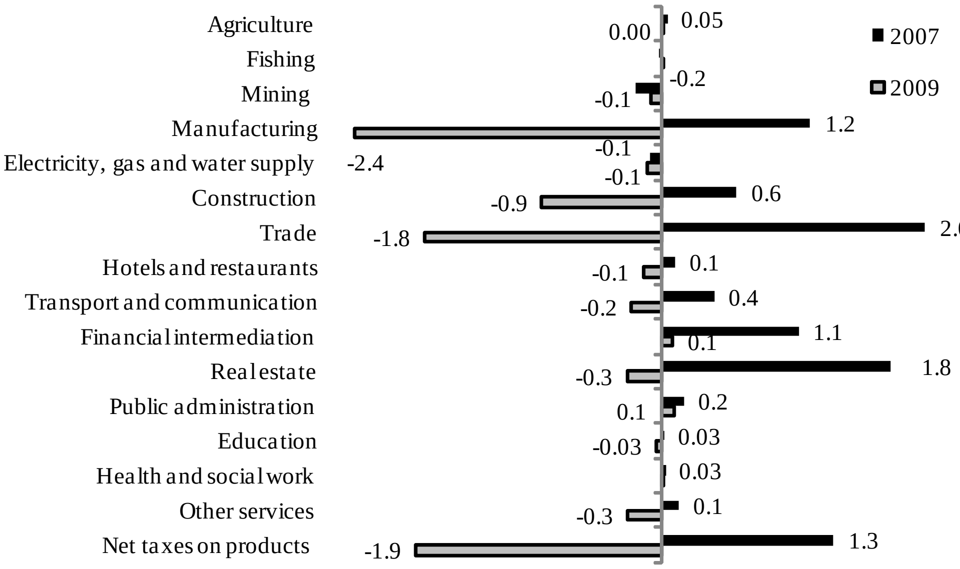
	Manufacturing		Textile and apparel	
	A	B	A	B
2003	8.8	10.3		1.2
2004	8.1	10.5	-7.2	-4.0
2005	4.4	7.6	-11.8	3.6
2006	6.6	8.4	9.7	11.8
2007	7.5	10.5	-1.9	-0.5
2008	-2.2	0.5	-5.4	-5.4
2009	-15.8	-15.2	-17.9	-16.2

Sources: Rosstat HP as of September 8, 2010 and author's calculations.
Notes: The GDP data for the textile and apparel are estimated by the aggregation of the textile and the apparel using chain method.

We can also suggest the importance of manufacturing for the Russian growth. Figure 7 shows sectoral contributions to the growth rate in 2007 and 2009 based on the official statistics (precisely, contributions of growth of the sectoral value added at basic prices to the overall growth rate of GDP at market prices). For instance, the sectoral contribution for 2007 is calculated as (the nominal sectoral share in the base year 2006)*(the sectoral real growth rate in 2007).

The largest contributor to the 2007 growth rate of 8.5 percent was the trade sector (2 percentage points), followed by the real estate sector (1.8 percentage points) and the dummy sector of net taxes on product (1.3 percentage points). It is noteworthy that the real estate sector includes many business activities (rental of movables, computers, and related activities, R&D, legal and economic activities, architectural and engineering activities, advertising, activities of employment agencies, and other business activities). Excluding the dummy sector, the manufacturing was the third largest contributor (1.2 percentage points) of 15 sectors. The mining sector's contribution was negative (-0.2 percentage point).

Figure 7. Sectoral Contributions to GDP Growth (percentage points)



If we replace the sectoral value added at basic prices (current prices) in the base year 2006 by the sectoral GDP at market prices, as in the practice of national accounts in Japan and the United States, the share of manufacturing GDP in the overall GDP in 2006 will increase by more than 50 percent than the official share of the value added in the total GDP. This suggests that the contribution of the manufacturing GDP to the 2007 GDP growth rate will also increase from 1.2 to 1.8 percentage points by 50 percent (we do not have to adjust the official growth rate in accordance with changes in the nominal shares). Furthermore, if foreign trade revenues generated from exports of the oil and gas are transferred from the trade sector to the mining sector (crude oil and gas) and the manufacturing sector (refined oil), this will reduce the share of the trade sector value added in the total GDP by 25 percent. As a result, the contribution of the trade sector to the 2007 GDP growth rate should be reduced from 2 to 1.5 percentage points by 25 percent. After all, if Japanese and U.S. methodologies are used, the manufacturing sector would be the largest contributor to the 2007 growth rate.

Based on the official data, the largest contributor to the 2009 GDP contraction of 7.9 percent was the manufacturing sector (2.4 percentage points), followed by the dummy sector of net taxes on product (1.9 percentage points) and the trade sector (1.8 percentage points). The mining sector’s contribution to the contraction was only 0.1 percentage point. After similar adjustments made for 2007, the contraction contribution of the manufacturing sector will increase from 2.4 to 3.5 percentage points. Approximately half of the 2009 recession can be explained by the manufacturing slump.

Thus, it is clear that the impact of the manufacturing sector on the Russian overall growth is markedly large.

Table 3. A Comparison of Industrial Structure: Oil-rich Counties and Japan

(percent share in GDP at market prices)

		Russia official	Russia estimated	Norway	Saudi Arabia	Azerbaijan	Kazakhstan	Japan
		2006	2006	2005	2005	2007	2007	2005
		at basic prices	at market prices	at basic prices	at market prices	at basic prices	at basic prices	at market prices
A	Agriculture	4.1	4.2	0.7	3.2	5.5	5.6	1.2
B	Fishing	0.3	0.3	0.6		0.3	0.1	0.2
C	Mining	9.4	18.8	23.2	48.3	54.7	15.1	0.1
	Crude oil and gas	7.8	17.3	23.0	48.3	54.7	…	…
	Other mining	1.6	1.5	0.2	0.0	0.0	…	…
D	Manufacturing	15.8	24.4	8.7	9.4	5.1	11.5	18.3
	Automobile	0.5	1.1	0.1	-	-	0.1	1.7
	Refined oil	2.9	6.3	1.0	3.3	…	1.1	0.9
	Other manufacturing	15.4	17.0	7.6	6.1	…	10.4	15.7
E	Electricity, gas and water supply	2.8	3.0	2.3	0.9	0.8	1.7	2.6
F	Construction	4.6	4.7	3.9	4.6	7.1	9.4	5.8
G	Trade	17.6	13.1	7.2	5.3	4.9	12.4	14.4
H	Hotels and restaurants	0.8	1.0	1.1		0.6	0.9	2.5
I	Transport and communication	8.5	8.5	6.9	3.2	5.7	11.5	10.2
J	Financial intermediation	3.9	3.9	3.5	8.3	1.1	5.9	5.2
K	Real estate	8.6	8.7	12.4		1.6	14.8	11.2
L	Public administration	4.4	4.4	3.9		2.1	1.9	6.2
M	Education	2.3	2.3	3.9	14.9	1.8	3.3	5.4
N	Health and social work	2.9	2.9	7.7		1.2	1.7	6.0
O	Other services	1.6	1.7	2.8	2.4	1.2	1.8	10.8
	FISIM	-2.2	-2.2		-1.4	-0.7	-4.8	-
	Net taxes on products	14.6	-	11.0	0.9	7.0	7.2	-
	GDP at market prices	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Sources: http://www.gks.ru, http://www.ssb.no,http://www.cdsi.gov.sa, http://www.stat.go.jp.
Data supplied by Rosstat, CIS Statistics Committee and Kazakh Statistics Office, and author's estimation.
Saudi Arabia's net tax on products implies import duties.

Table 3 presents the industrial structure of Russia in comparison with four oil-rich countries and Japan. The Russian original data is converted to an estimation in which the net taxes on products are distributed among sectors and foreign trade and transport revenues from oil and gas sectors are transferred to the mining sector and the manufacturing sector (see Kuboniwa, Tabata, and Ustinova, 2003). The above adjustments of sectoral value added for the contribution calculations were derived from the information presented in this table. From this table, we can derive the following findings.

First, the estimated GDP share of the Russian mining sector of 19 percent is sufficiently large, whereas it is much less than the GDP share of Norway (23 percent), Saudi Arabia (48 percent), and Azerbaijan (55 percent). From the viewpoint of industrial structure, the oil dependency in Russia is much less than that in Norway, with a highly developed GDP per capita level, and that of Saudi Arabia, which has the world’s largest oil reserves.

Second, the estimated GDP share of the Russian manufacturing sector of 24 percent is much higher than the manufacturing GDP share in Norway (9 percent), Saudi Arabia (9 percent), Azerbaijan (5 percent), and Kazakhstan (12 percent), even though one-fourth of the Russian manufacturing GDP is generated by the oil refinery subsector. Surprisingly, this manufacturing share in Russia is much larger than the corresponding GDP share of 18 percent in Japan, with highly developed manufacturing partially because Japan experienced a hollowing out of manufacturing through capital out-flow. As was stated, Russia also experienced the hollowing out of manufacturing in quite a different context.

The manufacturing sector is still important for the economy of Russia, which has a population of 140 million. The position of manufacturing in Russia is entirely different from that in Norway, which has a population of 5 million. Based on the BP data, the Norwegian export level of crude oil relative to the Russian level was indeed 76 percent in 2000 even if it continuously declined to 37 percent in 2005 and 27 percent in 2009 due to marked declines of oil extraction in Norway. The Norwegian export level of natural gas relative to the Russian level accounted for 26 percent in 2000 and increased continuously from 45 percent in 2005 to 72 percent in 2009. Indeed, Norway is an oil-dependent country. As Norway did not have to develop manufacturing, its sensitivity to overall output as well as manufacturing to oil prices is low. Roughly, if the Russian export level of crude oil and gas were ten times the Norwegian level without any deterioration of international oil prices, Russian people would enjoy at least a per capita GDP of 50,000 USD and would not have to worry about further development in manufacturing. However, if this dream did not come true at all and Russia wanted to catch up on the U.S. per capita GDP level with a high employment rate, Russia should derive further growth of manufacturing.

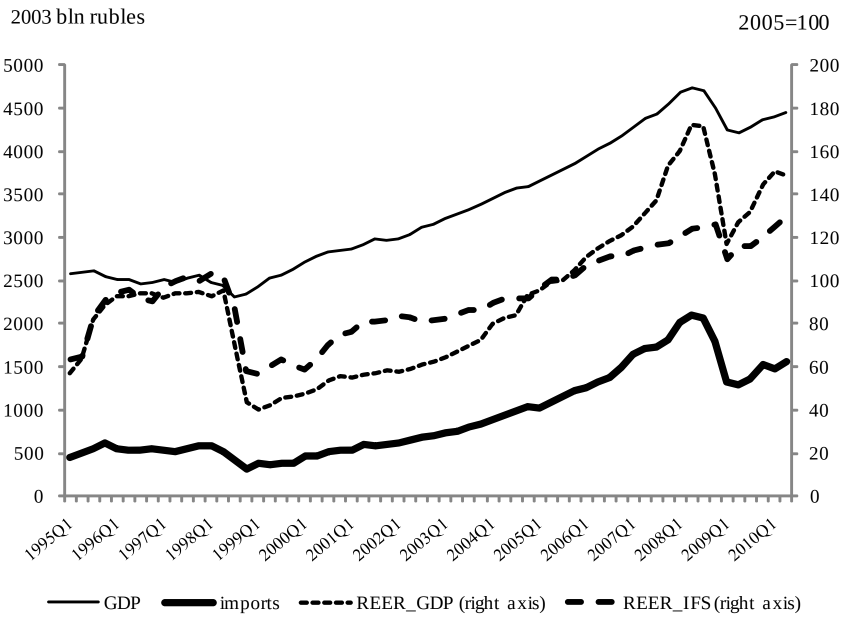
4. Rapid Increases in Imports and High Growth of the Trade Sector

The boost of imports was associated with the Russian favorable growth. Consistently, the great contraction of the GDP growth in 2009 was coupled with the drastic drop in imports. Since the GDP concept is a net of imports, increases in imports have a directly negative impact on GDP growth. However, the Russian economic growth went along increases in imports. As was reported, the continuous appreciation of the real effective exchange rate (REER) of the ruble due to oil price rises induced the boost of imports in Russia, which, in turn, did not necessarily induce adverse effects on

Russia's economic growth and competitiveness.

Figure 8 presents the movements of imports and REER with the GDP growth in Russia for 1995Q1-2010Q2. In this figure, two kinds of REER are shown. One is the IFS's CPI-based real effective exchange rate (REER_IFS). Another is the GDP-based real effective exchange rate (REER_GDP), which is derived using the Russian GDP deflator and the U.S. GDP deflator.[10]

Figure 8. Imports and Real Exchange Rates



First, we can derive the following regression result for imports, GDP, and REER, with all coefficients at the 1 percent significance level:

$$imports = \underset{(31.023)}{1.700^{*}gdp} + \underset{(12.857)}{0.729^{*}reer\_ifs} \quad \text{(adjusted R-squared of 0.984);} \qquad (18)$$

and

$$imports = \underset{(33.146)}{1.655^{*}gdp} + \underset{(15.030)}{0.437^{*}reer\_gdp} \quad \text{(adjusted R-squared of 0.987).} \qquad (19)$$

It is noteworthy that, unlike in Rautava (2009), the above regressions do not include the variable of oil price changes because, in the introduction of this additional variable, its coefficient was not statistically significant. These equations for two real

[10] The U.S. quarterly deflator is from the NIPA on BEA HP. The Russian deflator is an estimation in which the official GDP series in nominal terms are seasonally adjusted by X-12, and our GDP series with corrections of the official non-seasonally adjusted data for 1995-2003 at 2003 prices are also seasonally adjusted by X-12. The nominal exchange rate is from IFS. The effectiveness of the GDP-based REER in the empirical analysis of oil-rich countries is suggested by Korhonen and Juurikkala (2009).

exchange rates, regarding the elasticity of imports to GDP, are almost similar. They suggest that a 1 percent of GDP growth induces a 1.7 percent increase in imports. A 10 percent appreciation of the CPI-based (GDP-based) real exchange rate leads to about a 7 (4) percent increase in imports. The elasticity of imports to CPI-based real exchange rate is about twice higher than that to GDP-based real exchange rate. As is shown, imports grew (fell down) with the GDP growth (contraction) in Russia. In addition, the subsequent appreciation of the real exchange rate of the ruble would bring about the boost of imports in Russia. The effects of oil prices on imports are indirectly shown by the GDP variable, which heavily depends on the oil prices, as explained.

The Russian level of elasticity of real exchange rates to oil prices is rather debatable. From the given data, we have the following results at all coefficients at the 1 percent significance level:

$$\underset{}{reer\_ifs} = \underset{(8.090)}{0.256} * oil\ price \quad \text{(adjusted R-squared of 0.514);} \tag{20}$$

$$reer\_gdp = \underset{(9.345)}{0.486} * oil\ price \quad \text{(adjusted R-squared of 0.586);} \tag{21}$$

and

$$reer\_ifs = \underset{(27.196)}{0.541} * reer\_gdp \quad \text{(adjusted R-squared of 0.925).} \tag{22}$$

The value of the GDP-based elasticity of 0.49 is about twice the value of the CPI-based elasticity. This is due to the fact that the movement of the CPI is more stable than that of the GDP deflator in Russia. Our result for the GDP-based elasticity (0.5) is consistent with the results for the OPEC countries shown in Korhonen and Juurikkala (2009), while our result for the CPI-based elasticity is lower than expected.[11] However, even for 2000Q1-2008Q2, the elasticity of the CPI-based real exchange rate with respect to oil prices shows the value of 0.326 (adjusted R-squared of 0.775; the coefficient at the 1 percent significance level). Although this problem requires further examination, our results of the elasticity of both CPI-based and GDP-based real exchange rates with respect to oil prices may be plausible.

As was reported, according to the official statistics, the trade sector was the largest contributor to the favorable economic growth and the second largest contributor to the 2009 recession. The domestic distribution activities of imported goods are accounted as a part of sources of GDP. We would like to prove that the boost of imports largely contributed to the high growth of the trade sector GDP, which was, in turn, one of the

[11] Oomes and Kalcheva (2007) presented the results of the elasticity (0.49 to 0.58) with many additional operations.

major sources of the overall high growth.

Figure 9 shows the trade sector GDP (the value added at basic prices) and imports at 2003 chained rubles.[12] Let us consider the equation $Y_{trade} = A\exp(\lambda t)M^{\alpha}$, where Y_{trade} = the real trade sector GDP, M = real overall imports, α = the elasticity of the trade sector GDP with respect to imports, λ = the exogenous effects, and A = a constant. Then,

$g(Y_{trade}) = \alpha * g(M) + \lambda$;

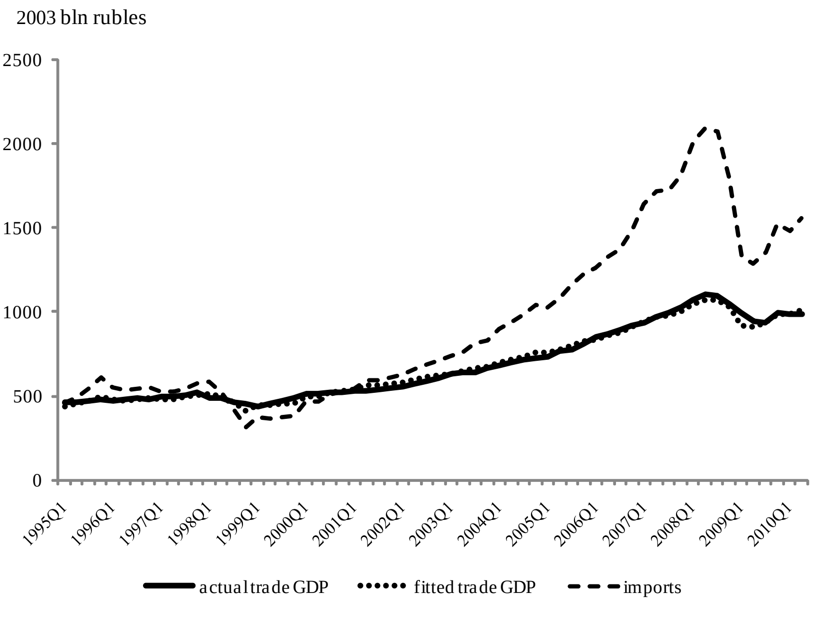
trade gdp = elasticity**imports* + exogenous effects*trend.

Using the log-log type regression, we have the following result with all coefficients at the 1 percent significance level (adjusted R-squared of 0.989):

trade gdp = 0.374**imports* + 0.0063 (annualized rate of 2.5percent). (23)
(21.905) (12.624)

This result indicates that a 1 percent increase in imports induces an approximate 0.4 percent growth of the trade sector GDP. The underlying growth trend of 2.5 percent reflects the distribution activities (trade margins from the final expenditures) of domestically produced goods and services, including most of life's necessities and exports.

Figure 9. Trade Sector GDP and Imports



The average annual growth rate of the trade sector GDP and imports for 1995Q1-2010Q2 were 5.1 percent and 8.5 percent, respectively. The contribution of

[12] We connected the trade GDP data based on the old classification for 1995Q1-2002Q4 (available at the archive on Rosstat HP) with the data based on the new classification for 2003-2009 using the official growth rates for 1996Q1-2003Q4. The time series are seasonally adjusted by using X-12. There is very little difference between the coverage of the two classifications for the trade sector.

imports to this growth amounts to 3.2 percentage points (0.374*8.5=3.2). Hence, the contribution share of imports in the trade sector GDP accounts for more than 62 percent for the observed 62 quarters. The residual of 38 percent consists of the underlying growth trend of 49 percent and the statistical error of -11 percent.

Indeed, the impact of imports on the trade sector GDP is sufficiently large. The factors determining the rapid growth of the trade sector have not yet been studied. Needless to say, there are still many problems to solve, including the growth rate of the non-observed economy of the trade sector, which comprises about 38 percent of the trade sector value added at current prices in 2007 (Rosstat HP). The official data on the trade sector GDP also includes foreign trade revenues from oil and gas. This is very important in nominal terms. However, it cannot be the source of the rapid growth of the trade sector because exports of oil and gas have not shown marked increases in physical terms.

5. Concluding Remarks

Using simple regressions and descriptive statistics, we showed the difference between the Dutch and Russian Diseases. We demonstrated that the key symptom of the Russian Disease is the strong positive impact of oil prices or trading gains on the overall GDP growth and the manufacturing growth as well. In a sense, this suggests high potentials for the Russian economy because continuous increases in oil prices induce higher GDP growth with higher TFP in Russia than in most of the other resource-rich and non-resource-rich countries. However, the fact that the diversification efforts themselves are oil-dependent would bring about rather high instability with vast volatilities in the economy. The reconstruction of the Russian industrial base, including developments of SMEs, would require several decades.

We also reformulated the oil price windfalls (disasters) as the trading gains (losses) in the framework of national accounts. The findings of the studies on the spillover effect mechanisms of trading gains (losses) over all the sectors of the economy are yet to be thoroughly analyzed.

In addition, we clarified an important aspect of the functions of imports in Russian economic growth through the value added of the trade sector generated by the domestic distribution of imports. The fact that the growth leader is the traditional trade sector can also be regarded as a symptom of the Russian Disease.

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Appendix

The order of integration of the series is important for the selected regressions. We tested for unit roots by the commonly used Augmented Dickey-Fuller (ADF) tests. Table A below shows results using the lag length selected by the Schwarz information criterion. For all series of variables in levels we cannot reject the null of nonstationarity. In other words, all variables are nonstationary. Performing the tests for the first differences of variables, we reject the null of nonstationarity. Since all variables have to be differenced once to obtain stationarity, they are integrated of order 1, I (1).

To test whether the nonstationary variables in our regressions are cointegrated or spuriously related, we examined the properties of the regression residuals by the ADF test. Table B below reports our results for regressions in this paper. For all regressions we can reject the null of no cointegration. In other words, the nonstationary variables in all of our regressions are cointegrated.

Table A. Results of ADF Tests for Variables

Variables	Exogenous	Lag	t-Stat.	
Russia for 1995Q1-2010Q2 except *manufacturing gdp*				
gdp	constant, trend	1	-2.925	
D(*gdp*)	constant	0	-4.348	**
oil price	constant, trend	1	-3.444	
D(*oil price*)	constant	0	-4.348	**
trading gain	constant, trend	1	-3.315	
D(*trading gain*)	constant	0	-5.292	**
trade gdp	constant, trend	1	-2.227	
D(*trade gdp*)	constant	0	-3.993	**
imports	constant, trend	1	-2.769	
D(*imports*)	none	0	-4.454	**
reer_ifs	constant, trend	1	-2.223	
D(*reer_ifs*)	constant	0	-5.519	**
reer_gdp	constant, trend	1	-2.098	
D(*reer_gdp*)	constant	0	-4.776	**
manufacturing gdp	constant, trend	1	-2.209	
D(*manufacturing gdp*)	constant	0	-3.522	*
terms-of-trade	constant	1	-1.581	
D(*terms-of-trade*)	none	0	-5.081	**
Norway for 1995Q1-2010Q2				
oil price (Brent)	constant	1	-1.125	
D(*oil price*)	none	1	-5.996	**
gdp	constant, trend	1	-2.321	
D(*gdp*)	constant	0	-13.827	**
trading gain	constant, trend	3	-3.881	
D(*trading gain*)	constant	0	-5.306	**
terms-of-trade	constant, trend	2	-3.744	
D(*terms-of-trade*)	constant	0	-6.368	**
The United States for 1995Q1-2010Q2				
gdp	constant, trend	1	-1.000	
D(*gdp*)	constant	0	-4.460	**
trading gain	constant, trend	3	-4.064	
D(*trading gain*)	constant	0	-6.726	**
terms-of-trade	constant, trend	1	-3.500	
D(*terms-of-trade*)	constant	3	-5.355	**
Japan for 1980Q1-2010Q2				
gdp	constant, trend	0	-0.907	
D(*gdp*)	constant	0	-8.963	**
trading gain	constant, trend	2	-1.109	
D(*trading gain*)	constant	1	-8.076	**

Notes:

**: the 1 percent significance level.

*: the 5 percent significance level

The lag length is generated by the Schwarz information criterion.

D(x) denotes the first difference of x.

Table B. Results of ADF Tests for Residuals of Regressions

Equation	Lag	t-Stat.	
Eq. (1)	0	-2.982	**
Eq. (2)	0	-3.258	**
Eq. (3)	0	-3.322	**
Eq. (4)	0	-3.551	**
Eq. (5)	0	-3.829	**
Eq. (6)	0	-4.200	**
Eq. (7)	1	-2.980	**
Eq. (8)	0	-3.182	**
Eq. (9)	0	-3.455	**
Eq. (10)	0	-2.909	**
Eq. (11)	1	-5.092	**
Eq. (12)	0	-7.812	**
Eq. (13)	2	-3.023	**
Eq. (14)	2	-3.093	**
Eq. (15)	1	-1.978	*
Eq. (16)	0	-2.109	*
Eq. (17)	1	-4.062	**
Eq. (18)	0	-3.562	**
Eq. (19)	0	-3.694	**
Eq. (20)	0	-3.042	**
Eq. (21)	1	-2.163	*
Eq. (22)	0	-3.349	**
Eq. (23)	0	-4.180	**

Notes:

**: the 1 percent significance level.

*: the 5 percent significance level.

The lag length is generated by the Schwarz information criterion.

D(x) denotes the first difference of x.