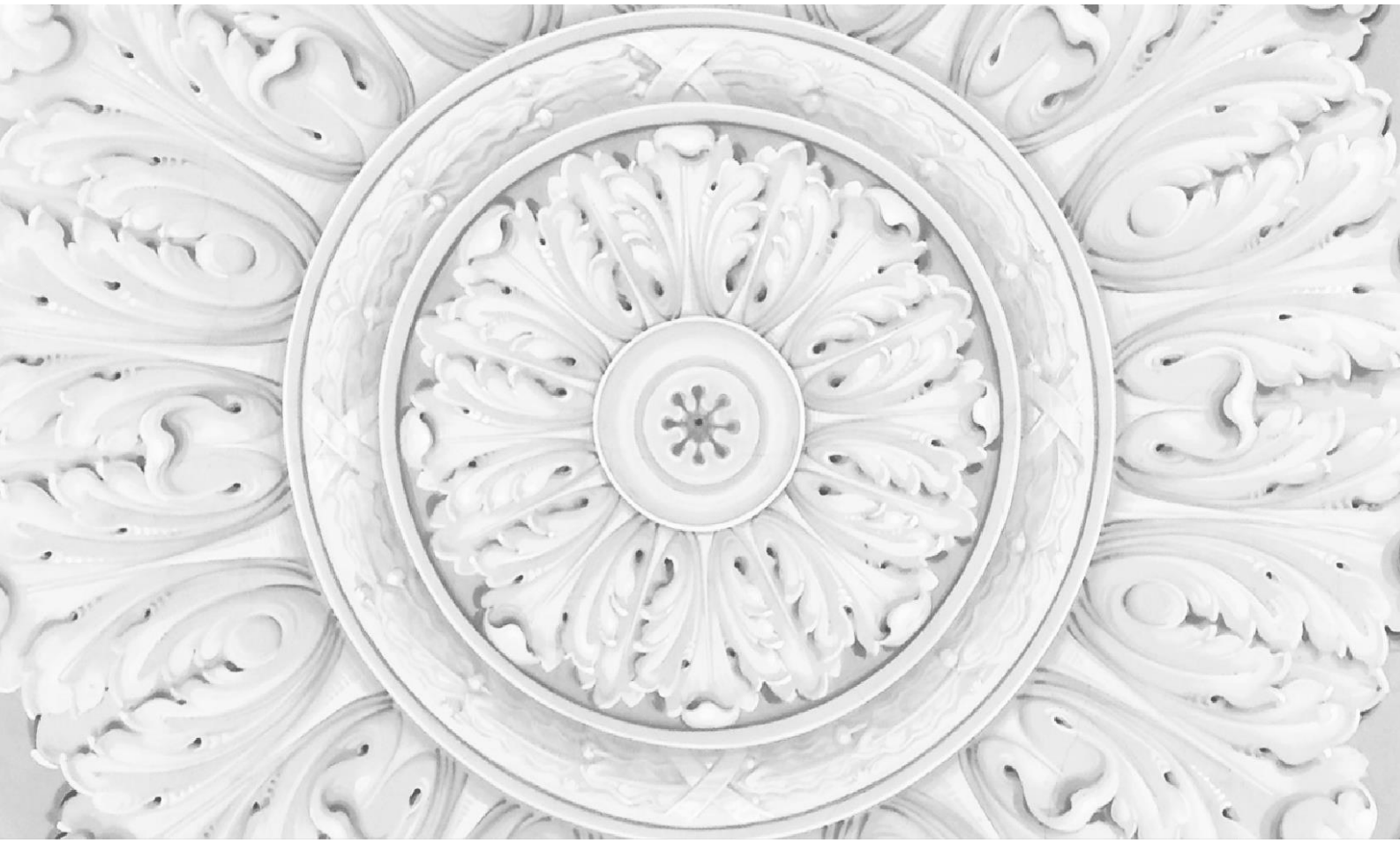
Bank of Russia
The Central Bank of the Russian Federation



TALKING TRENDS

Macroeconomics and markets

February 2018

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The views expressed in the Bulletin are solely those of the authors and do not necessarily reflect the official position of the Bank of Russia.

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CONTENTS

Executive summary

1. Monthly summary

- Inflation for the December 2017 to January 2018 period was again at fresh historical lows. Inflation anchoring at low rates is ongoing, assisted, among other things, by temporary factors. Short-term inflationary risks are down. Annual inflation is expected to move below 4% in 2018 and keep close to this reading throughout 2019. Economic expansion continues, gaining traction on a slow but sustainable growth path. The late 2017 slowdown was limited to several industries; in all probability, it was driven by one-off factors likely to remain impactful in early 2018. The current balance of risks enables a speedier shift from the current moderately tight to neutral monetary policy - which may be complete before the end of this year.
    - 2017 inflation was 2.5%; in January 2018, it declined to 2.2%. The January decline in inflation was mainly triggered by the performance of food prices, primarily in fruit and vegetables, coming as a result of advances in greenhouse farming. This structural shift in the food market is a key factor to consider in analyses of inflation processes. The slowdown of inflation was also supported by the indexation of rates for passenger transportation services: the traditional January upgrade was lower than last year. However, signs emerged in early 2018 that inflation may be reversing course and trending upwards. Our estimates suggest that recent months have been seeing a slight acceleration in the low monthly consumer price growth across the steadiest product and service categories. Monetary indicators and inflation readings have yet to fully respond to the prior cuts in the Bank of Russia key rate. Among key mid-term inflation risks are possible drastic changes in consumer behaviour, accelerating growth in consumer lending, volatile and elevated inflation expectations and the state of the labour market. The Bank of Russia's policy fosters reduced inflation risks and the anchoring of inflation at a level close to 4% over the forecast horizon.
    - The economy in 2017 turned in moderate yet sustainable growth consistent with its potential. The uneven intra-quarter performance of economic growth in 2017 comes as a result of temporary factors. These factors will act as constraints on economic expansion in the early months of 2018. Nonetheless, the findings of periodic producer and household polls suggest that positive economic trends are likely to remain in 2018, and the economy will retain its solid prospects of continued growth close to its potential.
    - In early 2018, risks to the stability of Russian financial markets receded against the backdrop of a global rally in financial markets, gains in oil prices and a stronger ruble. The environment grew more challenging in early February, however, as an upsurge in volatility weighed on global markets. Nonetheless, given an increasingly resilient national economy, Russian markets were mainly unaffected.

2. Outlook

- 2018 PMI data suggest that January saw continued solid growth in business activity across major advanced economies.
- Financial analysts' median forecast suggests inflation anchored at 4%, with a downgrade in the Bank of Russia key rate as of end 2018, after the December rate cut - from 7.00% to 6.75 %.

3. In focus. Electric vehicles set to undermine global oil demand by mid-2020s

- Advances in the electric car industry along with rising fuel efficiency will determine oil consumption in motor transport.

1. Monthly summary

1.1. Inflation

Inflation in 2017 was recorded at 2.5%; in January 2018, it declined to 2.2% and touched a fresh all-time low. This was assisted by, among other things, temporary factors.

Short-term inflation risks are down. Inflation together with its stable components remains low against the BoR target. Having said that, signs have recently emerged that monthly core inflation is showing slow growth. In a reflection of prior monetary policy decisions, this trend, alongside the dying-out of temporary tailwinds, is expected to drive inflation close to 4% in the course of 2019.

Short-term inflation risks remain; they are also down however. Among key mid-term inflation risks are a possible switch to a consumer behaviour pattern, to the detriment of savings, elevated and volatile inflation expectations of both businesses and households, and a possible onset of skill shortages in the labour market.

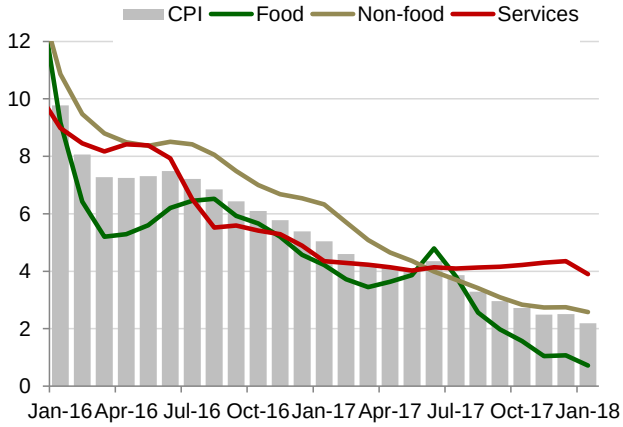
1.1.1. Annual inflation edged lower in January

- In January 2018, inflation declined to 2.19% and touched a fresh all-time low. Consumer prices were up 0.31% MoM in January, which our estimates show is a match to seasonally adjusted growth of 0.05% MoM.
- Prices on fruit and vegetables, mainly cucumbers and tomatoes, were a key factor behind the January decline in inflation, coming as a result of advances in greenhouses and the warm weather.
- The development of greenhouse farming is seen as an increasingly impactful structural driver influencing prices, helping push down intra-year seasonal fluctuations of fruit and vegetable prices. This factor is also responsible for the overall slowdown in food prices.
- According to inFOM, median estimates for observed and expected inflation have held at their all-time lows - in defiance of household inflation expectations which are above actual inflation and unanchored.
- The modified indicators of core inflation continued on a slow growth path in monthly terms, in a sign that inflationary pressure may be gradually rising from the previous low readings recorded.
- Annual inflation is set to remain below 4% in 2018 and keep close to this reading throughout 2019.

According to Rosstat, annual inflation in January was 2.19%, against 2.51% in December (Figure 1).

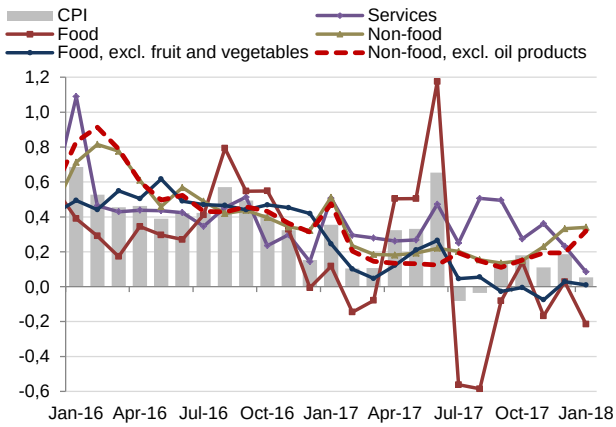
The growth of consumer prices in the food market slowed to 0.72% YoY on 1.07% YoY in December, in the main thanks to the performance of fruit and vegetable prices that edged lower 0.11% YoY in January, following 1.21% YoY growth in December. These data are explained by a decline in cucumber and tomato prices, unusual at this time of year (Figure 3).

Figure 1. Inflation and its components, % YoY



Sources: Rosstat, R&F Department calculations.

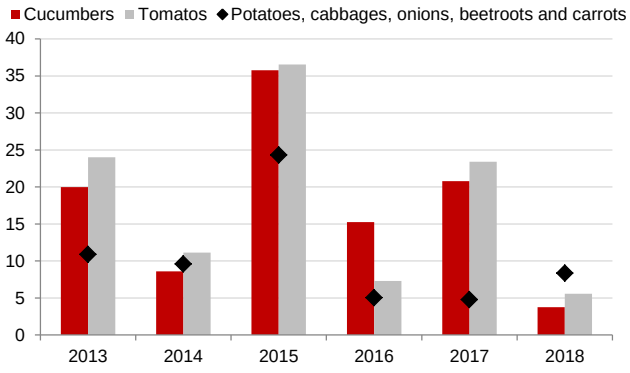
Figure 2. Seasonally adjusted price growth, % MoM



Sources: Rosstat, Bank of Russia estimates.

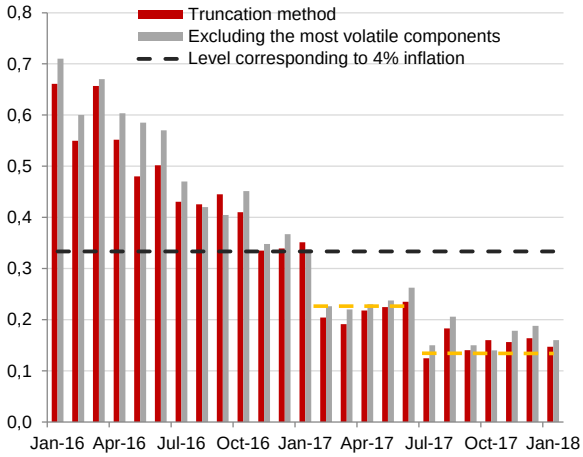
The development of greenhouses is a reason behind these developments. According to the Ministry of Agriculture, gross output of greenhouse vegetables was up 17% against 2016 and 34.2% against 2015. Greenhouse development is a key priority in agricultural policy. Imports of vegetables show a considerable contraction: they dropped from 2.4 million tonnes in 2014 to 1.1 million tonnes in 2016. Growing domestic output in cold seasons is set to mitigate seasonal price volatility. A booming growth of greenhouses, as long as it continues, is expected, on the one hand, to distort seasonally adjusted monthly price growth rates, inasmuch as statistical methods fail to promptly capture the drastic changes in seasonality that may be ongoing. On the other hand, it is certain to push intra-year seasonal price volatility downwards. The implication is, it is crucial to come up with an accurate estimate for the disinflationary effect from fruit and vegetable prices given the structural shift to the ‘new normalcy’ in the agricultural sector's prices. Once complete, the currently dynamic greenhouse construction is supposed to ramp up and align the performance of greenhouse fruit and vegetables with that of other food categories, other things being equal.

Figure 3. Price growth in January across several food products, % MoM



Sources: Rosstat, R&F Department calculations.

Figure 4. Modified indicators of core inflation*, % MoM



Sources: Rosstat, R&F Department calculations.

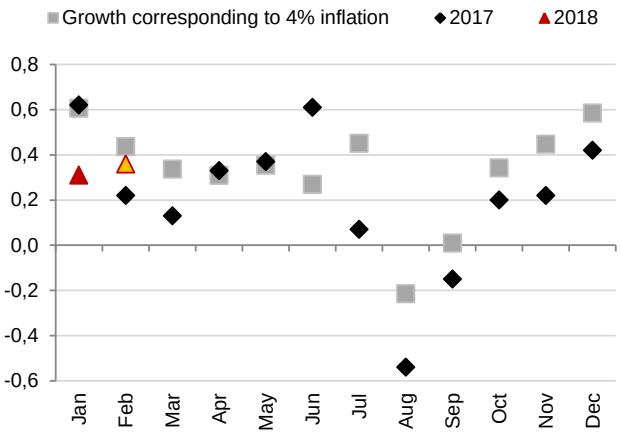
Food inflation remained fairly stable at 2.58% YoY in January against 2.75% YoY in December. Inflation in the service sector was 3.90% YoY, slowing down from 4.35% YoY in December. The slower annual growth of prices for services was supported by the indexation of rates for passenger transportation services, which was lower than last year. Our estimates show that based on the weights in the consumer basket, passenger transportation rates were up 1.3% on average, as of week one this year, relative to 9.3% as of week one last year.

On a monthly basis, consumer prices were up 0.31% MoM in January, which is estimated to be consistent with the seasonally adjusted growth of 0.05% MoM in January, against 0.19% MoM in December (Figure 2). Importantly, due to the above-mentioned structural factors related to trends in food prices, the estimates in question fail to be fully reflective of seasonality shown by consumer prices.

It should be noted that annualised seasonally adjusted rates of food price growth have held at 4% for a second month in a row. In December this was mainly the result of growth in oil product prices, tracking the price of crude. In January, estimated rates of non-food price growth (excluding oil products) hit 4%, on an annual basis, for the first time in the period since February 2017. This indicator suggests that inflationary pressure is strengthening in the non-food segment compared to late 2017. Meanwhile, food prices were mainly unchanged in December and edged lower by 0.21% MoM in January[1]. In the service sector, price growth rates slowed for a second month in a row, hitting 0.08% MoM in January.

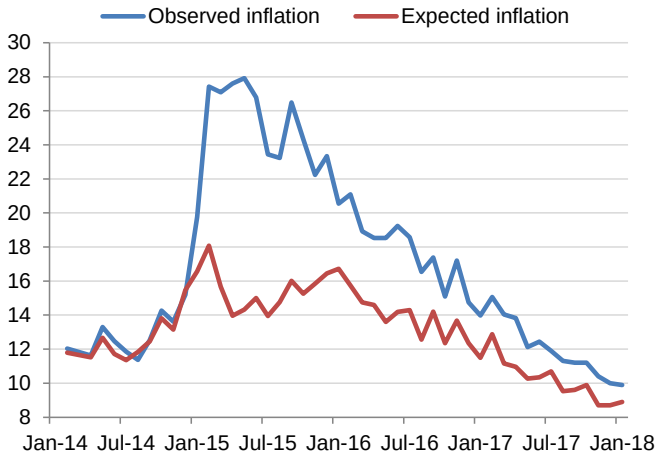
[1] Seasonally adjusted.

Figure 5. Price growth, % MoM seasonally adjusted



Sources: Rosstat, R&F Department calculations.
The February estimate is preliminary.

Figure 6. Household inflation expectations, %



Source: inFOM.

Inflationary pressure, albeit still below a level consistent with 4% inflation, stopped declining in recent months. The modified indicators of core inflation[2] continue to rise slowly (Figure 4), for more details of approaches to calculations see the Box *Methodology for calculating the modified indicators of core inflation)*. While September's core inflation growth rates were around 0.15% MoM, December saw them accelerate to as much as 0.17 – 0.19% MoM. On an annual basis, these readings are still much above the reporting January figure which stands slightly above the annual growth of overall CPI (2.2%). On a monthly basis, January's modified indicators of core inflation were again lower and moved close to 0.15 % MoM - which can, in our view, be mainly explained by a technical factor. Therefore, it is important to note that the modified indicators of core inflation are still influenced by temporary factors related to a stronger ruble and good crops (however, to a lesser degree than their impact on headline inflation). This implies that from the standpoint of the rate of inflation fully adjusted for the impact of temporary factors, the modified indicators of core inflation we have discussed are undervalued. Following a downward trend, however, seen in the first nine months of 2017, there came not only a stabilisation but a gradual reversal to growth, which is an important factor to consider in Bank of Russia monetary policy decisions.

Methodology for calculating the modified indicators of core inflation

Core inflation indicators are calculated based on the method of excluding the most volatile components and by the truncation method.

The exclusion-based method to calculate core inflation, when the most volatile components are stripped out, implies that volatility is measured through the standard deviation of monthly inflation in separate CPI components in a rolling two-year window. CPI

[2] For more details see: Implications of underlying inflation readings for Russia. 2015. No. 4. March.

components most often excluded from underlying inflation calculations, the index for Russia based on a Bank of Canada method, include the following products and services: eggs, sugar, fruit and vegetables, petrol, cheese, communications, and pasta and cereals. All these components were taken into account in underlying inflation calculations in less than 50% of cases.

Similar to the exclusion-based method, the truncation technique aims to cut off CPI price changes which may occur on the back of changing relative prices. The truncation method entails excluding extreme values from calculations each month. The components to be excluded change each month.

First, based on this approach, changes will occur in the composition of the basket to calculate core CPI. This leads to difficulties analysing the movements of the index. *Second,* the method is specific in that truncation is used not for volatilities (which is the case of the exclusion-based method), but for monthly inflation rates.

The key question this approach raises is which level of truncation to select and should this level be symmetrical. Based on the methodology outlined by *Meyer, Venkatu (2014)*, we proceeded to calculate the optimal level of truncation for Russia's data (before and after the period of crisis), which turned out to be practically symmetrical and totalled about 20%.

According to our estimates, exchange rate fluctuations are still a factor weighing on inflation paces; however, their impact is fading. Therefore, inflation stripped of exchange rate influences is estimated to stand at approximately 3.0% YoY.

Based on an inFOM consumer survey, January's median estimate of household inflation expectations for the next 12 months was virtually unchanged from the November to December period and totalled 8.9% (Figure 6). As before, most respondents (59%) expect steady price growth next year. The proportion of those expecting inflation to accelerate edged lower. The median estimate of observed inflation was virtually unchanged, holding at an all-time low.

The survey results continue to show a mismatch between responses to a direct question about the rate of inflation and the estimated growth in the cost of a fixed food basket, with significant influence of the wordings of the questions on responses. Observed inflation in excess of 50% was cited by a mere 2% of those polled, while the same growth in the cost of a 10,000-ruble fixed food basket was reported by 18% of respondents[3].

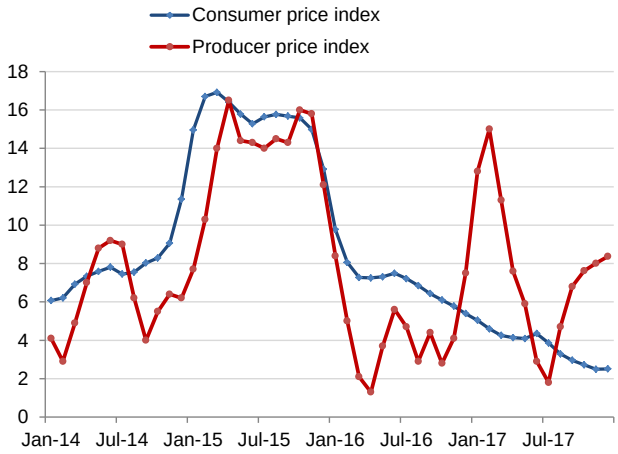
[3] Last month, the question was built on a 1,000-ruble basket, with the following effect for responses: as many as 45% of those polled claimed that the cost of the basket had grown by over 50%.

1.1.2. Acceleration in producer prices has yet to translate into consumer price movements

- In spite of the fact that annual growth rates of producer prices continue to exceed consumer inflation, consumer prices are so far unaffected by producer price pressures.
- Nevertheless, accelerated price growth across most industries is set to lead to increased costs and price pressures on producers of consumer goods in time.

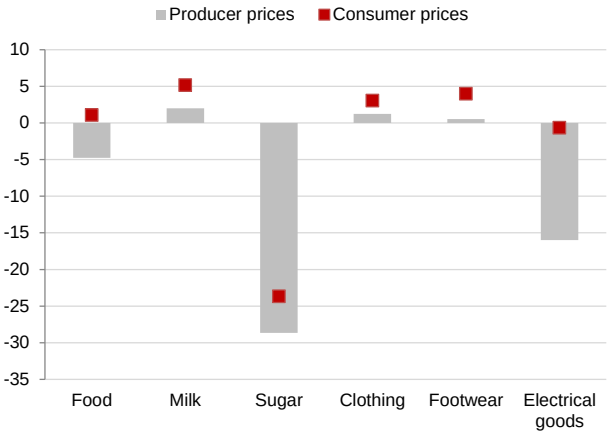
According to Rosstat, in December annual growth rates of producer prices were recorded at 8.37% after 8.01% seen in November, in a sign they had held considerably above consumer inflation (Figure 7). The increase in producer price inflation is connected with significantly increased prices in the production of crude oil and natural gas[4].

Figure 7. Producer price and consumer price index, % YoY



Sources: Rosstat, R&F Department calculations.

Figure 8. Price movements across individual products in December, % YoY

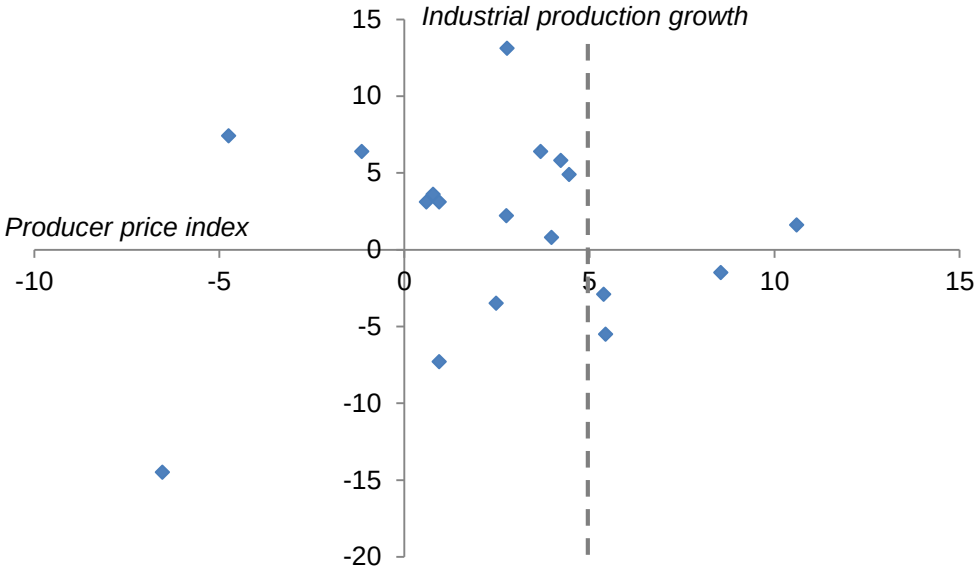


Sources: Rosstat, R&F Department calculations.

In the manufacturing sector, growth in producer prices slowed down to 4.17% from 6.30% in November. Most producer prices are growing more slowly than those of consumer goods, pointing to the absence of added inflationary pressure from the producer side (Figure 8). Nevertheless, an acceleration in fuel price growth could at some point in time influence output prices in other industries.

[4] The annual growth rate of prices in crude and natural gas production accelerated to 36.4% in December after 16.9% in November.

Figure 9. Industrial production growth and producer price index across sectors in December 2017, % YoY*



Sources: Rosstat, R&F Department calculations.

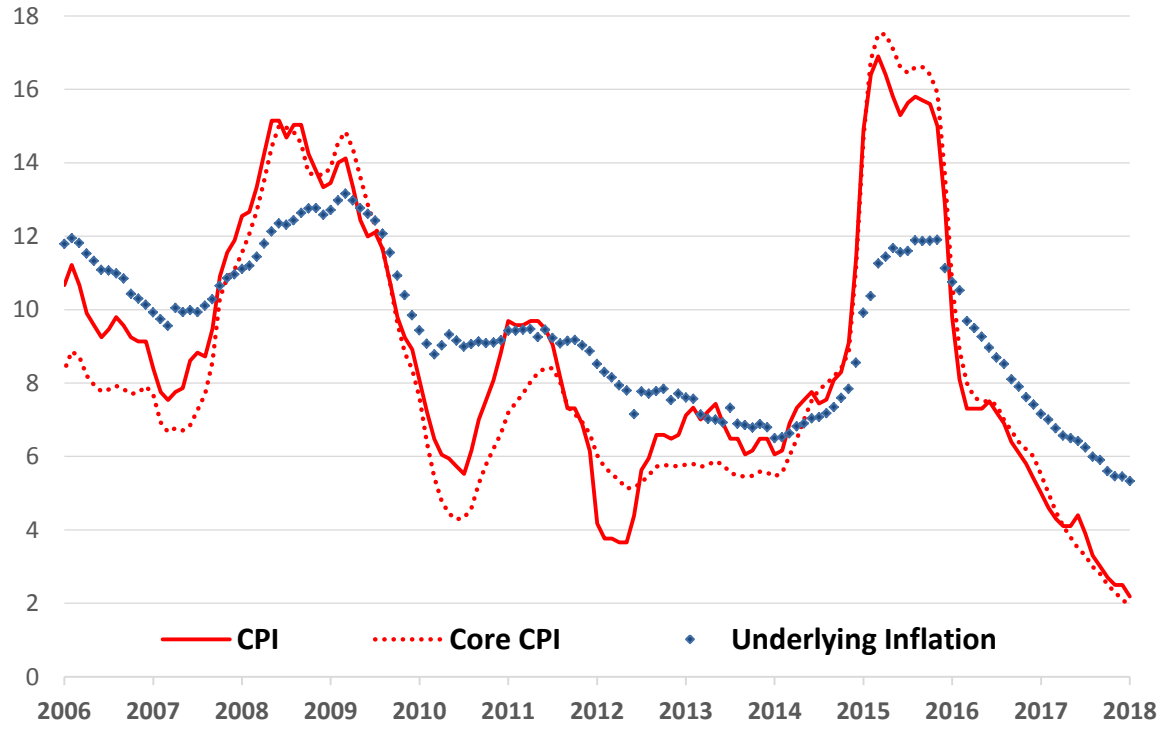
** The calculations only included manufacturing sectors without tobacco products, coke and oil products.*

It is also important to note that sectors which turned in moderate (up to 5%) price growth in 2017 or a decline are seeing a rise in production volumes (Figure 9).

1.1.3. Underlying inflation continues its slow decline in January

- In January 2018, annual rates of underlying inflation declined to 5.3% (from 5.4% in December (Figure 10).
- Despite the sustainable slowdown in underlying inflation, its current estimate is still viewed as elevated, which is attributed to heightened historical inflation rates, as well as the inertia of this indicator in terms of generation.
- Over recent months, underlying inflation has posted slower rates of deceleration. This suggests that in the medium term the risks of annual inflation moving away upwards from 4% still exceed those of inflation deviating downwards.

Figure 10. CPI, core CPI and historical estimates for underlying inflation, % YoY



Sources: Rosstat, R&F Department calculations.

1.2. Economic performance

The Russian economy turned in 1.5% growth in 2017, a sure sign that it had climbed out of recession. Overall, this growth is consistent with its potential. Quarterly economic growth was meanwhile highly uneven: the accelerated growth above expectations in Q2 was followed by an unexpected slowdown in Q3-Q4. This uneven performance was largely caused by the impact of temporary external and internal factors, mainly positive, occurring early in the year, and negative - in the second half, which had implications for individual sectors.

Current macroeconomic indicators and survey data suggest the economy continued to expand in the first half of 2018. Moving forward, growth will be supported by higher domestic demand as real wages increase and the global economy turns in healthy growth.

1.2.1. The 2017 GDP growth estimate of 1.5% is most likely to be revised upwards

- Rosstat's 2017 GDP growth estimate of 1.5% came in lower than most analysts expected, undermined by a slowdown in the fourth quarter.
- This slowdown is explained by a considerable decline in public spending and higher-than-expected physical import volumes.
- Annual rates of household consumption, investment and inventory levels were within our expected ranges.

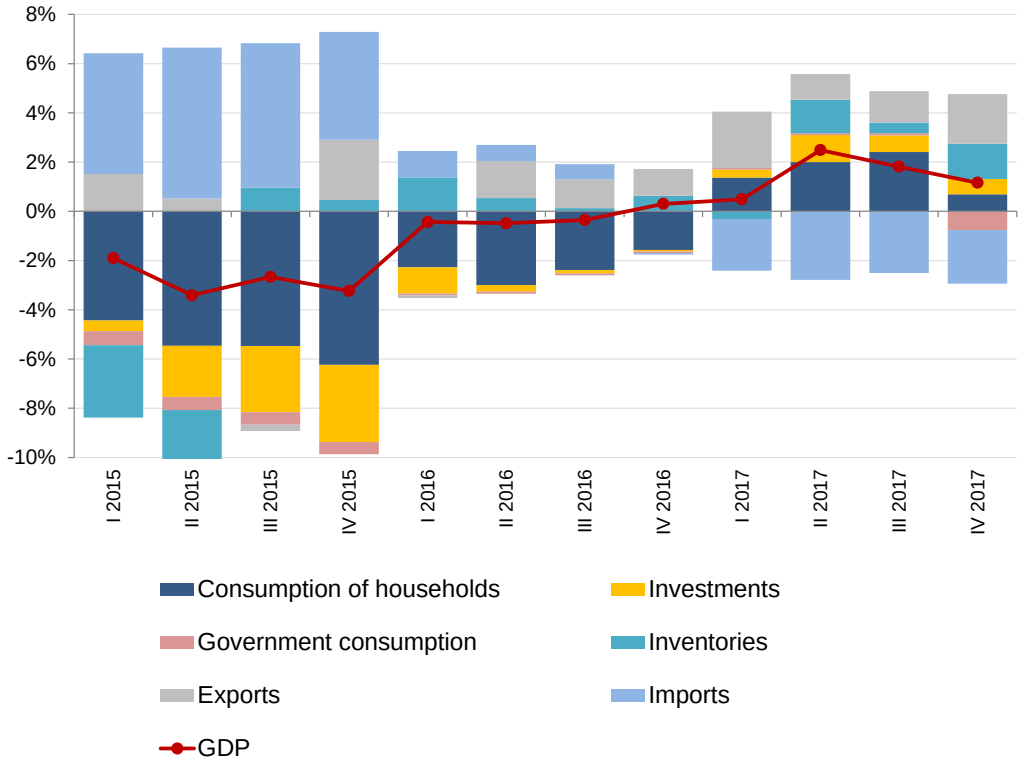
According to Rosstat's first estimate, annual GDP growth rates in 2017 stood at 1.5%. This estimate is somewhat lower than our expectations which assumed stabilised GDP growth in 2017 Q4 against the background of a favourable oil price environment and ongoing positive trends in consumer demand. Our estimates suggest that 2017 Q4 GDP growth was down to 1.2% YoY against 1.8% YoY in Q3. Against this background, annual 2017 growth rates were 1.5% against R&F Department's December estimate of 1.7%.

It is rather difficult at this point to give a seasonally adjusted QoQ estimate for this decline. More accurate estimates will probably be available after the publication of Rosstat's Q4 data. Currently, quarterly estimates are misaligned with the updated annual GDP estimate. No firm conclusions are possible as regards its quarterly structure. Consistent with 2017 Q1-Q3 data, (0.5% YoY, 2.5% YoY and 1.8% YoY), the annual GDP growth decline to 1.2% YoY in the fourth quarter musts have signalled considerable contraction in seasonally adjusted quarterly growth rates, possibly to negative readings. Nonetheless, we believe that, moving forward, Q1-Q3 statistical data is certain to be revised, thus invalidating such assumptions.

At the same time, as per a R&F index estimate based on current macro data, seasonally adjusted GDP growth rates in the fourth quarter slowed down to a mere 0.4% QoQ vs 0.5% QoQ in the third quarter (for more details, refer to Subsection 2.2.2 'GDP growth projections: moderate increase is to hold'). Although these estimates might look overly optimistic, they are more in line with the fairly good data of current economic and consumer activity surveys. At the same time, our short-term model GDP estimates predominantly target final GDP data after all reviews, rather than Rosstat's first estimate.

Annual GDP breakdown by disposition for 2017 shows that overall GDP decline occurred on the back of factors beyond investment and household consumption. Annual growth rates of these two, as well as those of inventories, were overall in line with our expectations (Figure 11).

Figure 11. Contribution of GDP components by disposition to GDP growth rates, pp



Source: Rosstat, R&F Department calculations.

Importantly, the high rates of import growth are increasingly emerging as a sustainable trend. Q4 physical volumes in YoY terms were virtually unchanged in the fourth quarter at approx. 15% YoY. This performance appears to be outrunning even relative to the substantial rise in oil prices in the second half of 2017. With this in mind, even the much higher than expected growth rates of physical volumes of exports (almost 7% YoY in Q4 and 5.4% for 2017) failed to offset the annual acceleration in imports.

Imports growing this quickly may well be a reflection of consumer demand expansion risks; the latter are fuelled, beyond high rates of real wage growth, by a graduate rise in consumer lending.

We attribute the uneven 2017 GDP data to the performance of oil prices, triggered by compliance with the OPEC+ deal, as well as the impact of the budget. The rise in oil prices combined with Q1-Q2 funding of budget expenditure that was more substantial than usual (including on major investment projects) made a meaningful contribution to the strong 2017 H1 data. However, 2017 H2 economic activity was increasingly affected by the relative decline in quarterly budget expenditure and the cuts in annualised crude output in line with the OPEC+ deal. We believe that the effects of compliance with the OPEC+ deal and declining demand for gas exports will be a temporary constraint on output, with negative implications for overall economic growth.

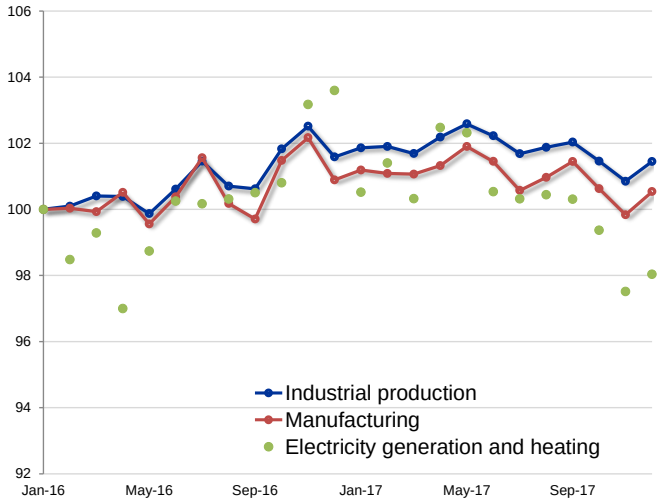
1.2.2. The industrial sector ends 2017 with growth

- Industrial production in December resumed growth, on the back of a growing manufacturing sector.
- Q4 and overall H2 data proved weaker that at the start of the year, confirming the trend towards slower growth as the economy is on the way to a sustainable yet low growth path.
- The 2017 growth leaders in manufacturing were motor vehicles, pharmaceuticals, furniture and textiles.

According to Rosstat, seasonally adjusted industrial growth in December was up 0.4% MoM (-1.5% YoY), having posted the only monthly increase in the whole fourth quarter. R&F Department's estimates are more upbeat at 0.6% MoM. Growth owes its origin to sanguine data posted by the manufacturing sector (+0.7% MoM, according to the R&F Department): year-on-year output growth was quickest in clothing, pharmaceuticals and furniture. The negative contribution (within the statistical margin of error) came from mining and quarrying (-0.3% MoM, per R&F Department estimates). Importantly, *the ragged end problem* and the high volatility of output in December undermine the reliability of conclusions when the seasonally adjusted indicator is explored.

Although the reading for annual industrial output is positive (+2.0% YoY), the fourth quarter was worse than in the quarters before. The negative trend is also signalled by the industrial production intensity index by the Higher School of Economics: in monthly terms, it declined throughout the second half of the year.

Figure 12. Seasonally adjusted industrial output index

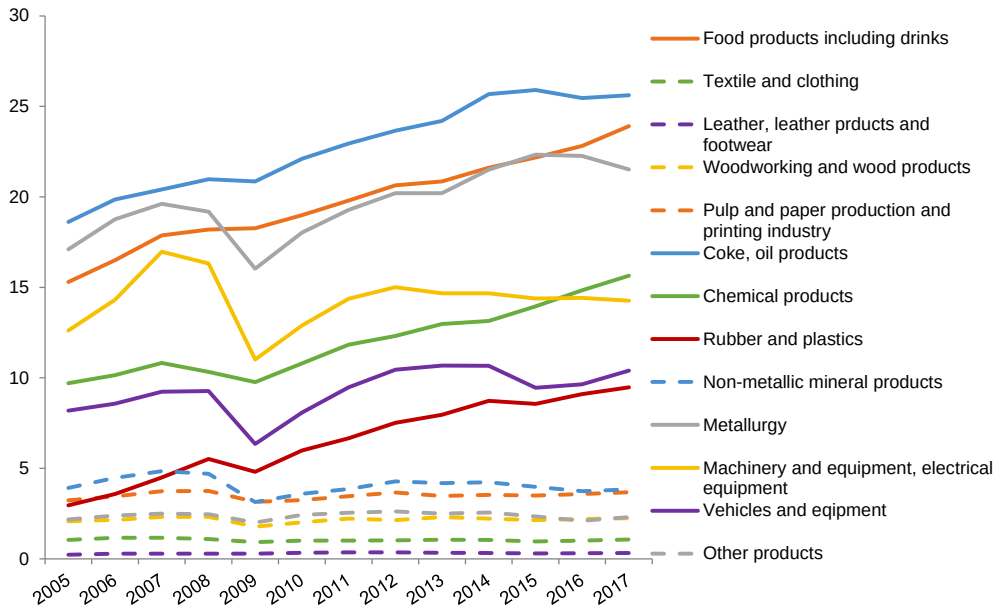


Sources: Rosstat, R&F Department calculations.

All estimates suggest that current industrial data are somewhat below the readings of late 2016. However, we attribute most of this decrease to the high base effect (especially in oil output at the end of 2016) and the abnormally warm weather with its impact on electricity generation and heating. Besides, both Rosstat's Business Confidence Index and PMI record a robust improvement in business sentiment. Expectations are on the mend relative to both 2016 and the mid-2017 levels. This sanguine indicator is set to become yet another optimistic factor for the industrial sector at the beginning of this year.

Importantly, over the last ten years, the manufacturing sector has undergone a change in its structure (Figure 13). The chemical industry has posted stable growth, with its contribution becoming stronger over time. The mechanical engineering sector, on the contrary, has been in persistent decline since 2012. Oil processing, the largest of all manufacturing sectors, has changed little if at all since 2014. Moreover, its growth paces over recent years are no longer as high as they once were. These factors are in many ways responsible for weak manufacturing data in recent years.

Figure 13. Changes in sector contributions* to the manufacturing industry index (by share in 2016 GVA)



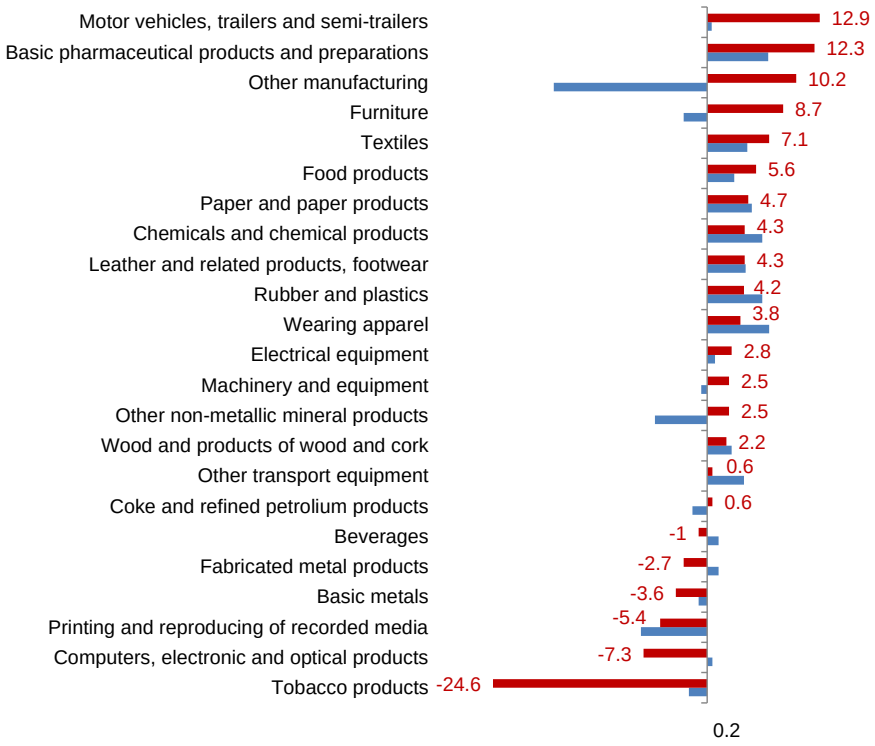
** Calculations through 2013 were based on the OKVED classifier; the OKVED-2 classifier has been applied since 2014; tobacco is excluded.*

Sources: Rosstat, R&F Department calculations.

When revisiting the 2017 results from the standpoint of industrial sectors, emphasis should be made on accelerated growth in *consumer sectors*, which stems from strong data posted by the food industry (the output of food products gained +5.6% YoY) (Figure 14). Almost all the rest of the sectors within this group also show positive trends, against the background of import substitution. These include pharmaceuticals, and 'other finished products' (including jewellery +18.8% YoY), furniture, leather goods, clothing and footwear. As the market of light vehicles gained pace following the two failed years, the car industry underwent a recovery (+12.9% YoY). Nonetheless, outputs of tobacco products,

drinks and printing products shrank. The strongest decline in 2017 (-24.6% YoY) was seen in the tobacco industry. For all the negative impact, these sectors contribute little to the consumer product production index.

Figure 14. Output growth rates in manufacturing sectors, %



Source: Rosstat.

In *intermediary industries,* the growth drivers are unchanged and include chemicals (+4.3% YoY) and rubber and plastics (+4.2% YoY) where continued investor activity is supporting an upward trend. Increased outputs are posted by the paper and woodworking industries (+4.7% YoY and +2.2% YoY respectively) as production capacities expanded.

The weak growth (+0.6% YoY) of oil processing output alongside a considerable decline in metallurgy (-3.6% YoY) come as key reasons for the feeble growth across the whole group of intermediary sectors. Despite rising outputs of ferrous metals (+1.4% YoY) and pipes (+2.1% YoY), the metallurgical group is still affected by declining outputs of 'other non-ferrous metals' and nuclear fuel (-13.1%).

In the *investment industries* group, rising outputs of machinery and equipment (+2.5% YoY) is indicative of rebounding investment demand. Indicators of 'other engineering industries' were affected by reduced national defence spending. Year-end outputs of electronics showed a decline (-7.3% YoY). Outputs of 'other vehicles and transport' remained highly volatile throughout 2017; yet, the annual output was virtually unchanged (+0.6% YoY), which is slower against the previous year.

1.2.3. PMIs: growth in 2017 posted by most sectors

- In January, the manufacturing PMI held close to the 52.0 pp mark, testifying to a positive economic outlook at the beginning of a year.
- At the same time, PMI hit a 6-month high in terms of output and new orders, suggesting the emergence of a clear trend towards a rebound in demand.
- Alongside the still positive data across other subindexes, this suggests a likely acceleration is due in manufacturing as an overall sectoral trend.
- This is contrary to the mixed data on manufacturing outputs Rosstat has recorded in recent months.
- The services PMI totalled 55.1 in January on 56.8 in December, still in positive territory and aligned with sustained paces of economic growth.
- The relatively higher weight of services led to the January PMI decreasing to 54.8 on 56.0 in December.

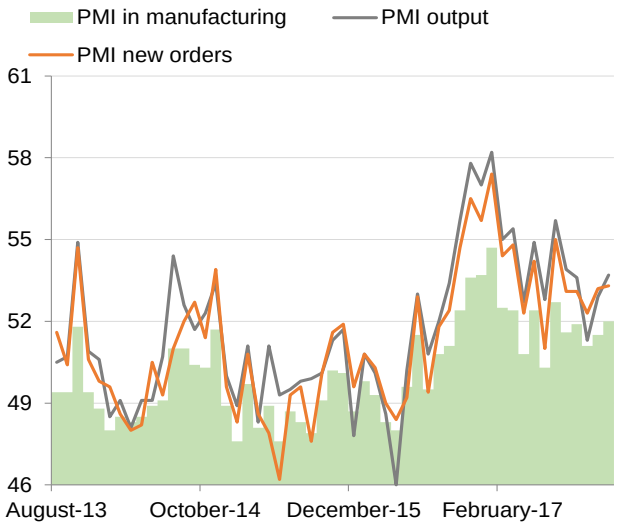
IHS Markit's January data signal a positive business sentiment in the industrial sector. The January index came in at 52.1 vs 52.0 in December, thereby having posted muted growth; however the fact that the index held above the neutral mark (50.0) and virtually level with 2017 H1 (52.2) shows the industrial sector is keeping growth momentum going. We attribute these developments to improvements in global markets, especially recovering oil prices. The latter fact is confirmed by IHS Markit analysts: some respondents cite 'favourable global markets from a demand perspective'.

As follows from a component breakdown of the index, growth mainly occurred on the back of categories related to total and new order intakes. The strongest growth was seen in the *new export orders* subindexes (50.5 against 49.4 one month before) and 'new order intakes' (54.2 on 53.3), which is further evidence of rising demand. A positive contribution was also made by 'the volume of purchases' (51.7 vs 50.8) and 'output' (54.1 vs 53.7).

The overall performance of PMI, alongside other indirect industrial activity indicators[5] suggests signs of growth in the manufacturing sector remain in place (which is a mismatch with Rosstat's Q4 data), as well as continued growth early this year. Therefore, the emerging positive trend in manufacturing outputs is set to remain, with a slowdown in a few sectors understood to be local in nature.

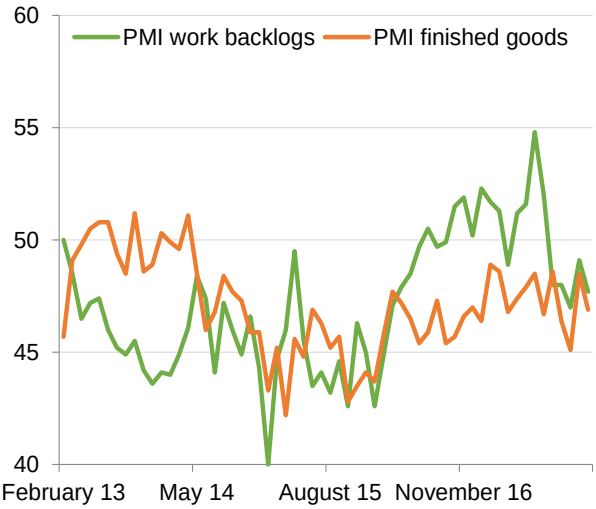
[5] Railway shipments, electrical power consumption, according to the Centre for Macroeconomic Analysis and Short-term Forecasting (CMASF).

Figure 15. Manufacturing PMI



Source: IHS Markit.

Figure 16. Price growth over the last three weeks and the corresponding period last year, %



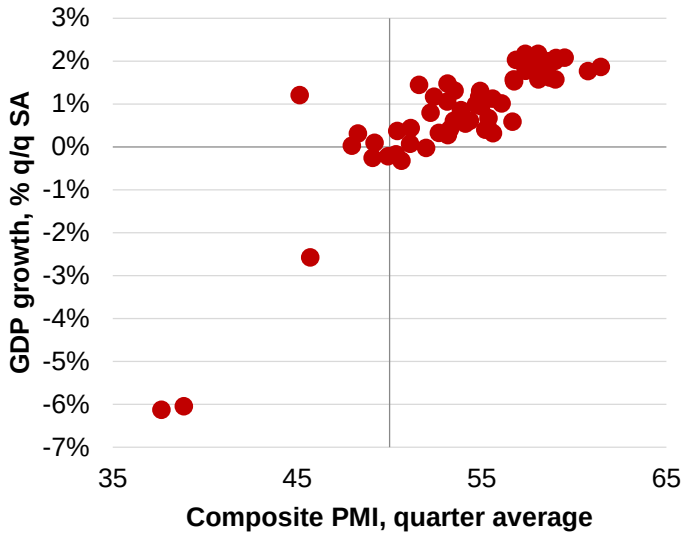
Source: IHS Markit.

January's Services PMI stood at 55.1 against 56.8 in December. Our understanding is, this decline is essentially technical. The service sector's index is still considerably above the neutral mark and even retains a value close to the 2017 average, the year the economy indeed hit on a long-term growth path. Overall economic activity in the service sector has posted strong data, with respondents citing benign economic conditions and growth in new order intakes and customers.

The relatively higher weight of services led to the January PMI decreasing to 54.8 on 56.0 in December. Importantly, this indicator is invariably above its all-time average.

Traditionally, there is a strong PMI to GDP movement correlation (Figure 17). Our estimates based on Russian data suggest that such correlation for the last four years has been 71%, and 86% since 2003. Usually, several reviews result in Rosstat's GDP data becoming more aligned with PMI data. Accordingly, the positive PMI data of late 2017 and early 2018 bode well for the strength of Q4 results commensurate with or above their potential.

Figure 17. GDP growth and aggregate output PMI



Sources: IHS Markit, Rosstat.

1.2.4. Consumer demand continues to recover

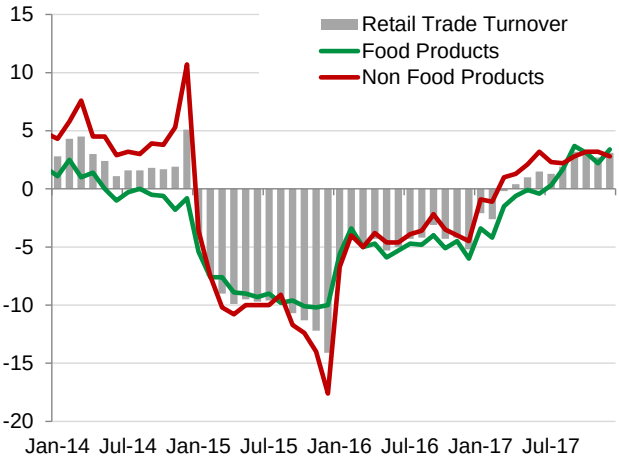
- In December, retail sales were up 3.1% YoY, on 2.7% YoY in November. Retail sales in annual terms for 2017 grew by 1.2% YoY.
- Seasonally and calendar effect adjusted, sales were declining more slowly at a pace of 0.1% MoM in December, on 0.3 MoM in November.
- Moving forward, the recovery in consumer demand is set to be supported by rising real wages, and continued recovery in lending alongside still optimistic consumer sentiment including households' positive attitude towards large purchases.

According to Rosstat, annualised sales in December were back to the October data, growing 3.1% YoY, relative to 2.7% YoY in November (Figure 18). Retail sales in the fourth quarter accelerated to 3% YoY on 2.1% YoY in the third quarter.

The growth of food sales accelerated to 3.4% YoY, following a slowdown in the October to November period. By contrast, non-food sales decelerated to 2.8% YoY on 3.2% YoY in November.

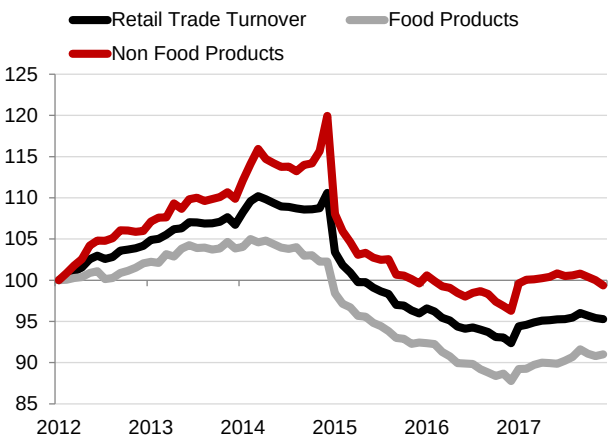
According to our estimates, seasonally and calendar effect adjusted retail sales dropped 0.1% MoM in December, after 0.3% MoM growth between October and November (Figure 19). In the reporting period, food sales stopped to decline: their growth totalled 0.3% MoM. Nonetheless, non-food sales continued to decline for a third month in a row, with rates of contraction going up to 0.6% MoM.

Figure 18. Food, non-food and total retail sales, % YoY



Sources: Rosstat, R&F Department calculations.

Figure 19. Retail sales (% January 2012 = 100%, seasonally adjusted)

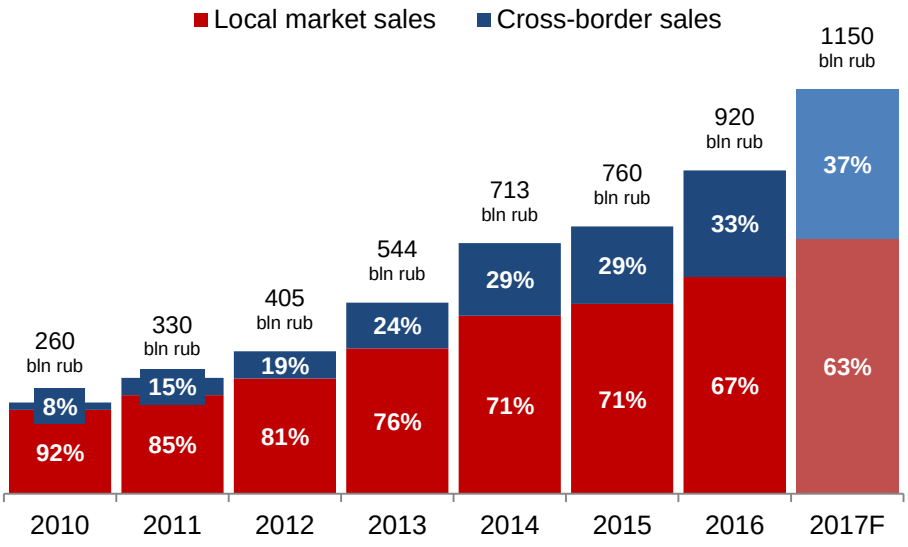


Sources: Rosstat, R&F Department calculations.

To some extent, the negative data on non-food sales can be attributed to advancing online sales, especially to a rise in demand for products sold in foreign web stores.

According to the AITC[6], cross-border sales are still ahead of local market sales (Figure 20). 2017 H1 results show that the number of international postal parcels was up 49%, whereas the corresponding number on the local market was up by only 8%. The difficulties related to Rosstat's recording of such sales lead to possible undervaluation of non-food sales.

Figure 20. The Russian e-commerce market



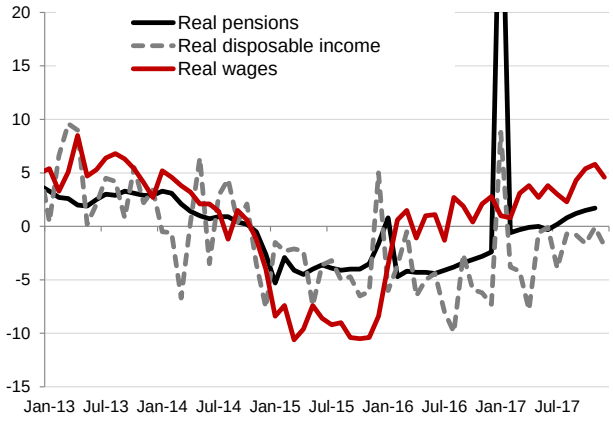
Source: AITC.

[6] The Russian Association of Internet Trade Companies (AITC): «Исследование рынка Интернет-торговли в России. Итоги 1 полугодия 2017 года». 28.09.2017.

Total 2017 retail sales were up 1.2% after a drop of 4.6% in 2016 and 10.0% in 2015. The recovery in consumer demand comes with growth in real wages that went up 3.4% in annual terms. On a monthly basis, real wages grew 4.6% YoY in December, slowing down slightly against November (Figure 21). Overall real wages have steadily kept up growth momentum since early 2016.

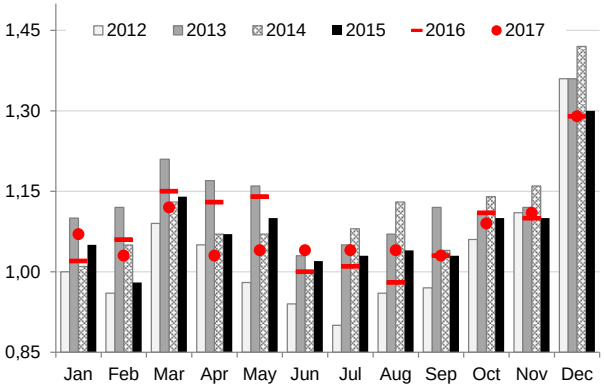
According to pollster Romir,[7] households' total every-day spending was up 15.9% in December (Figure 22). The December uptick in spending is explained by the traditional New Year shopping spree. At the same time, real spending showed close-to-zero growth.

Figure 21. Real income of households, % YoY



Source: Rosstat, R&F Department calculations.

Figure 22. Real every-day spending (%, January 2012=100%)



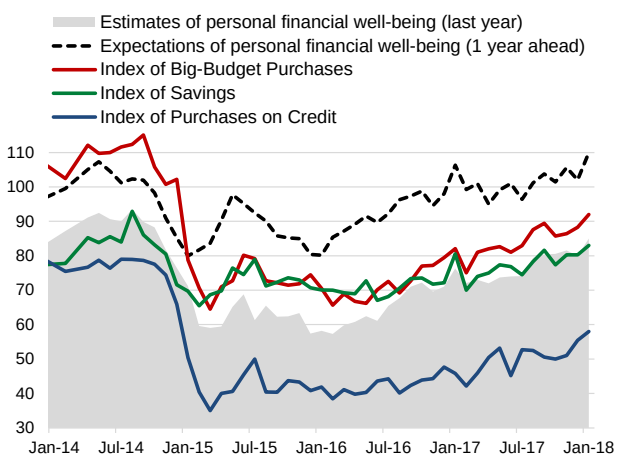
Source: Romir.

InFOM survey results[8] show that consumer sentiment saw a significant improvement in January. Estimates of current and future financial standing improved, too (Figure 23). Respondents showed a more positive attitude towards major purchases and savings.

The steadiness of consumer sentiment is shown by the findings of a sampling analysis into Q4 consumer sentiment by Rosstat. The consumer confidence index was unchanged from the third quarter (Figure 24). Estimates for current and future financial standing remained steady. Households' attitudes to major purchases and savings improved: the corresponding index was up 2 pp. Economic conditions are also perceived positively.

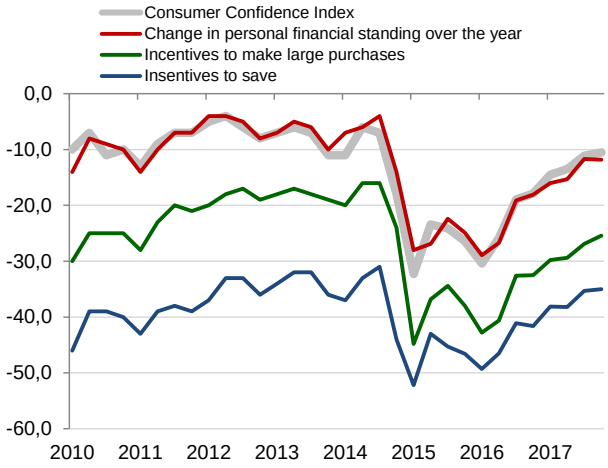
[7] Romir Research Holding. «Новогодние растраты». 16.01.2018.
[8] Real-time data for January.

Figure 23. Consumer sentiment index components, pp



Source: inFOM, R&F Department calculations.

Figure 24. Rosstat's Consumer Confidence Index and its components



Sources: Rosstat, R&F Department calculations.

Better household expectations expressed by more upbeat estimates of current and future financial standing against the background of the willingness to make large purchases, including purchase on credit, is expected to support consumer demand in the months to come.

1.2.5. The unemployment rate in 2017 fell to its lowest level since 2014

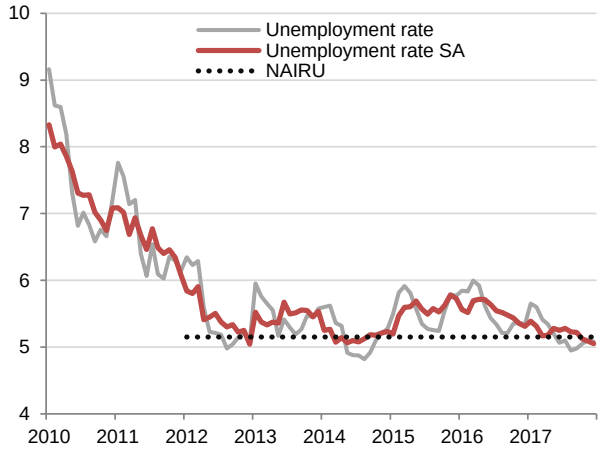
- Unemployment in 2017 dropped to 5.2%, its lowest level since 2014. According to the ILO's forecast, unemployment will continue to decline.
- December saw an accelerated pace of real wage growth, for all its slowdown to 4.6% YoY from 5.8% YoY seen in November 2017.
- The recently adopted labour regulations are expected to add a further 2.5 pp to nominal wage growth.

Unemployment in December, unchanged from the previous month, was 5.1%. Adjusted for seasonal fluctuations, the unemployment rate went down from 5.11% to 5.07%, driven by declining numbers of unemployed (Figure 25).

In 2017, the unemployment rate totalled 5.2%, level with the 2014 mark. According to the International Labour Organisation's[9] report, the rate of unemployment in Russia is in for further decline in 2018 to total 5.0% and 4.9% in 2019. This assumes a 300 thousand contraction in the number of unemployed to 3.6 million people. This is likely to continue to put upward pressure on paces of nominal wage growth.

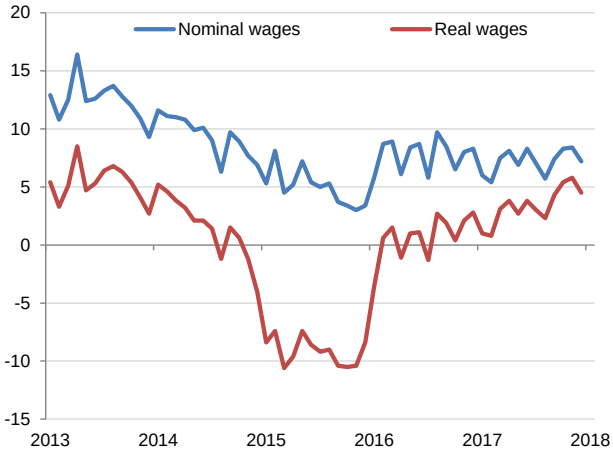
[9] http://www.ilo.org/wcmsp5/groups/public/---reports/---dcomm/---publ/documents/publication/wcms_615594.pdf.

Figure 25. Unemployment rate and its natural rate estimates, %



Sources: Rosstat, R&F Department calculations.

Figure 26. Nominal and real wages, % YoY



Sources: Rosstat, R&F Department calculations.

In December, nominal wages grew 7.2% vs 8.4% YoY the month prior. The slowdown affected the paces of real wage growth from 5.8% to 4.6% YoY (Figure 26).

It is highly probable that wages will continue to rise, which is triggered by, among other things, recent regulatory changes.

First, a 4% rise is due in public sector employees' salaries (those excluded in the May presidential decrees). On a federal scale, this rise will cover more than 2 million people. In light of the regional and local scale, this compensation may add another 0.2 pp to the pace of wage growth.

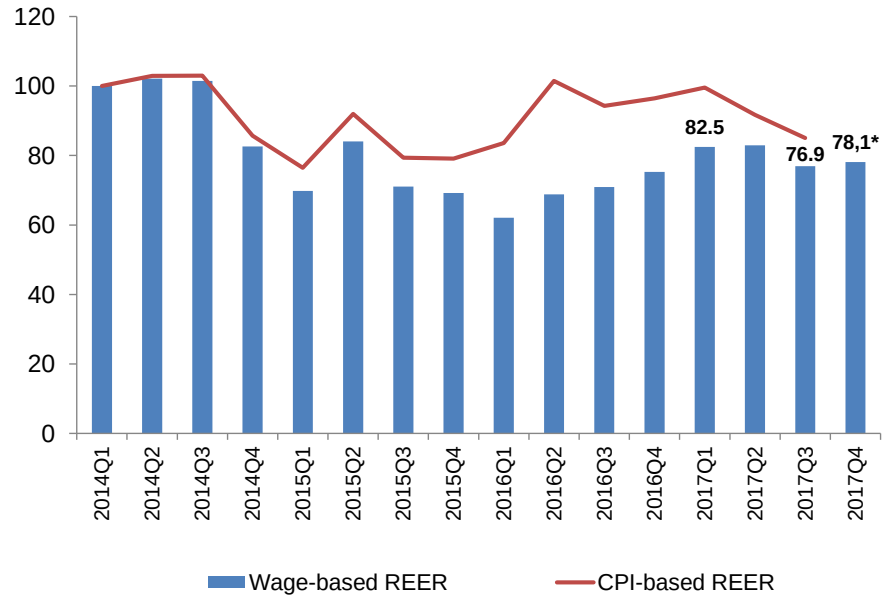
Second, the May presidential decrees will be fully implemented in 2018. According to Rosstat, the number of public sector employees covered by the May decrees is 5.6 million people. Following salary reviews in January-September 2017, a third of employees already enjoy salaries at a level of the region's average. The rise in the salaries of the rest of the group may add another 0.8-1.0 pp to the growth rate of nominal salaries.

Third, a rise in the minimum wage from 7,800 rubles to 9,489 rubles will extend to 5 million people. Provided that the number of these jobs remains, another 1.5 pp will be added to overall growth pace of nominal salaries.

Consequently, the above-mentioned laws and regulations will result in nominal wages, other things being equal, increasing by 2.5 pp.

It is important to note that when considering the Russian economy's competitiveness against key trading partners not in CPI terms (which takes into account prices for both tradable and non-tradable goods), but in terms of the differential of salaries in the manufacturing sector, there will be no meaningful loss in competitiveness resulting from a rise in wages above labour productivity observed. Moreover, the real effective ruble exchange rate calculated through salaries was virtually unchanged in 2017. More so, it has held on a three-year average level.

Figure 27. Real effective ruble exchange rate vis-à-vis foreign currencies, calculated through CPI, and nominal wages (January 2014 = 100)*



**Preliminary estimate*

Sources: Bank of Russia, CEIC, R&F calculations.

As our estimates show, relative to the first nine months of 2014, the real weakening of the ruble in terms of real wages was around 20% or slightly higher. Overall, this reading suggests Russian producers' foreign trade competitiveness was not undermined.

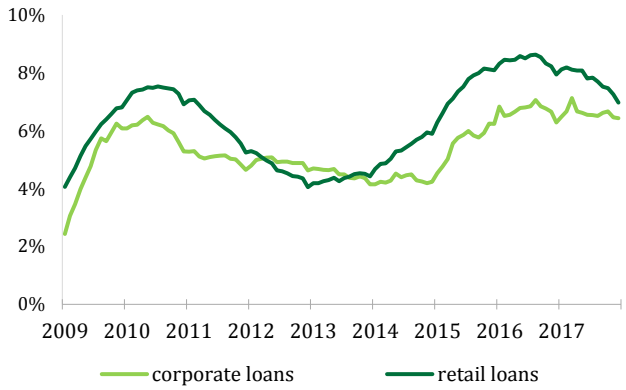
1.2.6. Banking sector outcomes in 2017: lending growth accelerates

- In 2017, bank assets increased by 9%, while household loans added 13.2% and corporate loans - 3.7%, overshooting 2016 results considerably.
- It is of particular note that retail lending gained momentum as households showed more evident signs of transition to consumption-focused behaviour model. This may drive inflationary pressure in the foreseeable future.
- The banking sector's profit proved to be lower than in 2016 due to the considerable additional one-time provisions by banks undergoing financial resolution.
- Dollarisation of deposits dropped in 2017 to pre-crisis levels following, among other things, ruble appreciation.

In 2017 banking sector assets increased by 9% (in 2016, 3.4%). Importantly growth was mainly driven by retail bank transactions which have gained momentum amid the accelerated consumption recovery in the economy.

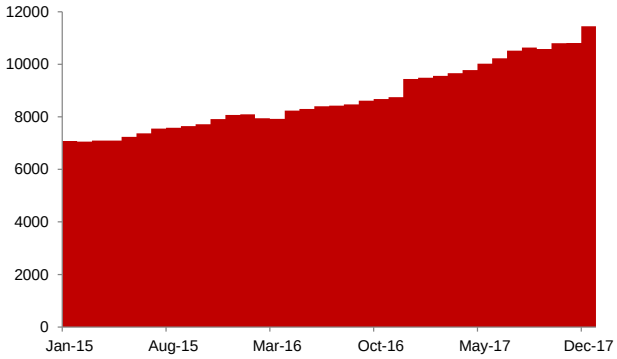
Household loans grew by 13.2% in 2017 (in 2016, 2.5%) while household deposits increased by 10.7% (in 2016, 11.8%). These dynamics were further proof of households' transition from a saving-based to consumption-focused behaviour model.

Figure 28. Overdue debt, %



Source: Bank of Russia calculations.

Figure 29. Corporate bonds, billion rubles



Source: Cbonds.

We believe that the observed upward trend in lending reflects the easing of monetary conditions and may continue in 2018 factoring in time lags in the Bank of Russia's monetary policy transmission mechanism. This factor reflects a potential slight increase in inflationary pressure from the current low level that may occur in the forthcoming quarters.

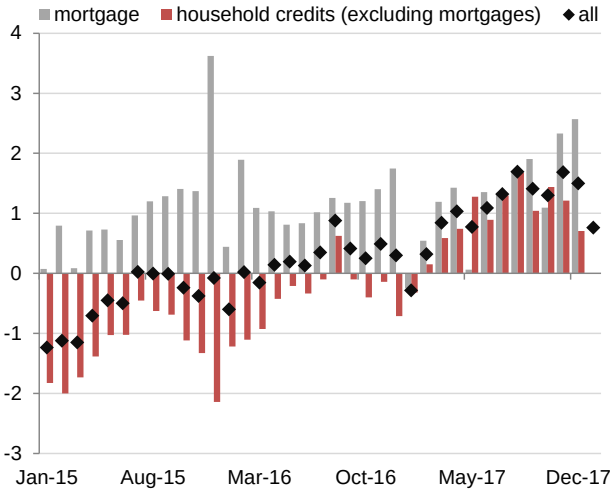
At the beginning of the year, growth in the retail loan portfolio was associated with the ongoing expansion of mortgage lending. In the second half of the year, this growth driver was supplemented with the high growth rate of unsecured consumer lending (Figure 31). Both lines of business seem to have registered double-digit growth rates as of the year-end. Importantly, banks 100% owned by non-residents and state-controlled banks were leading in terms of growth rates in the retail segment.

Corporate lending increased by 3.7% in 2017. This largely resulted from lower rates on corporate bonds compared with rates on bank loans for some corporate borrowers. Corporate bond issuance demonstrated a double-digit growth rate of 21.3% YoY in 2017 (Figure 29).

Figure 30. Dollarisation of deposits, % (as of the year start)

Source: Bank of Russia calculations.

Figure 31. Mortgage and consumer lending, % MoM



Source: Bank of Russia calculations.

As the loan portfolio resumed growth, overdue debt stabilised. In 2017, the share of overdue debt declined from 7.9% to 7.0% in the retail portfolio and stabilised at 6.4% in the corporate portfolio (Figure 28). In this environment, the 27% increase in loan loss provisions in 2017 was largely attributed to a one-time additional provisions by banks undergoing financial resolution through the BSCF. These banks tripled their provisions. As a result, expenses linked to provision creation in the banking system as a whole increased from 100-150 billion rubles in 2017 Q1-Q2 to 514 billion rubles in 2017 Q4. The lower financial result may also be attributed to this fact. In 2017, the banking sector's profit totalled 790 billion rubles vs 930 billion rubles in 2016. Importantly, in January-November 2017, the banking sector's profit exceeded past year readings by 10.4% YoY.

The reduced dollarisation of deposits was a further positive result of 2017. It declined in 2017 by 6.3 pp to 33.7% for corporate deposits and by 3.1 pp to 20.6% for household deposits (Figure 30). Meanwhile, our estimates suggest that the ruble appreciation explains only 2 pp and 1.2 pp of the drop in the proportion of dollar deposits respectively.

2. Outlook: leading indicators

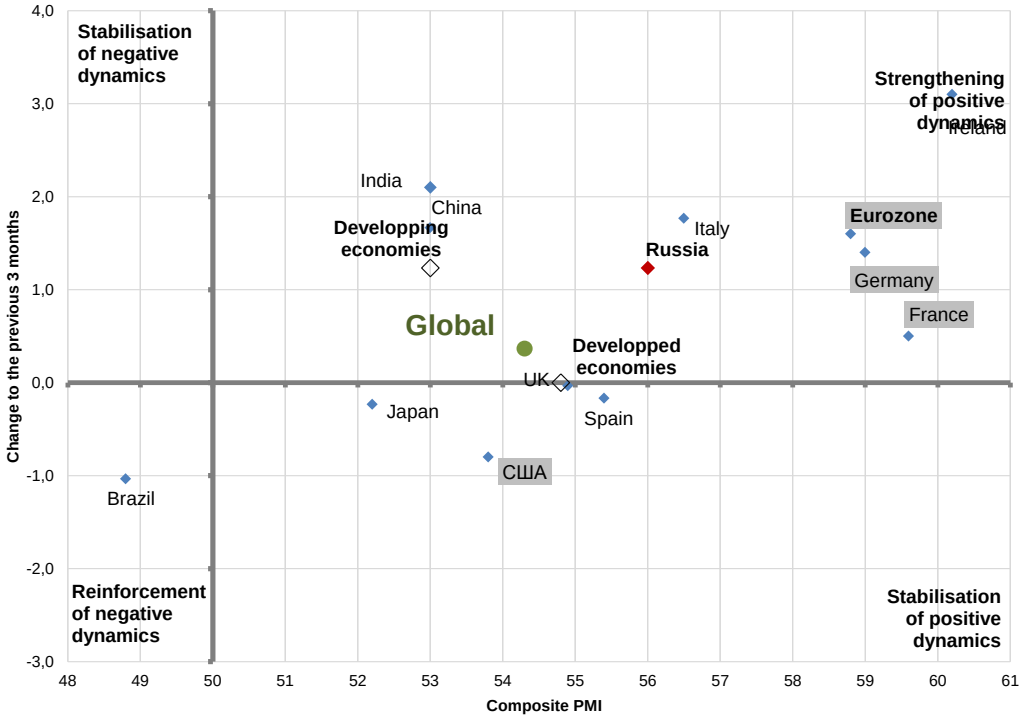
2.1. Global leading indicators

2.1.1. Global PMIs: business activity in advanced economies continues to inspire optimism

January PMI data suggest continued growth in business activity across major advanced economies (Figure 32, highlighted in grey).

In January, the US composite PMI dropped from 54.1 to 53.8 pp, an eight-month low. However, the slowdown in business activity was only marked in the services sector (from 53.7 to 53.3 pp). The manufacturing PMI reached 55.5 pp, an almost three-year high, amid elevated domestic demand. Although the composite indicator slowed, the flow of new orders remained considerable and companies' optimism rose prompting that moderate growth rate of business activity will hold. Furthermore, input and output prices and employment continue to increase sustainably. Thereby, economic conditions remain optimistic despite a certain slowdown in business activity growth.

Figure 32. Composite PMI for January and change to the October to December average



Sources: IHS Markit, Bloomberg Finance L.P.

The composite PMI of the euro zone continues to hit many-year highs. In January, the index rose to 58.6 pp, a 12-year high. Employment expanded at the highest rate since 2000 while inflationary pressure showed the strongest readings over the past seven

years. Importantly, business extensively translated growing costs into output prices. Everything is indicative of a very solid year-start in the euro zone.

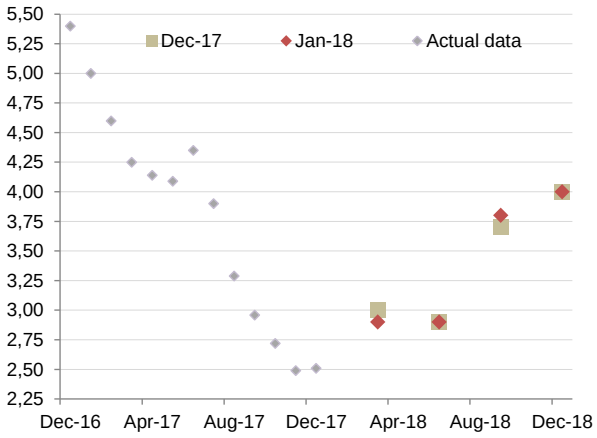
2.2 What do Russian leading indicators suggest?

2.2.1. Analysts' inflation expectations remain anchored at 4% in the medium run

- While price growth remained low in January, experts failed to see any reasonable grounds for revision of the inflation forecasts for late 2018.
- The median annual inflation forecast for the end of 2018 is holding sustainably at 4%.
- The Bank of Russia key rate forecast for the late 2018 was revised downward from 7.00% in late 2017 to 6.75% in January.
- This may be attributed to the pace of the Bank of Russia's key rate cut in December - unexpected by market participants - that has been reflected in Bloomberg consensus forecast just recently.

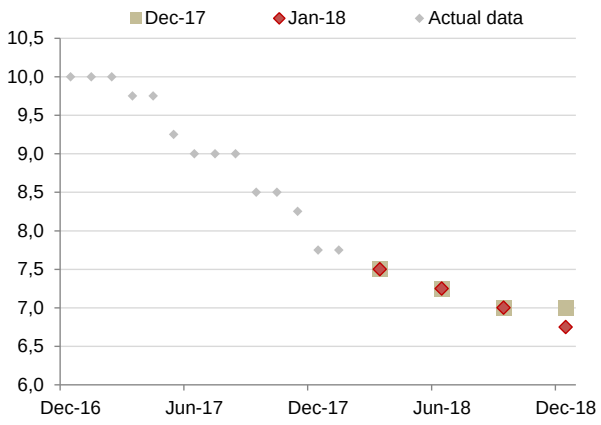
Analysts' median inflation forecast for the end of 2018 is holding sustainably at 4.0%. As in previous surveys, the first half of the year is expected to see inflation hold at roughly 3.0% and gradually return to 4.0% by the year-end as the 2017 low base effect wanes (Figure 33).

Figure 33. Analysts' expectations for inflation, % YoY



Source: Bloomberg Finance L.P.

Figure 34. Analysts' expectations for the BoR key rate,% p.a.



Source: Bloomberg Finance L.P.

2.2.2. GDP growth projections: moderate increase is to hold

- GDP estimates for the period until mid-2018 suggest that economic growth rates are settling close to the potential readings assuming that oil prices hold close to the current readings.
- 2017 Q4 GDP growth projections remained unchanged as of late January holding at +0.4% QoQ SA.
- 2018 Q1 GDP growth estimates stand at +0.4% QoQ SA, while in 2018 Q2 we expect GDP to add +0.5% QoQ SA.
- The considerable positive contribution to GDP growth estimates in the first half of 2018 is brought about by rising oil prices (up to 0.1-0.2 pp growth per quarter). These model estimates proceed from the temporary Urals prices increase to $70 a barrel in early 2018.
- 2018 model estimates do not factor in possible fallouts from budgetary and other factors (e.g., the OPEC+ deal) on GDP growth (see Sub-section 1.2.1. The 2017 GDP growth estimate of 1.5% is most likely to be revised upwards). This may serve as a ground for their further downward revision as new statistics are released during the year.
- Furthermore, the obtained estimates are coupled with additional uncertainty associated with increased fluctuations in the short-term industrial production readings in the second half of 2017.
- Short-term GDP model estimates may be revised as new statistics are released.

	January 2018	December 2017
	% QoQ SA	% QoQ SA
2017 Q4	**0.4**	0.4
2018 Q1	**0.4**	0.4 – 0.5
2018 Q2	**0.5**	0.4

3. In focus. Electric vehicles set to undermine oil consumption for motor transport fuels by mid-2020s

- Advances in the electric car industry along with rising fuel efficiency will determine oil consumption in motor transport.
- Varying scenario estimates suggest that oil consumption for motor vehicle fuels is likely to peak by mid-2020s. Given the considerable advances in fuel efficiency or fast development of the electric car market (similar to the replacement of cartage by motor vehicles in early 20th century) the peak is set to be passed in the coming years. This may undermine oil prices considerably.
- As the demand shifts from conventional vehicles to electric cars, the demand for industrial metals is poised to change.
- Producers of copper, nickel, graphite, cobalt and lithium stand to gain from these developments. That said, the demand for cobalt and lithium may not be met unless electric vehicle battery production methods are revised. Producers of platinum and palladium are likely to lose.

In the run up to 2018, Bloomberg released the Pessimist's Guide to 2028 that lists a breakthrough in electric vehicle technology among the eight challenges set to crash oil prices to $20 a barrel by 2021. Our estimates suggest that these expectations are exaggerated; however, the advancement of electric vehicles bears the risk of demand for oil reaching its peak in the forthcoming years and prices of some metals changing considerably.

The number of electric vehicles is growing at a fast pace and their market share is increasing. On the supply side, this is driven by technological advancement and falling cost of an electric car and its amortisation. On the demand side, consumers are seeking to choose goods whose production and use is less harmful to the environment. Moreover, state regulation and support are of high importance. Highly polluted air drives the Chinese authorities to encourage purchase of electric vehicles through tax exemptions and transfers. However, electric cars still account for only 0.2% of the global vehicle fleet.

Preconditions. Our analysis covers the horizon until 2040. Our calculations are based on the OICA statistics: sales, and vehicle fleet in use (motor cars, trucks and buses). They estimate that as many as 1.28 billion vehicles were used globally in 2015. We assume that this indicator will grow at its 10-year average rate of 3.6% per year (it hardly varies from year to year) and the vehicle fleet in use will amount to 3.10 billion cars by 2040.

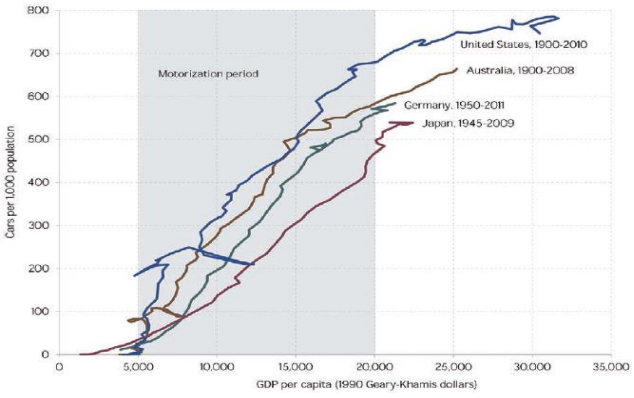
We consider ***three scenarios of expansion in the proportion of electric cars***.

The medium scenario proceeds from the French and British plans to end sales of conventional motor vehicles by 2040. This allows us to forecast that electric vehicles will account for 99% of sales in OECD countries, 90% in non-OECD EU countries and 80% in

other less developed economies by 2040. The introduction of innovations usually follows an S-curve, and we expect that these shares will follow a trend close to exponential[10] (Figure 37).

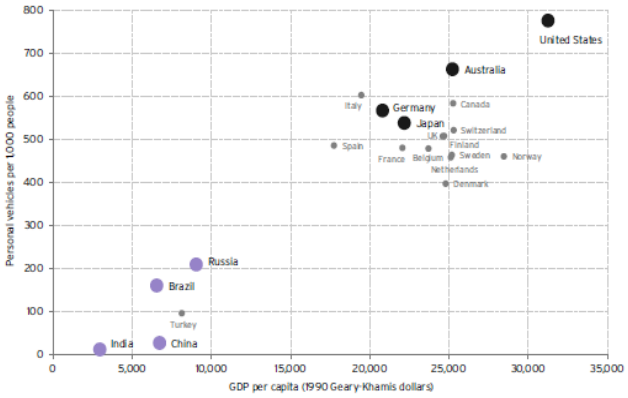
We also consider the continued recent trend towards a shift in the proportion of cars in use from OECD countries and some other EU member-states to other countries. This results from both lower demographic growth and modest increase in the number of cars per capita in advanced economies. Estimates by Ecola et al. (2014)[11] suggest the number of vehicles per capita and trip length per vehicle increase the most pronouncedly if GDP per capita ranges between 5 and 20 thousand Geary-Khamis dollars in 1990 prices (Figure 35). Whereas almost all the advanced economies have passed that border, developing countries are either at the beginning of this interval (Brazil, China, Russia and Turkey) or approaching it (India) (Figure 36).

Figure 35. Car ownership and GDP per capita



Source: Ecola et al. (2014).

Figure 36. Car ownership and GDP per capita in 2008



Source: Ecola et al. (2014).

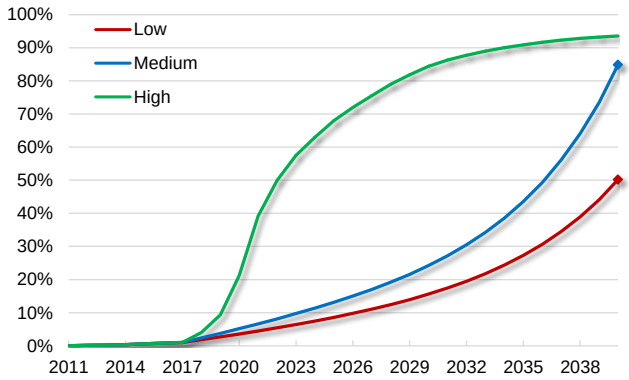
The low scenario is characterised by a more sluggish development of electric vehicle market and lower sales of electric cars by 2040 in each group of countries: 80% in OECD countries, 60% in other EU countries and 40% in other countries (Figure 37).

The preconditions suggest that electric vehicles will account for 85% of car sales by 2040 in the medium scenario and 50% in the low scenario (Figure 37), while in the aggregate fleet of motor vehicles electric cars will account for 38% in the medium scenario and 23% in the low scenario (Figure 38).

[10] See estimates of technology introduction Nagy B., Farmer J., Bui Q.M., Trancik J. (2013). Statistical basis for predicting technological progress. PLoS ONE 8(2): e52669.

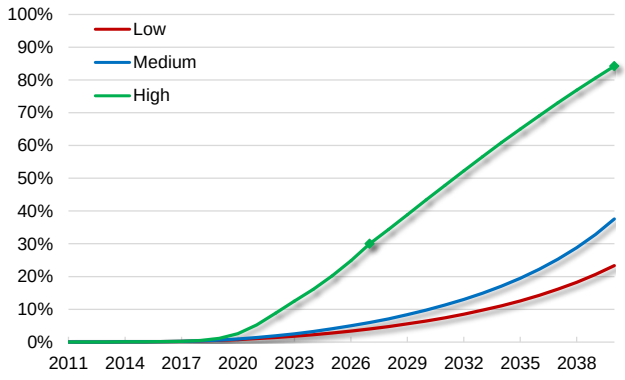
[11] Ecola L., Rohr C., Zmud J., Kuhnimhof T., Phleps P. (2014). The Future of Driving in Developing Countries. RAND Corporation research report series.

Figure 37. Electric vehicle sales in the aggregate motor transport, by scenario, %



Sources: OICA, Cherif et al. (2017), R&F Department calculations.

Figure 38. Electric vehicles in the aggregate fleet of motor vehicles in use, by scenario, %

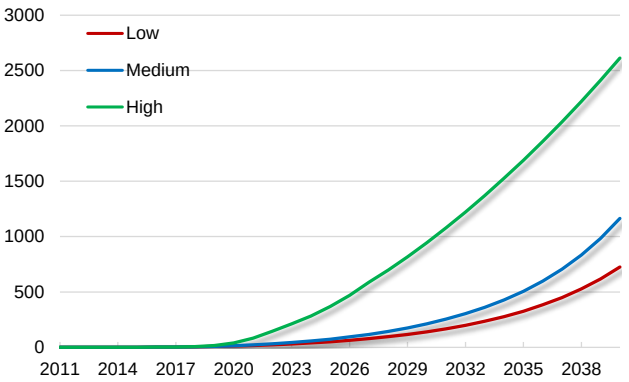


Sources: OICA, Cherif et al. (2017), R&F Department calculations.

The high scenario of electric vehicle market development is based on the pace of replacement of cartage by motor vehicles in early 20th century. Should that pace be repeated, in ten years electric cars will account for 30% in the aggregate fleet of motor vehicles in use, and in 15 years for 93% (Cherif et al. (2017)[12]) (Figure 38). This provides for considerably faster growth in the proportion of electric cars sold: to 50% by 2022 and 94% by 2040 (Figure 37).

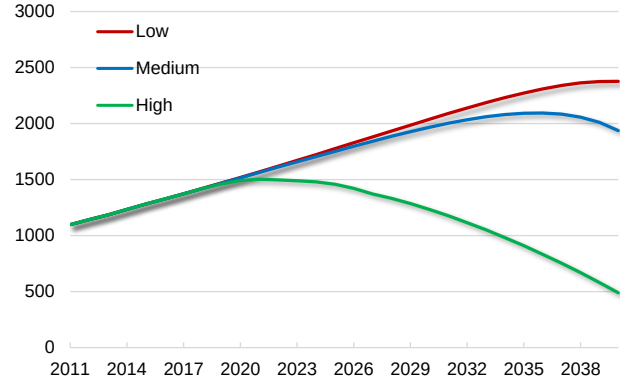
The number of electric and conventional motor vehicles varies considerably across the scenarios. The low scenario expects that the number of electric cars will increase to 0.72 billion by 2040, the medium one suggests an increase to 1.16 billion and the high scenario – to 2.61 billion (Figure 39). The number of conventional motor vehicles will peak by 2040 in the low scenario, 2036 in the medium scenario and by 2021 in the high scenario (Figure 40). The high scenario suggests that in 2032 the share of electric cars in the total motor vehicle fleet will overpass 50%.

Figure 39. Number of electric vehicles in use, by scenario, million



Sources: OICA, Cherif et al. (2017), R&F Department calculations.

Figure 40. Number of conventional vehicles in use, by scenario, million



Sources: OICA, Cherif et al. (2017), R&F Department calculations.

[12] Cherif R., Hasanov F., Pande A. (2017). Riding the Energy Transition: Oil Beyond 2040. IMF Working Paper, No. 120.

Impact on the oil market. Motor vehicles are the key component of (growth in) global demand for oil. According to BP estimates, they account for 44% of total oil consumption, of which passenger transportation accounts for 3/5 and freight turnover – for 2/5 of that volume.

Along with the developing electric car market, oil consumption growth is constrained by higher fuel efficiency. Natixis estimates suggest that the increase in fuel efficiency in 1980-2006 reduced oil consumption by 0.87 million barrels a day.

Here, we examine ***three scenarios related to the increase in fuel efficiency***.

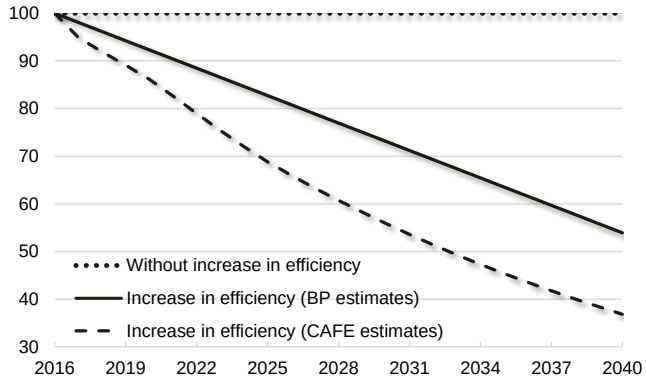
The high scenario provides for an increase in efficiency at the pace, for which ***CAFE standards upward revision*** (*Corporate Average Fuel Economy*) applied in the US serves as a proxy. We use weighted average data for light vehicles and light and medium trucks. In line with this scenario, fuel efficiency should almost triple by 2040 vs. the 2016 readings (Figure 41).

The medium scenario employs ***BP estimates of fuel efficiency increase*** from their long-term forecast. This scenario suggests that fuel efficiency should almost double by 2040 (Figure 41).

The low scenario ***does not provide for a further increase in efficiency*** (Figure 41). The scenario is provisional but it may be contingent upon, for example, car makers' decision to cease investing in the development of the internal combustion engine and instead focussing on electric engines and other technologies.

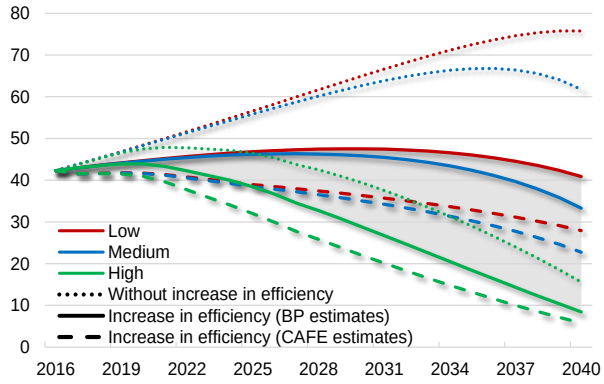
Scenario-based calculations suggest that oil consumption for motor vehicles is influenced by the pace of electric car market development and the increase in fuel efficiency (Figure 42). Forecast trajectories vary but overall there are two dimensions: by oil consumption peak and the pace of consumption shrinkage. The low and medium scenarios of electric car market development suggest that unless fuel efficiency is increased, consumption will rise aggressively and only pass its peak at the end of the forecast period. The same scenarios envisage that if fuel efficiency is growing moderately (BP), consumption will peak in the second half of 2020s to subsequently slow down at a relatively moderate pace. The other five possible alternatives provide for the consumption peak to be reached in the medium run, in 2018-2021; those of them based on the high scenario of electric vehicle market development also expect consumption to drop relatively fast in the years that follow. The materialisation of these scenarios may result in the considerable drop in oil prices even amid the expected slowdown in deployment of new fields in early 2020s due to their underinvestment in the recent years.

Figure 41. Scenarios of fuel efficiency movements, 2016=100



Sources: BP, CAFE, R&F Department calculations.

Figure 42. Oil consumption for motor vehicles depending on electric vehicle market development (low / medium / high) and fuel efficiency, million barrels a day



Sources: BP, CAFE, OICA, R&F Department calculations.

Impact on metal markets. Changes in the structure of the motor vehicle fleet in use towards electric cars shifts the demand for metal towards those used widely in the production of electric cars, mostly their batteries.

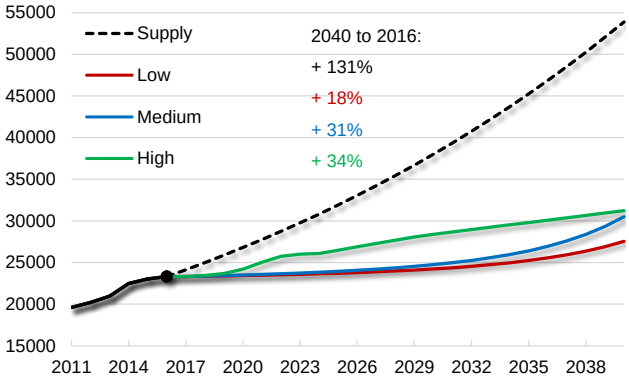
In our electric vehicle market development scenarios, we used information, provided by Geology for Investors and Natixis, on the average weight of metals used to create one conventional vehicle and one electric car to estimate the demand for basic metals which are set to benefit or lose from changes in the motor vehicle market structure. Copper, nickel, graphite, cobalt and lithium are set to benefit, whereas platinum and palladium will lose.

An electric car needs on average 40 kg more ***copper*** used in gearboxes as compared with conventional vehicles. ***Nickel*** for battery cathode is needed in the average amount of 14 kg per electric car. The battery in the Tesla S needs roughly 54 kg of ***graphite***. One electric car battery needs on average 7 kg of ***cobalt*** and 13 kg of ***lithium***. Figure 43-Figure 47 show the ratio between the motor industry's demand for metals and increase in their global supply relative to the 2016 readings. The demand growth path is featured for the low, medium and high scenarios of electric car market development. The 2017-2040 supply growth path is based on the average growth registered in 2012-2016. The supply paths are provisional, but, first, they serve as a benchmark of supply growth based on the past years' readings; and second, if we assume that supply follows the demand, the trajectories give an idea of how global demand would change if it followed the dynamics of recent years. Therefore, if demand of the motor industry grows (considerably) faster than supply, we can assume that the market may become (considerably) tougher and the price of the respective metal may increase (significantly), and vice versa.

The calculations suggest that copper producers will hardly have to revise their plans considerably to meet the demand from the motor industry (Figure 43); however the producers of other metals will have to increase output significantly. The target is quite

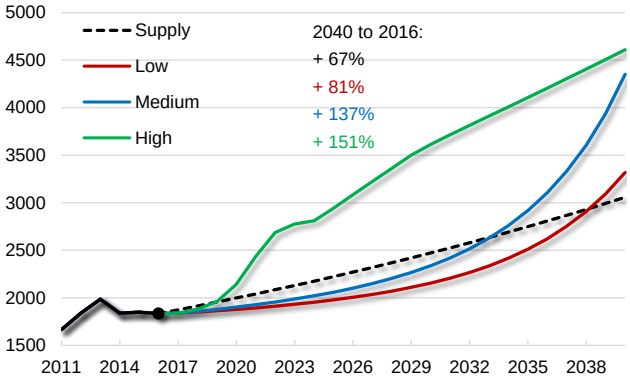
achievable for nickel and graphite: the explored stock means the demand can be met, while the challenges of the high scenario of electric car market development are likely to be overcome by way of price increases for nickel and graphite, making production expansion profitable (Figure 44 and Figure 45). However, the capabilities of cobalt and lithium producers seem to lag behind the demand, and unless electric car battery technology is revised, even considerable price growth will not allow a required increase in their production (Figure 46 and Figure 47).

Figure 43. Copper: global supply growth and additional growth in demand from the motor industry, by scenario (relative to 2016), thousand tonnes



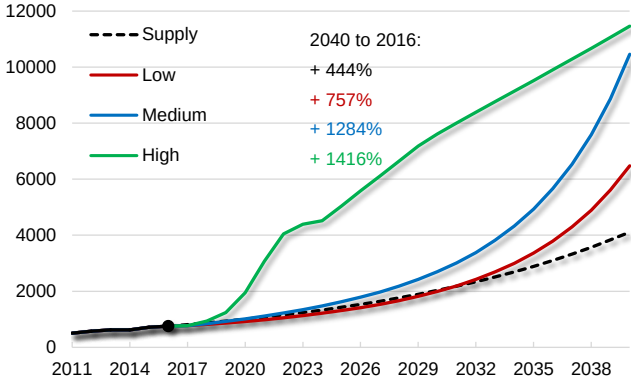
Sources: Bloomberg Finance L.P., Geology for investors, R&F Department calculations.

Figure 44. Nickel: global supply growth and additional growth in demand from the motor industry, by scenario (relative to 2016), thousand tonnes



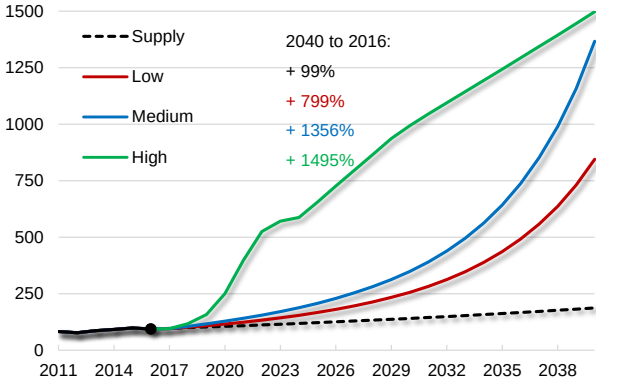
Sources: Bloomberg Finance L.P., Natixis, R&F Department calculations.

Figure 45. Graphite: global supply growth and additional growth in demand from the motor industry, by scenario (relative to 2016), thousand tonnes



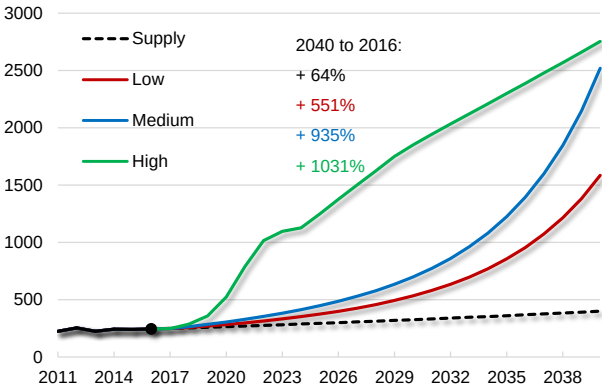
Sources: Geology for investors, Statista, R&F Department calculations.

Figure 46. Cobalt: global supply growth and additional growth in demand from the motor industry, by scenario (relative to 2016), thousand tonnes



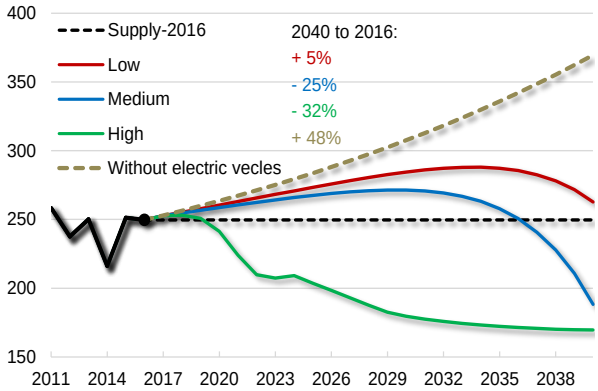
Sources: Bloomberg Finance L.P., Geology for investors, Natixis, R&F Department calculations.

Figure 47. Lithium: global supply growth and additional growth in demand from the motor industry, by scenario (relative to 2016), thousand tonnes



Sources: CEIC, Geology for investors, Natixis, Statista, R&F Department calculations.

Figure 48. Platinum: additional growth in demand from the motor industry, by scenario (relative to 2016) and potential growth in demand without further increase in electric car sales, tonnes

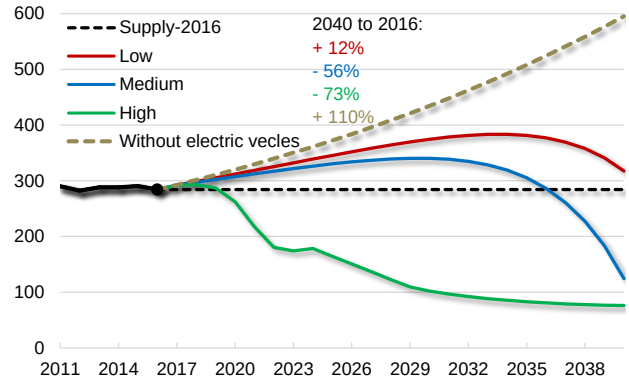


Sources: Bloomberg Finance L.P., R&F Department calculations.

Platinum and ***palladium*** are used in the production of catalytic converters for conventional motor vehicles. Although their weight per vehicle is very low (according to our estimates based on Metals Focus Limited data, roughly 1 and 2.5 gram respectively), the motor industry accounts for 43% and 78% of total global demand for these metals. Figure 48 and Figure 49 display the increase in demand for metals from the motor industry by scenario and the potential increase in demand should electric car sales stop growing further (sales at the 2016 level).

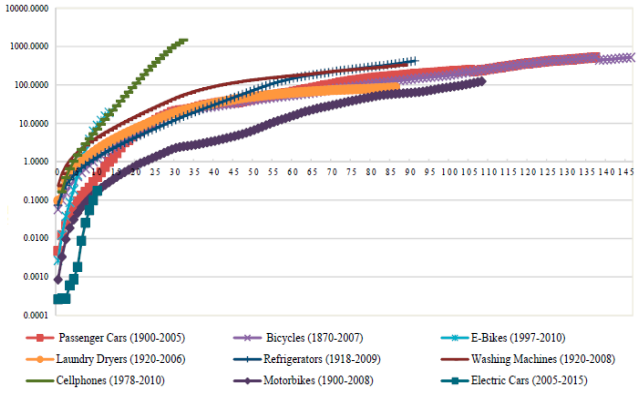
The calculations suggest that a shift in demand from conventional vehicles to electric cars will shrink the demand for platinum and, even more pronouncedly, palladium, while the materialisation of the high scenario should result in a slump in prices of these metals in early 2020s (Figure 48 and Figure 49).

Figure 49. Palladium: additional growth in demand from the motor industry, by scenario (relative to 2016) and potential growth in demand without further increase in electric car sales, tonnes



Sources: Bloomberg Finance L.P., R&F Department calculations.

Figure 50. Introduction of new technologies (vertical axis – pieces per one thousand persons, logarithms; horizontal axis – years after the introduction)



Source: Cherif et al. (2017).

Scenario choice and conclusions. Given the current situation, we are inclined to choose the medium scenario of electric car market development, which is generally similar to the majority of other electric car market development estimates (International Energy Agency, OPEC, BP, etc.). This results, in particular, from the likely challenges of infrastructure development (service stations, electrification), short supply of cobalt and lithium for electric car production, and the fact that electric car market development is currently largely encouraged by the state support.

Having said that, we consider a shift from the medium to high scenario to be highly likely. New technological solutions are reducing the cost of batteries and electric cars. John Goodenough announced a battery in which more widely available sodium substitutes for lithium. Estimates by Bloomberg New Energy Finance and Cambridge Econometrics suggest that the cost of an electric car may be comparable with that of a conventional vehicle as early as 2022-2025. Furthermore, according to the estimates made for the US by Needell et al. (2016)[13], existing batteries allow to make 87% of trips. As regards the infrastructure-side restrictions, Cherif et al. (2017) note that they are comparable with those at the beginning at the 20th century during the replacement of cartage by motor vehicles (service station shortage, poor road quality). They also demonstrate that new technologies are introduced at a similar pace allowing to expect a surge in the number of electric cars in the years to come despite the currently evident hurdles (Figure 50).

We also expect fuel usage efficiency growth to continue, though at a moderate pace that is close to or undershoots BP estimates due to the shift in car makers' investment from internal combustion to electric engines.

We revealed risks of a considerable drop in the motor industry's demand for oil, platinum and palladium, and considerable growth in demand for lithium and cobalt, and partially graphite and nickel. However, this does not give us a clear picture of demand. Thereby, alongside motor vehicles 11% of aggregate demand for oil is attributed to air and marine transportation, and different estimates suggests that these industries will continue to increase their consumption. The rest 45% of global consumption may be attributed, for instance, to petrochemicals, which is set to show an increase in consumption as well. Thereby, the peak of oil consumption by the motor industry does not necessarily mean the peak of overall oil consumption, but will bring it closer. There is also high uncertainty over the supply of oil and metals. This hampers in drawing definitive conclusions about price movements.

[13] Needell Z., McNerney J., Chang M.T., Trancik J. (2016). Potential for widespread electrification of personal vehicle travel in the United States. Nature Energy, 1, 16112.

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