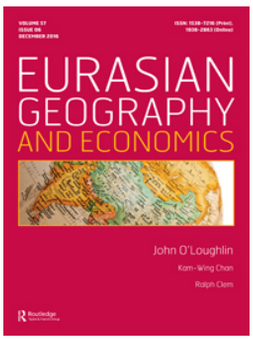

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Factors underlying inflation in Russia 2000–2015

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ABSTRACT

This paper examines the problem of continuing inflation in Russia in the period from 2000 to 2015. Although factors causing high inflation changed during this period, such factors as money supply, wages, gas and electricity prices, and ruble exchange rate have been essential factors when analyzing inflation in Russia. This paper focuses on gas and electricity prices that represent state-regulated prices in natural monopoly sectors and that have been factors of price increases specific to Russia. They have been raised by the state in order to narrow the gap between their domestic and international prices. It is suggested that there was a turnaround in 2008 when the role of each inflation factor changed significantly. Concerning the rebound of inflation rate since 2014, the overwhelming influence of depreciation of the ruble is indicated. Institutional factors such as the monopolistic structure of the economy that have kept the inflation rate high in Russia are also suggested.

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Russia; inflation; money supply; ruble exchange rate; gas price; electricity price; oil price

Introduction

This paper focuses on inflation in Russia, since this is currently one of the most serious problems for that country's economy. In 2006, for the first time in the post-Soviet period, the inflation rate decreased to below 10%.[1] In 2011–2013, however, inflation rates were still above 6%, rising again to more than 10% after 2014.

One of the negative influences of high inflation is poor performance of credit activities in Russia. Because the inflation rate has been high, interest rates applied to firms and consumers have also been high in Russia. This has been one of the underlying reasons for poor investment activities (low investment rate) and capital flight in Russia (Connolly 2011). The Russian government and the Central Bank of Russia (CBR) have attempted a transition to inflation-targeting in their policies, and leading economists recommended a decrease in inflation rates as one of the most urgent tasks for the economy (*Strategiya-2020* 2013).[2] In spite of the importance

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of this problem, there are few articles that discuss the causes of inflation in Russia, with some exceptions (e.g. Vymyatnina and Ignatenko 2009).

This article analyzes the components of inflation in Russia in the period 2000–2015 and the general causes of inflation in that country. A full econometric analysis of inflation is beyond the scope of this paper. It is hoped that this essay suggests the seriousness and peculiarities of Russia's inflation process and hints at some direction for future investigation. In the next section, price indices and factors of inflation analyzed in this article are explained. Then, the impact of each factor on inflation in Russia is examined.

Trend of inflation in 2000–2015

This article analyzes the most widely used indicator of inflation, the consumer price index (CPI), and its components: price indexes of food, non-food, and services. These are quarterly data, which show an increasing rate in the percentage from the corresponding quarter of the previous year, for the period from the first quarter in 2000 through the fourth quarter in 2015. When we look at components of the CPI, we find that the increase in service prices was outstanding, especially in the period until 2007 (Figure 1). Increases in food prices were substantial at the beginning of 2001, 2005, 2008, and 2011. This figure suggests that the causes of inflation changed during this period. Table 1 shows that the price of services increased most rapidly in 2000–2015, especially in 2000–2007. Among services, prices of housing and public utilities, including prices of gas, electricity, heating,

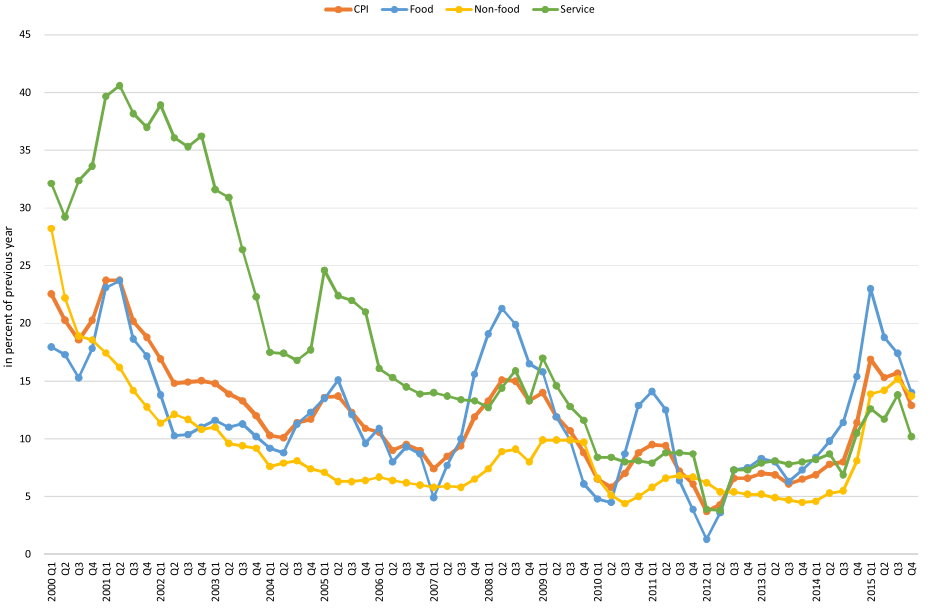

Figure 1. Russia's inflation, 2000–2015. Source: Compiled by author from Rosstat's website.

Table 1. CPI increase and contribution to its increase in Russia, annual average in percent, 2000–2015.

	Price increase			Contribution to CPI increase		
	2000–2007	2008–2015	2000–2015	2000–2007	2008–2015	2000–2015
CPI	13.7	9.3	11.5	13.7	9.3	11.5
Food	12.8	10.4	11.6	5.5	4.0	4.7
Non-food	9.7	7.6	8.6	3.3	2.8	3.0
Services	24.4	10.0	17.2	5.7	2.5	4.1
Passenger transport services[a]	16.9	10.1	13.0	0.6	0.3	0.4
Housing and public utilities services[a]	27.6	12.4	18.9	2.5	1.1	1.7
Housing[a]	29.6	11.2	19.1	0.8	0.3	0.5
Public utilities[a]	26.9	13.0	18.9	1.6	0.8	1.1

[a]Since price increase data are not available prior to 2001, figure for 2002–2015 is presented instead of 2000–2015.
Source: compiled by author from Rosstat's website.

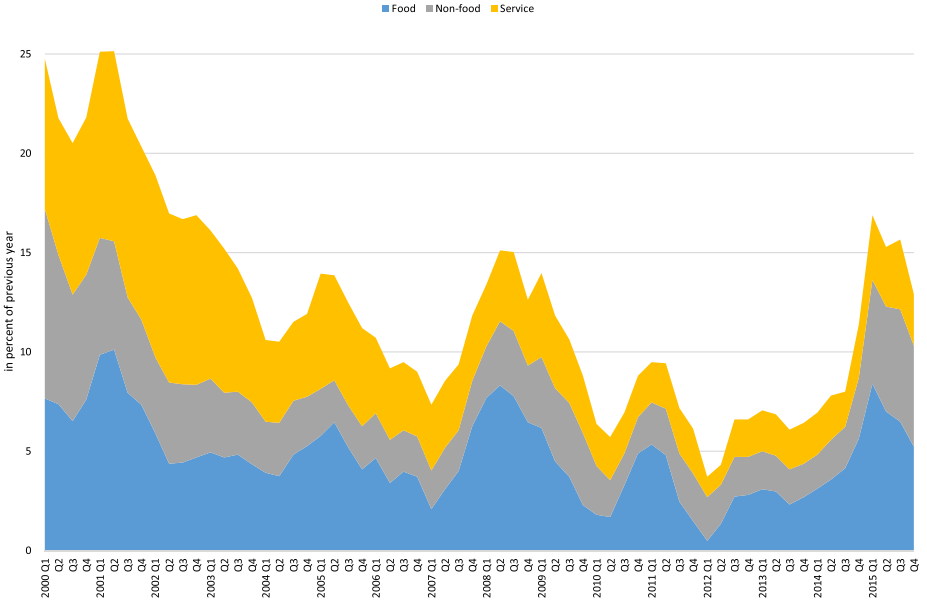

Figure 2. Contribution to increase in CPI in Russia, 2000–2015. Source: Compiled by author from Rosstat's website.

and water, and fares for passenger transport services, increased rapidly. This table indicates some changes around 2008. It should be recalled that in the period from 2000 until mid-2008, Russia enjoyed high economic growth fueled by oil price increases (Tabata 2009; Gaddy and Ickes 2010; Kuboniwa 2012).

Figure 2 shows the contribution to the increase in CPI by food, non-food, and services.[3] It demonstrates that the contribution of services has not always been the most significant; in many quarters, the contribution by food was larger than that of services. It is one of the characteristics of Russia that the share of food in

the consumer basket has been larger in comparison with other countries. In Russia, the share of food was 37.3% in 2012, while in Germany it was 13.5%; United States, 15.3%; Japan, 19.1%; South Africa, 21.6%; and Brazil, 23.1%. A larger share was observed for India (49.7%) (CBR 2013, 37). Table 1 summarizes the contribution to CPI increase by some components and demonstrates that the main cause of inflation was the increase in food and service prices.

Factors relating to inflation

Generally speaking, there are three causes of inflation (Kim 2008): excessive supply of money, cost increases resulting from external influence coming from abroad, and cost increases due to internal pressure stemming from changes in the cost of factors of production within the country. This article analyzes the following indicators:

- Indicator of money supply(M2).
- Indicators of internal cost changes – indexes of nominal and real wages and purchasers' price indexes of gas and electricity.[4]
- Indicator of external cost changes – index of exchange rate of the ruble against the dollar in real terms.

The indicator of money supply is used to measure the magnitude of demand–pull inflation, while indicators of internal and external costs changes are relevant to cost–push inflation. Purchasers' price indexes of gas and electricity are chosen as representative of natural monopoly prices that are regulated by the state. As indicators of external costs, the index of exchange rate of the ruble against the dollar is preferred to the index of import prices for the reason explained below.

Table 2 summarizes increases in these and some other indicators in 2000–2015. The CPI increased 5.6 times in this period. Much larger increases were recorded in such indicators as M2, nominal wages, and the purchasers' price of gas. We

Table 2. Increases in indicators related to inflation in Russia, 2000–2015 (at the end of the period in percent of the end of preceding period).

	2000–2007	2008–2015	2000–2015
CPI	277.6	203.1	563.7
M2	1800.9	278.3	5011.1
Wage, nominal[a]	814.3	233.5	1901.4
Wage, real[a]	296.3	115.8	343.1
Purchasers' price of gas	500.4	280.4	1403.0
Purchasers' price of electricity	356.6	216.9	773.5
Purchasers' price of crude oil	493.0	118.9	586.1
Export price of gas[b]	358.1	75.6	270.9
Export price of crude oil[b]	338.7	53.9	182.6
Real exchange rate of the dollar against the ruble	305.6	68.4	208.9

[a]Comparison of December 1999, 2007 and 2015.
[b]Comparison of Q1 of 2000, Q4 of 2007 and Q4 of 2015.
Source: compiled by author from websites of Rosstat and CBR.

find a significant slowdown or even decrease in the period after 2008 compared with the preceding period. It is interesting to note that the smallest slowdown is observed in CPI.

Impact of inflation factors

Money supply

Correlation coefficients between M2 and price indexes are not high, except for the coefficient between M2 and service prices (Table 3). Figure 3 shows a correlation between CPI and money supply (M2). Nine triangles in red were recorded from the fourth quarter of 2008 through the third quarter of 2009 and from the fourth quarter of 2014 through the fourth quarter of 2015. If we exclude these

Table 3. Correlation coefficients between price indexes and factors of inflation in Russia, 2000–2015.

	M2	M2[a]	Wage, nominal	Wage, nominal[a]	Wage, real	Wage, real[a]	Purchasers' price of gas	Purchasers' price of electricity	Purchasers' price of oil
CPI	0.351	0.594	0.697	0.896	0.380	0.703	0.503	0.599	0.368
Food	0.079	0.381	0.412	0.697	0.086	0.472	0.250	0.428	0.200
Non-food	0.305	0.580	0.564	0.812	0.306	0.705	0.369	0.482	0.611
Service	0.545	0.594	0.828	0.861	0.623	0.709	0.676	0.635	0.253

[a]Excludes data in the period from 2008 Q4 to 2009 Q3 and 2014 Q4 to 2015 Q4.
Source: compiled by author from websites of Rosstat and CBR.

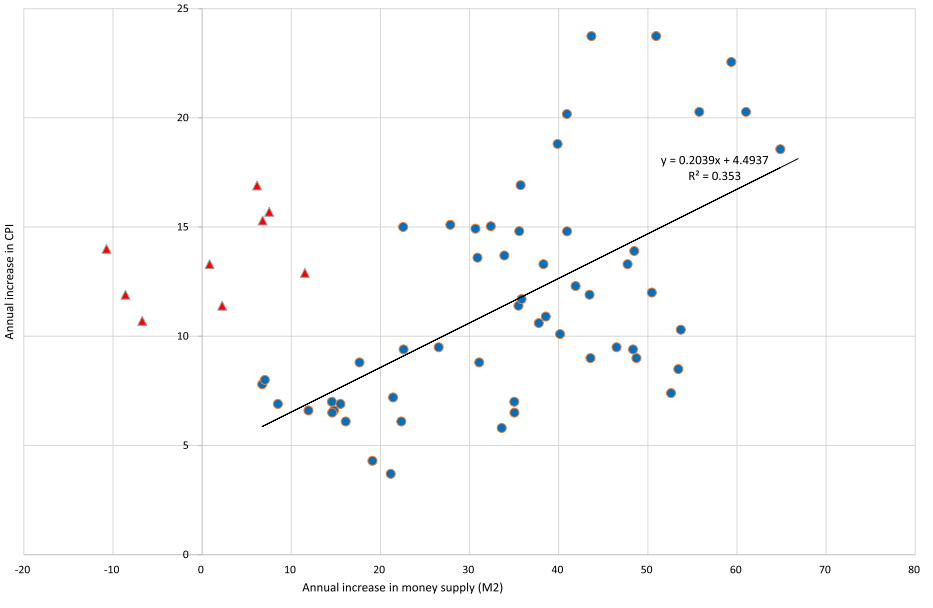

Figure 3. Correlation of increases in CPI and money supply in Russia, quarterly data in 2000–2015.
Source: Compiled by author from Rosstat's and CBR's websites.

periods, the correlation coefficient between CPI and M2 increases from 0.351 to 0.594 (Table 3). Since in the period 2000–2007 M2 increased very rapidly (Table 2; the annual increase rate was 40.5% on average), at first glance it seemed that there was a strong impact of M2 increase on inflation.

We should, however, take into consideration the quantity theory of money (i.e. the Fisher equation, in which MV = PT, where M, V, P, and T represent money supply, velocity of money, price level, and volume of transactions, respectively), which suggests that, for most of this period, T was rising strongly, with some continuing monetization.[5] It follows from this that the increase in money supply was supported by higher demand for money. In other words, we observe that Marshallian k (M2/GDP or M/PT) is increasing. Marshallian k is still not high in Russia by international comparison, although it continuously increased from 15.7% at the end of 2000 to 44.3% at the end of 2015 (Figure 4).[6] Therefore, we conclude that money supply has not been one of the main causes of inflation in Russia.

Here, we analyze why M2 increased so rapidly, especially in 2000–2007, making use of the data of a monetary survey reported by the CBR using the following formula:[7] Foreign liabilities + Liabilities to general government + Money supply (M2) + Other liabilities = Foreign assets + Claims on general government + Claims on other sectors + Other assets. Money supply (M2) = Net foreign assets + Net claims on general government + Claims on other sectors + Net other assets.

It is obvious from Figure 5 that the increase in money supply was caused by various factors in this period. Until 2007 when money supply increased quite rapidly, the contribution of net foreign assets (i.e. net assets reserved in foreign

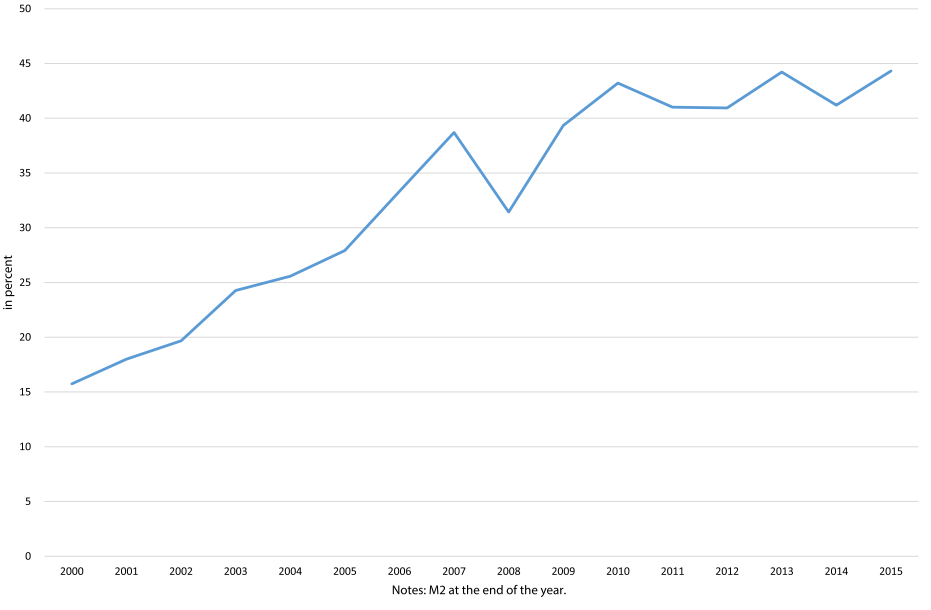

Figure 4. M2/GDP in Russia, 2000–2015. Source: Compiled by author from Rosstat's and CBR's websites.

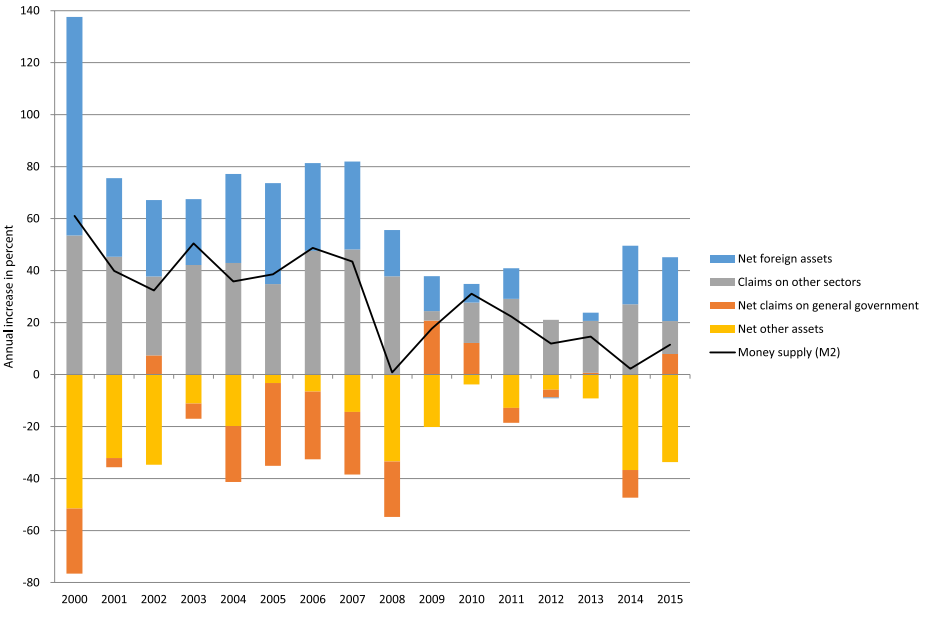

Figure 5. Contribution to increase in money supply (M2) in Russia, 2000–2015. Source: Compiled by author from CBR's website.

currencies by CBR and all other credit organizations) was very large, together with the contribution of claims on other sectors (i.e. credit extension to companies and households by banks). The large contribution of net foreign assets implies a great amount of purchase of US dollars in foreign exchange markets by the CBR. Therefore, it can be argued that the increase in money supply by these interventions in exchange markets was one of the main causes of inflation in this period (Tabata 2009, 685–686). But, if we calculate the correlation coefficient between CPI and M2 in the period 2000–2007, it is only 0.205, which does not support the argument of Tabata (2009). We should regard the increase in money supply as one of the underlying factors of inflation, which has not directly influenced fluctuation of prices.

In addition, in the period from 2004 to 2007, liabilities to the government counterbalanced to a considerable degree the increase in foreign assets. This is because some oil tax revenues were accumulated in the government's Stabilization Fund, and this fund has been officially calculated as part of the CBR's foreign currency reserves.[8] The Stabilization Fund account comprises in part foreign currency reserves and therefore is at the same time a liability of the CBR to the government. This is in fact sterilization; in other words, the government offset the increase in money supply in rubles by converting some of them into foreign currencies (Tabata 2007).

Since 2008, however, purchases of dollars by the CBR have decreased considerably, as the ruble stopped appreciating rapidly in real terms. In 2009 and 2010, the increase in claims on the government became one of the major causes of the

increase in money supply, due to the increase in government expenditures by the use of the Reserve Fund in the government account at the CBR (Konno 2011). Since 2011, however, government expenditure has ceased to function as a factor in the increase in money supply.

Wages

Indexes of nominal and real wages have a strong correlation with price indexes, especially with prices of services (Table 3). The stronger correlation between wages and services is logical, since wages occupy a relatively larger share in the costs of services than in other sectors, especially when compared with the case of food and non-food items. A much stronger correlation between nominal wage and inflation than that between real wage and inflation is also logical, if we take into consideration the existence of some kind of wage indexation, which is diffused among mid-size and large companies and public organizations. This may also imply that there is a cyclical loop in inflation. The strong correlation between real wages and the CPI, shown in Figure 6, is explained by these mutual influences. As is the case for money supply, if we exclude the years of global financial and present economic crises (nine triangles in red in this figure), this correlation becomes much stronger; the correlation coefficient between the CPI and real wages rises from 0.380 to 0.703 (Table 3).

It should be noted that there is a strong correlation between wage indexes and M2; the correlation coefficient of M2 with real and nominal wages is 0.812

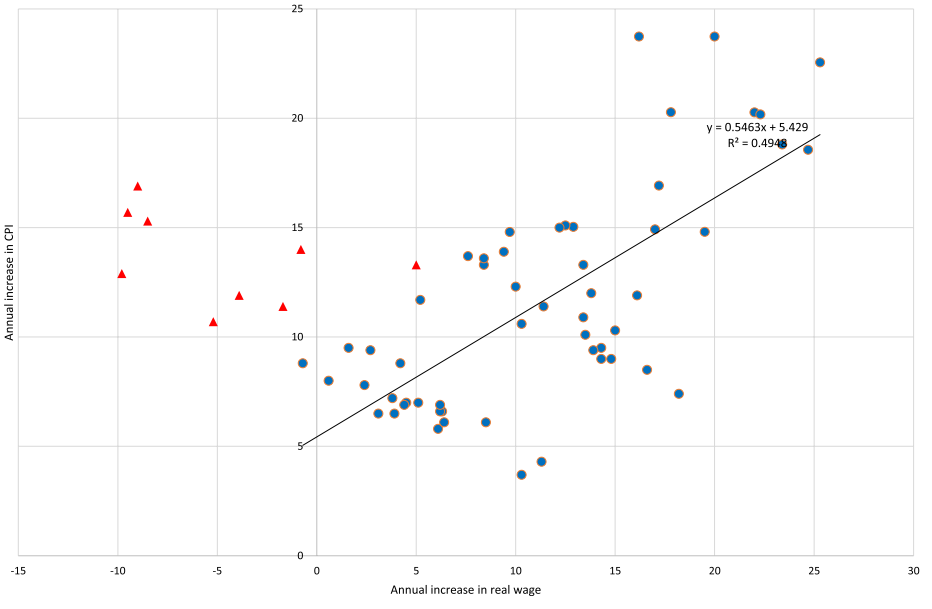

Figure 6. Correlation of increases in CPI and real wage in Russia, quarterly data in 2000–2015. Source: Compiled by author from Rosstat's website.

and 0.761, respectively. It is also worth pointing out that both indexes of M2 and wages ceased to function as factors contributing to inflation in the period after the fourth quarter of 2014, as Figures 3 and 6 suggest.

Gas and electricity prices

Purchasers' prices of gas and electricity have a rather strong correlation with price indexes, especially with service price (Table 3). This correlation is stronger than that between the CPI and oil prices. Strong correlation between gas and electricity prices on the one hand, and the CPI, especially service prices, on the other, may be due to the inclusion of retail prices of natural gas and electricity prices in the calculation of the index for service prices. The share or weight of public utilities that include gas and electricity prices for households in the calculation of the service price index in 2015 amounts to 22.5% (calculated from Rosstat data). On the other hand, purchasers' prices of oil have some correlation only with prices of gasoline. Since the share of gasoline in the non-food basket is 8.4% in 2015, the non-food price index has a rather strong correlation with oil prices (Table 3).

In addition, the method of administrative control of wholesale prices of natural gas and electricity is associated with this correlation. We should recall that retail prices for natural gas and electricity for households have been controlled by the state together with their wholesale prices, which are close to their purchasers' prices used in this paper. It is a specificity of Russia that although basically prices were liberalized in 1992, some prices in the sphere of natural monopoly have been regulated by the government. They include prices of electricity and natural gas for industrial users; oil transport fares by pipeline; freight transport fares by rail; prices of electricity, gas, heating, and water for households; and passenger transport fares by rail. Since these prices have not been liberalized but regulated by the state, and since there have been considerable differences between domestic and international prices of these goods and services, the government had raised these prices every year by the order of 10–20% over the decade until 2013. In contrast, oil prices were liberalized in the 1990s, and its domestic price has been largely determined by the market.

As for natural gas, the difference between the export and the purchasers' price has been very large (Figure 7).[9] While at the beginning of the 2000s, the ratio of export to purchasers' prices of gas, shown in this figure, was more than five times, it declined to almost 2.5 in 2004, since the purchasers' price of gas was raised rapidly. But, thereafter, because the export price of gas increased too fast, due to the increase in international prices of energy, the difference between export and domestic prices of gas widened until 2008.

These low domestic prices for natural gas were criticized by the European Union (EU), when Russia held negotiations with the EU concerning Russia's entry into the World Trade Organization (WTO) in the first half of the 2000s, because these price differences functioned as subsidies to domestic users. Therefore, the Russian

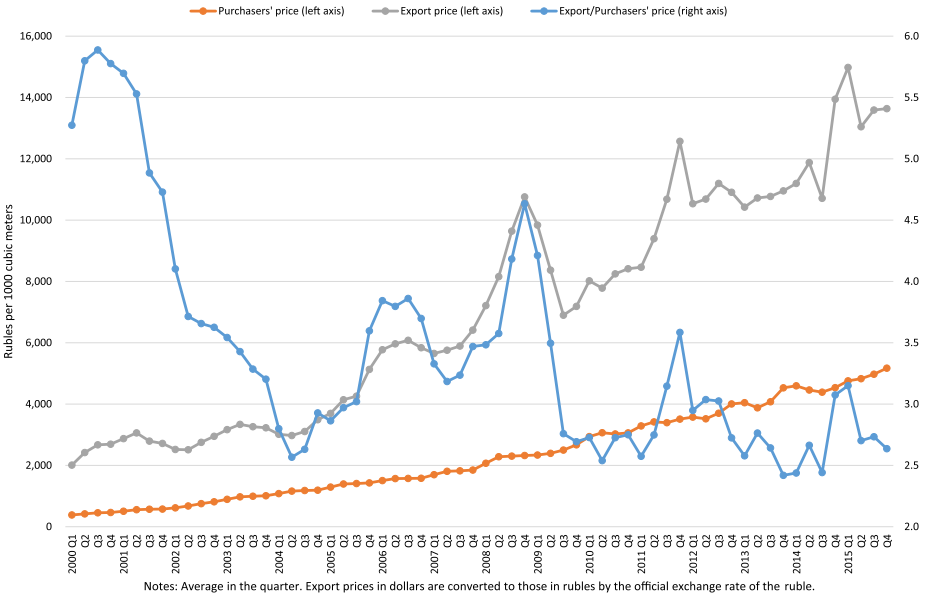

Figure 7. Prices of natural gas in Russia, 2000–2015. Source: Compiled by author from Rosstat's and CBR's websites.

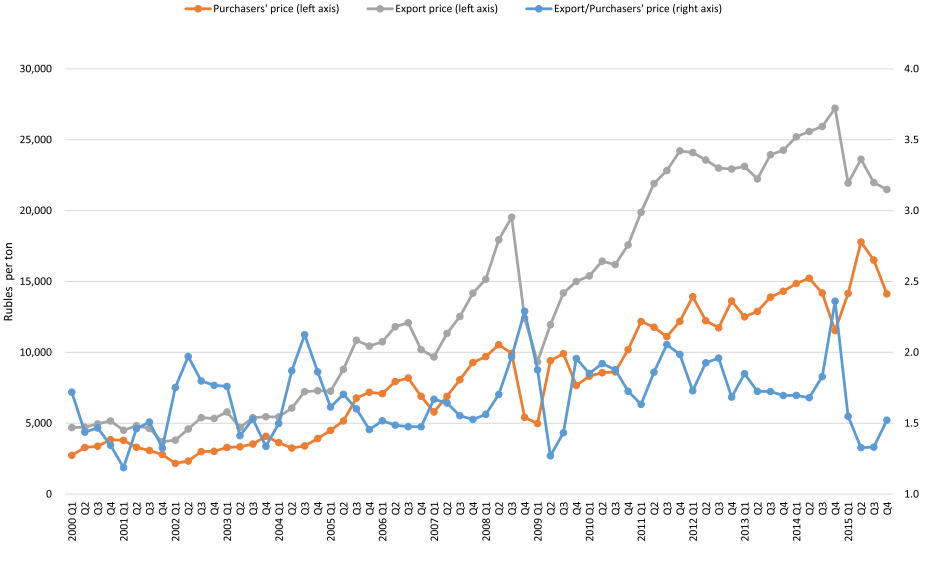

Figure 8. Prices of crude oil in Russia, 2000–2015. Source: Compiled by author from Rosstat's and CBR's websites.

Notes: Average in the quarter. Export prices in dollars are converted to those in rubles by the official exchange rate of the ruble. Export prices are converted from "per barrel" to "per ton" by 1 ton = 7.3 barrels.

government promised to increase natural gas prices in the past decade. Under this circumstance, Government Resolution No. 333 dated 28 May 2007 specified that profits from the domestic and international markets of gas should be equal

by the beginning of 2011.[10] In other words, export prices should have been equal to domestic prices + export duties + transportation costs by that time.

But, due to the global financial crisis, the government had to abandon this plan. According to new Government Resolution No. 1205 dated 31 December 2010, the period from 2011 to 2014 was regarded as a transition period, and domestic gas prices were to be liberalized at the beginning of 2015. By Government Resolution No. 342 issued on 15 April 2014, however, the schedule of gas price liberalization was postponed for three years until the beginning of 2018.

It is worth comparing the case of natural gas with that of crude oil (Figure 8). In the case of crude oil, the difference between export and the purchasers' price has been smaller, and the ratio of export to the purchasers' price has fluctuated in a narrower range from 1.2 to 2.4. Table 2 illustrates that purchasers' prices of both natural gas and crude oil increased approximately five times during the period 2000–2007. After 2008, while the purchasers' price of crude oil increased only by 19%, the price of gas increased 2.8 times. This was a result of administrative increase in this price. Still, the difference between export and the purchasers' price of gas is significantly larger than that for crude oil at present.

The increase in state-regulated prices of electricity has been significant as well, although its increase rate has been lower than the case for natural gas (Table 2). It should be noted that the increase in gas prices has necessitated an increase in electricity price, since about 70% of electricity is produced by thermal power stations (*RSY* 2015, 388) and about 70% of thermal power generation is fueled by natural gas in Russia (*Energeticheskaya* 2009).

The effects of an electricity price increase on the economy are considerable. Generally speaking, repercussion (spillover) effects of price increase of one commodity on other commodities can be analyzed using input–output tables. Unfortunately, in Russia, input–output tables have not been compiled since 2003.[11] Nonetheless, we can calculate the repercussion effects of price increase in electricity using the following formula:

$$\Delta p_j = b_{nj}/b_{nn}\Delta p_n$$

$$b_{ij} = (I - A)^{-1}_{ij}$$

where p_j is price of goods j, I is the identity matrix, and A is the matrix of direct coefficients.[12]

The sum of the effects of the price increase in electricity on the price increase in other industries was 11.42, if electricity price doubles. It was the largest among 13 sectors of the mining and manufacturing industries, with the second largest (7.46) being products of "other industry"[13]; the third, machinery and equipment (6.29); and the fourth, oil and gas (6.18).

Concerning the increase in natural monopoly prices, in 2013 the Russian government decided to restrict price increases in 2014. This suggests that the Russian

government regards the increase in state-regulated prices as having been one of the main causes of continuing inflation in Russia. A concrete plan was published in the forecast of social and economic development for Russia created by the Ministry of Economic Development on 23 October 2013 (Minekonomrazvitiya 2013b). According to this plan, in 2014 there would be no increase in the prices of natural gas and electricity for industrial users and freight transport fares by rail. For 2015–2016, the upper limit of their increases would be set to be the same as the increase in the CPI in the preceding year. As for those state-regulated prices for households, the upper limit of the increase in prices was set to a level lower than CPI increase by 30% for 2014–2016.

This measure is in sharp contrast with the situation in 2012 and 2013, when annual indexation was 10–20%, except for freight transportation by rail (6–7%). Before this measure was adopted, price indexation in the range of 9–15 was planned for 2014–2016 for these commodities and services, except for freight transportation by rail (6–7%) (Minekonomrazvitiya 2013a). It should be noted that if price increases in natural monopoly sectors are restricted, then the price distortion or price subsidies will remain in the future. There is a dilemma between inflation and price distortion in Russia.

There were some effects of this measure on inflation in 2014. The purchasers' price of natural gas increased by only 0.6% and that of electricity decreased by 2.1%. As for gas, this was the lowest figure since 2000; the second lowest was 11.5% in 2010. With respect to electricity, a decrease was recorded only twice: –0.6% in 2007 and –0.8% in 2010. However, new factors of inflation, import restriction and depreciation of the ruble, overwhelmed this effect in 2014. In 2015, the purchasers' price of gas and electricity increased by 11.6 and 4.1%, respectively. The Russian economic authorities intend to restrict increase in state-regulated prices in the sphere of natural monopoly in the near future as well. According to the economic forecast for the period 2016–2018 by the Ministry of Economic Development, in 2016, purchasers' price increases in gas and electricity will be 2 and 7.5%, respectively (Minekonomrazvitiya 2015, 76–80). It should be noted that on 21 July 2015, the Federal Service on Tariffs was abolished and the function of control of state-regulated prices was transferred to the Federal Anti-Monopoly Service (see Presidential Decree No. 373 on 21 July 2015 and Government Resolution No. 941 on 4 September 2015). This may reflect the dissatisfaction of the Putin administration with the situation concerning inflation.

Import prices or exchange rate

It can be argued here that it would be more fitting to analyze the relationship between price indexes and exchange rates rather than the relationship between price indexes and import prices. Since Russia's foreign trade statistics have been recorded in dollars, the Federal Customs Service (FCS) of Russia has released only a price index in dollars. In Table 4, we calculate import price indexes in rubles from

Table 4. Correlation coefficients between price indexes and factors of inflation related to imports in Russia, 2000–2015.

	2000–2007			2008–2015			2000–2015		
	Import prices in rubles	Import prices in dollars	Depreciation of ruble against dollar	Import prices in rubles	Import prices in dollars	Depreciation of ruble against dollar	Import prices in rubles	Import prices in dollars	Depreciation of ruble against dollar
CPI	−0.420	−0.818	0.767	0.497	−0.202	0.511	−0.152	−0.512	0.255
Food	−0.311	−0.579	0.544	0.434	−0.078	0.395	0.120	−0.293	0.328
Non-food	−0.471	−0.866	0.811	0.434	−0.552	0.670	−0.118	−0.712	0.392
Service	−0.396	−0.854	0.766	0.492	0.006	0.366	−0.432	−0.455	−0.024

Sources: compiled by author from websites of Rosstat and CBR; FCS, various issues.

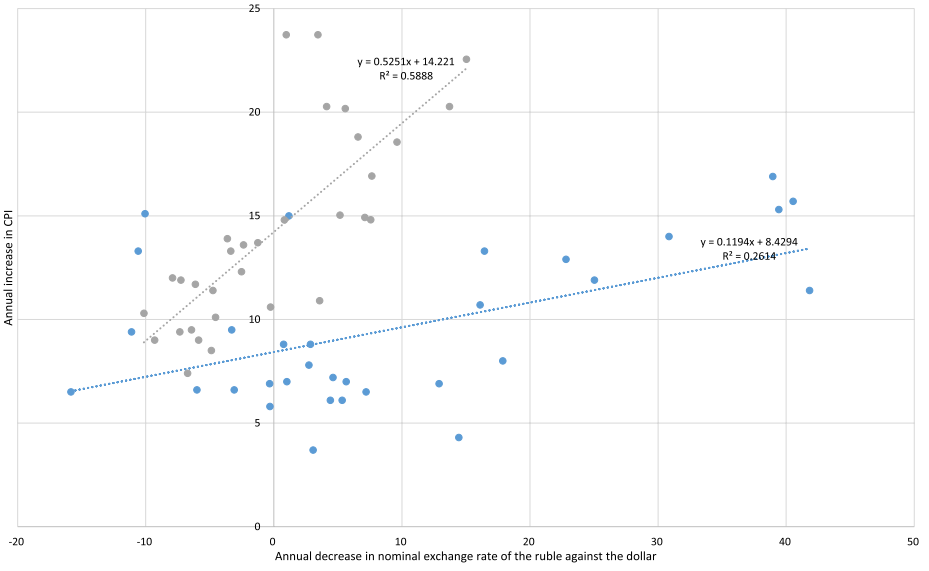

Figure 9. Correlation of increase in CPI and decrease in nominal exchange rate of the ruble in Russia, quarterly data in 2000–2015. Source: Compiled by author from Rosstat's and CBR's websites.

those in dollars, obtained from the FCS (various issues), and indexes of exchange rate (depreciation rate) of the ruble against the dollar in nominal terms, released by the CBR, which show depreciation of the ruble against the dollar.[14] We find that there is some correlation between the CPI and depreciation of the ruble, although there is no correlation between the CPI and import price indexes in rubles in the period 2000–2015 as a whole (Table 4). The correlation between the CPI and ruble exchange rate becomes stronger if we calculate it separately in the periods 2000–2007 and 2008–2015, where it is 0.767 and 0.511, respectively. This seems to suggest that there occurred a certain change in the relationship between the CPI and the exchange rate around 2008 (Figure 9). In fact, fluctuation in the

exchange rate in the latter period was much greater than that in the former period (the standard deviation is 15.70 and 6.71, respectively). It should be noted that the non-food measure has a stronger correlation with depreciation of the ruble than food and services (Table 4).

The reason that there was no correlation between the CPI and import prices in rubles is explained by the fact that there is a strong negative correlation between import prices in dollars and depreciation of the ruble (the correlation coefficient is −0.618 in the period 2000–2015).[15] Remember that indexes of import prices in rubles are calculated from these two indexes. This negative correlation seems logical, since a decrease in import prices in dollars occurred when the world economy turned to recession, which caused depreciation of the ruble in most cases, especially after 2008.

The strong negative correlation between the CPI and import prices in dollars in 2000–2007 can be explained by the existence of this negative correlation between import prices in dollars and depreciation of the ruble. In other words, it is the exchange rate of the ruble, which has some relationship with inflation, not import prices in dollars, since there appears no logical explanation for the existence of the negative correlation between CPI and import prices in dollars.

This observation seems to suggest that it is the profit of trading companies, not the cost of imported goods, that has some connection with the inflation process in Russia. Trading companies or importers may increase the price of imported goods if they foresee depreciation of the ruble, even though actual prices of imported goods denominated in dollars have not increased so greatly. It should be recalled that Russians have reacted too sensitively to the drop in oil prices. It was true of the exchange market as well. Exchange rates of the ruble in real terms have corresponded to the dynamics of oil prices in the world market (Figure 10). The correlation coefficient between the exchange rate of the ruble and oil prices is 0.948.[16] Interestingly, in 2015, while the surplus of the current balance increased and deficit of private capital accounts (i.e. net outflow of capital) decreased, the annual average exchange rate of the ruble declined significantly compared with the previous year. This may be explained by the psychological effects on the Russian people of a considerable drop in oil prices.

Concluding remarks

Findings or observations in this paper are summarized as follows. First, factors of inflation have changed substantially during the period 2000–2015. In particular, around 2008, there seemed to be a fundamental change that was related not only to the growth model, but also the inflation process in Russia.

Second, since the fourth quarter of 2014, two inflation factors, money supply and wages, have ceased to have some relevance to inflation. In this period, inflation proceeded in spite of small increases in money supply and wages. In addition, there were some restrictions on the increase in state-regulated prices of natural

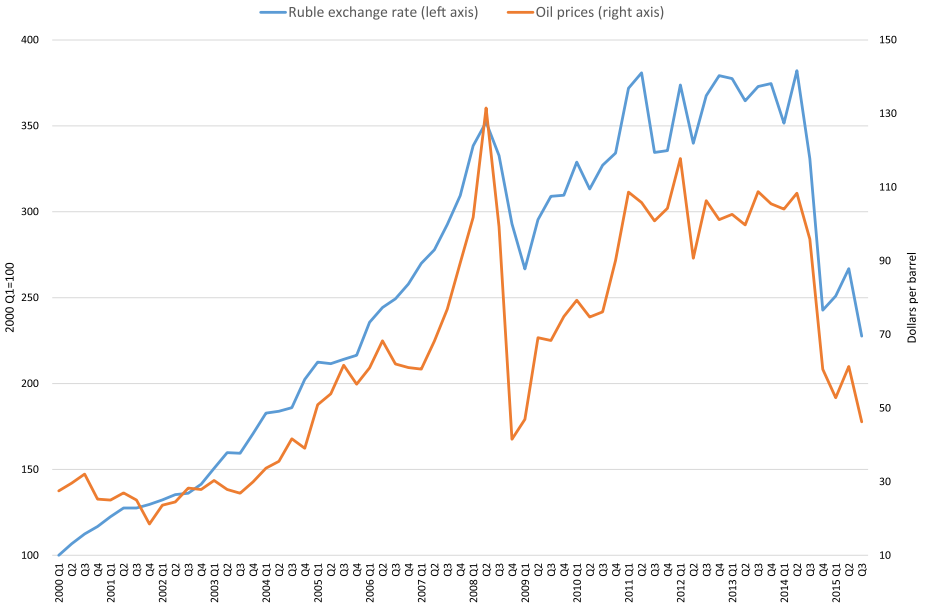

Figure 10. Ruble exchange rate against the dollar in real terms and oil prices, 2000–2015. Source: Compiled by author from websites of CBR, Rosstat and IMF.
Note: Oil price is the average petroleum spot price released by IMF.

gas and electricity. Consequently, it should be regarded that in this period, the exchange rate of the ruble had an overwhelming impact on inflation. It should be noted that there were some influences of counter-sanctions imposed by Russia from August 2014 (i.e. a ban on imports of agricultural products and foods from the US and the EU, among others). As noted by Connolly (2016, 13), it is difficult to separate the impact of the food embargo from the ruble depreciation. Minekonomrazvitiya (2015, 72) suggested that the effect of the depreciation of the ruble, counter-sanctions, and other factors on the increase in CPI in 2015 was 71, 12, and 17%, respectively.

Finally, in spite of the change in factors that contribute to increases in prices, continuation of high inflation in Russia seems to suggest that we should take into consideration institutional factors. Consider the behavior of enterprises, especially large enterprises that are able to pass the rise in costs onto product prices. Generally, the Russian economy is characterized as having a monopolistic structure, which promotes this kind of activity by large firms. They were probably more easily able to raise their product prices, when wages, prices of gas, and electricity, and the exchange rate of the dollar rose, compared with companies in other countries where the market mechanism functions more properly.[17] This observation seems to suggest that even though depreciation of the ruble will stop in the near future, Russia will still have difficulty in bringing the inflation rate down to below 5%.

Notes

1. The Federal State Statistics Service of Russia (Rosstat) only recently began to publish monthly and annual average price indexes. Previously, they published only price indexes at the end of the month and year in comparison with the end of the previous month and year. Even now, they attach more importance to end-to-end indexes than average indexes, since price registration or monitoring is performed only at the end of the month and year. Taking into consideration this circumstance, in this paper, price index data of Russia are end-to-end data, unless otherwise stated.
2. *Strategiya-2020* (2013) was drafted and published as a result of expert works under the leadership of Vladimir Mau and Yaloslav Kuzminov for the discussion of socioeconomic strategy until 2020 by the request of Vladimir Putin.
3. Because data on the structure of the consumer basket have been available since 2006, data on the consumer basket structure for 2006 were used for the calculation of contributions until 2005 in Figure 2 and Table 1.
4. These prices are purchasers' prices for industrial organizations published by Rosstat, and they include value added taxes (VAT), excises, transportation, marketing, and intermediary costs, in addition to production prices (*Tseny v Rossii* 2010, 201).
5. This idea was suggested by Yulia Vymyatnina and Shigeki Ono.
6. Marshallian k is 205.7 for China, 178.7 for Japan (in 2014), 98.5 for Euro area, 69.1 for USA, 64.5 for Saudi Arabia, 58.7 for South Africa (in 2014), and 38.7 for Brazil in 2015 (Calculated from *International Financial Statistics,* provided by IMF).
7. This method of analysis was employed by Konno (2011).
8. At the beginning of 2008, the Stabilization Fund was transformed into the Reserve Fund and the National Welfare Fund.
9. Data on export prices are from the website of the CBR (http://www.cbr.ru). Export prices include export duties, but their rate has been "only" 30% since 2004. This means that even under the regulated and low purchasers' prices, Gazprom has enjoyed a good profit.
10. Previously, Government Resolution No. 1021 dated 29 December 2000, approved basic regulation for the state control of gas prices, which illustrates the principle of appropriate costs and profits.
11. In addition, the 2003 table was not so disintegrated: data on oil and gas were integrated (*Sistema* 2006).
12. See Kaneko (1976, 151–152). Data on the Leontief inverse matrix (b_{ij}) were published in *Sistema* (2006, 112–114).
13. It is difficult to understand why the effect of "other industry" was so large. This was due to the large input of products of this industry into production of "other kind of activity." "Other industry" includes microbiology, mixed fodder, printing, etc. and "other kind of activity" includes information calculation, editing and publishing, guard service, etc. (*Sistema* 2006, 50–55, 115–116).
14. Import price indexes for the first quarter of 2000 and for the third quarter of 2010 were not published by the FCS.
15. The correlation coefficient is −0.824 in 2000–2007 and −0.761 in 2008–2015.
16. This correlation is fully analyzed in Kuboniwa (2012, 135–136).
17. *Strategiya-2020* (2013, 39, 149) also discussed the importance of institutional measures for reducing the inflation rate, including demonopolization of the economy and fostering of competition in the domestic market. Kudrin and Gurvich (2015, 19) pointed out the weakness of the market mechanism as one of the fundamental deficiencies of the Russian economy.

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