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Cyclical Mechanisms in the US and Russia: Why are they different?

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Abstract

This paper demonstrates that cyclical movements of major industrial market groups (durable and nondurable consumer products, equipment, materials and supplies) have important peculiarities in Russia and in the US. It allows a better understanding of business cycles in national economies determined with their specific structural features. Based on a statistical analysis of monthly indexes of industrial output (for Russia the relevant indexes were specially calculated by the author), one can conclude that in Russia the dynamics of industrial output do not dependent so much on demand but rather on supply of products. This is explained through both weak diversification of the Russian economy as well as its high degree of monopolization and exceptional role of imports in consumer and investment expenditures.

1.   Introduction

Business cycle issues have been studied for more than a century and not without great results. Ideas and methods of Arthur Burns and Wesley Mitchell were especially fruitful as they show a way to analyse business cycles systematically. Since then, hundreds and thousands of theoretical and empirical studies have been carried out. However, the last Great Recession put all economists into the necessity to even think more carefully about business cycles, their causes, mechanisms, and inevitabilities. In particular, it became clear that an economy is subject to some kind of "mutations". After several decades an economy is not the same anymore (perhaps it has "matured"), but in some sense is a different one: interrelations of various sectors, aggregates and agents have changed. That is why currently economists do not know exactly whether, or to what extent, past scientific results are relevant for the present and future. Scientists are familiar with problems and questions, they wield formidable methods and instruments but they do not know all the answers including those they have acquired not so long ago. The only thing they can do – is to examine business cycles, their patterns and mechanisms once more (and hardly for the last time).

One of the main areas of empirical business cycles analyses is the study of cyclical fluctuations of various macroeconomic time-series. This tradition has begun by [Burns and Mitchell, 1946] and then continued in a great number of studies for the US ([Stock and Watson, 1998], [Stock and Watson, 2002], [Zarnowitz, 1973], [Zarnowitz and Braun, 1991], [McConnell and Perez-Quiros, 2000] (to name the most well-known) and for various other countries (for example, [Ellery et al, 2002] for Brazil; [Urasawa, 2008] for Japan; and many others; one can find an extensive bibliography on the issue in [Marcellino, 2006]).

At the same time, we have almost no information concerning Russian economic cycles. In the Communist's era there was a politician decision that cyclical fluctuations of the Soviet economy are "not possible" and economists had no choice but to submit to this. However, twenty years after the collapse of the planned economy (what other proof of inevitability of cyclical drops is needed?) we still know very little on the subject. Certainly, there is a great need to fill this gap.

This paper starts with comparison of Russian and US fluctuations of industrial output. We show that in the US various sectors of industry do not fluctuate synchronically during a business cycle but rather with some lags and leads relative to the all-economy cycle. We expect these leads and lags to be dependent on specific demand for different types of industrial goods. Hence, we test this idea using data for industrial output by major market groups (materials and suppliers, equipment, durable and nondurable consumer goods) which definitely differ in their demand peculiarities.

The next section describes the sources for US and Russian statistical data for industrial production (whilst FRB's indexes for US are well known, industrial time-series for Russia have been calculated by the author). Then, the main descriptive statistics of growth rates by major market groups and some results from correlation analyses are presented – separately for US and Russia. In Section 4 they are compared and discussed, whereas the final conclusions are contained in the last section.

2.   Data

2.1   US industry

US statistics for industrial production allow distinguishing the following market groups:

a) materials and nonindustrial supplies, or shortly MT hereafter (sum of B53000 and B54000 time series weighted by their value added);

b) equipment, EQ (B52000);

c) durable consumer goods, CD (B51100)

d) nondurable consumer goods, CN (B51200)

Using original (non-seasonally adjusted) monthly indexes for all of the mentioned market groups as well as for the industry as a whole we have calculated monthly year-over-year (Y-o-Y) growth rates for January 1948–August 2009. Then we compare the trajectory of those rates with peaks and troughs dated by the NBER (these are plotted on Figure 1).

One may observe that during all post-war recessions (of which there were 11) the Y-o-Y % changes of industrial production were negative and the last recession was accompanied by a severe fall of output.[1] Furthermore, moments where the annual % change of total industrial output, while negative, started to increase, in most cases were either identical to the last recessionary month as classified by the NBER, or only differed from that by no more than one month.

In any case, it is evident that the fluctuations of industrial output are closely related to phases of the overall economic cycle. Therefore, one may confidently use annual % change of total industrial production as a reference series to investigate movements of different market groups across business cycles.

Figure 1   US: Industrial Production Growth Rates, Total Industry (January 1948 – August 2009)
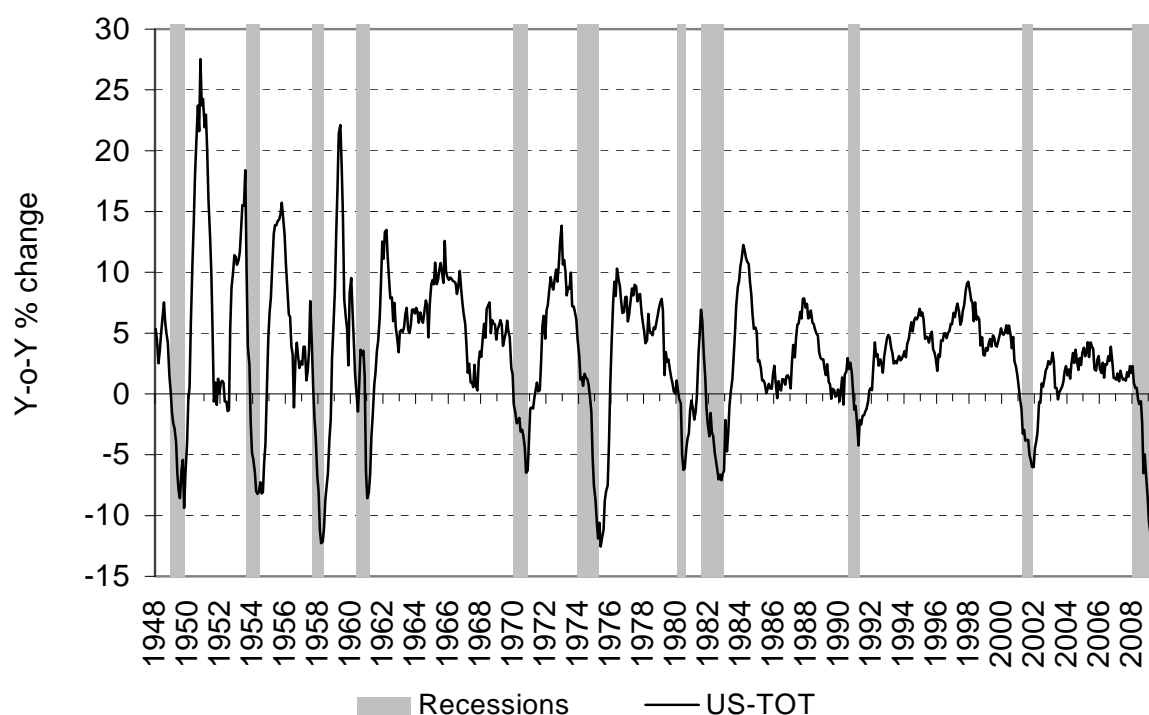
Source: FRB

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[1] Periods in which industrial output fell (in a year-over-year comparison) while the NBER did not classify the US economy being in recession are very rare. The only important case is the industrial stagnation during the Korean War from August 1951 till July 1952. The NBER did not classify this episode as a recession because GDP growth while declining remained positive.

2.2   Russian Industry

Official data on physical output of various industrial products have begun to be aggregated by Rosstat (Russian Statistical Office) into the total index of industrial production only in 1992. Unfortunately there are no separate indexes for major market groups until now. That is why we have calculated those indexes ourselves using Rosstat's monthly data for physical output of 108 industrial goods since January 1981.The distribution of these goods by market groups is shown in Table 1. The dynamics of the base index (1989 = 100) for the total industry is plotted on Figure 2. Careful inspection of the index confirms its interpretability and reliability (see [Smirnov, 2010] for details). Hence, we use this index as well as the indexes for materials and suppliers, equipment, durable and nondurable consumer goods in this paper.

Table 1   Russian indexes of industrial production by markets groups

Markets groups	Code	Number of goods in a group	Weights in total industry, %	
			By number of goods	By sales in 1989
Total Industry	TOT	108	100,0	100,0
Materials and supplies	MT	46	42,6	70,3
Equipment	EQ	25	23,1	7,4
Consumer durables	CD	13	12,0	4,0
Consumer nondurables	CN	24	22,2	18,3

Source: Rosstat. Author's calculations

Figure 2   Russia: Industrial Production Growth Rates, Total Industry (January 1982 – June 2009)
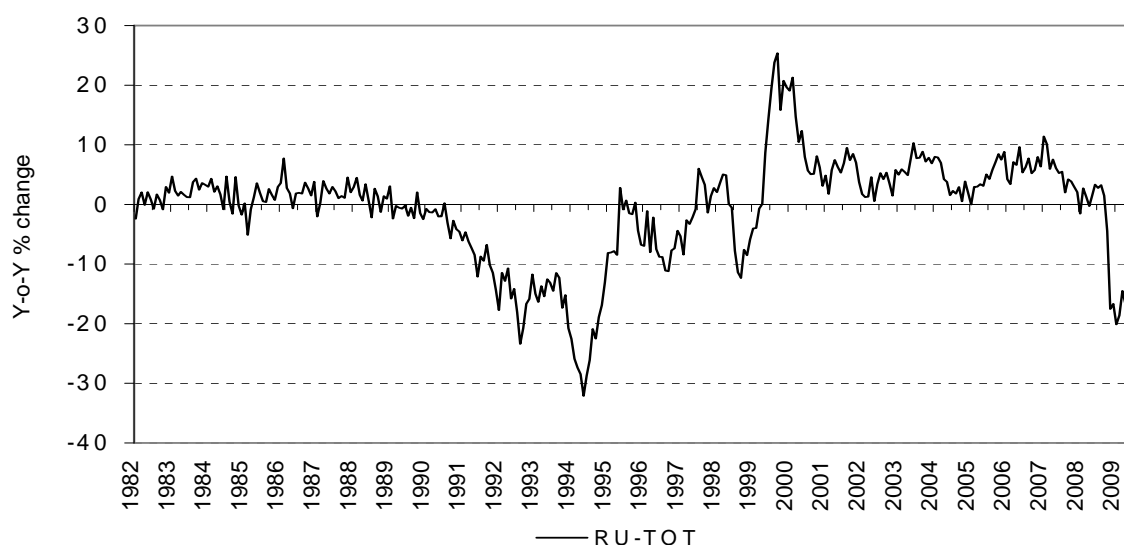
Source: Rosstat. Author's calculations

3.   Results

3.1   Results for US

Some descriptive statistics for US industrial growth rates by market groups are shown in Table 2.

Table 2   US Industrial Production, Y-o-Y % changes (January 1948 – August 2009)

Market Groups	Code	Average	Standard deviation	Minimum	Maximum	Max – Min
Total Industry	TOT	3.2	5.9	-13.6	27.5	41.2
Materials and supplies	MT	3.3	7.1	-16.1	38.8	54.8
Equipment	EQ	4.6	9.2	-18.7	46.8	65.5
Consumer durables	CD	3.7	11.4	-35.3	45.9	81.1
Consumer nondurables	CN	2.6	2.8	-5.4	13.8	19.3

Source: FRB

The range of industrial annual growth is considerable: Year-over-year growth varies from +27.5% (in October 1950) to -13.6% (in April 2009). There is a certain tendency towards reduced volatility of industrial output. It was especially large up until the 1960's and has decreased considerably after the mid 1980's.

Dynamics of materials and suppliers (MT) output resembles the dynamics of the total industry (see Figure 3). This similarity can be explained by not only a considerable weight of materials and suppliers in the total industrial output (59%), but also by the specificity of demand for intermediate goods since these are produced in more or less 'technological' proportions to the gross industrial output. At the same time, figures from Table 2 show that fluctuations of materials and suppliers are somewhat more pronounced than those of the total industry: its peaks are slightly higher and its troughs somewhat lower. We expect that this results from the heightened sensitivity of this market group to exaggerated expectations (too high near peaks and too low near troughs). This may be the reason for excessive changes (positive or negative, respectively) of inventories which more definitely affect the changes of the output of materials and suppliers.

The main distinguishing feature of equipment production is even higher growth volatility and its lagging characteristic vis-à-vis the total industry. In our view it is tied to peculiarities of investment demands. During downturns it is quite common to seek to finish those projects which are close to be completed "at any cost" and on the other hand to reject new costly investment projects. The existence of decision-making lags often causes investments to still decline during the beginning of an expansion and to grow at the start of a recession.

The output of durable consumer goods is also considered to be highly volatile (even more so than the output of investment goods!). In some aspects household demand of such goods is similar to investment demand. For example, during the worsening of market condition, the acquisition of durable consumer goods can, without much trouble, be put aside for the time being. But from a point of view of cyclical dynamics, there are considerable peculiarities with respect to the demand of durable consumer goods. For instance, it does not lag the overall economic cycle, but rather leads it. The predecessoring qualities of consumer demand are well known in the context of the US economy as indicators on consumer expectations and sentiment are considered to be one of the most important

leading indicators. The output of durable consumer goods is, most likely, lagging in relation to the first signs of change in *demand*, but comparing with the overall industrial *output* it is likely to be slightly leading.

Figure 3   US: Industrial Production Growth Rates by Market Groups (January 1948 – August 2009)
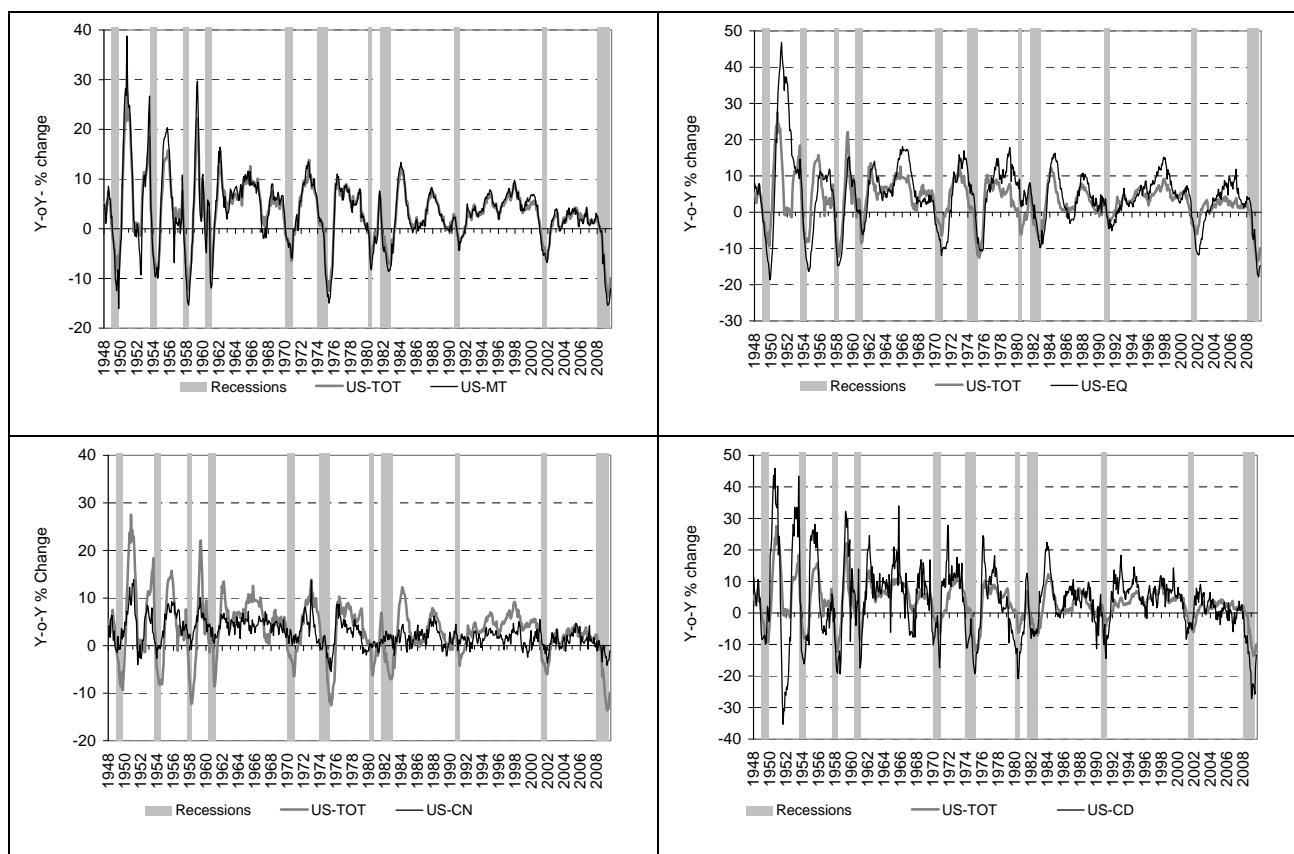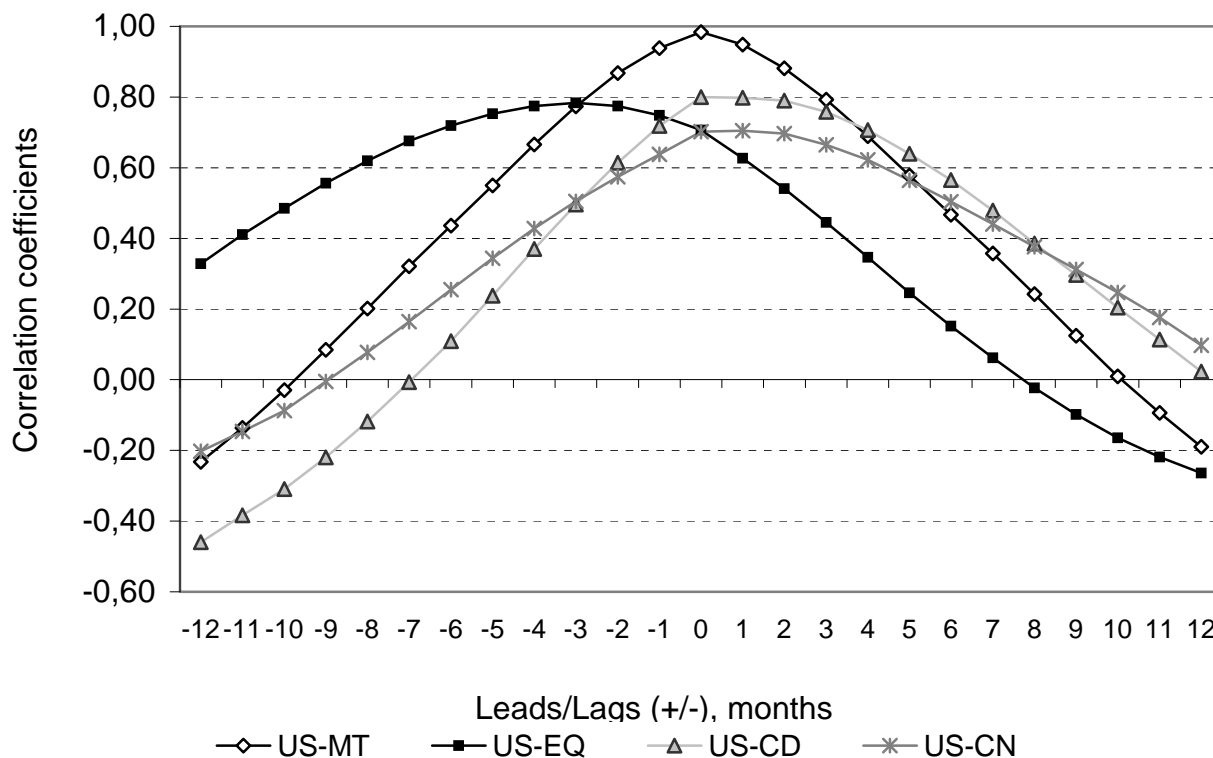

Source: FRB. See tables for the time-series codes

The output of nondurable consumer goods also leads industrial dynamics, but the most striking difference in this market group is its low volatility. The maximum growth rate of this group (+13.8%) was seen in February 1951, and the minimum (-5.4%) in May of 1975. Generalized volatility indicators (the difference between minimum and maximum or a standard deviation) here are approximately 2 times lower than for the total industry, or 4 times lower than for the durable consumer goods. Apparently, such low volatile rates are also defined by the peculiarities of demand: consumers are quite reluctant in lowering the levels of current consumption even during difficult economic periods but during the times of economic prosperity do not increase that amount considerably either.

The effects of leading and lagging can be studied more closely on the basis of pair correlations between the growth rates of the total industrial output and the growth rates of major market groups with different lags (see Figure 4). These calculations confirm our basic propositions based on descriptive statistics and visual analysis.

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Figure 4   USA: correlations between growth rates of total industry and market groups' indexes with various lags (January 1948-August 2009)

In particular, one can easily notice the synchronous nature of the growth rates for total industry and for materials and supplies. The coefficient of correlation between these indicators with zero lag equals 0.983, and it lowers monotonously in both directions with increasing lag size. The correlation coefficient for equipment reaches its maximum (0.783) with a 3 month lag. This means that production of investment goods is reacting to changes in economic conditions (either positive or negative) with a lag of around a quarter. We assume that this to a large extent is determined by a decision-making lag.

Also, there appears to be a moderate (1-2 months) lead of both durable and nondurable consumer goods. The maximum correlation coefficient for nondurable consumer goods (0.705) is reached with +1 lag ("plus" means leading, not lagging). This hardly differs from correlations for lags 0 (0.702) and +2 (0.697). The maximum correlation for durable consumer goods (0.800) is reached at lag 0 but differs just slightly from those for lags +1 (0.798) and +2 (0.790).

Special note should be taken of an effect of "delayed demand" for durable consumer goods. The coefficients of correlation between the growth rates of this market group and total industrial output decrease alongside the lags, becoming negative at lag -7. After this point they continue to increase (in absolute value) and, as opposed to the remaining market groups, become statistically significant at large lags, however with a negative sign. The maximum correlation (-0.482) is reached at lag -13 (13 month delay). This means that there exists an inverse relation between the current growth rate, and the rate around a year ago. In other words, if a year ago the sales of durable consumer goods were low due to a poor overall economic situation, it on average can now be expected to be stronger since

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the "old" demand for durable consumer items is still alive.[2] It is interesting to notice that the effect of "delayed demand" is not significant for equipment; old investment demand does not survive.

3.1   Results for Russia

Based on our indexes of industrial output for Russia we calculated year-over-year growth rates for Russian industry as a whole and for the four highlighted market groups from January 1982 through June 2009. The results are presented in Table 3 and Figure 5.

Table 3   Russian Industrial Production, Y-o-Y % changes (January 1982 – June 2009)

Market Groups	Code	Average	Standard deviation	Minimum	Maximum	Max – Min
Total Industry	TOT	-0.7	8.9	-20.1	25.4	57.5
Materials and supplies	MT	-0.8	8.4	-20.6	24.0	54.4
Equipment	EQ	-3.9	19.1	-67.4	43.7	117.1
Consumer durables	CD	0.1	17.0	-65.2	54.8	120.1
Consumer nondurables	CN	0.6	11.3	-8.6	45.5	74.2

Source: Rosstat. Author's calculations

Immediately, it becomes apparent that the majority of trends seen in the United States are not visible in the case of Russia. There appears to be only one common result: the growth rates for total industry and for materials and supplies are closely tied. But even here there are differences: the volatility of materials and supplies is not higher but lower than total industrial in Russia (although not by much).This could be explained by the export orientation of Russian manufacturers of materials and supplies (which is less relevant for USA)[3] or by the inability of Russian companies to manage their inventories.

There is no clear tendency towards a decrease in volatility of output in Russia. The 2008-2009 recession is comparable, in terms of annual decline, to the years of transition (although this transition period continued for eight years in a row!). On the other hand an annual increase of the main market groups by 30%-40% is not uncommon in Russia. This is especially true in the case of equipment as well as durable consumer goods.

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[2]   For example, if one had to defer the purchase of a new refrigerator during a recession, then this will be bought as soon as the recession has ended. As a result, an above average number of refrigerators will be purchased (and produced): those which would have been bought anyway, as well as those which, in the absence of a recession, would have been bought during the previous period.

[3]   This explanation "works" if the volatility of raw materials export is less than the volatility of raw materials production. We leave this topic for further research.

**Figure 5   Russia: Industrial Production Growth Rates by Market Groups (January 1982 – June 2009)**
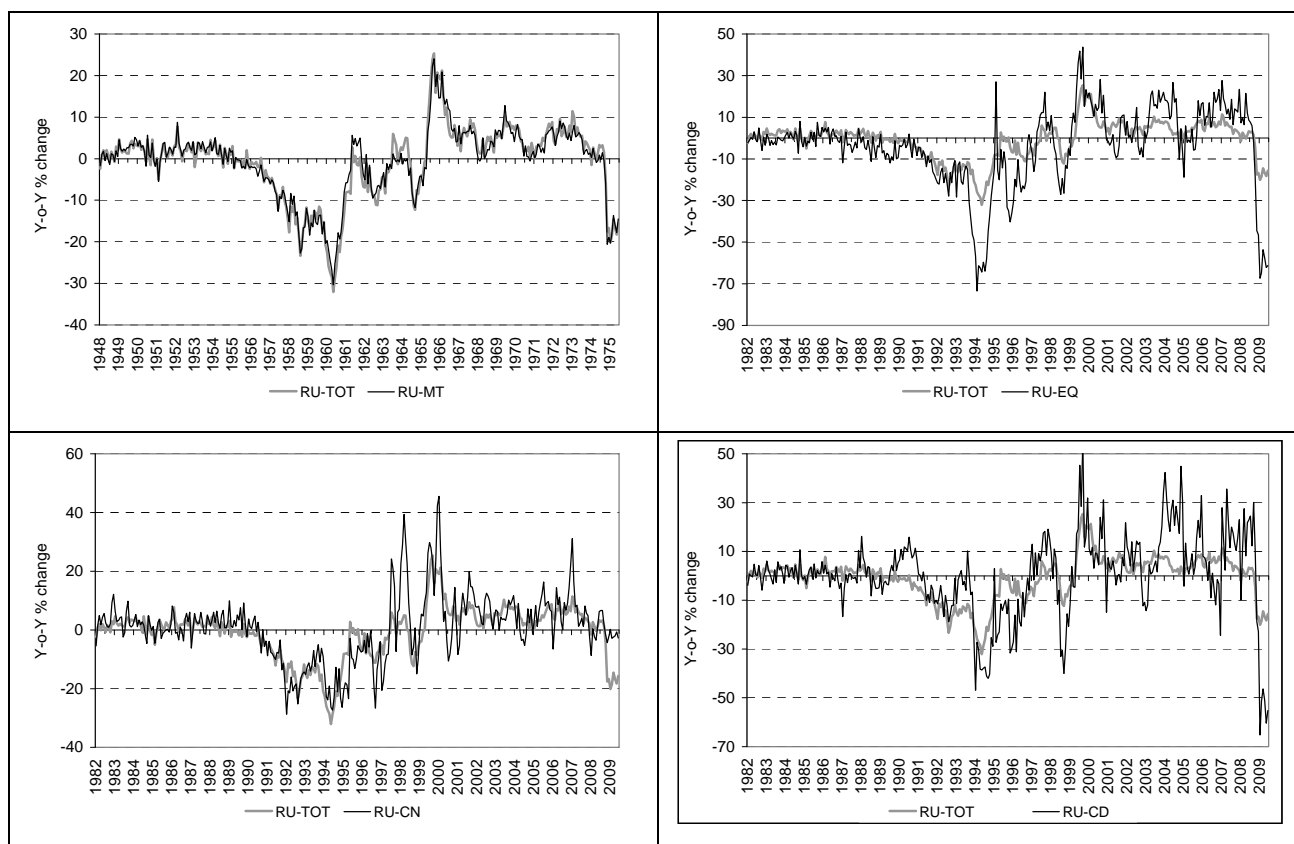
Source: Rosstat. Author's calculations. See tables for the time-series codes

In Russia, there seems to be no effects of leading and lagging of various market groups (see Figure 6). In particular, there are no lags connected with investment's decision-making process. There is neither a lead of durable consumer goods nor an effect of "delayed demand". It is also worth mentioning that the correlations between market groups and total industry for large leads and lags (more than six months) are much higher in Russia than in United States. Paradoxically, this means a more inert behaviour of companies and simultaneously more volatile dynamics of production in the Russian industry.

Finally, just like in United States, volatility of nondurable consumer goods is lower than volatility of equipment and durable consumer goods. However, it is much higher in Russia than the volatility of materials and supplies (and of the total industry). In fact, volatility of nondurable consumer goods was so high that it raised doubts whether the calculations might contain an arithmetic error. Recalculations did not show any such errors. It showed, however, that output of some nondurable consumer goods, year-on-year grew quite frequently by tens or even hundreds (!) of percent.

Figure 6   Russia: correlations between growth rates of total industry and market groups' indexes with various lags (January 1982-August 2009)
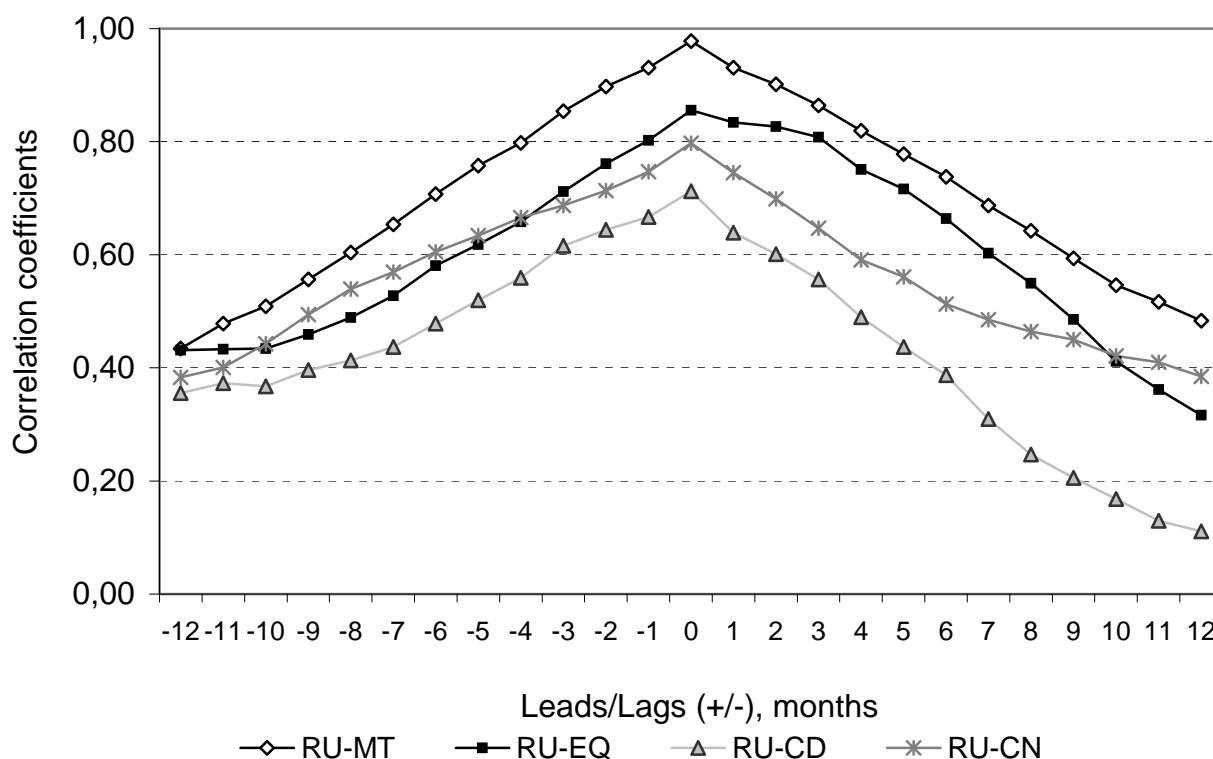
Source: Rosstat. Author's calculations. See tables for the time-series codes

For example, in January 2007 the aggregate index of nondurable consumer goods rose by 31% (year-on-year). Looking at the disaggregate data, the output of wines was 25 times higher than in January 2006, while the output of vodka was 260 times higher. Is it plausible that the demand for these goods rose by just as much? Of course not. The year before, the government attempted to implement an automated system for counting the production of alcoholic beverages. Due to its flaws, however, it paralyzed legal production of alcohol establishments. Consequently, the following year's growth rates were colossal. As another example, in the same January 2007, output of sugar tripled on year-over-year basis. This could have been related to the diminishing demand for sugar by vineries in January 2006. However, that is not the explanation. At the beginning of 2006 there were no reductions in demand on sugar. In reality there was a deficit of sugar (this is evident from the fast rising of sugar prices during that period). Moreover, this deficit was world-wide in its nature and was caused by diminishing supplies from Brazil and Thailand.[4]

4.   Discussion

Let us summarise the results of our analysis of cyclical movements in the US and Russia.

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[4]   One additional factor for Russia was a reduction of sugar export from the Ukraine during that period. It was just before elections in the Ukraine and the authorities of the country were afraid to create a domestic deficit of this highly popular product.

The US economy largely depends on the specificity of demand. Due to the fact that households try to uphold a regular volume of consumption, the output of nondurable consumer goods is not very volatile. The output of equipment and especially durable consumer goods fluctuates much more since, during the "hard times", their purchases can be carried over to later periods (note that the effect of a "delayed demand" for durable consumer goods exists, while investment decisions start from scratch, without regard for the fact that earlier projects were suspended). Materials and supplies are practically synchronous with the total industry in the United States (which is natural, since the output of intermediate products is to a large extent defined by the dynamics of the final product) but are more volatile since the changes in production consumption are exasperated by the changes in inventories. Finally, the output of consumer products leads the total industrial cycle by 1-2 months (due to sensitivity of American consumers towards changes of economic situation) and the output of investment goods, by contrast, is lagging by approximately 3 months (most likely due to an existence of lags in making investment decisions).

Within the Russian industry, almost none of these cyclical trends are found. Does this mean that Russian economy is not dependent from the business cycle forces?

In order to answer this question we first need to say a few words about a planned economy and its relation to business cycles (around one third of Russian industrial output series falls onto a period of agonizing Soviet economy of the 1980's). Many Russian economists (and not only with soviet background!) still believe that there are no cycles inside planned economies. Even though it is impossible to delve here into this issue, we will note that the thesis about lack of crises and nonexistent cyclical tendencies of planned economies has long been disproved (see for example [Ickes, 1986] for a survey of literature). It gives us reason to use Russian statistics for 1980's, not to ignore it.

It is also important to relate cyclical concepts with Russian transition period, which has defined the dynamics of Russian economy in the first half of 1990's. This recession is often referred to as a unique phenomenon, connected to the disintegration of the entire economic system, and therefore having nothing to do with business cycle developments. From our point of view, this thesis is based on an old misunderstanding, which confuses cyclicity with periodicity of an economic dynamics. In such paradigm, we can talk about economic cycles only if crises appear with more or less constant repetition (for instance every 10 years).[5] We have to state, however, that during the span of several decades of empirical studies, there has been no firm affirmation of such assertions. In reality, as a result of the academic research initiated by the Great Depression of the 1930's, cyclicity and periodicity are understood as evidently different concepts. One may remember the classical definition of a cycle in this context:

> "Business cycles are a type of fluctuation found in the aggregate economic activity of nations that organize their work mainly in business enterprises: a cycle consists of expansions occurring at about the same time in many economic activities, followed by similarly general recessions, contractions, and revivals which merge into the expansion phase of the next cycle; this sequence of changes is recurrent but not periodic; in duration business cycles vary from more than one year to ten or twelve years; they are not divisible into shorter cycles of similar character with amplitudes approximating their own." [Burns and Mitchell, 1946, p.3]

According to these views, economic cycles are formed by a continuous change of non-periodic recessions and expansions, each of which has its own dominating driver and is interrupted by different kinds of positive or negative shocks (wars, sudden leaps of prices or currencies, new technologies, decisions of monetary authorities, etc.). From this point of view (which we find theoretically plausible

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[5] One may also suppose that real economic dynamics is formed as a result of interference between several strictly periodical processes with various wave-lengths (each of these processes is caused by some periodical factor, such as: renewal of fixed capital, technological innovations etc.).

and empirically productive) the transitional recession in Russia is to be seen as one of the prolonged phases of an economic cycle. Cyclical mechanisms analogous to the American ones obviously could work throughout this recession. But they didn't!

We also made additional calculations for Russian and American data for 1997-2009 period (i.e. for the years when the transitional effects, planning specificity aside, have failed). This resulted in basically the same results: in the United States the effects of leads and lags do exist, in Russia, however, they are still absent.[6] Output of all types of goods fluctuate in a more or less synchronous fashion and without effects of advance and delays. The output of nondurable consumer goods is not the least volatile but rather materials and supplies, which can be most likely explained by export orientation of Russia's sector of raw goods. The events related to individual companies or narrow segments of the economy, often play an important, "macroeconomic" role.[7]

5.   Conclusion

All these facts lead us to believe that in Russia, as opposed to US, dynamics of industrial market groups' output is dictated not so much by the movement of demand, but rather by fluctuations in supply. We think that to a large degree this is connected to a high concentration of production left over to Russia from the Soviet era. Another convincing factor is tied to a low financial firmness of the majority of Russian companies; during an expansion, almost all of them flourish, while during a recession they crumble at almost the same moment. The third and likely most important factor is that a considerable part of internal consumption in Russia (and not in US) is met by imports. It is likely that movements of imported goods (and not goods produced in Russia) show all tendencies revealed in US, but this issue is outside the scope of this paper.

Even though both Russian and American economies are subject to general laws of cyclical development (alterations between phases of rises and falls, or of fast and slow growth) the mechanisms of realization of these laws definitely differ. These differences are determined, among other things, by structural peculiarities of the two economies. The specifics cyclical processes in various national economies should receive much more attention in practice as well as in theory. Our future understanding of business cycles should be based on the results of such research.

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[6]   The main difference within the US, however, is the absence of the effect of delayed demand of durable consumer goods. Most likely, this has to do with the fact that the latter part of 1990's and the beginning of 2000's turned out to be very stable years and almost no one had to tighten their budget spending on nondurables.

[7]   Such was the case after the fire on the large Turkish owned TV factory in November 2005.

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