Economic and Monetary Developments

Autumn 2021

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Abbreviations

CPI   Consumer Price Index
EA   euro area
ECB   European Central Bank
EC   European Commission
EME   emerging market economy
EONIA   euro overnight index average
ESA 2010   European System of Accounts 2010
ESI   Economic Sentiment Indicator (European Commission)
EU   European Union
EUR   euro
EURIBOR   euro interbank offered rate
Eurostat   statistical office of the European Union
GDP   gross domestic product
HICP   Harmonised Index of Consumer Prices
IMF   International Monetary Fund
IPI   industrial production index
MFI   monetary financial institution
MF SR   Ministry of Finance of the Slovak Republic
MTF   NBS's Medium-Term Forecast (published on a quarterly
            basis)
NACE   Statistical Classification of Economic Activities in the
            European Community (Rev. 2)
NBS   Národná banka Slovenska
NEER   nominal effective exchange rate
NFC   non-financial corporation
OECD   Organisation for Economic Co-operation and Development
p.a.   per annum
p.p.   percentage point
PMI   Purchasing Managers' Index
REER   real effective exchange rate
SME   small and medium-sized enterprise
SO SR   Statistical Office of the Slovak Republic
ÚPSVR   Ústredie práce, sociálnych vecí a rodiny – Central Office of
            Labour, Social Affairs and Family
USD   US dollar
VAT   value-added tax

Symbols used in the tables
.   – Data are not yet available.
-     – Data do not exist / data are not applicable.
(p)   – Preliminary data

1 Summary

The return of the Slovak economy to pre-pandemic levels is now not expected to happen until early 2022. Advanced world economies are rapidly rebounding to pre-crisis levels of performance, and this favourable trend is creating fertile soil for a similar situation in Slovakia. In the case of our economy, however, the projected pace of economic growth in coming quarters is clouded by two factors. The first is the incoming third wave of the pandemic, which will undermine domestic consumer demand in particular. Even greater uncertainty and probably higher output losses will, however, be caused by persisting supply bottlenecks in manufacturing industry.

The most likely projection for Slovakia's GDP growth in 2021 is 3.5%, which represents a significant downward revision of the projection given in the summer forecast.

The economy is expected to recoup its 2021 losses at a later date. We envisage the normalisation of component supplies in the second half of next year. In subsequent quarters, with demand at elevated levels, manufacturing output is expected to be temporarily higher than projected in the summer. As regards domestic demand, private consumption is expected to pick up as soon as the pandemic's third wave has faded, just as it did after the first two waves.

Strong economic growth in 2022 and 2023 will be supported by a resurgence in investment. Private investment will benefit from a decline in real interest rates. In addition, a huge package of EU funds will be available for disbursal.

The slowdown in economic activity in the near term is expected to have a dampening effect on employment growth. Thereafter, however, we assume that firms will be rapidly filling job vacancies. Recruitment should be buoyed by sharply rising wage growth, which will reflect labour market tightening, stronger price growth and, far more than anything else, accumulated labour productivity.

High input prices have passed through to consumer prices more rapidly than we envisaged in the summer forecast. The impact of input prices is evident in all inflation components. Weaker demand has had the highest impact on inflation, as it continues to weigh heavily on those sectors hardest hit by the pandemic. Next year the inflation rate will also be affected by increases in administered energy prices, and it is not expected to return to around 2% until 2023.

The current uncertainty about future developments stems mainly from factors that are dampening economic activity and simultaneously pushing prices up. Although the forecast has been substantially revised in the light of new information, the main risk continues to be that supply-side pressures will be greater or longer-lasting than expected. Hence the next quarters are expected to see even lower growth and higher inflation.

The public finance deficit projection for 2021 remains the same as in the summer forecast. Public debt is expected to peak in 2021, before falling gradually amid a decreasing fiscal deficit.

This issue of the Economic and Monetary Developments (EMD) report includes several in-depth analyses and special annexes. Their main conclusions are as follows:

- Compared with advanced economies such as Germany and Italy, Slovakia has withstood the pandemic crisis relatively well and has recouped most of its crisis-related losses. This positive difference is partly because the Slovak economy is still at the catching-up phase and therefore, on that basis, has a faster-growing economy. The measures taken by the Slovak government during the pandemic have generally been more moderate; nevertheless, mobility reduction beyond what is implied by the measures has had a considerable downward impact on economic growth. Also playing a negative role in this regard has been the differing sectoral composition of economies. Part of the positive difference in recent quarters, however, cannot be explained by pandemic indicator trends. A more important factor in Germany was the global shortage of components, while in Italy the domestic situation was disproportionately impacted by restrictions on travelling and holidaying within Europe and in advanced economies elsewhere in the world.
- We can expect another wave of the pandemic with two peaks in the number of hospitalisations: in mid-November 2021 and early February 2022. This is shown by our own new model of the pandemic.
- But for shortages of component supplies for Slovak industry, the economic growth projection for this year would have remained unchanged. And if the vaccination rate in Slovakia reached the EU average and gradually caught up with rates in the best-vaccinated countries, short-term household consumption (especially consumption of services) could be €1 billion higher for the two-year period of 2021–22.
- The expected closure of the economy's cyclical position in 2022, together with the accelerating absorption of EU funds, is creating scope for a consolidation of public finances that would imply a notably lower level of public sector debt in 2023.
- The pandemic crisis has not eroded the price competitiveness of Slovak industry. At the outset of the crisis the euro appreciated against the cur-

rencies of Slovakia's key trading partners outside the euro area and has remained stronger ever since. This trend, however, has gradually been reflected in producer prices levels. Domestic manufacturing prices have been gradually falling in comparison with producer prices in countries whose currency has weakened against the euro. In consequence, not only has the initial overpricing of domestic producers' products been wiped out, but their price competitiveness has improved.

2 Current macroeconomic developments in the external environment and in Slovakia

2.1 External environment

The global economy continued its recovery in the second quarter of 2021, though at a gradually moderating pace. Vaccination campaigns in several regions progressed significantly (Chart 1), allowing economies to reopen and supporting economic activity in the services sector (Chart 2). Manufacturing production continued to rise sharply. On the other hand, strong demand for intermediate inputs ran into supply constraints, resulting in significant upward pressure on prices of several commodities as well as container shipping prices. In poorer regions, vaccination rates remained well behind those in the advanced world. This adversely affected not only the economies of these regions, but also the functioning of global supply chains. Demand gradually begun shifting to the services sector, and this trend, together with supply chain disruptions, contributed to an easing of activity growth in manufacturing.

Chart 1
Percentage of the population that is fully vaccinated against COVID-19 (%)

Legend:
- United Kingdom
- Low-income countries
- Medium-low income countries
- European Union
- United States
- Israel
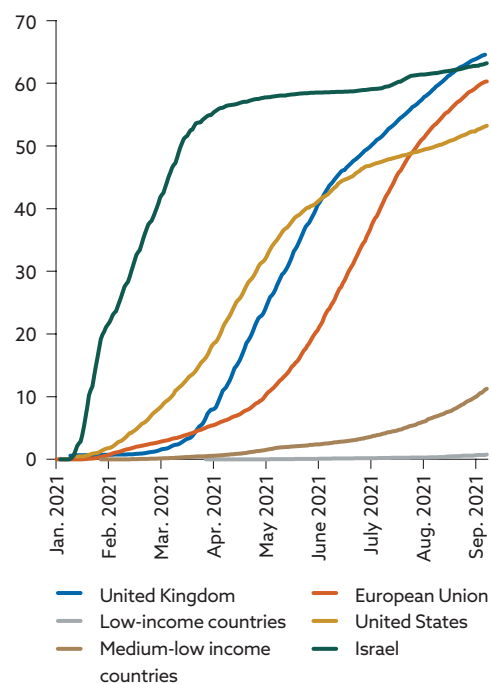
Source: Macrobond.

Chart 2
Global Purchasing Managers' Index (a value of 50 denotes stagnation)

Legend:
- Composite PMI
- Manufacturing
- Services
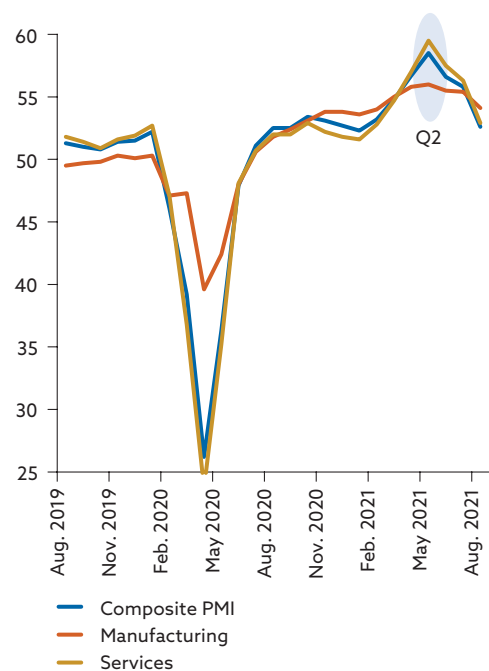
Source: Macrobond.

Because of supply shortages, manufacturers have been unable to finish a number of products. To meet their customers' demand, firms have had to dig deep into their inventories of finished products (Chart 3). In the United States, the positive impact of fiscal stimuli has gradually faded. This has affected not only US households' consumption, but also exports from countries, in particular China, which export their output to the US market (Chart 4). The summer months saw a gradual deterioration of the pandemic situation with the emergence of the Delta variant of the coronavirus (COVID-19) in several Asian economies and in some parts of the United States. The resulting negative impact on economic activity was again focused on services. In Asia in particular, however, sentiment in industry also started to worsen, potentially exacerbating the problem in supplies of certain components and in the functioning of global supply chains.

Chart 3

Assessments of finished product inventories in the United States and the euro area (standardised index; percentage balances)

Legend: Euro area — United States

Sources: Macrobond, Institute of Supply Management, and EC.
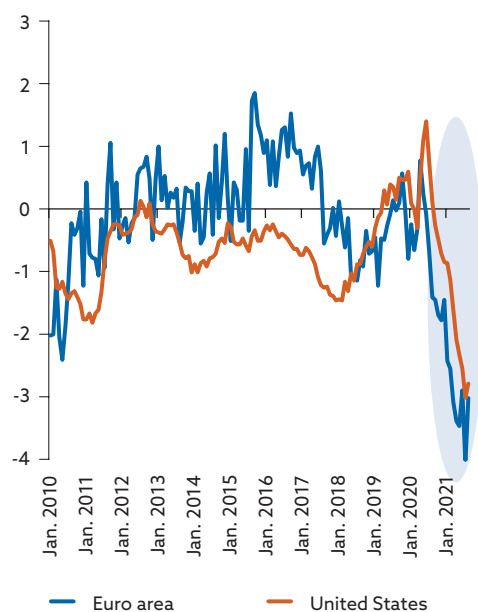
Chart 4

China's exports to the United States (USD billions)

Source: Macrobond.

The US economy expanded by 1.6% in the second quarter, which was higher than its pre-crisis growth rate. Compared with the crisis years of 2008 and 2009, the economic recovery has been faster (Chart 5), albeit aided by hefty fiscal stimulus. The main driver of the second-quarter growth was private consumption, which also benefited from accumulated "pandemic" savings which themselves were largely the result of fiscal transfers (Chart 6).

Chart 5

United States: comparing post-peak GDP growth during the 2008-09 crisis and the pandemic crisis (peak expansion = 100)

Number of quarters since expansion peak

— 2008 – 2009   — 2020
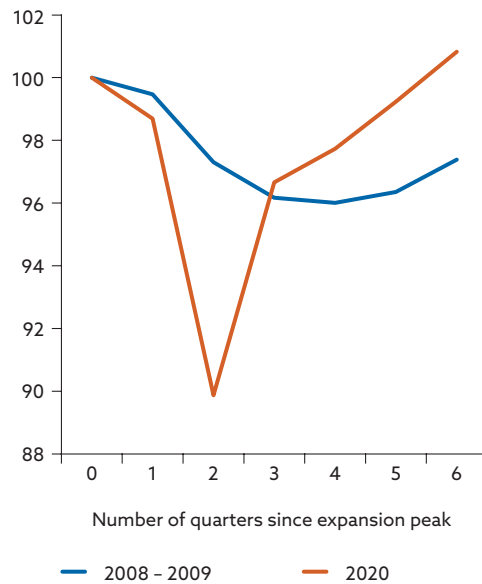
Source: Macrobond.

Chart 6

United States: household saving ratio and government current transfers (percentage of disposable income; annual percentage changes)

— Government current transfers
— Household saving ratio (percentage of disposable income; right-hand scale)
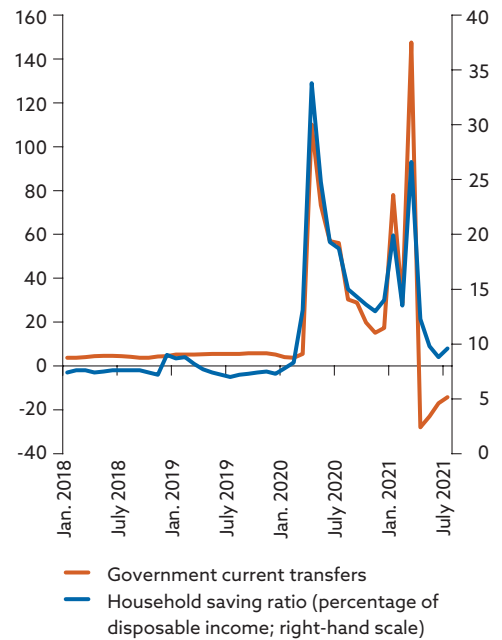
Source: Macrobond.

The euro area economy grew by a robust 2.2% in the second quarter of 2021. Although growth remained below pre-pandemic levels (Chart 7), the most recent ECB projection envisages a return to pre-crisis performance by the end of this year. Economic activity in the second quarter was supported considerably by increasing vaccination rates and by the improving pandemic situation. As the economy reopened, consumption surged. Leading indicators in the euro area suggest economic activity remains solid, but its growth rate is likely to moderate amid supply shortages of certain components and commodities, as well as their high prices. Firms in industry and services are having to cope with labour shortages, probably stemming from the numbers of people who have withdrawn from the labour market during the pandemic. Compared with the pre-pandemic period, the active population in the labour market has fallen by almost three million (according to data for the first quarter of 2021) (Chart 8). Moreover, the gradually spreading Delta variant is posing a rising risk, particularly in the services sector.

Chart 7

Euro area: comparing post-peak GDP growth during the 2008-09 crisis and the pandemic crisis (peak expansion = 100)

Number of quarters since expansion peak

— 2008 – 2009   — 2020
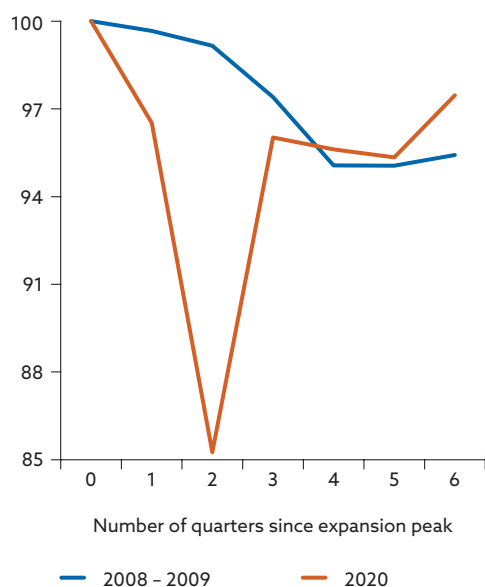
Source: Macrobond.

Chart 8

Euro area: active population in the labour market (millions of people)
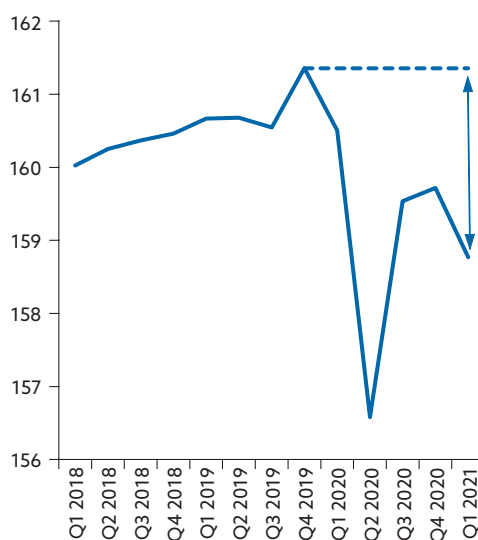
Source: Macrobond.

2.2 Slovakia

The economic losses resulting from the pandemic's more moderate second wave were immediately recouped in the second quarter of 2021. In line with projections, GDP increased by 2.0% quarter on quarter. The labour market still needed support from the government budget, but the extent of the support was falling during the quarter. The easing of pandemic containment measures improved the situation in the trade and services sectors and galvanised household consumption (Chart 9). Industry, however, had to struggle with component shortages, with some firms having to shut down temporarily despite stable order books. In order to reach its pre-pandemic level, the economy still has to grow by a further 2.1% (Chart 10).

In line with expectations, economic growth in the second quarter was driven mainly by domestic consumption. Consumer demand that had become pent up during the lockdown was being released. After a strong winter wave of the pandemic, the situation improved in spring to the extent that almost all containment measures could be lifted and businesses were able to reopen. Beside necessities, durable consumer goods were also being purchased in increased volumes, and household consumption therefore quickly rebounded to pre-pandemic levels.

Chart 9
GDP broken down by sector (quarter-on-quarter percentage changes; percentage point contributions)

Industry
Trade and services
Other sectors
GDP (%)
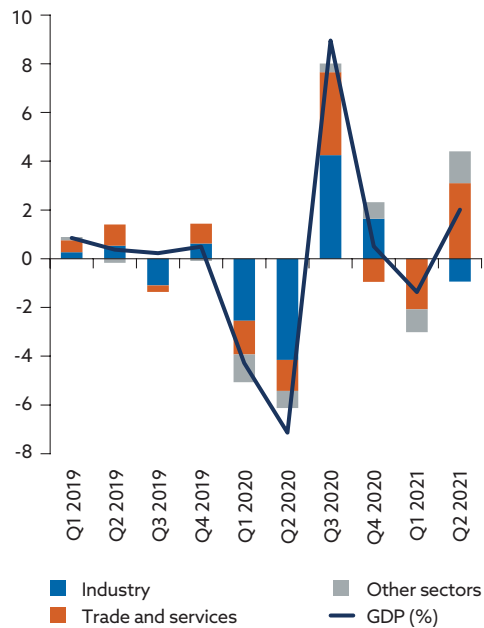
Sources: SO SR, and NBS calculations.

Chart 10
Current state of the economy and labour market (difference vis-à-vis Q4 2019; percentages)

First pandemic wave
Second pandemic wave
2.1%

GDP relative to its Q4 2019 level
Number of private sector workers using the government's job retention schemes
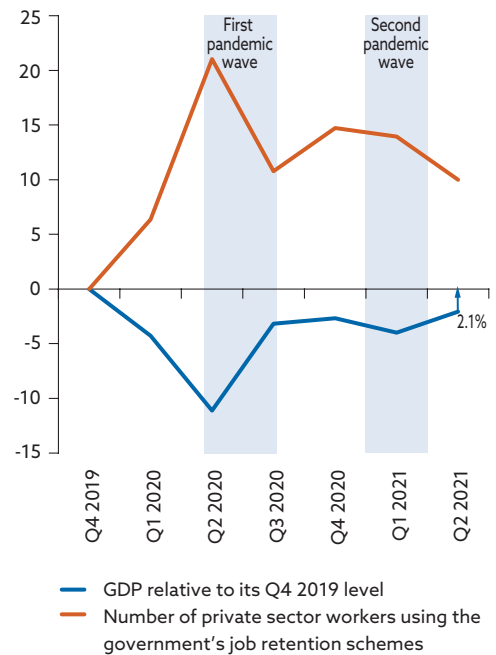
Sources: SO SR, and NBS calculations.

Households are not as yet dipping into accumulated savings and are financing their consumption largely out of current income. Although rising prices are chipping into their income, households are saving the same proportion of their income as they were doing before the pandemic (Chart 11). The return of the saving ratio to normal levels bears out the fact that most households wish to use their accumulated savings to strengthen their financial buffer.

As the epidemiological situation has improved, so mobility has increased and the services sector has gradually recovered (Chart 12). With the health situation improving, households started to socialise more and to spend their money on restaurant and accommodation services. The increases in mobility and tourism were supported by the rising vaccination rate. According to electronic cash register data, the summer season may have been slightly better this year than last year. In the tourism sector, however, there remains a sense of caution, since this year's season was also marked by a low number of tourists, especially from abroad.

The continuation of the favourable household consumption trend is at risk, however, from the incoming Delta variant wave coupled with the country's low vaccination rate. The presence of concerns about the future

situation is also apparent from the deterioration of sentiment in the services and trade sectors towards the end of summer.

Chart 11
Household income and consumption (constant prices; quarter-on-quarter percentage changes)
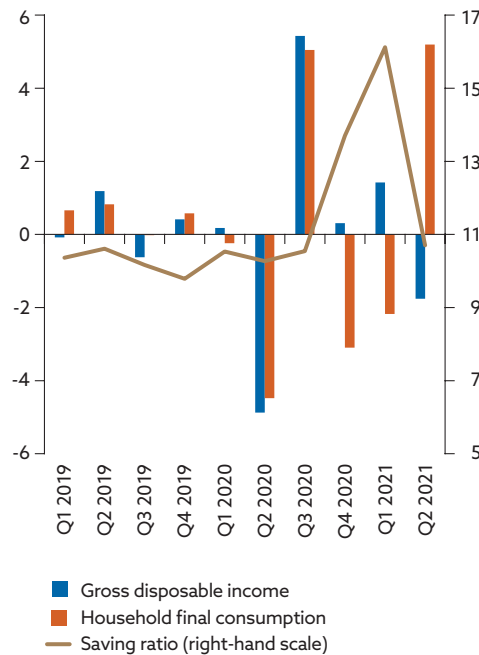
Chart 12
Household consumption broken down by Classification of Individual Consumption According to Purpose (COICOP) (constant prices; annual percentage changes; percentage point contributions)

- Gross disposable income
- Household final consumption
- Saving ratio (right-hand scale)

Sources: SO SR, and NBS calculations.

- Food and alcohol
- Miscellaneous goods and services
- Household final consumption (%)
- Housing
- Services
- Goods
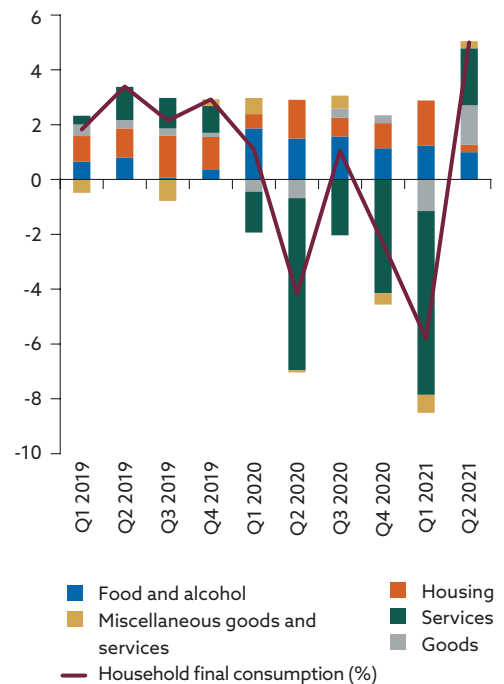
Sources: SO SR, and NBS calculations.

Industry faced component supply bottlenecks in the second quarter of 2021, and this was reflected in lower exports. In the first months of the year, Slovak manufactures managed to avoid the impact of global computer chip shortages, but in the second quarter they were no longer able to do so. Many firms, especially in the automotive industry, were compelled to shut down their production temporarily. In consequence, after starting the year strongly, Slovak exports to all countries declined.

Firms are not currently able to meet favourable overall demand. On the contrary, supply bottlenecks appear to be getting worse, as is also indicated by business survey results. A still larger proportion of industrial firms see the supply situation as rather negative, and these perceptions are reflected in sentiment indicators. The uncertain and still far-off end to this problematic situation is further increasing risk.

Box 1
Qualitative assessment of cyclical conditions

Economic sentiment in Slovakia has deteriorated ahead of the onset of the pandemic's third wave. After the optimism of the spring months, confidence has worsened significantly (Chart A). In their discussions with Národná banka Slovenska, the country's largest employers have highlighted their problems with input shortages, with the consequent sharpy rise in input prices, and with finding skilled labour. Supply bottlenecks are not expected to ease until the second half of next year.

Chart A
Confidence indicators (standardised balances)
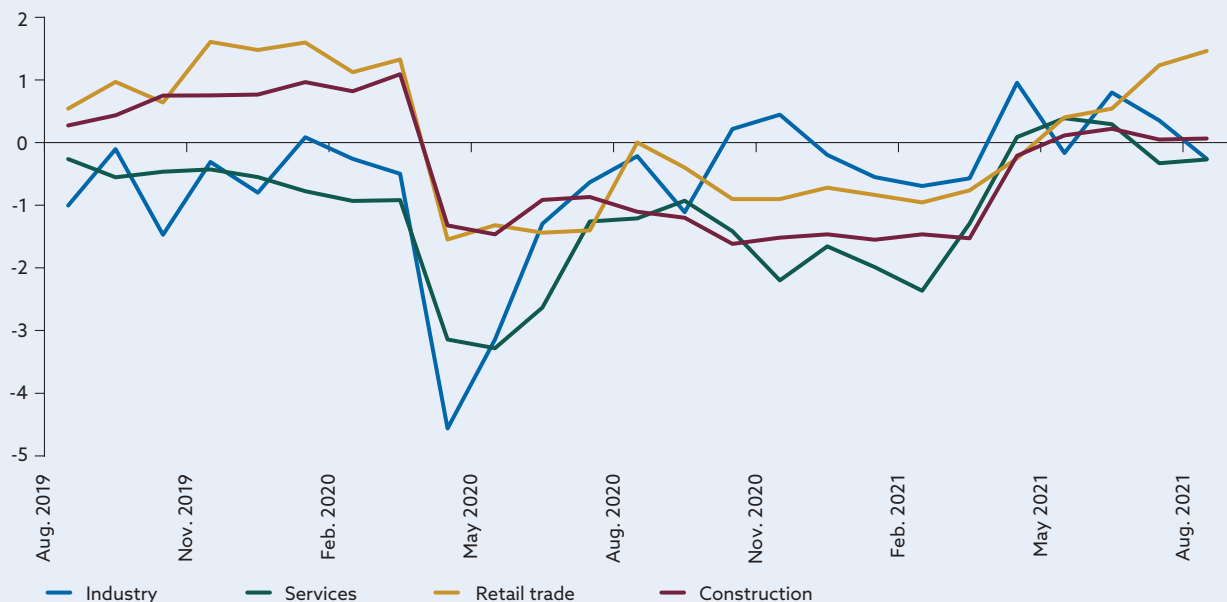
Sources: European Commission, and NBS calculations.

Industry confidence has been dented by the global supply crisis. Although assessments of order books are at exceptionally high levels, confidence growth is being curbed by uncertainty about the smooth functioning of supply chains and input shortages. The main problem is with supplies from Asia, from where car and electronics manufacturers import components (Chart B). Shortages of these inputs, together with the persisting shortage of skilled labour (Chart C), are seen by firms as the main constraints on production. Moreover, firms are having to come to terms with surging input prices. From their perspective, the major source of cost pressures and a long-term competitive disadvantage in the international market is the high price of electricity in Slovakia.

Chart B
Input shortages as a constraint on producers using electronic components (percentage of respondents)

Legend: Computers and electronics, Electrical equipment, Cars
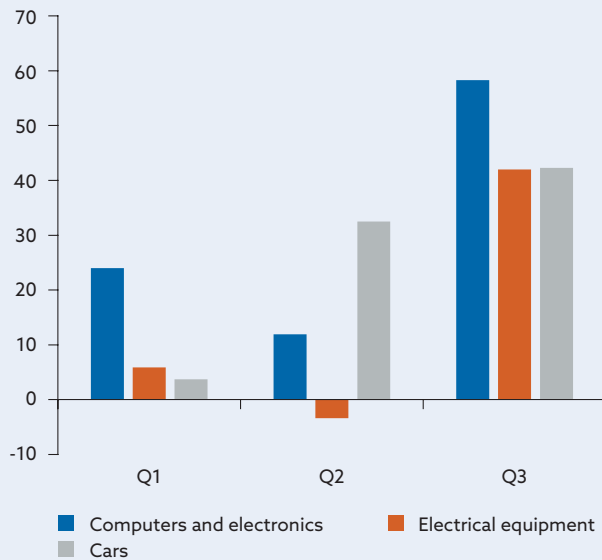
Source: European Commission.

Chart C
Labour shortages as a constraint (percentage of respondents)

Legend: Industry, Services

Source: European Commission.

Services confidence is stronger than it was before the pandemic, but concerns ahead of the pandemic's third wave are undermining optimism. With the easing of containment measures in spring, services confidence rebounded to above pre-pandemic levels on the back of exceptionally optimistic assessments of expected demand and the business situation. Since they viewed government support measures as inadequate, businesses in the hard-pressed sectors of food service activities, accommodation, and entertainment and recreation were particularly reliant on the summer season, including the positive impact of the vaccination campaign. They encountered, however, a problem of labour shortages, since concerns about further income losses made people wary of working in these sectors (Chart C). The decline in confidence in the late summer is indicative of concerns about the situation during the next pandemic wave.

Retail trade confidence remains positive (Chart D). Except for shops selling necessities, many businesses were shut down for a longer period during the second wave of the pandemic than during the first wave. The main beneficiaries of this situation were online merchants that were able to adapt quickly to new conditions and shifts in consumer behaviour (Chart E). This is why some businesses have not been so badly affected by the pandemic crisis and why assessments of the current and expected business situation remain favourable. A greater cause of concern is the rising prices of goods.

Chart D

Retail trade confidence and retail sales (percentage balances; annual percentage changes)

- Retail sales (%)
- Retail trade confidence indicator (right-hand scale)
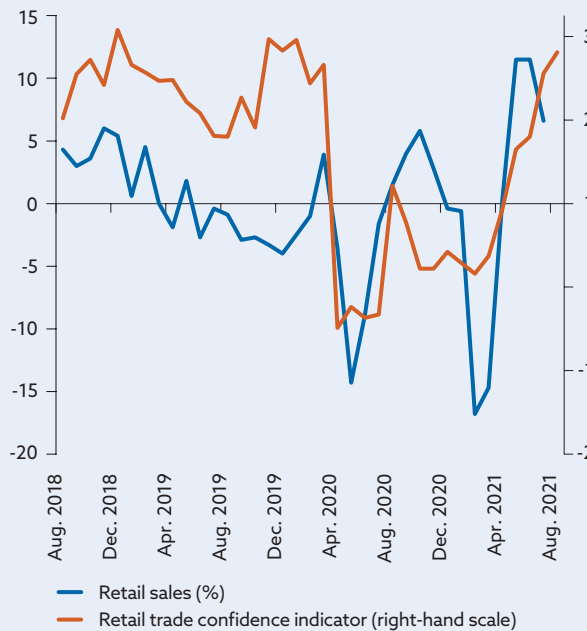
Sources: European Commission, SO SR, and NBS calculations.

Chart E

Retail trade confidence and private consumption (percentage balances; annual percentage changes)

- Retail trade confidence indictor
- Private consumption (right-hand scale)
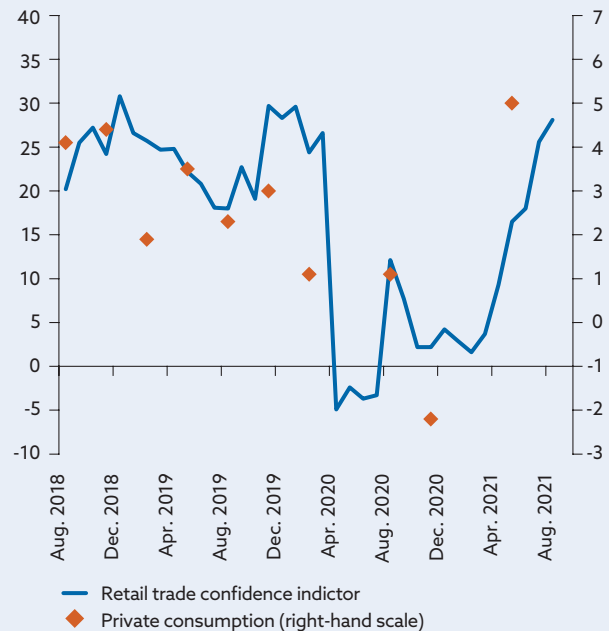
Sources: European Commission, SO SR, and NBS calculations.

Investment activity in the second quarter was driven mainly by the government sector, while firms continued to take a cautious approach to investment decisions. In manufacturing industry, input shortages prevented a stronger pick-up in investment activity. The bulk of this investment was in the machinery and equipment segment. Low fixed capital formation is also due to the unfavourable situation in the construction sector, in which rapidly rising input prices pose a risk.

The increase in general government consumption in the second quarter stemmed mainly from increasing expenditure on wages, goods and services, whose impact was partly dampened by rising revenues. Expenditure was affected by purchases of pandemic-related medical supplies (antigen tests and vaccines) as well as by higher spending on goods and services. Strong growth was also seen in public sector wages, particularly in contractual wages in the hospital and local government sectors. There were also bonuses for front-line health workers. Given its low base in 2020, the increase in healthcare expenditure appears to represent a realisation of previously deferred healthcare spending.

In the case of public investment, the first six months of 2021 saw a slight pick-up in activity. General government investment was boosted by de-

fence spending on military equipment, as well as by the ongoing modernisation of the state railway operator's rolling stock.

The absorption of EU funds increased in the second quarter for a second successive quarter, with most of the funds being earmarked for projects to mitigate the impact of the pandemic crisis on households. In the pre-crisis period, EU funds were largely allocated to demand-driven expenditure[1] (Chart 13), most notably through projects in the areas of transportation and environment. During the imposition of stringent containment measures in the early part of the pandemic crisis, EU fund disbursements, together with investment activity, stopped growing. Subsequently, these disbursements gradually picked up, largely thanks to allocations to co-financed pandemic containment measures. Demand-driven expenditure has therefore been stagnating, notwithstanding the high level of contracted and undrawn funds, whose recipients can begin using these funds almost immediately.

Slovakia has not as yet managed to take advantage of undisbursed EU funds available for supporting its weakened economy. When it was hit by the pandemic crisis, Slovakia's outstanding allocation under the EU's 2014–2020 budget stood at almost €10 billion. The easing of disbursement conditions by the EU provided an opportunity for them to be used to stimulate the country's crisis-affected economy.

Chart 13
EU fund disbursements in Slovakia (constant prices; annual percentage changes)

Demand-driven expenditure (non-COVID)
Household income and wages (non-COVID)
Household income and wages (COVID)
Other
Annual percentage change (%)
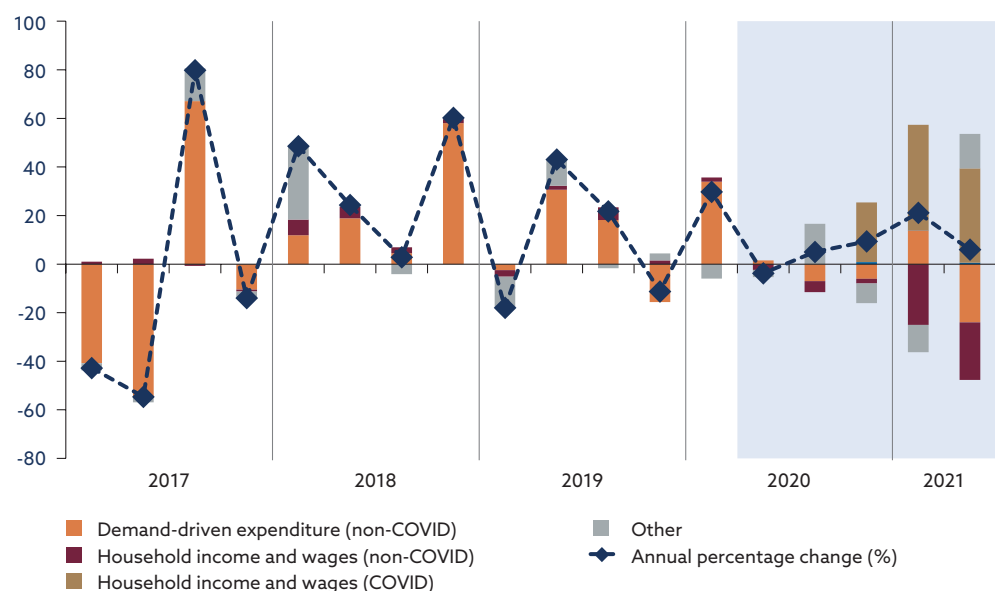
Sources: Eurostat, State Treasury, and NBS calculations.

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[1] Demand-driven expenditure represents the most significant item and includes all public and private investment, public expenditure on goods and services, and current expenditure on private sector projects.

The improving health situation and easing of containment measures helped improve labour conditions in the second quarter of 2021. Employment increased in all sectors of the economy, most markedly in trade and services. In the public sector, job creation schemes were restarted (Chart 14). By the end of the quarter, the total number of people in employment was around 60 thousand below the pre-pandemic level (Chart 15).

Chart 14

Employment (quarter-on-quarter percentage changes; percentage point contributions)

- Public administration, defence, education and health care
- Agriculture, forestry and fishing
- Construction
- Services and trade
- Industry
- Employment in total (%)

Sources: SO SR, and NBS calculations.
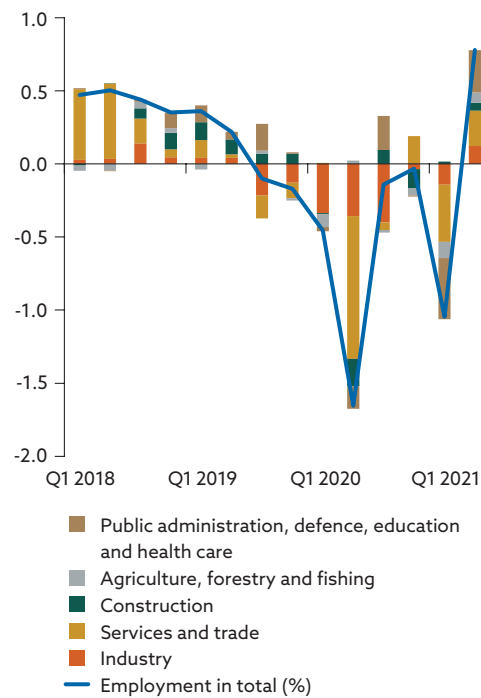
Chart 15

Employment (level; thousands of people)
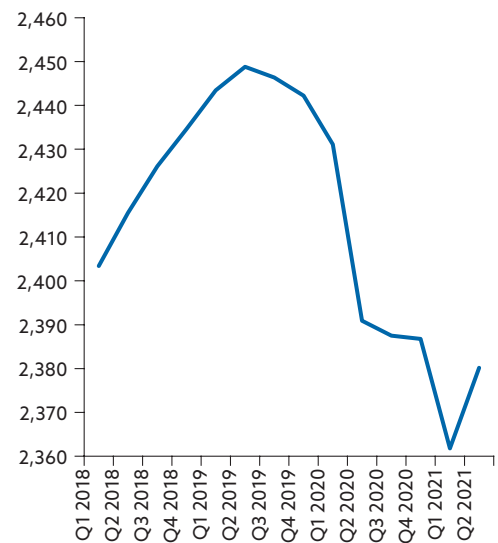
Sources: SO SR, and NBS calculations.

Labour demand is relatively strong. Even now, when the number of unemployed is higher than it was in the pre-pandemic period, firms are reporting labour shortages. The number of job offers accelerated to record levels in the second quarter of 2021 (Chart 16). But while the job vacancy rate increased rapidly, the unemployment rate remained flat at around 7%. Employers are struggling to find appropriately qualified staff (Chart 17), which suggests that the labour market has a structural problem. Labour shortages could hinder the economy's return to its pre-crisis growth path.

Chart 16

Number of active job offers (level; quarter-on-quarter percentage changes)

Quarter-on-quarter percentage change (right-hand scale)

Number of active offers
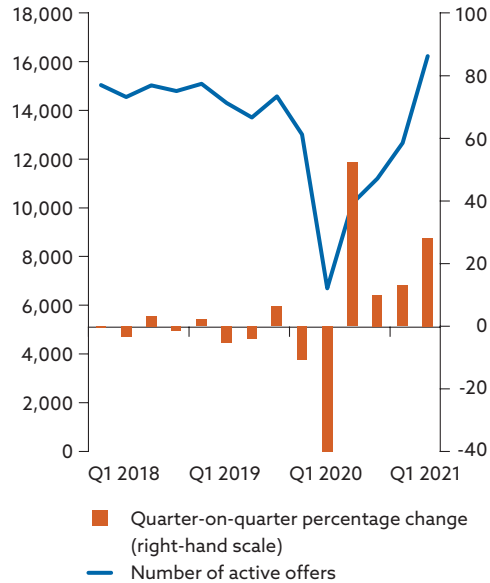
Sources: Profesia online job portal (www.profesia.sk), and NBS calculations.

Chart 17

Beveridge curves
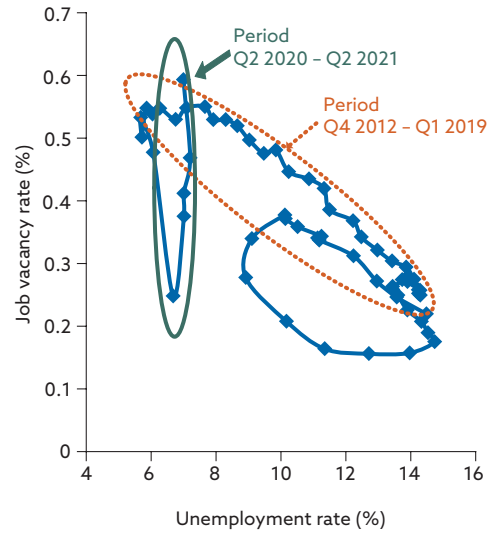
Sources: SO SR, Profesia online job portal (www.profesia.sk), and NBS calculations.

Wages increased moderately in the second quarter, but with prices rising sharply, households' purchasing power fell. The economy's reopening had an upward impact on wages in sectors hard hit by containment measures (Chart 18). In some parts of the economy where crisis-related problems were persisting, fiscal support measures continued to be implemented. Abstracted from government income support measures, private sector compensation was therefore still not back to its pre-pandemic level.

Chart 18

Compensation per employee (index: Q4 2019 = 100)

Private sector excluding support measures   Private sector   Government sector   Total
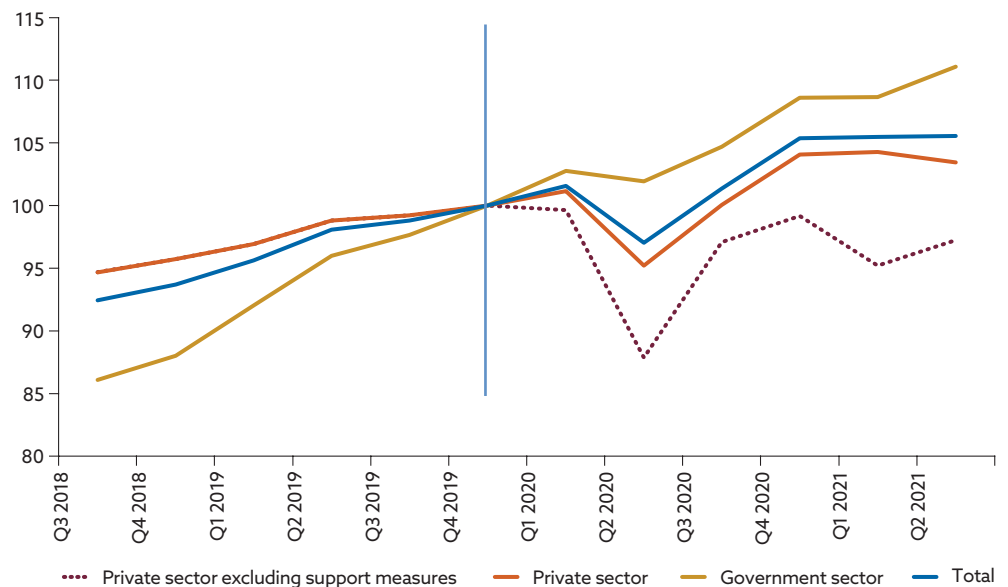
Sources: SO SR, and NBS calculations.

Annual consumer price inflation accelerated beyond 3% in August 2021 (Charts 19 and 20), significantly outpacing expectations. This increase should be seen in the context of high input prices and the economy's re-opening; it is a consequence of the slow response to rebounding demand. Prices of imported goods increased amid sharp worldwide rises in all input prices. In the domestic economy, service sector firms took the opportunity to raise prices to compensate for their revenue losses during the pandemic period.

Chart 19
HICP inflation and its components
(annual percentage changes; percentage point contributions)
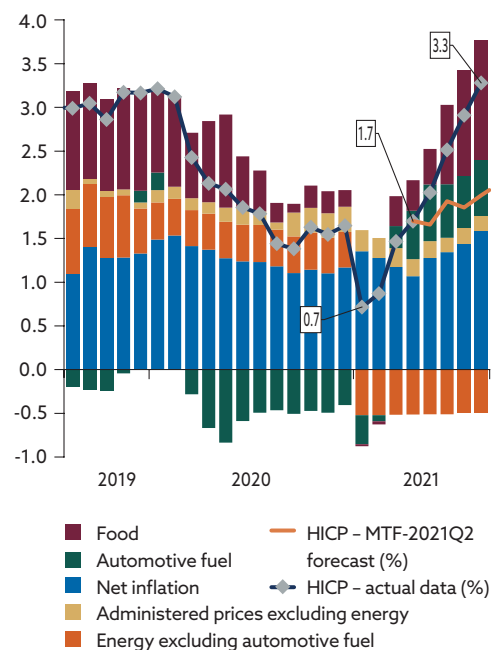
Sources: SO SR, and NBS calculations.

Chart 20
Contributions to the acceleration of HICP inflation since April 2021
(percentage point contributions; annual percentage changes)
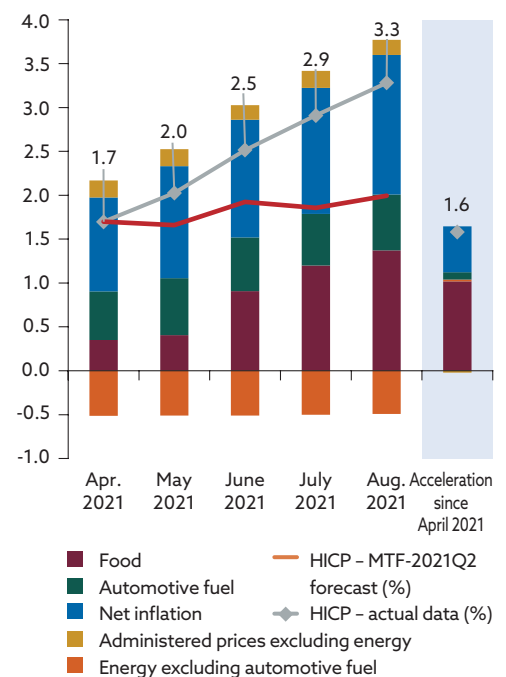
Sources: SO SR, and NBS calculations.

Accommodative monetary policy continues to support favourable financial conditions in Slovakia. In the second quarter, the financial conditions index climbed to its highest level for the past several years (Chart 21). Lending rates for loans to non-financial corporations (NFCs) remained close to their historical low. The average interest rates on loans to households for house purchase even dropped to below 1% and is now one of the three lowest among euro area countries. This is supporting demand for housing loans, which became more pronounced in the second quarter. A corollary of this has been strong growth in housing prices.

Chart 21

Financial conditions index[2]

Source: NBS calculations.

The Slovak banking sector has been taking the opportunity to obtain relatively large amounts of funding from the ECB's targeted longer-term refinancing operations (TLTROs). Banks therefore have sufficient cheap funding with which to support the economy.

Box 2
Why has the Slovak economy withstood the pandemic crisis relatively well?[3]

Compared with other advanced economies, Slovakia has managed to weather the pandemic crisis relatively well and recoup most of its crisis-induced losses. The impact of the coronavirus (COVID-19) pandemic was at its height in all countries in spring 2020, following the original outbreak. In subsequent waves, the impact has been more moderate, as manufacturing industry has managed to adapt quickly to, and operate in, these conditions. There has been no repeat of the temporary plant shutdowns that heavily skewed GDP in the second quarter of 2020, and economies have been able to recoup their losses relatively quickly. In the early part of the crisis, Germany's economy showed a very similar trend to Slovakia's, whose structure is similar to Germany's; later on, however, the German economy's losses in comparison with the pre-crisis period were higher. In the case of Italy, whose economy is more dependent on services (especially tourism) and which was the first European country to be struck by the pandemic, the economic trend has been more divergent (Chart A).

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[2] The financial conditions index is an application of an approach presented in Kupkovič, P. and Šuster, M., *"Identifying the Financial Cycle in Slovakia"*, *NBS Working Paper,* No 2, Národná banka Slovenska, Bratislava, 5 February 2020.

[3] More detailed information is provided in Annex 1 *Why has Slovakia's economy been more resilient than Germany's during the pandemic?*

Chart A
GDP (index: Q4 2019 = 100; seasonally adjusted)

Legend: SK, DE, IT

Sources: Eurostat, and NBS calculations.

The positive difference between Slovakia and these other countries is partly because the Slovak economy is still at the catching-up phase. Compared with more advanced countries, Slovakia's economy is expected to grow at a faster pace.

Mobility reduction beyond what can be attributed to containment measures has had a considerable downward impact on economic growth. Although the measures taken by the Slovak government during the pandemic have generally been more moderate (Chart C), people in Slovakia have gone further than required in terms of social distancing and reducing mobility. From the available data, however, it cannot be excluded that Slovaks generally have lower mobility and, even during normal times, travel less than do other nationalities. In Italy, where the virus first emerged in Europe, the consequences of the pandemic have been more severe. Containment measures there have been more stringent throughout the period under review. Hence, compared with Italy, the impact of de jure mobility reduction on Slovakia's GDP has been notably positive.

Sectoral differences between the economies under review have also been a factor. In Germany, the services sector constitutes a slightly larger share of the economy (Chart B) than it does in Slovakia; for its part, the Slovak economy was adversely affected by less favourable developments in the construction and agriculture sectors. In contrast to Italy (Chart B), the Slovak economy's main losses during the first wave stemmed from the higher share of industry in total GDP. Although the pandemic crisis had a significant impact on certain services (tourism, financial services, real estate activities), their lower share in the economy somewhat mitigated that impact.

Chart B

Decomposition of the difference in GDP between Slovakia and selected countries (percentage point contributions)

DE

IT
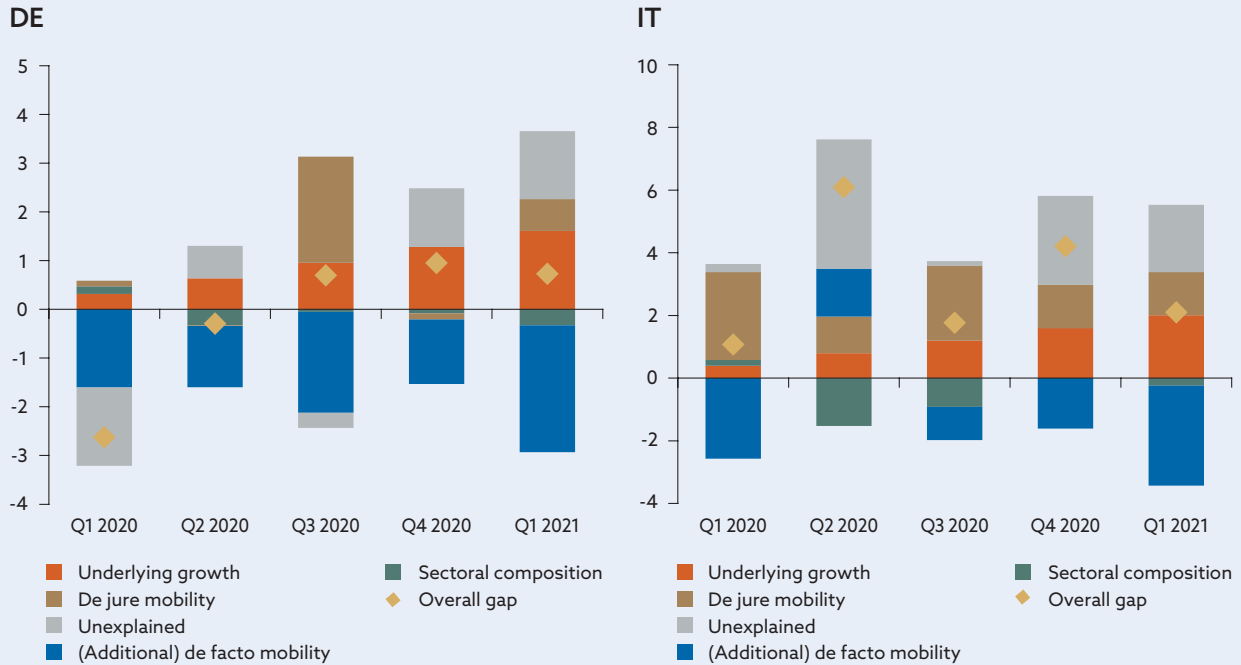
Sources: Eurostat, and NBS calculations.

In recent quarters, part of the positive difference between Slovakia and the other economies cannot be explained by pandemic indicators. In respect of the comparison with Germany, one reason for this appears to be the dependence of both economies on the automotive industry and the component supply shortages that are affecting that industry worldwide. German carmakers, however, were already at the turn of this year starting to be affected by the global shortage of components. Firms in Slovakia did not begin struggling with this issue until May 2021. As for Italy, its dependence on tourism is important and, by extension, so is its dependence on the mobility of people in surrounding countries. The strong pandemic wave during the winter and spring restricted travelling and holiday-making in almost all EU countries, so services in Italy were harder hit than their pandemic figures alone would imply (Chart D).

Chart C
Oxford Stringency Index
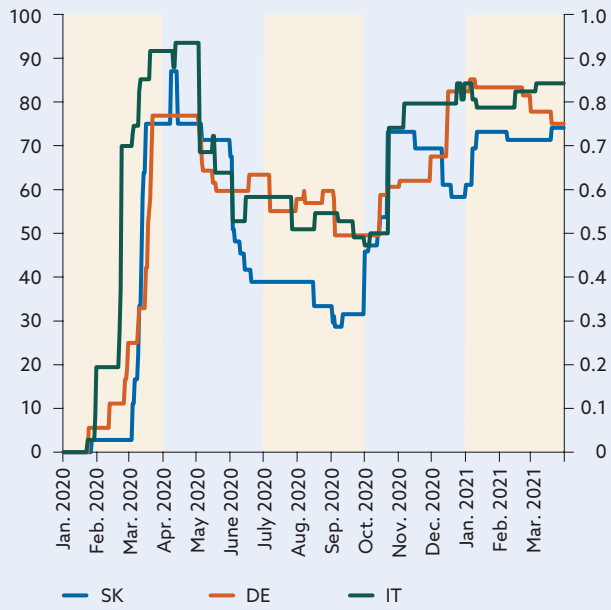
Source: University of Oxford – COVID-19 Government Response Tracker.

Chart D
Google mobility trends
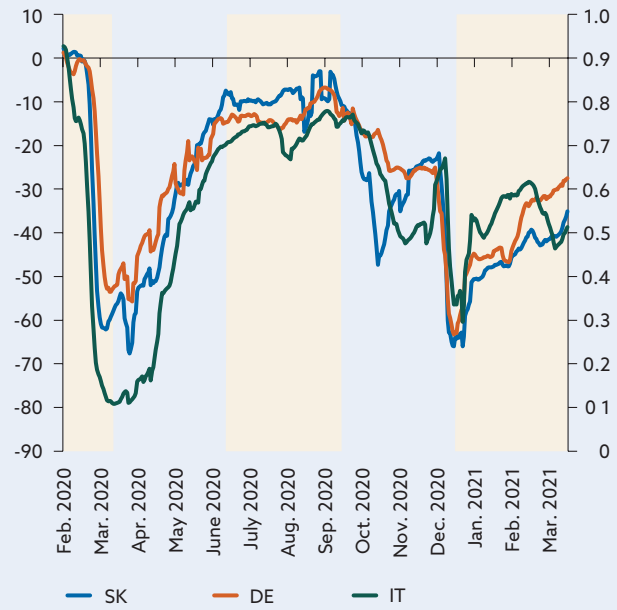
Source: Macrobond.

3 Medium-term forecast

3.1 Global outlook and technical assumptions of the forecast[4]

The assumed path of foreign demand has not changed (Chart 22). Developments in the second quarter of 2021 were positively affected by the fading of the pandemic's second wave and a pick-up in global trade. The better initial position will, however, be almost entirely cancelled out in the second half of the year by component shortages in the automotive industry. It is because of supply chain disruptions that trading partners' demand for Slovak exports is assumed to increase more slowly in the second half of this year. Subsequent years are expected to see a gradual normalisation of component supplies.

Chart 22

Foreign demand (index: Q4 2019 = 100)
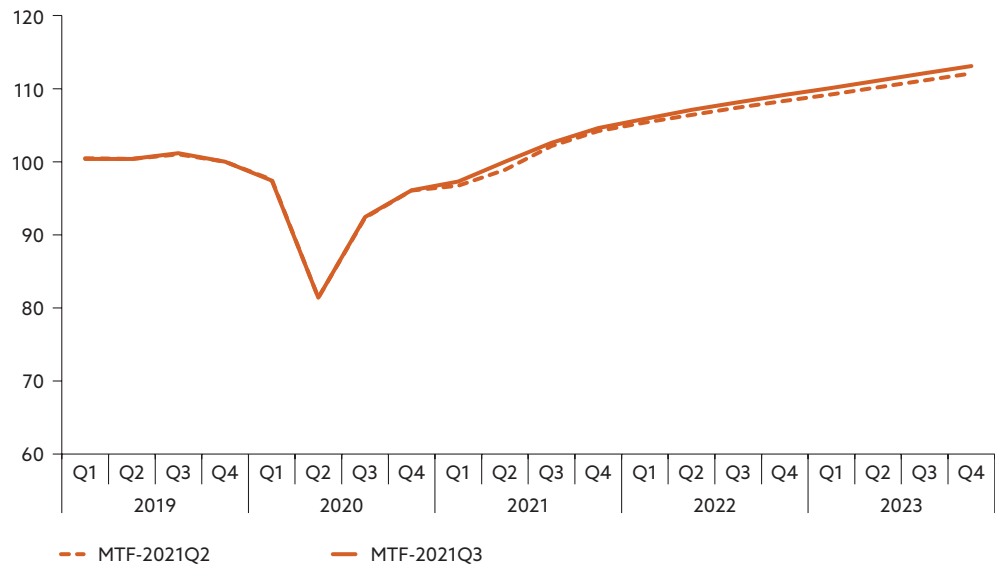
Source: NBS calculations.

Compared with the summer forecast, the technical assumptions of this forecast include significant increases in prices of inputs and all types of commodities. This has been reflected in the revision of projected price developments across the economy.

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[4] The technical assumptions of this Medium-Term Forecast are based on the September 2021 ECB staff macroeconomic projections for the euro area.

	Actual data	MTF-2021Q3			Difference vis-à-vis MTF-2021Q2		
	2020	2021	2022	2023	2021	2022	2023
Slovakia's foreign demand	-8.6	10.1	6.4	3.8	0.7	0.0	0.3
USD/EUR exchange rate [1, 2] (level)	1.14	1.19	1.17	1.17	-1.5	-3.1	-3.1
Oil price in USD [1, 2] (level)	42.3	67.5	66.1	63.0	2.5	2.4	1.8
Oil price in USD [1]	-33.9	59.6	-2.0	-4.7	3.9	-0.1	-0.6
Oil price in EUR [1]	-35.2	53.0	-0.6	-4.7	6.0	1.5	-0.6
Non-energy commodity prices in USD	3.2	37.9	4.3	-1.9	-1.1	4.2	6.1
Three-month EURIBOR (percentage per annum)	-0.4	-0.5	-0.5	-0.5	0.0	0.0	-0.2
Ten-year Slovak government bond yield (percentage)	0.0	-0.2	-0.1	0.0	-0.3	-0.4	-0.5

Table 1 External environment and technical assumptions (annual percentage changes, unless otherwise indicated)

Sources: ECB, SO SR, and NBS calculations.
Notes:
1) Annual percentage changes and changes vis-à-vis the previous forecast are calculated from unrounded figures.
2) Differences vis-à-vis the previous forecast are in percentages.

3.2   Macroeconomic forecast for Slovakia

3.2.1 Economic growth

The economy will take longer to return to its pre-crisis level. Compared with the June forecast, the economic growth projection for this year has been revised down significantly (Chart 23). This revision is due to the pandemic's expected third wave and to component supply shortages in industry. Not only is there uncertainty related to the future evolution of the pandemic, but there is in particular the unknown of how and when global supply chains will get back to normal.

After this year, the economic losses of coming months will gradually be recouped and the economy will return to the growth path projected in the June forecast. Following the easing of supply bottlenecks in the second half of 2022, output and exports are expected to increase. The decline in private consumption is projected to be only temporary, and the second quarter of 2022 is expected to see consumer demand return to the level projected in the previous forecast.

Chart 23

GDP projection (index: Q4 2019 = 100)
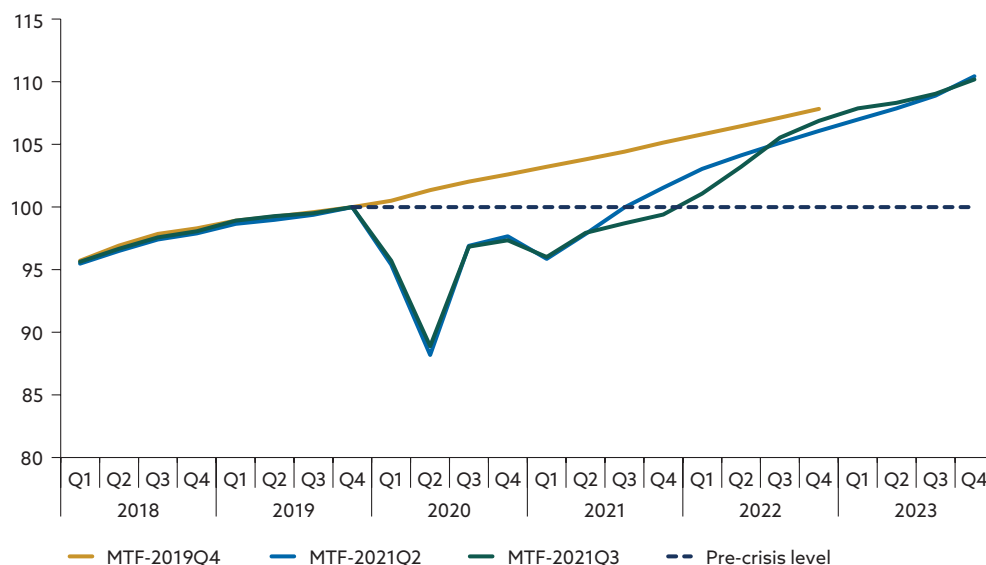
Source: NBS calculations.

The pandemic's impact on the economy will be more moderate during the third wave than it was at the beginning of this year. This forecast takes into account a pandemic situation assumption simulated by a new model (Box 3). We expect the health situation to deteriorate in the last quarter of 2021, with relatively a large increase in the numbers of both cases and hospitalisations. The vaccination rate is expected to increase only moderately, up to around 50% by early next year. Pandemic containment measures are expected to be entirely localised. Even these, however, will curb the use of services, and households will respond to the adverse health situation by voluntarily reducing their mobility and their expenditure. We envisage the situation improving from spring of next year.

Box 3
Forecast for the pandemic's third wave

In autumn 2021, the short-term outlook for economic developments in Slovakia includes expectations for the third wave of the COVID-19 pandemic. The future evolution of the pandemic is important in regard to its impact on the stringency of containment measures. These affect the mobility of households, which in turn affects economic activity. This can be approximated by revenues from the eKasa online cash register system, an indicator of private consumption. Besides affecting consumption, the pandemic's evolution also impacts the magnitude of fiscal measures.

For the purpose of forecasting the pandemic's future evolution in Slovakia, we compiled a version of a behavioural Susceptible-Infectious-Recovered (SIR) model.[5] The model framework serves as a tool for evaluating various assumptions about the course of the third wave of infections. To this end, we have included the more virulent Delta variant of the virus in the model as from 23 June 2021, when the first case of this variant was recorded in Slovakia.

The third wave forecast is based on the following assumptions:

Baseline assumptions about the evolution of the pandemic's third wave in Slovakia
The infection rate of the Delta variant is twice as high as that of the previously dominant version.
The number of people susceptible to the disease as at end-July 2021 amounts to 50% of the total population.
The vaccination rate from end-July 2021 is only one-fifth of its previous pace. This drop is derived from data observations.
The sensitivity of the virus transmission rate to the number of hospitalisations (explained further in the annex) not only rises to its level at the onset of the second wave, but increases to three times that level. This assumption follows the introduction of the new COVID-19 warning system ("Covid automat"), which is designed to make the introduction of containment measures faster and more efficient.
A decline in the sensitivity of the virus transmission rate to the number of hospitalisations will strike in December, and the virus transmission rate will increase temporarily.

These assumptions lead to a third wave that emerges precisely because of the Delta variant's higher infection rate. As Chart A shows, we can expect a wave with two peaks in the number of hospitalisations: in mid-November 2021 and early February 2022. Such an evolution of the pandemic accords with the experience of other countries.

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[5] For more detailed information, see Annex 2 *A pandemic model for Slovakia – the BSIHR model.*

Chart A

Forecast for the pandemic's evolution in Slovakia until August 2022

Number of people hospitalised

- Model simulation
- Hospitalised, real data

Source: NBS calculations.

Number of people vaccinated

- Model simulation
- Vaccinated, real data
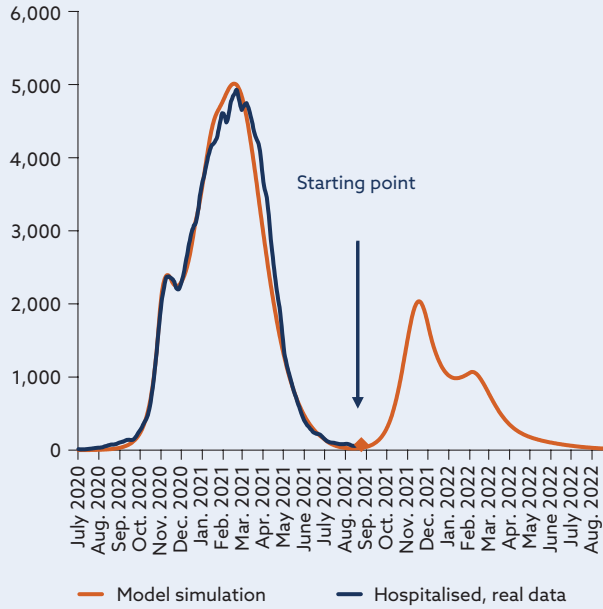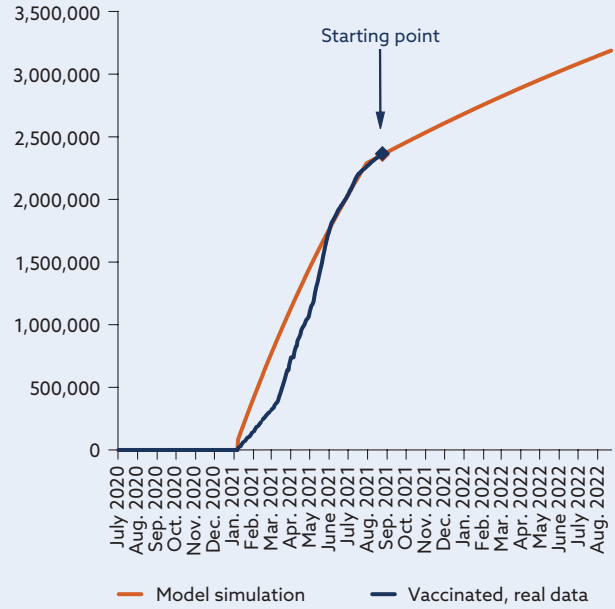
Chart B

Stringency of measures

- MTF-2021Q2
- MTF-2021Q3
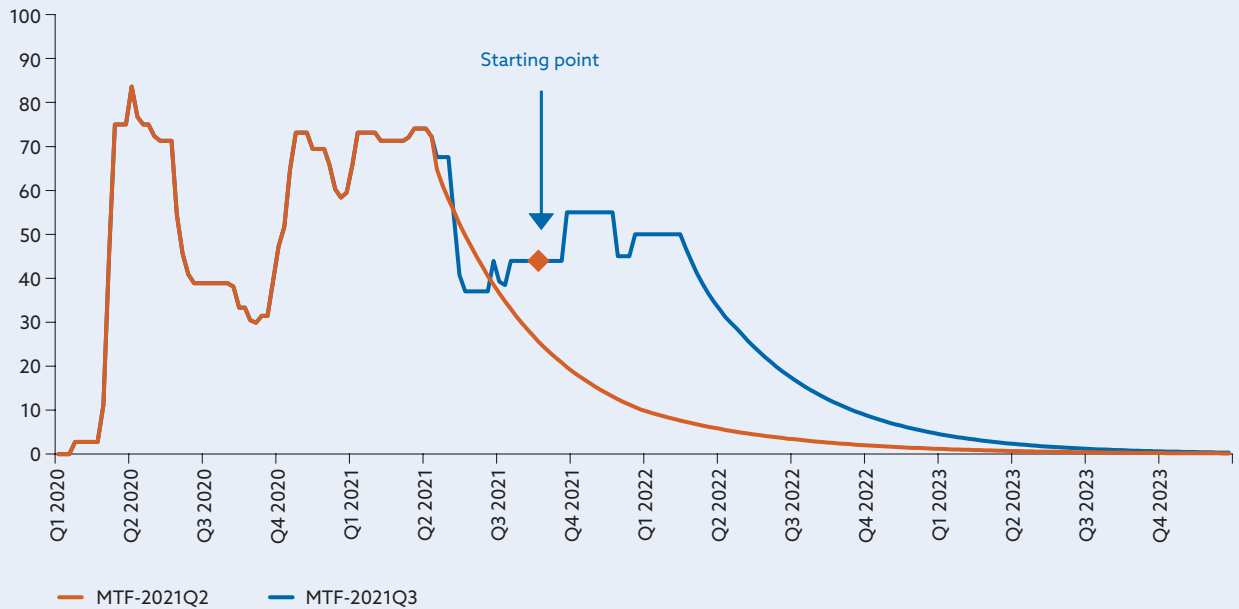
Sources: Oxford University, and NBS calculations.

A deteriorating health situation and local containment measures will have a downward impact on private consumption in late 2021. Given, however, the vaccination rate and the localisation of containment measures, the decline in consumption is expected to be less than half of that recorded during the first two waves of the pandemic (Chart 24). Like during previous lockdown periods, the household saving ratio will increase (Chart 25). Household spending is projected to return to normal levels in early 2022. Thereafter, consumer demand will rebound to a higher level than that projected in the June forecast. On the one hand, it will be supported by an improving labour market situation; on the other hand, its growth will be dampened by high inflation that will gradually erode accumulated savings.

Chart 24
Level of private consumption (EUR millions)
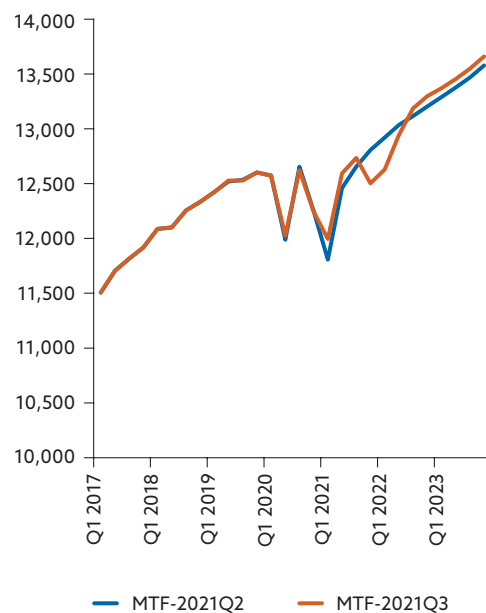
Source: NBS calculations.

Chart 25
Household income, household consumption and the household saving ratio (annual percentage changes; constant prices)

Saving ratio (percentages)
Private consumption (annual percentage changes)
Disposable income (annual percentage changes)
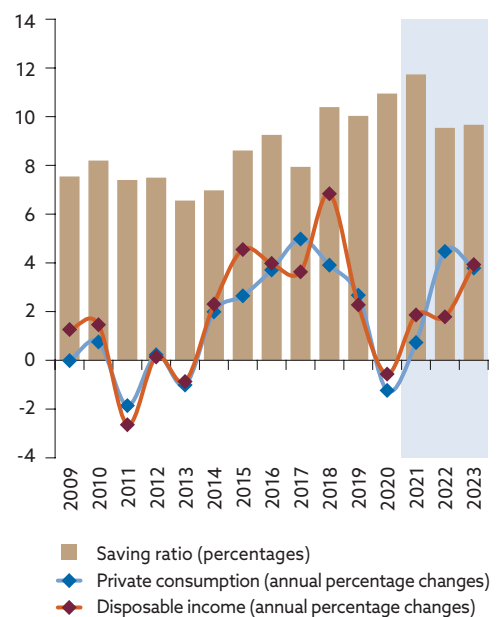
Sources: SO SR, and NBS calculations.

In the automotive industry, the impact of component shortages will outweigh that of strong global demand, and export growth will be consequently reduced. In an environment of robust global demand, problems on the supply side are mounting. We assume that supply disruptions could persist until the middle of next year, with supply-related production losses peaking during the current quarter and then gradually dissipating. The second half of next year should see a partial recouping of production losses.

Box 4

The impact of component supply shortages on production and export performance

Component shortages could persist until mid-2022. In the automotive industry, supply bottlenecks are becoming both more severe and more protracted. At present, it is difficult to say when the bottlenecks will ease, given the near exhaustion of current capacity in the semiconductor industry, which is subject to high utilisation. Shortages have carried over from the second quarter to the third quarter, when they are projected to reach their height. It is expected that supply-related production losses will gradually moderate from the end of this year and that car makers will begin steadily recouping production losses in the second half of next year (Chart A). Around 70% of the production lost to supply bottlenecks is expected to be recouped by the end of the projection period.

Chart A
Export losses resulting from component shortages (constant prices; EUR millions)

MTF-2021 – changes   MTF-2021 – level
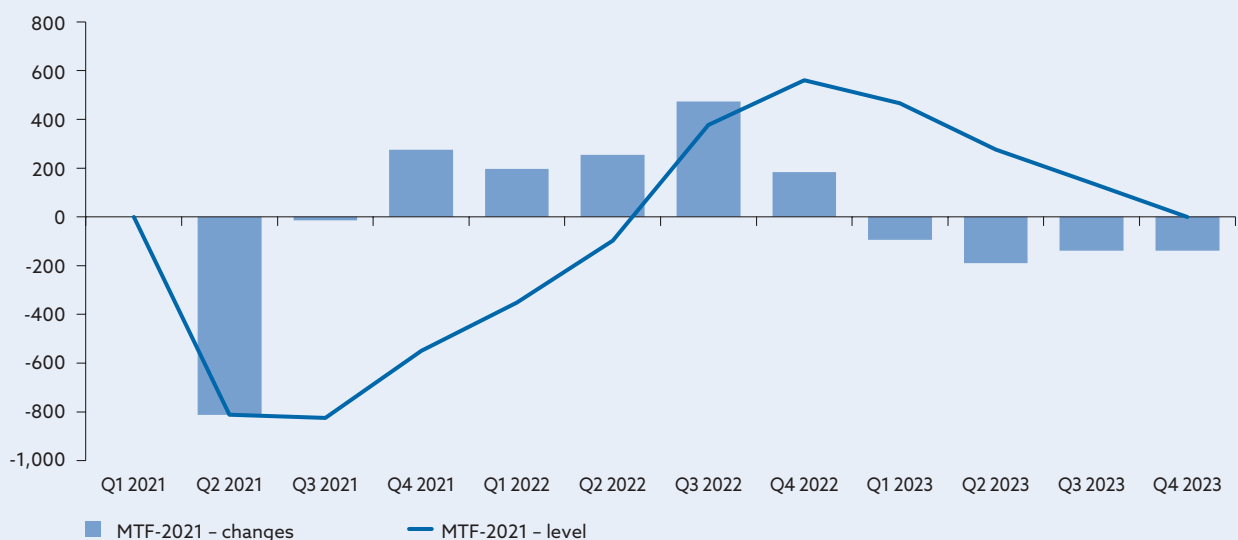
Source: NBS calculations.

The negative impact of component shortages on export growth in 2021 is projected to be around 2.8 percentage points, and on GDP growth, 1.1 percentage points (Charts B2 and C1). In subsequent years, the process of gradually catching up with lost production is expected to have a positive impact on economic growth parameters, while the secondary effects of component shortages on economic activity are expected to be minimal. Over the long term, the current component shortages are not envisaged to impact the amounts of production and exports (Charts B1 and C1).

Chart B1
Export performance (constant prices; EUR millions)

MTF-2021Q3 excluding components — MTF-2021Q3
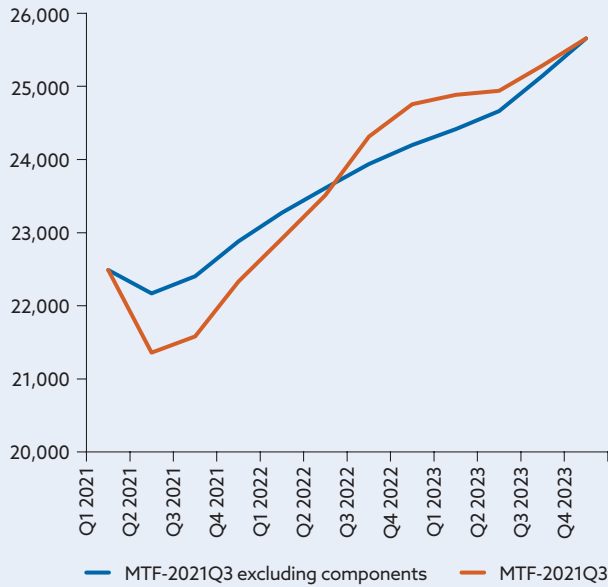
Source: NBS calculations.

Chart B2
Export performance and contributions of component shortages (percentages; percentage points)

■ MTF-2021Q3 excluding components ◆ MTF-2021Q3
■ Components
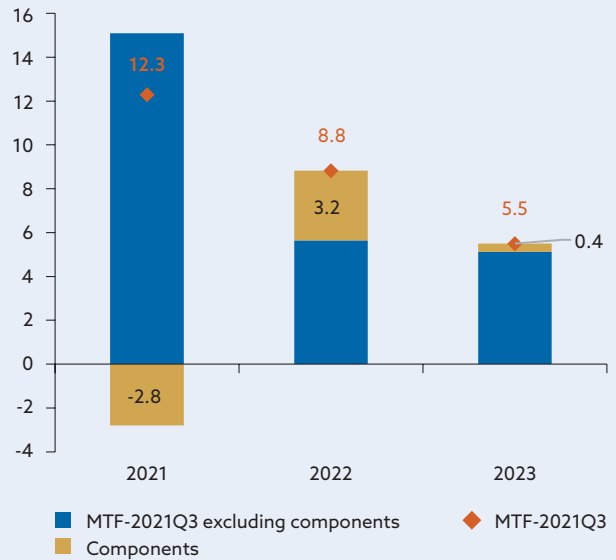
Source: NBS calculations.

Chart C1
GDP (constant prices; EUR millions)

MTF-2021Q3 excluding components — MTF-2021Q3
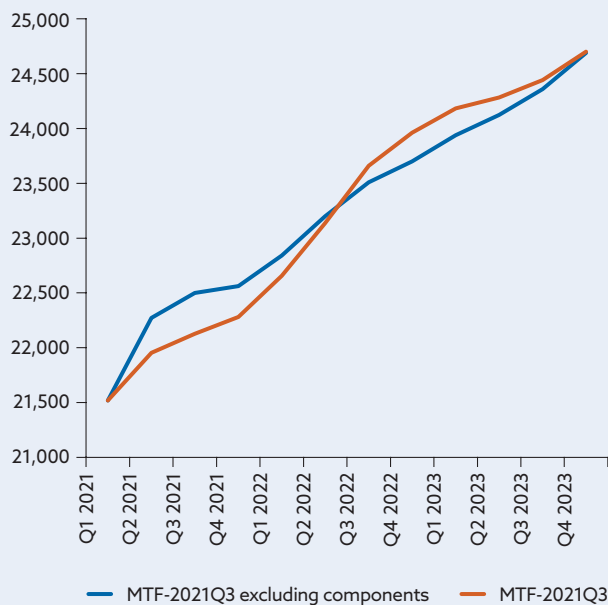
Source: NBS calculations.

Chart C2
Economic growth and contributions of component shortages (percentages; percentage points)

■ MTF-2021Q3 excluding components ◆ MTF-2021Q3
■ Components
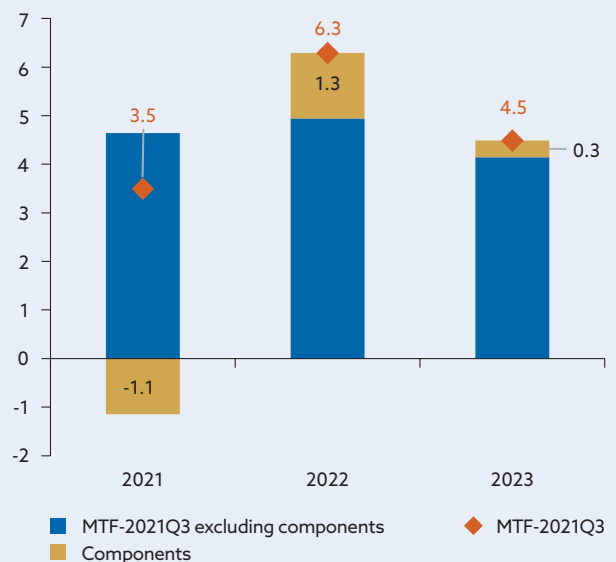
Source: NBS calculations.

Following the pandemic period, investment demand is also expected to pick up. After being subdued for a long time, private sector investment is projected to rebound (Chart 26). The share of private investment in GDP growth has fallen back to the level it was at during the global financial crisis. It is therefore envisaged that firms will release pent-up investment demand and replace fixed capital. Investment activity is expected to be supported by a further decrease in real interest rates. Impetus is also expected to come from the increasing absorption of EU funds. The large outstanding amount of Slovakia's allocation under the EU's 2014–2020 budget will be disbursed to a great extent over the next two years, just as happened at the end of the previous budget period. Moreover, funds will be available from the EU's Recovery and Resilience Facility (RFF) through the implementation of Slovakia's recovery and resilience plan (RRP). The accumulation of available funding will cause a relatively large increase in government investment (Chart 27).

Chart 26
Investment (annual percentage changes; percentage point contributions)

Sources: SO SR, and NBS calculations.
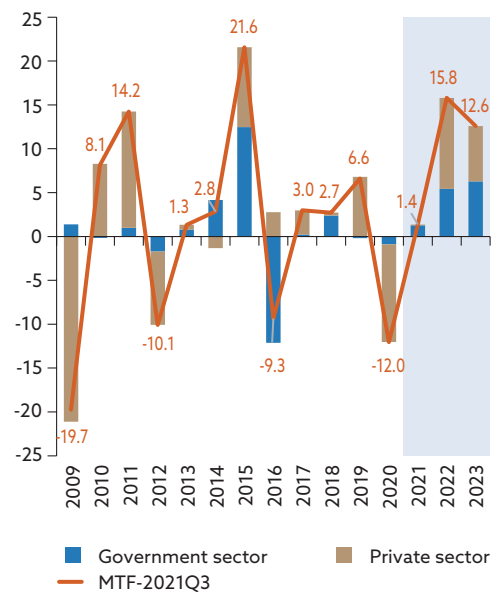
Chart 27
Investment (index: Q4 2019 = 100)
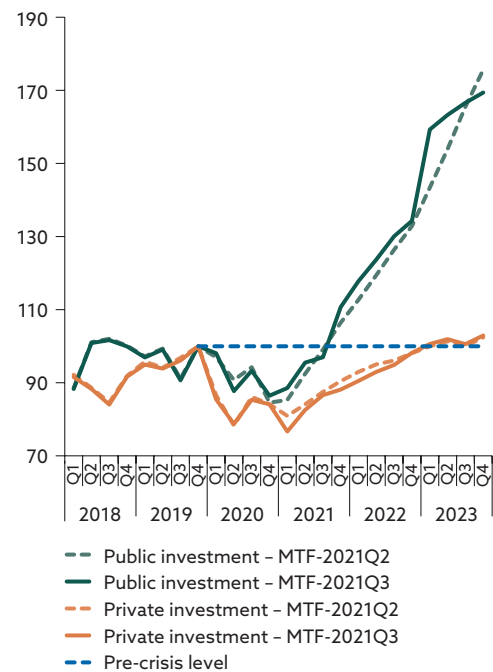
Sources: SO SR, and NBS calculations.

3.2.2 The economy's supply side and cyclical position

The global economy's recovery and the easing of pandemic containment measures is creating further scope for the economy to gradually increase its productive capacity without experiencing significant permanent losses. Potential output is expected to return gradually to the levels expected before the pandemic crisis (Chart 28). In our view, component sup-

ply shortages are a supply-side shock that are also having a short-term impact on economic potential. The related production losses and subsequent catching-up with that lost production are passing directly through to potential output (via total factor productivity). Hence potential output growth is projected to slow to 1.2% in 2021, before accelerating gradually to 3.5% and 3.8% in 2022 and 2023. We expect that the cyclical gap between the economy's current performance and its potential will close during the course of 2022 and that the economy will be overheating slightly in 2023.

Chart 28
Potential output (level in EUR millions)

Including the impact of component shortages

Excluding the impact of component shortages
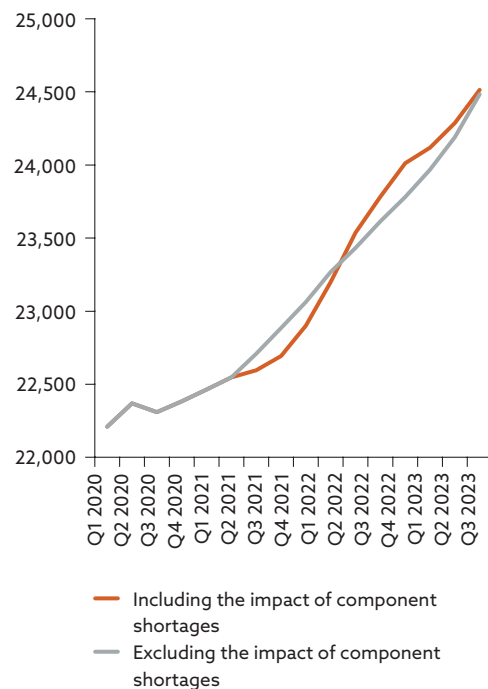
Sources: SO SR, and NBS calculations.

Chart 29
GDP and the output gap (percentages)

Output gap (percentage of potential GDP)
Potential GDP growth
Annual GDP growth
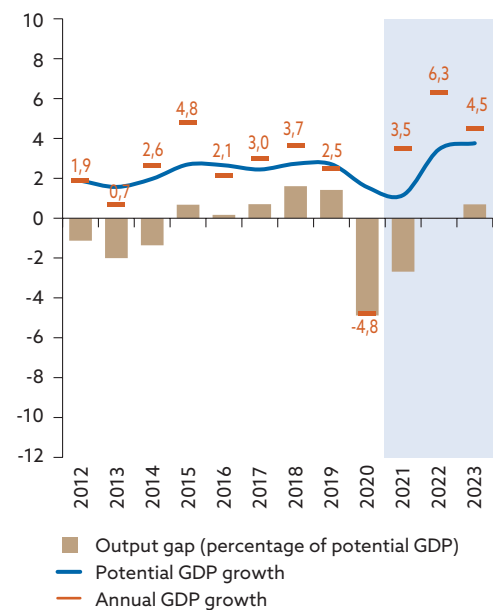
Sources: SO SR, and NBS calculations.

3.2.3 Funds from the EU budget

Slovakia's receipts from the EU budget are expected to accelerate gradually in future years, up to 4% of GDP. Besides drawing its outstanding allocation under the 2014–2020 budget, Slovakia will increasingly be tapping funds available from the Recovery and Resilience Facility (the centrepiece of the EU's Next Generation EU instrument) and from the new 2021–2027 budget (Chart 30).

Over the projection horizon, the uptake of EU funds to fight the pandemic is expected to be similar to its 2020 level. The bulk of the pandemic measures are expected to be taken in 2021, when their total funding will amount

to around 0.3% of GDP.[6] In this period, 98% of the EU funding in this area will be targeted at job retention measures. Thereafter, that share will drop to only one-half, with the rest of the funds being allocated mainly to purchases of medical supplies and research in the relevant area.

Payments to the EU budget are expected to remain stable until 2023, amounting on average to 1.1% of GDP per year. After deducting those payments, Slovakia's net financial position is expected to become gradually more favourable. In 2023 it is projected to be around 2.9% of GDP, which should provide an additional stimulus to domestic demand and economic growth.

Chart 30
Slovakia's absorption of EU funds and its net financial position (percentages of GDP)

Legend:
- Government consumption and investment
- Transfers to non-government
- Funds available under the 2014–2020 budget [3)]
- Funds available under the 2021–2027 budget [2)]
- NGEU resources
- Subsidies available under the 2021–2027 budget
- Net financial position [1)]
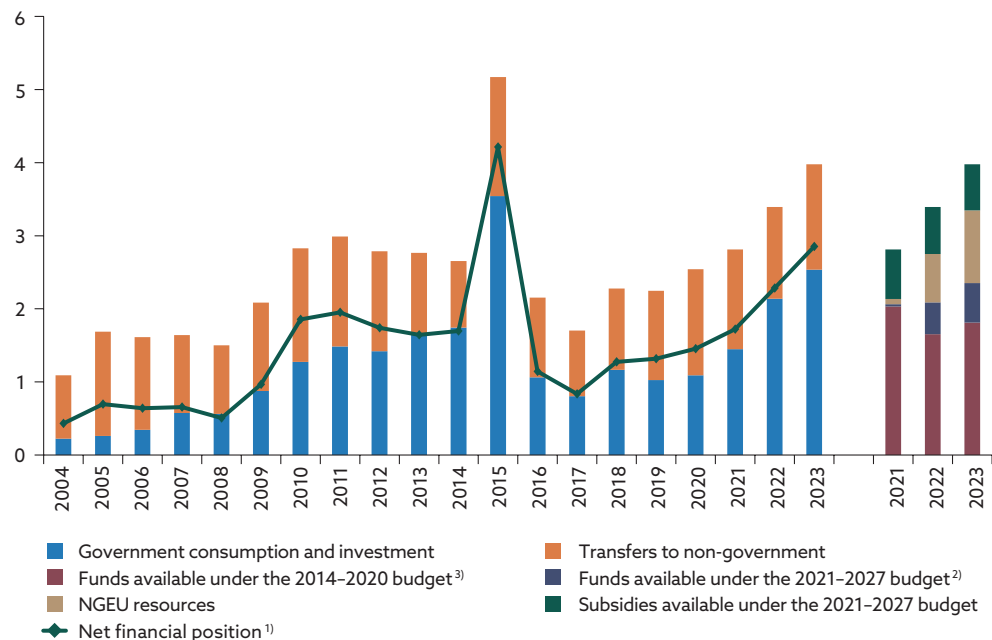
Source: NBS.
1) Net of the EU's own resources collection costs.
2) Funds available under the 2021–2027 are net of subsidies, which are denoted separately in the chart.
3) 2014–2020 budget disbursements made over the projection horizon do not include so-called transfers to financial instruments, which are financial operations. According to the ESA 2010 methodology, these transfers are excluded from non-financial operations.

3.2.4 Labour market

The labour market situation is expected to start improving with the fading of the pandemic's third wave and the easing of component supply bottlenecks. The slowdown of economic activity in coming months will

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[6] This amount does not include transfers to instruments for providing public guarantees on loans to firms.

dampen employment growth (Chart 31). In an environment where labour demand is strong and perceived labour shortages are one of the main factors preventing an increase in production, we expect job vacancies to be filled gradually next year. Accumulated labour productivity and expectations of a brisk recouping of production losses imply a need for more employees. Compared with what happened during the global financial crisis, the current situation is more favourable thanks to fiscal measures aimed at retaining jobs. Compared with the June projection, employment is expected to recover more quickly over the projection period (Chart 32) owing to the current strong demand for labour. Recruitment is expected to be supported by relatively strong wage growth.

Chart 31
Employment (annual percentage changes)

— Global financial crisis (Q1 2009)
— COVID-19 pandemic (Q2 2020)
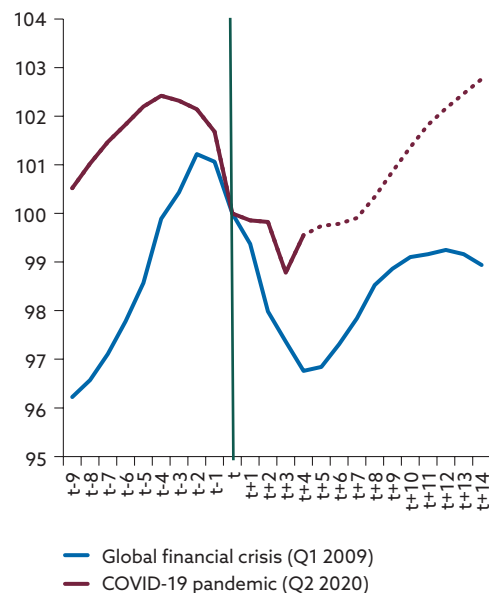
Sources: SO SR, and NBS calculations.
t – is the period in which the crisis began.

Chart 32
Employment (index: 2019 average = 100)

— MTF-2019Q4   — MTF-2021Q2
— MTF-2021Q3
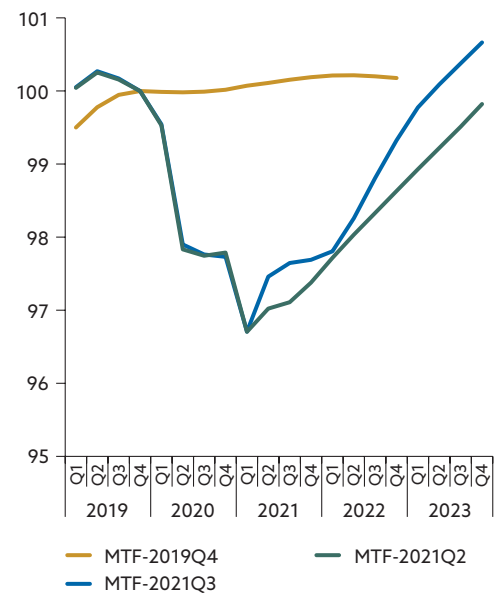
Source: NBS calculations.

3.2.5 Prices and labour costs

Nominal wages will grow strongly in an environment of skilled labour shortages and rising prices. Their growth will slow temporarily owing to the pandemic and component shortages, but in the longer term they will come under upward pressure from the economy's return to a growth path coupled with accelerating labour productivity growth. Given their perceived labour shortages, firms will have to attract workers with high wages. If employees are to retain their purchasing power amid elevated inflation, wage bargaining will need to deliver higher wages.

Table 2 Wages (annual percentage changes)				
	2020	2021	2022	2023
Nominal labour productivity	-0.6	6.5	9.1	5.3
Whole economy – nominal wages	3.3	5.0	5.2	5.3
Whole economy – real wages	1.3	2.3	1.3	3.0
Private sector – nominal wages	1.4	4.9	6.0	5.7
Private sector – real wages	-0.5	2.1	2.0	3.3
Public administration, education and health care – nominal wages	8.8	5.5	3.3	4.6
Public administration, education and health care – real wages	6.8	2.7	-0.6	2.3

Sources: SO SR, and NBS calculations.
Notes: Deflated by the CPI. Nominal labour productivity – GDP divided by persons in employment (ESA 2010).

A period of higher inflation lies ahead. Inflation is expected to gather pace in coming quarters amid rising input prices and high prices of all commodities. The faster than expected growth of these prices in the current period is expected to have an upward impact on food inflation and net inflation until the end of this year.

A combination of cost and demand factors is expected to keep services inflation elevated also in the next period. The strong increase in prices can be largely ascribed to a supply shock. Not even the temporary deterioration of the pandemic situation in Slovakia and the localisation of containment measures are expected to significantly stem the rate of increase in these prices. Rising prices of agricultural commodities, food and labour are expected to put indirect upward pressure on prices for restaurant and catering services.

Increases in input prices, shipping costs, import prices and domestic producer prices are translating into higher than projected growth in industrial goods prices (Chart 33), whose strong uptrend is expected to persist in 2022. An ongoing upside risk to the inflation outlook is the shortage of intermediate inputs in manufacturing, low flexibility in the transformation of supply-chain structures, and increasing consumer demand.

The annual HICP inflation rate is projected to reach almost 5% in early 2022. Its acceleration reflects the lagged impact of this year's extremely rapid increase of energy commodity prices on administered prices of electricity, gas and heat. In January 2022 electricity prices are expected to rise by 13%, and gas prices, by 10%. Maintaining the current price levels of year-ahead contracts for energy commodities represents an upward risk to the inflation outlook for 2023.

Annual food price inflation is expected to peak at 6% in late 2021/early 2022. Market information about future prices of agricultural commodities points to a gradual moderation of food inflation from the middle of next year.

Chart 33
Imported inflation and domestic producer prices (annual percentage changes)

- - - Slovakia's import prices from euro area countries
—— Domestic producer prices (PPI, right-hand scale)
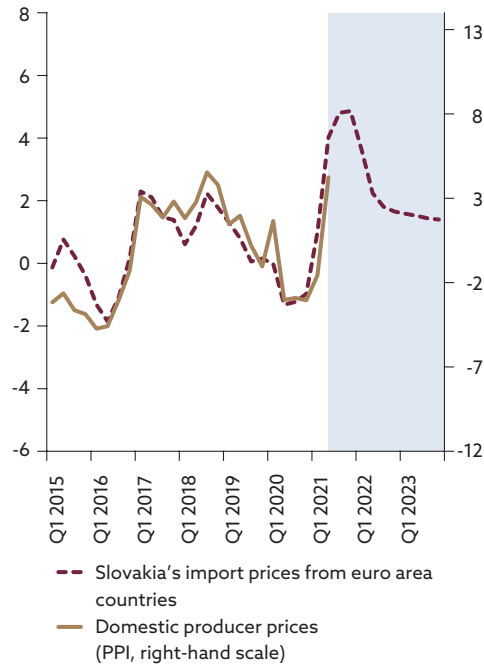
Sources: ECB, and NBS calculations.

Chart 34
Phillips curves (annual percentage changes)

- Range of the best explanatory models
- Range of all models
—— Unemployment rate
—— Net inflation   —— GDP
—— Output gap   —— Employment
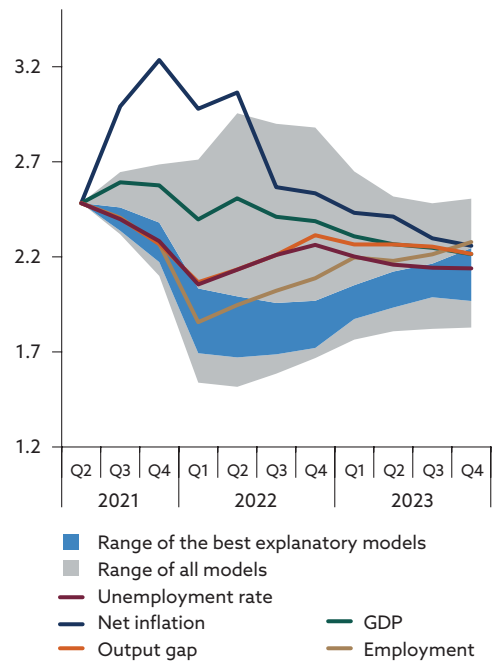
Sources: SO SR, and NBS calculations.

Table 3 Components of HICP inflation (annual percentage changes)							
	Average for 2004–08 (pre-crisis period)	Average for 2010–14 (post-crisis period with euro currency)	2019	2020	2021	2022	2023
HICP	4.1	2.0	2.8	2.0	2.4	3.9	2.2
Food	3.6	3.1	3.7	2.2	2.8	4.2	2.5
Non-energy industrial goods	0.2	0.3	1.1	1.7	2.2	2.7	2.3
Energy	8.3	2.3	4.2	0.0	-0.4	8.0	0.7
Services	5.3	2.5	2.8	3.1	3.5	3.0	2.5
Net inflation	1.8	1.0	2.2	2.5	3.0	3.0	2.4

Sources: SO SR, and NBS calculations.

3.3 Public finance projections

Slovakia's general government deficit for 2021 is projected to be 6.6% of GDP, representing a year-on-year increase of 0.5 percentage points (Chart 35). For a second successive year, fiscal policy has been loosened because of the pandemic crisis. The business cycle is expected to have a positive impact as early as this year; hence, the additional costs related to the pandemic's third wave area should be largely offset by an upturn in tax revenues.

Fiscal consolidation is not expected to gain significant momentum until 2022 (Chart 36). The fading of temporary measures to mitigate the impact of the pandemic, together with further cyclical conditions, will bring the fiscal deficit down to just below 4% of GDP in 2022. In the following year, the combination of a smaller increase in expenditure and a still relatively strong economic performance will be conducive to further fiscal consolidation, so the deficit for 2023 is projected to drop to 3.4% of GDP. Fiscal performance in that year will also to some extent reflect an expected import of military equipment, with its temporarily dampening effect on consolidation.

Chart 35
Breakdown of the general government balance (percentages of GDP)

Structural primary balance (excl. COVID-19 measures)
Cyclical component
Interest expenditure
One-off effects
COVID-19 measures
General government balance
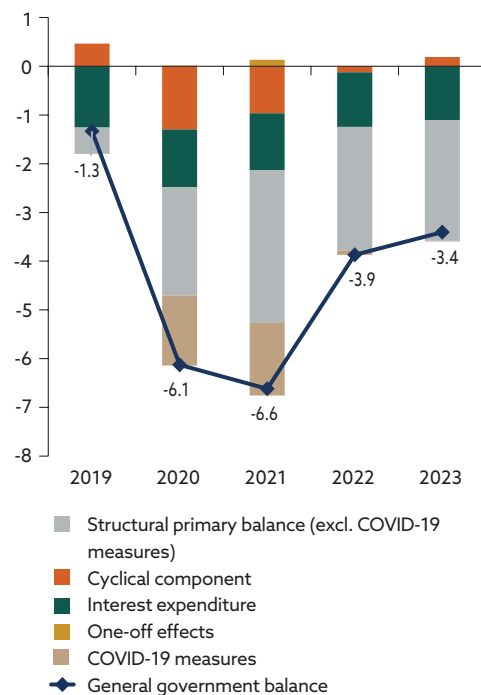
Sources: SO SR, and NBS calculations.
Note: One-off factors include non-cyclical effects that have a temporary impact on the general government balance and should be eliminated in the future.

Chart 36
Fiscal stance (percentage points of GDP)

Fiscal stance   Total
EU funds
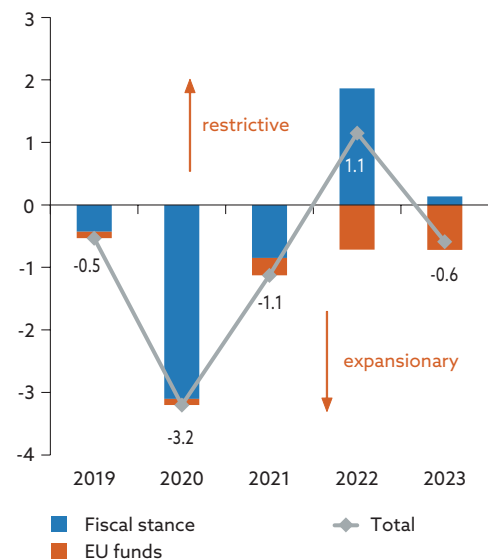
Sources: SO SR, and NBS calculations.
Note: Fiscal stance – annual rate of change in the cyclically adjusted primary balance.

The deficit projection for 2021 is the same in this forecast as in the previous forecast (Chart 37). Data for the second quarter show an improvement in tax and contribution cash flows as well as in VAT collection. The impact of higher revenues, however, is being dampened by higher expenditure on intermediate consumption, compensation and transfers.

Compared with the previous forecast, the fiscal deficit projection for 2022 is moderately worse and the projected consolidation in 2023 is faster. The

2022 deficit is expected to be adversely affected by an expected additional payment to the EU budget for reduced tariffs on Chinese imports. The main positive contribution is expected to come from robust macroeconomic developments.

Chart 37
The fiscal deficit and its decomposition (percentages of GDP; percentage point contributions)
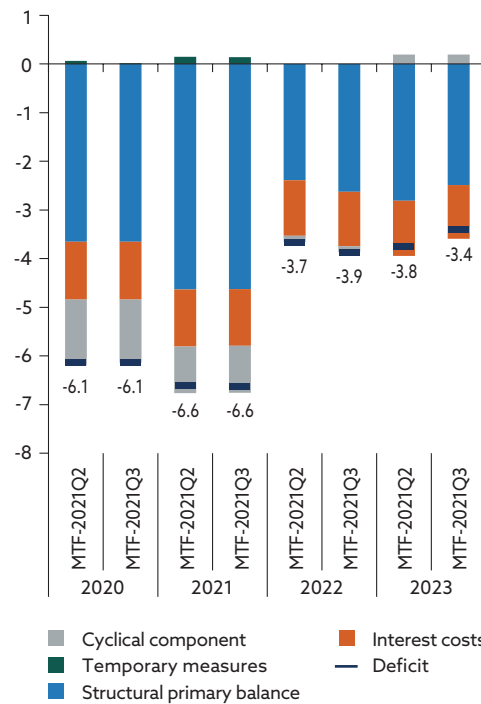
Source: NBS calculations.

Chart 38
Public debt (percentages of GDP)
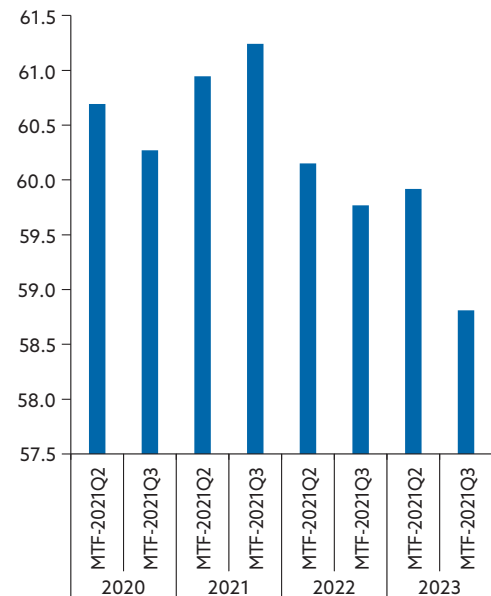
Source: NBS calculations.

In the medium term, public debt is expected to fall further below the 60% of GDP level than previously projected. This should be affected by the unwinding of one-off fiscal measures and economic growth, which is expected to be reflected in a gradual decrease in the state's financial needs **(Chart 38)**.

Public debt is expected to remain above 60% of GDP in 2021, given the pandemic's persisting impact on the economy and public finances (Chart 39). The projected negative impact of the crisis is expected to fade gradually. As growth recovers and one-off fiscal effects fade, public debt is expected to decrease over the rest of the projection period, down to 57.3% of GDP in 2023. Compared with the previous forecast, that figure represents a downward revision of 1.5 percentage points.

Chart 39
Public debt (percentages of GDP; percentage points of GDP)
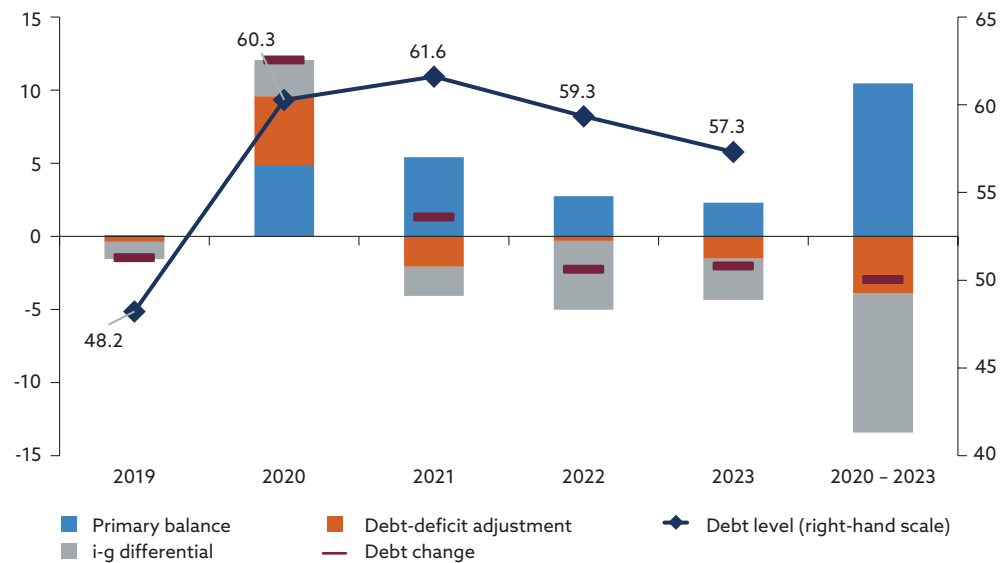
Sources: SO SR, and NBS calculations.
Notes: Debt-deficit adjustment – a factor of consistency between the fiscal deficit and the debt change. i-g differential – a factor taking into account the impact of interest costs and economic growth on the debt change.

Box 5
Fiscal consolidation options at a time of increasing EU funds absorption

With the closing output gap, scope is emerging for fiscal consolidation in 2022. Following the fading of anti-pandemic measures, most EU countries are expected to see the state of their public finances improve in 2022. The structural deficit, i.e. the fiscal deficit adjusted for the impact of the business cycle and one-off factors on the budget is expected to decrease (Chart A). In Slovakia, however, the government's plans as set out in its Stability Programme imply no change in the structural deficit. When those plans were being formulated, economic overheating was expected to be higher in Slovakia than in any other euro area country. Our updated forecast reckons on more moderate developments, but it also envisages that the cyclical position will close in 2022 and that inflationary pressures will gradually increase. The countercyclical fiscal policy is naturally expected to respond with a higher rate of consolidation.

Subsequent years, moreover, are expected to be particularly favourable in regard to the absorption of EU funds. These may to some extent replace domestic sources of expenditure funding. According to the Stability Programme, EU budget disbursements in Slovakia are expected to accelerate to 4.2% of GDP in 2023, while the outstanding amount of Slovakia's allocation under the 2014–2020 budget will stand at around 0.9% of GDP. Furthermore, Slovakia should at that time be midway through implementing reforms and investment under its recovery and resilience plan (RRP). Compared with other EU Member States, Slovakia still,

in the third quarter of 2021, has one of the lowest absorption rates for EU funds allocated under the 2014–20 budget (Chart B). According to NBS's fiscal projections, in 2021 the risk of EU funds absorption being lower than projected in the Stability Programme scenario to around 0.4% of GDP, which increases the "available" funds that may be used in the subsequent two years.

Chart A

Fiscal stances of EU countries in 2022

Output gap (percentages) vs Structural balance change (percentage points of GDP)
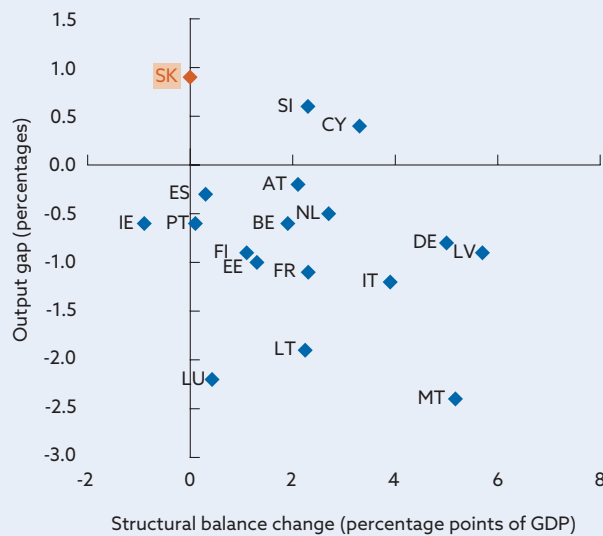
Source: European Commission – euro area countries' stability programmes for 2021–2024.

Chart B

Absorption of EU funds allocated under the 2014–20 budget (percentage of the allocation)[1]

Average – 63%

IE CY LT GR PT HU EE PL CZ LV SI ES BG RO SK MT HR

Sources: European Commission, and NBS calculations.
1) Absorption of EU budget funds as at 20 September 2021

We have produced two alternative fiscal consolidation scenarios. The baseline is based on the plans and projections in the Stability Programme (SC SP). The scenarios are configured so that the positive output gap estimated in the Stability Programme closes in 2022 and therefore economic growth decelerates. These scenarios should be seen as indicative. They are expected to contribute positively to the discussion on the scope for post-crisis repair of public finances that does not excessively undermine the economic recovery.

Scenario 1 (SC1, Chart C), which for 2022 envisages a larger consolidation of 1.7 percentage points of GDP, results in the debt ratio falling by 2 percentage points of GDP in 2023. Under **scenario 2 (SC2)**, which reckons on EU funds being disbursed to the maximum extent, the debt ratio decreases in 2023 by around 3.9 percentage points of GDP. This scenario assumes that the additional EU disbursements in 2022 and 2023 total 1.8% GDP. With the output gap remaining closed, there is scope for reducing domestic sources of expenditure funding.

Additionally, we have **a scenario based on NBS's fiscal projections**, which incorporates current macroeconomic and fiscal developments, including the updating of the assumption for

EU funds absorption. This scenario differs from the SC SP mainly in assuming a lower fiscal deficit in 2022, which implies a higher consolidation rate when the output gap is neutral. Hence pressure on public debt is falling under this scenario and, compared with the SC SP, the debt is lower in 2023 by 2.5 percentage points, at 61.8% of GDP (Chart D).

Chart C
Fiscal balance (percentage of GDP)

Legend:
- SC SP
- SC3 – NBS
- SC1 – closed output gap
- SC2 – maximum absorption of EU funds
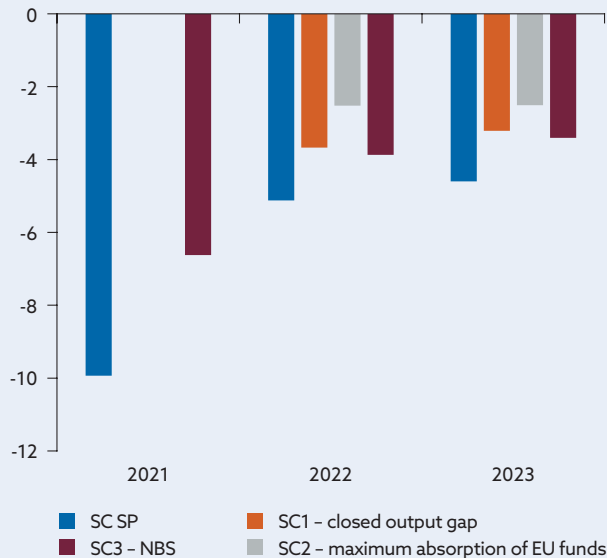
Sources: MF SR, and NBS calculations.

Chart D
Public debt (percentage of GDP)

Legend:
- SC SP
- SC3 – NBS
- SC1 – closed output gap
- SC2 – maximum absorption of EU funds
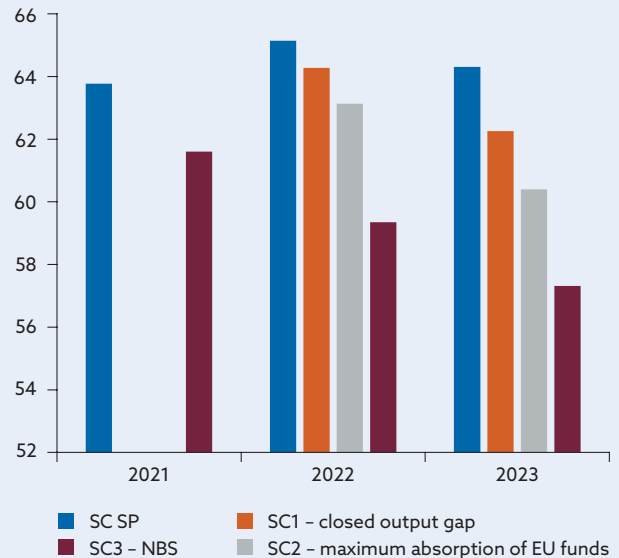
Sources: MF SR, and NBS calculations.

3.4 Risks to the forecast

Regarding the real economy, the risks to the outlook are tilted to the downside. Along with the possibility of the pandemic evolving in a more adverse way, another risk is that the assumed normalisation of semiconductor supplies in the middle of next year is overly optimistic.

As for price developments, the risk is that higher inflation will last longer than projected.

On the domestic side of the economy, the effects of the pandemic situation continue to pose a risk. The lower than desired vaccination rate is creating potential for a wider spread of the virus. The effects of that in coming quarters would again weigh particularly heavily on the services sector. In the case of a more effective vaccination campaign, the pandemic's economic repercussions would be expected to be lower. The direct effects of the vaccination on household consumption are addressed in Box 6.

Box 6
Alternative pandemic scenarios and their impact on short-term consumption

The vaccination rate has a key role in regard to the COVID-19 pandemic's spread and economic consequences. Given the ongoing uncertainty about the pandemic's future evolution and its effects on domestic consumption, we have prepared **two alternative pandemic scenarios**. The differences between these scenarios and the baseline scenario employed for the economic projections described in the main text are the assumed vaccination rates.[7]

The first alternative scenario, the **Elevated Vaccination Rate (EVR) Scenario**, comprises the baseline scenario plus the assumption of an acceleration in vaccinations in response to the pandemic's third wave. In other words, increases in infections, hospitalisations and resulting containment measures are prompting people who are still unvaccinated to have themselves vaccinated. This scenario envisages that the number of vaccinated people will increase from early October and that the vaccination rate will be approaching 80% in September 2022. That figure corresponds to the average vaccination rate for the five countries that, within the European Union, had the highest percentage of population vaccinated with at least one dose as at 17 September 2021. These countries are Portugal (87%), Malta (81%), Spain (80%), Denmark (76%) and Ireland (75%). Under this scenario, the higher vaccination rate prevents the baseline scenario's increase in cases in late 2021 and early 2022, thereby enabling a gradual easing of containment measures as early as the start of 2022.

The second alternative scenario, the **EU Vaccination Rate (EUVR) Scenario**, is purely hypothetical. Its purpose is to show what the situation might have been if Slovakia's vaccination rate had been at the level of the EU average on the following dates: 23 June 2021, when Slovakia recorded its first case of the Delta variant of COVID-19 (in which case the vaccination rate would have been 49% instead of the actual rate of 36%); and 17 September 2021 (66% instead of 44%). It further assumes that in September 2022 Slovakia's vaccination rate would be converging towards the above-mentioned current average for the five EU countries with the most successful vaccination campaigns (i.e. it would be 80% instead of the baseline 59%). Based on the new BSIHR pandemic model, such vaccination rates would enable almost complete suppression of the third wave and hence a speedier "return to normal", i.e. easing of most containment measures with no reductions in mobility and household consumption. We can therefore see this scenario as a benchmark for what the situation would look like without a third wave.

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[7] For more detailed information, see Annex 2 *A pandemic model for Slovakia – the BSIHR model.*

Chart A
Number of people vaccinated

- Elevated Vaccination Rate Scenario
- EU Vaccination Rate Scenario
- Baseline
- Actual number of vaccinated people
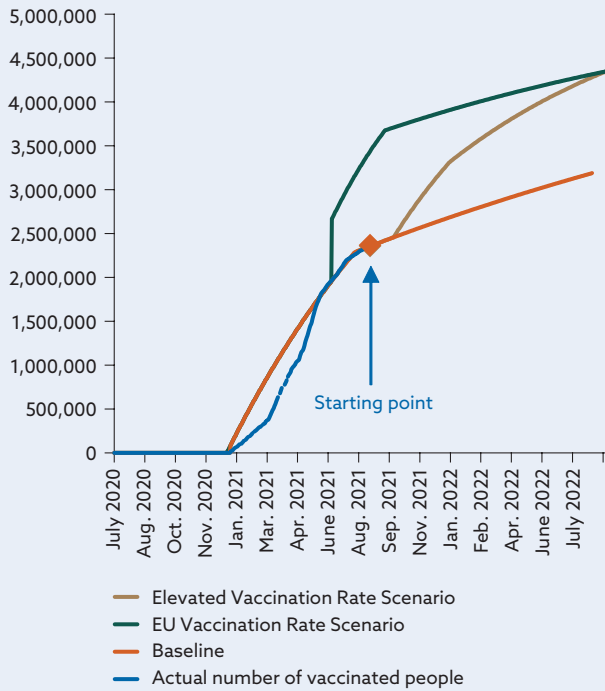
Source: NBS calculations.

Chart B
Number of people hospitalised

- Elevated Vaccination Rate Scenario
- EU Vaccination Rate Scenario
- Baseline
- Actual number of hospitalised people
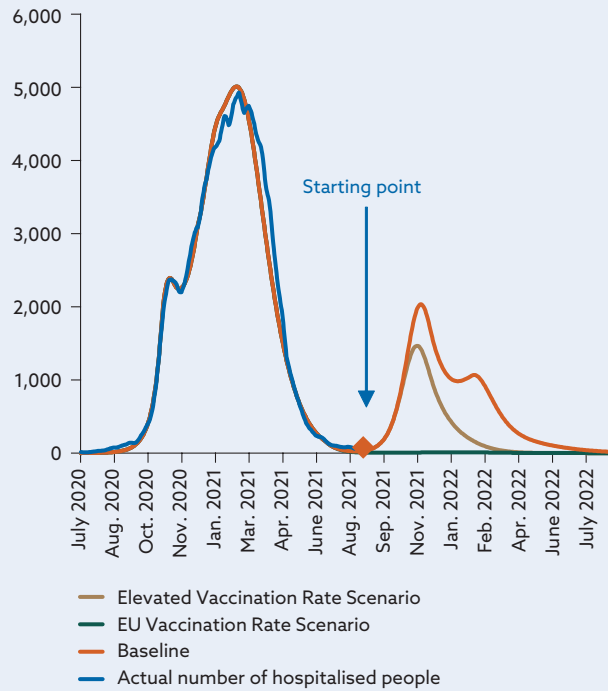
Source: NBS calculations.

Chart C
Stringency index for containment measures

- Elevated Vaccination Rate Scenario
- EU Vaccination Rate Scenario
- Baseline
- Stringency index – actual data
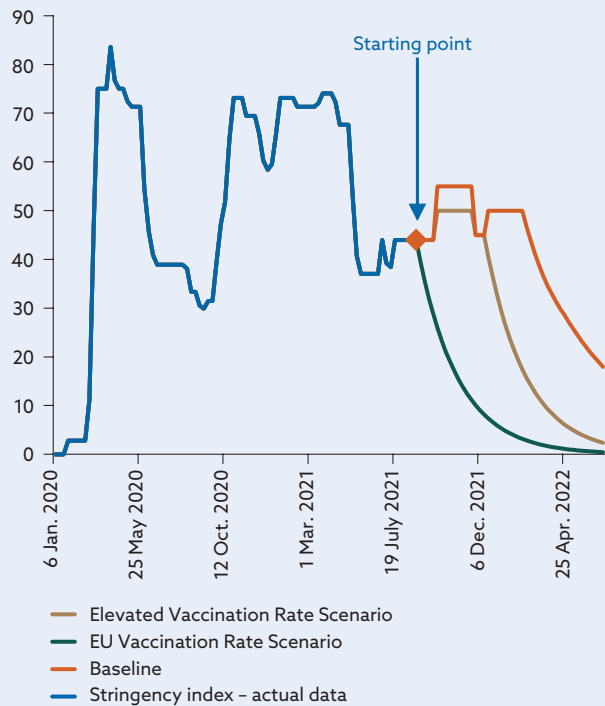
Source: NBS calculations.

Chart D
Mobility index

- Elevated Vaccination Rate Scenario
- EU Vaccination Rate Scenario
- Baseline
- Mobility index – actual data
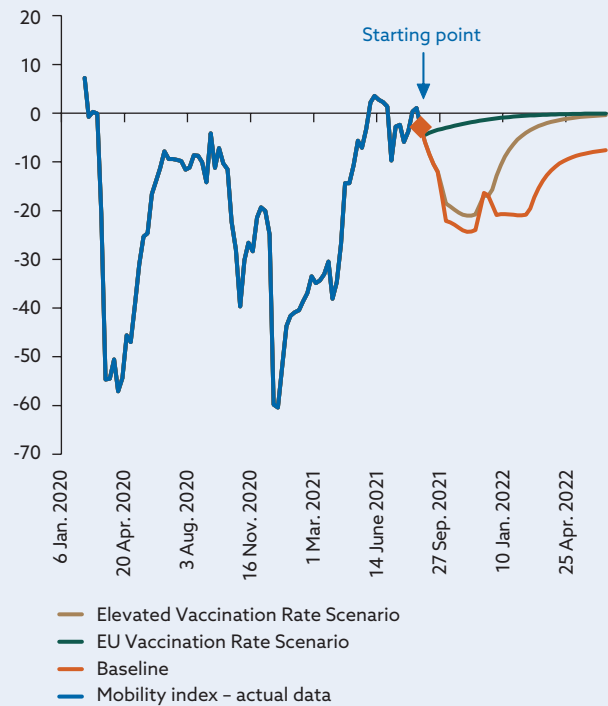
Source: NBS calculations.

The economic impacts are proxied by the extent to which short-term household consumption is lower than it would be under a scenario in which neither the third wave nor mobility reduction is a factor. The EUVR Scenario is such a scenario. In both the EVR scenario and the baseline, the third wave is estimated to be a temporary shock to consumption with no long-term effects. In that light, and taking into account that Slovakia's vaccination rate is almost 50%, we do not see either of these scenarios having a significant adverse impact on the labour market.

Table A shows in absolute and relative terms how much lower household short-term consumption is under the baseline scenario and EVR Scenario relative to the EUVR Scenario. **Under the baseline scenario, consumption is lower by 0.76% in 2021 and 1.20% in 2022, which together represent an absolute difference of around one billion euro. Under the EVR Scenario, which does not envisage an increase in cases in early 2022, consumption is lower by 0.64% in 2021 and 0.13% in 2022, representing an aggregate absolute difference of around €400 million.** These scenarios do not reckon on a catch-up of consumption, largely because the losses are expected to be in the services sector. Given the assumed short-term nature of the shock, household consumption in 2023 is not expected to be affected and is estimated to be the same in all scenarios.

Table A Losses of short-term household consumption vis-à-vis the EU Vaccination Rate Scenario						
	2021		2022		2023	
	absolute (EUR millions)	relative (%)	absolute (EUR millions)	relative (%)	absolute (EUR millions)	relative (%)
Baseline	-384	0.76	-632	1.20	0	0
Elevated Vaccination Rate Scenario	-321	0.64	-71	0.13	0	0

Source: NBS calculations.

The greatest risk to the fiscal performance outlook is the evolution of the pandemic's third wave and a draft amendment to the Social Insurance Act. A more adverse spread of the virus and consequent decline in economic performance would have a negative impact on tax receipts from economic activity, while potential government relief measures would further increase the level of social expenditure. The expenditure increase envisaged in a draft amendment to the Social Insurance Act has not so far been included in the public finance projections but may have a significant impact on fiscal performance (particularly by enabling working children to assign part of their social security contributions to their parents through a parental allowance). Another downside risk to the fiscal outlook for 2022, and possibly for 2023, is the renewable energy (RE) promotion scheme. The government has announced the possibility of capping the administered electricity price increase by reducing the transmission system tariff (TST), a move that by reducing revenues from the TST would create a risk of the RE promotion

scheme moving into deficit and of the government having to cover its costs. A higher deficit would have a negative impact on the debt situation.

An upside risk to the fiscal outlook is the possibility of a more accelerated absorption of EU funds and the stimulus that would provide to the real economy. On the one hand, higher EU fund disbursements imply additional co-financing expenditures and a consequent upward impact on the fiscal balance. On the other hand, the potentially stronger recovery of economic growth implies additional tax and social security contribution revenues that to some extent cancel out the impact of higher co-financing expenses.

3.5   Comparison with forecasts of other institutions

Compared with forecasts produced by other institutions, this forecast is more favourable in its economic projections for 2022. The divergence stems from different assumptions about the semiconductor chip crisis and subsequent recouping of production and export losses. As for price developments, we envisage a lower inflation rate in 2023 than do other institutions. Compared with the forecast made by the Slovak Ministry of Finance's Institute for Financial Policy (IFP), our forecast reckons on a lower increase in administered energy prices.

Table 4 Comparison with forecasts of other institutions (annual percentage changes, unless otherwise indicated; constant prices)

	2021					2022					2023				
	NBS	IFP	EC	IMF	OECD	NBS	IFP	EC	IMF	OECD	NBS	IFP	EC	IMF	OECD
Gross domestic product	3.5	3.7	4.9	4.7	4.2	6.3	4.2	5.3	4.5	5.2	4.5	5.0	-	3.8	-
Private consumption	0.7	0.1	0.8	-	0.1	4.5	2.4	5.2	-	4.9	3.8	3.6	-	-	-
Government consumption	2.0	4.9	2.5	-	2.3	0.4	4.1	-0.2	-	0.8	2.3	1.8	-	-	-
Gross fixed capital formation	1.4	-0.3	8.6	-	1.1	15.8	16.7	12.5	-	13.7	12.5	15.2	-	-	-
Exports of goods and services	12.3	10.5	12.2	10.8	10.2	8.8	3.1	5.3	4.5	5.9	5.5	6.0	-	5.1	-
Imports of goods and services	12.8	10.9	10.9	11.5	9.5	8.1	3.9	5.6	5.8	6.5	6.4	6.5	-	6.3	-
Harmonised Index of Consumer Prices[1]	2.4	2.3	2.1	1.2	1.1	3.9	4.0	2.2	1.9	2.2	2.1	3.1	-	2.0	-
Employment (ESA 2010)	-0.9	-0.8	-0.6	-	-	1.2	0.8	0.8	-	-	1.7	1.0	-	-	-
Unemployment rate (percentage)	7.0	7.0	7.4	7.3	7.6	6.5	6.7	6.6	6.7	7.2	5.6	5.7	-	6.3	-
Average nominal wage	5.5	5.4	-	-	-	5.4	5.5	-	-	-	5.3	5.1	-	-	-
Nominal compensation per employee	4.9	4.9	4.0	-	-	5.0	5.2	4.7	-	-	5.4	5.5	-	-	-
General government deficit (percentage of GDP)	-6.6	-9.9	-6.5	-7.1	-6.8	-3.9	-5.1	-4.1	-4.9	-4.1	-3.4	-4.1	-	-4.4	-
General government debt (percentage of GDP)	61.6	64.1	59.5	64.0	61.0	59.3	65.5	59.0	64.3	59.0	57.3	64.6	-	63.3	-
Balance of payments current account (percentage of GDP)	-2.2	0.3	-0.3	-1.2	0.3	-0.6	0.2	-0.4	-2.0	0.0	-0.8	0.1	-	-2.7	-

Sources: NBS, Institute for Financial Policy (IFP), European Commission (EC), International Monetary Fund (IMF), Organisation for Economic Co-operation and Development (OECD).
1) In the IMF forecast, the consumer price index (CPI).

Table 5 Medium-Term Forecast (MTF-2021Q3) for key macroeconomic indicators

Indicator	Unit	Actual data 2020	MTF-2021Q3 2021	MTF-2021Q3 2022	MTF-2021Q3 2023	Difference vis-à-vis MTF-2021Q2 2021	Difference vis-à-vis MTF-2021Q2 2022	Difference vis-à-vis MTF-2021Q2 2023
Prices								
HICP inflation	annual percentage change	2.0	2.4	3.9	2.2	0.7	1.4	0.1
CPI inflation	annual percentage change	1.9	2.7	4.0	2.3	1.1	1.6	0.2
GDP deflator	annual percentage change	2.4	2.0	3.9	2.5	0.4	1.3	0.6
Economic activity								
Gross domestic product	annual percentage change, constant prices	-4.8	3.5	6.3	4.5	-1.0	0.4	0.7
Private consumption	annual percentage change, constant prices	-1.2	0.7	4.5	3.8	0.2	-0.6	1.1
General government final consumption	annual percentage change, constant prices	0.3	2.0	0.4	2.3	1.8	-1.2	-0.1
Gross fixed capital formation	annual percentage change, constant prices	-12.0	1.4	15.8	12.5	-1.3	1.3	2.0
Exports of goods and services	annual percentage change, constant prices	-7.6	12.3	8.8	5.5	-3.5	2.1	1.1
Imports of goods and services	annual percentage change, constant prices	-8.5	12.8	8.1	6.4	-1.4	1.6	1.4
Net exports	EUR millions at constant prices	2,498	2,429	3,285	2,634	-1,624.0	-1,189.1	-1,496.2
Output gap	percentage of potential output	-4.9	-2.7	0.0	0.7	-0.1	0.0	0.0
Gross domestic product	EUR millions at current prices	91,555	96,667	106,740	114,267	-530.4	1,169.6	2,575.9
Labour market								
Employment	thousands of persons, ESA 2010	2,399	2,378	2,407	2,448	7.6	8.8	20.6
Employment (rate of change)	annual percentage change, ESA 2010	-1.9	-0.9	1.2	1.7	0.3	0.0	0.5
Number of unemployed	thousands of persons[1]	181	191	178	153	-0.9	-7.0	-12.8
Unemployment rate	percentage	6.7	7.0	6.5	5.6	-0.1	-0.3	-0.6
NAIRU estimate [2]	percentage	6.4	6.5	6.4	6.3	-0.3	-0.4	-0.3
Labour productivity [3]	annual percentage change	-2.9	4.4	5.0	2.7	-1.4	0.4	0.2
Nominal productivity [4]	annual percentage change	-0.6	6.5	9.1	5.3	-0.9	1.7	0.8
Nominal compensation per employee	annual percentage change, ESA 2010	3.3	4.9	5.0	5.4	-0.5	-0.3	0.9
Nominal wages [5]	annual percentage change	3.3	5.0	5.2	5.3	0.2	0.0	0.9
Real wages [6]	annual percentage change	1.3	2.3	1.3	3.0	-0.9	-1.6	0.7
Households and non-profit institutions serving households								
Disposable income	annual percentage change, constant prices	-0.6	1.9	1.8	3.9	0.2	-0.9	1.3
Saving ratio [7]	percentage of disposable income	10.9	11.7	9.5	9.7	-0.4	-0.5	-0.2
General government sector [8]								
Total revenue	percentage of GDP	41.6	42.5	41.6	41.8	1.3	0.3	0.2
Total expenditure	percentage of GDP	47.8	49.1	45.4	45.2	1.3	0.5	-0.1
General government balance [9]	percentage of GDP	-6.1	-6.6	-3.9	-3.4	0.0	-0.2	0.4
Cyclical component	percentage of trend GDP	-1.3	-1.0	-0.1	0.2	0.0	0.0	0.0
Structural balance	percentage of trend GDP	-4.8	-5.8	-3.7	-3.6	0.0	-0.2	0.3
Cyclically adjusted primary balance	percentage of trend GDP	-3.6	-4.5	-2.6	-2.5	0.0	-0.2	0.3
Fiscal stance [10]	annual percentage point change	-3.1	-0.9	1.9	0.1	0.0	-0.2	0.6
General government gross debt	percentage of GDP	60.3	61.6	59.3	57.3	0.4	-0.4	-1.5

Table 5 Medium-Term Forecast (MTF-2021Q3) for key macroeconomic indicators (continued)

Indicator	Unit	Actual data	MTF-2021Q3			Difference vis-à-vis MTF-2021Q2		
		2020	2021	2022	2023	2021	2022	2023
Balance of Payments								
Goods balance	percentage of GDP	0.6	-1.4	0.3	-0.1	-1.8	-0.9	-0.8
Current acount	percentage of GDP	-0.4	-2.2	-0.6	-0.8	-1.8	-0.9	-0.8
External environment and technical assumptions								
Slovakia's foreign demand	annual percentage change	-8.6	10.1	6.4	3.8	0.7	0.0	0.3
USD/EUR exchange [11], [12]	level	1.14	1.19	1.17	1.17	-1.5	-3.1	-3.1
Oil price in USD [11], [12]	level	42.3	67.5	66.1	63.0	2.5	2.4	1.8
Oil price in USD [11]	annual percentage change	-33.9	59.6	-2.0	-4.7	3.9	-0.1	-0.6
Oil price in EUR [11]	annual percentage change	-35.2	53.0	-0.6	-4.7	6.0	1.5	-0.6
Non-energy commodity prices in USD	annual percentage change	3.2	37.9	4.3	-1.9	-1.1	4.2	6.1
Three-month EURIBOR	percentage per annum	-0.4	-0.5	-0.5	-0.5	0.0	0.0	-0.2
Ten-year Slovak government bond yield	percentage	0.0	-0.2	-0.1	0.0	-0.3	-0.4	-0.5

Sources: NBS, ECB, and SO SR.

Notes:
1) Labour Force Survey.
2) Non-accelerating inflation rate of unemployment
3) GDP at constant prices / employment (ESA 2010).
4) Nominal GDP divided by persons in employment (according to SO SR quarterly statistical reporting).
5) Average monthly wages (ESA 2010).
6) Wages (ESA 2010) deflated by CPI inflation.
7) Saving ratio = gross savings / (gross disposable income + adjustments for any pension entitlement change) *100.
   Gross savings = gross disposable income + adjustments for any pension entitlement change – private consumption.
8) Sector S.13.
9) B9n – Net lending (+) / net borrowing (-).
10) Year-on-year change in cyclically adjusted primary balance; a positive value denotes a restrictive stance.
11) Year-on-year percentage changes and changes vis-à-vis the previous forecast are calculated from unrounded figures.
12) Changes vis-à-vis the previous forecast (percentages).

More detailed time series of selected macroeconomic indicators can be found on the NBS website at:

https://www.nbs.sk/en/publications-issued-by-the-nbs/economic-and-monetary-developments

Special annex 1

Why has Slovakia's economy been more resilient than Germany's during the pandemic?

In its early phase, the coronavirus (COVID-19) pandemic had a similarly negative impact on the Slovak and German economies. The pandemic's more adverse evolution in Slovakia implies that the GDP developments trend should be less favourable in Slovakia than in Germany over the period under review. Although government containment measures were more moderate in Slovakia, Slovaks have gone further than required in terms of social distancing and reducing mobility. Reduced additional mobility has therefore had a significant negative impact on economic growth. The economy's different sectoral composition has also contributed negatively to growth, albeit to a marginal extent. Despite these factors, the Slovak economy has come closer to end-2019 GDP levels than has the German economy. This is partly because Slovakia, as a country whose economy is still at the catching-up phase, has faster underlying trend growth. Another reason appears to be developments in industry, particularly in the automotive industry, which is an important segment of both the Slovak and German economies. The transition to electric car production in Germany has caused a temporary reduction in production. Global component supply bottlenecks were probably affecting German car producers as early as the turn of this year, whereas Slovak car producers were not experiencing significant supply shortages until the second quarter of 2021. Given that the Slovak and German economies have a similar structure, we have expanded the comparison to include Italy, an economy in which tourism has a larger weight and industry a smaller weight. In this case, the impact of sectoral composition is more apparent. Slovakia's lower slump in GDP compared with Italy was due in part to the lower share of services in its economy.

The pandemic's most severe impact on economies was in spring 2020, following its outbreak (Chart 1). It's impact on GDP moderated significantly in subsequent quarters, with the main difference being in manufacturing industry. While manufacturing, along with other sectors, was largely shut down during the pandemic's first wave, it subsequently managed to adapt to the new conditions. Although the economies under review showed very similar developments, Slovakia's economy did better than Germany's in rebounding towards its pre-pandemic level, and it also managed to maintain this gap during the pandemic's second wave, in the first quarter of 2021.

Chart 1

GDP (index: Q4 2019 = 100; seasonally adjusted)
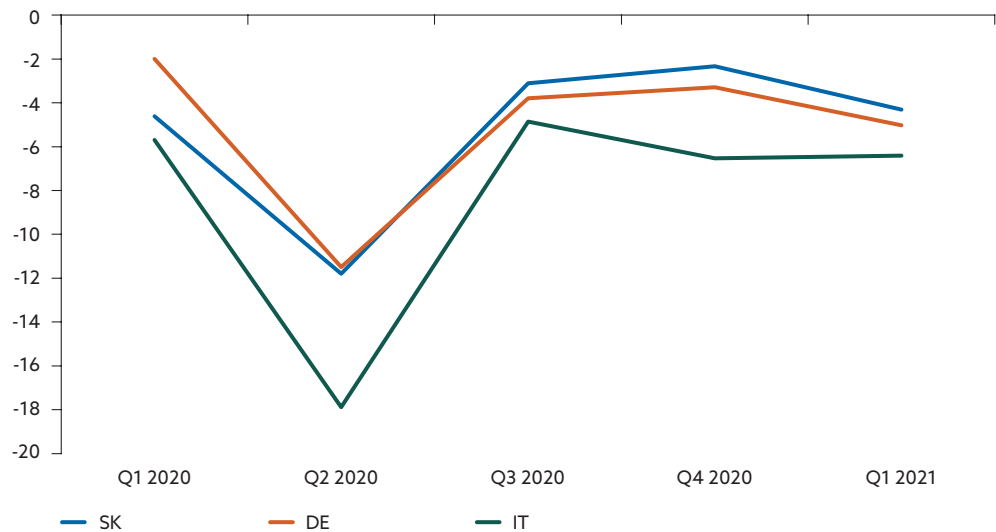
Sources: Eurostat, and NBS calculations.

To identify the main factors accounting for the difference in output performance between Slovakia and Germany since the start of the pandemic, we used an IMF analysis.[1] We decomposed the overall activity gap in three layers: underlying trend growth; the sectoral composition of the economy; and the pandemic's impact. The pandemic's impact was further divided into the impact of government measures and the impact resulting from the additional containment of the population. To verify the robustness of the results, we extended the comparison to include the Italian economy, whose structure is notably different from that of Slovakia and Germany. As regards the pandemic's impact, Italy's higher share of services in overall GDP is a particularly important factor. Our primary focus in the main text of this annex is the difference in performance between the Slovak and German economies; the decomposition results for the activity gap relative to Italy are given in Box 2.

Box 1
Technical details of the activity gap decomposition calculation

The analysis starts by computing, for each country (j), the percentage change in GDP (Y) relative to the fourth quarter of 2019:

$$\Delta^L Y_t^j = 100 * \left(\frac{Y_t^j}{Y_{4q2019}^j} - 1\right) \tag{1}$$

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[1] "Differences in Output Performance between Europe and the United States During Covid-19", *Regional Economic Outlook Update – Europe*, IMF, April 2021.
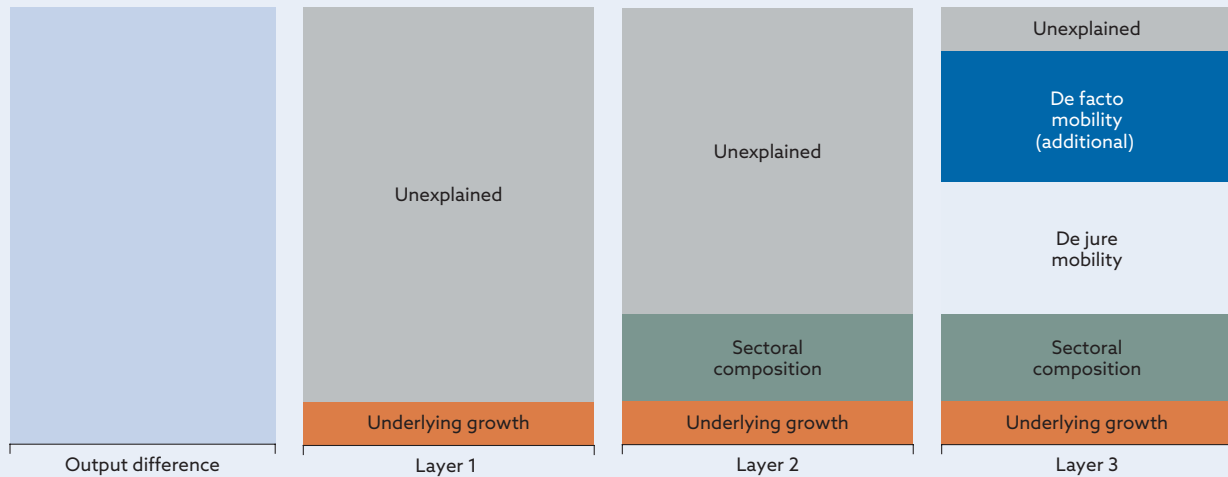
Next, the activity gap relative to Germany is calculated as follows:

$$\Delta^G Y_t^j = \Delta_t^j Y - \Delta_t^{DE} Y \qquad (2)$$

The overall activity gap is then decomposed in layers.

Chart A
Decomposition approach

Source: NBS calculations.

Layer 1 – Underlying pre-pandemic trend growth

The first layer quantifies how much of the total activity gap can be attributed to pre-pandemic differences in growth momentum. To that end, the analysis uses the average quarterly GDP growth projections for each quarter from the first quarter of 2020 to the fourth quarter of 2022, as given in the December 2019 Eurosystem staff macroeconomic projections for the euro area.

Layer 2 – Sectoral composition of the economies

This layer focuses on the differences between the economies in terms of their sectoral composition. The calculation was based on value added data for ten principal NACE sectors in each country. The activity gap can also be expressed as the sum of the weights of individual sectors and of the sectors' value added (where ω_i^j denotes the weight of sector i in country j).

$$\Delta^G Y_t^j = \Delta_t^j Y - \Delta_t^{DE} Y = \sum_{i=1}^{N} \omega_i^j \, \Delta^L Y_{i,t}^j - \sum_{i=1}^{N} \omega_i^{DE} \, \Delta^L Y_{i,t}^{DE} =$$

$$\sum_{i=1}^{N} \left(\omega_i^j - \omega_i^{DE} \right) \Delta^L Y_{i,t}^j + \sum_{i=1}^{N} \omega_i^{DE} \left(\Delta^L Y_{i,t}^j - \Delta^L Y_{i,t}^{jDE} \right) \qquad (3)$$

The first term at the end of equation (3) denotes the contribution of the sectoral composition of the economy to the cross-country activity gap.

Layer 3 – Mobility

The last layer aims to assess to what extent the activity gap stripped from the effects of underlying trend growth and sectoral composition can be attributed to different responses to the pandemic, i.e. to mobility differences. Mobility trends were affected, on the one hand, by the adoption of containment measures and, on the other hand, by voluntary social distancing by the population. The first step was to regress de facto mobility on de jure mobility (mobility implied by containment measures) in a panel setting at the country level using weekly data.

$$\Delta^L M_t^j = a + b\Delta^L R_t^j + e_t^j \tag{4}$$

where $\Delta^L M_t^j$ denotes the change in de facto mobility in country j, and $\Delta^L R_t^j$ denotes the change in de jure mobility (or the stringency of containment measures as measured by the Oxford Stringency Index). The coefficients are kept constant across countries. The residual from equation (4), $\Delta^L(M_t^j/R_t^j)$ denotes "additional" de facto mobility – that is, de facto mobility beyond what is implied by containment measures.

In the second step, sectoral activity gaps are regressed on de jure mobility and the "additional" de facto mobility in a panel setting at the country-sector level:

$$\Delta^L Y_{i,t}^j = \alpha_i + \beta_i \Delta^L(M_t^j/R_t^j) + \rho_i \Delta^L R_t^j + \epsilon_{i,t}^j \tag{5}$$

where β_i and ρ_i are sector-specific coefficients.[2]

After taking into account the contributions of each layer, part of the activity gap remains unexplained. This is a residual, resulting from the countries' additional differences which are unrelated to the pandemic's evolution, sectoral composition or mobility reductions. Identifying such specifics in economic performance requires a more in-depth structural analysis. For simplicity, they are hereafter referred to as the part unexplained(by the model).

Layer 1 – Underlying trend growth

Differences in pre-pandemic underlying growth momentum make a considerable positive contribution to the overall activity gap (Chart 2). The underlying growth trends of the Slovak and German economies follow the

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[2] In order to test the robustness of the results, the estimate was also made using fixed effects for each country. In each equation, the share of the explained variability of the dependent variable increased, but this effect was largely due to intercepts. In the end, this setting would reduce the impact of de jure and (additional) de facto mobility (the object of our interest), while the residual would be larger.

December 2019 Eurosystem staff macroeconomic projections for the euro area.[3] At that time, the incoming data on economic developments did not envisage any pandemic. The Slovak economy was and still is catching up with advanced economies such as Germany; hence its pre-pandemic quarterly growth rates were slightly higher and the contribution of this factor over the whole period under review is positive.

Chart 2
First layer of decomposition, Slovakia relative to Germany (cumulative contributions in percentage points)
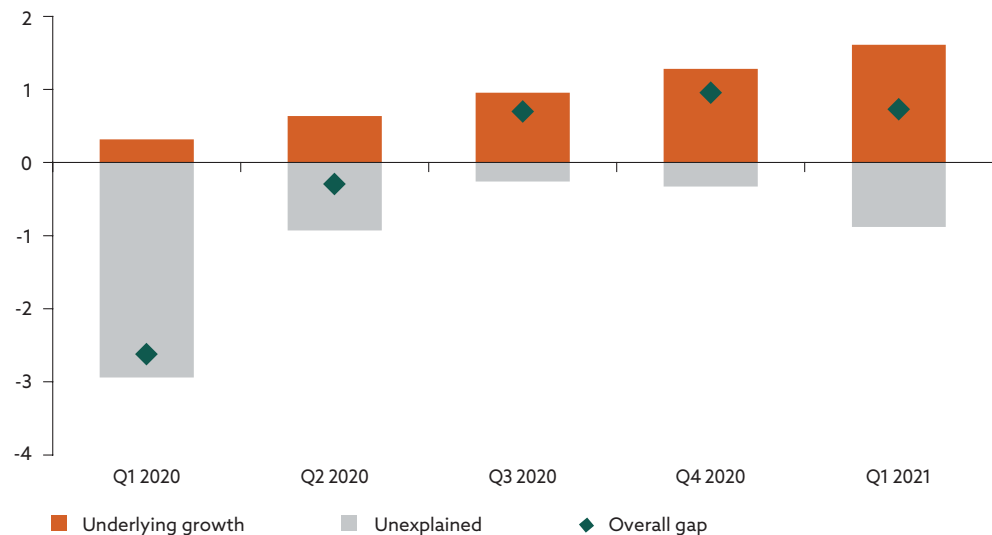
Source: NBS calculations.

*Layer 2 – Sectoral composition of the economies*

The next layer in the decomposition focuses on the impact of differences in the sectoral composition of the economies. The pandemic has affected some sectors (for example, contact-intense activities) more than others, so cross-country differences in the weight of these sectors may contribute to the activity gap.

The Slovak and German economies are very similar in terms of the share of industry in value added, but they differ more significantly in the share of services (Chart 3). Whereas Germany has a higher share of services and public administration in its GDP, Slovakia reports moderately higher shares for the agriculture and construction sectors. In addition, the countries differ considerably in the contribution of trade, transport, accommodation, and food service activities to overall value added.

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[3]   Similar results are achieved using the ECB's September 2019 projections.

Of the factors under review, the economies' sectoral composition has the least impact. The pandemic's impact on the agriculture and construction sectors during the period under review was far more adverse in Slovakia than in Germany, hence the slightly negative contribution of Slovakia's sectoral composition to the activity gap. By contrast, the trade sector in Slovakia had a positive impact, probably because it was less affected by lockdowns than was trade in Germany.

Chart 3
Weights of sectors in GDP
(percentage points; 2019)
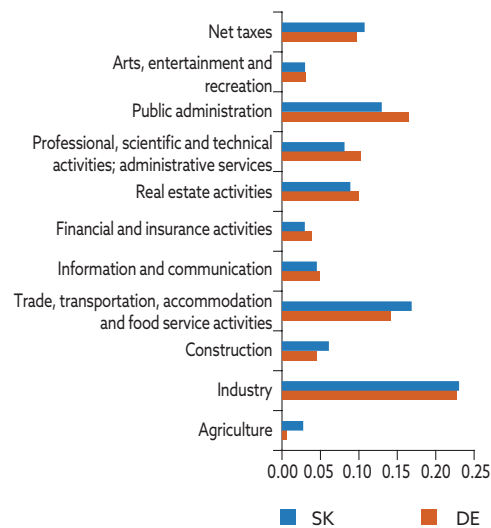
Source: NBS calculations.

Chart 4
Second layer of decomposition
– Slovakia relative to Germany
(percentage point contributions)
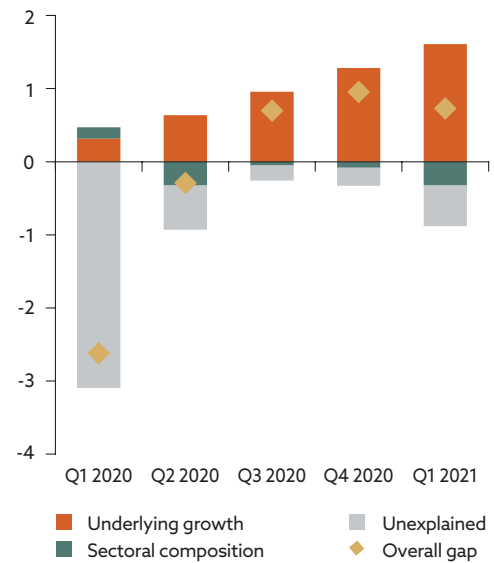
Source: NBS calculations.

Layer 3 – Mobility[4]

After adjusting for the previous layers, it remains to compare intra-sectoral developments in terms of the extent to which they have been impacted by government containment measures and by people's behaviour during the pandemic. All countries recorded a reduction in mobility from early 2020. However, government responses to pandemic waves can vary according to the different timing and intensity of the wave affecting their particular country; hence so can their impact on population mobility and, by extension, their impact on GDP growth.

Changes in mobility can reflect, on the one hand, the impact of government containment measures (de jure mobility) and, on the other hand, vol-

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[4] This analysis uses Google mobility data and Oxford Stringency Index data, provided by Macrobond.

untary social distancing, i.e. mobility reduction beyond what can be attributed to containment measures (de facto mobility).

Chart 5
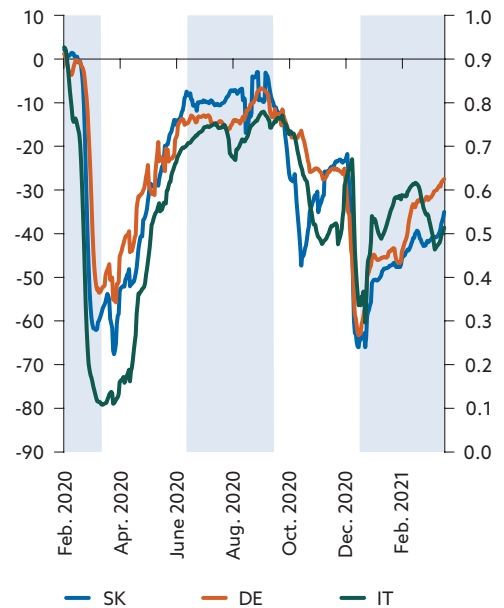**Oxford Stringency Index**

SK — DE — IT
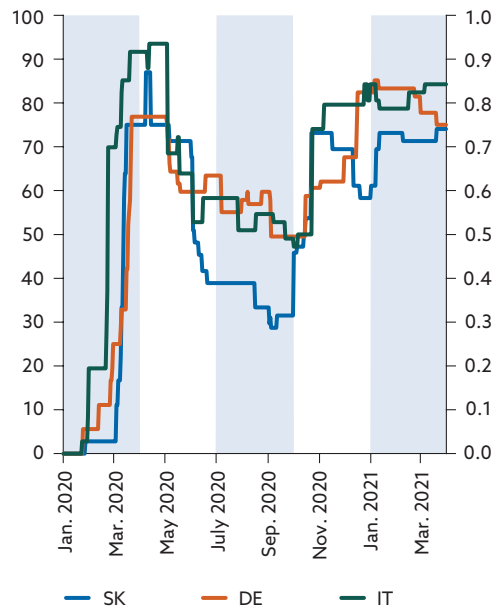
Chart 6
Google mobility trends

SK — DE — IT

After initially imposing stringent containment measures, the Slovak government has eased them to a greater extent than Germany has (Chart 5). During the summer, the measures in Slovakia were eased considerably, whereas those in Germany were kept at a more stringent level. During the second wave, Slovakia's containment measures were tightened later and to lesser extent.

The easing of containment measures during the summer was a major reason why Slovakia's GDP performed more favourably than Germany's (Chart 5). De jure mobility made a moderately positive contribution to the activity gap also in the first quarter of 2021, when the German government was responding more stringently at the start of the pandemic's next wave.

But even though containment measures in Slovakia have been more moderate since the start of the pandemic, people in Slovakia have gone further in reducing their mobility (Chart 6). The available data do not enable us to tell whether this is a case of "additional" mobility reduction resulting from cautiousness or a case of Slovaks travelling less and having less social contact than other nationalities even during normal times. The mobility reduction in Slovakia was more pronounced prior to the first nationwide testing campaign at the end of October 2020. Mobility in Germa-

ny increased vis-à-vis mobility in Slovakia also at the end of the first quarter of 2021, following a moderate easing of measures. In Slovakia, however, with the second wave being severe and putting the health system under great strain, the government took longer to relax containment measures, so mobility increased only slowly.

The higher level of mobility in Germany should have a more moderate economic impact right from the outset of 2020, and therefore the Slovak economy should record higher losses (Chart 7). The lower mobility in Slovakia may also be attributed to a certain cautiousness. According to the available pandemic indicators (number of new cases, number of deaths, etc.), the pandemic situation in Slovakia has been more serious. Considering also the state of Slovakia's health system compared with that of Germany's, it may be that people in Slovakia have been more inclined to engage in social distancing as way of protecting themselves against infection. Another reason, however, may simply be that mobility in Slovakia would have been lower even if there were no pandemic. A greater proportion of the German population appears to have more resources and reasons for travelling.

Chart 7

Decomposition of Slovakia's GDP gap relative to Germany (percentage point contributions)
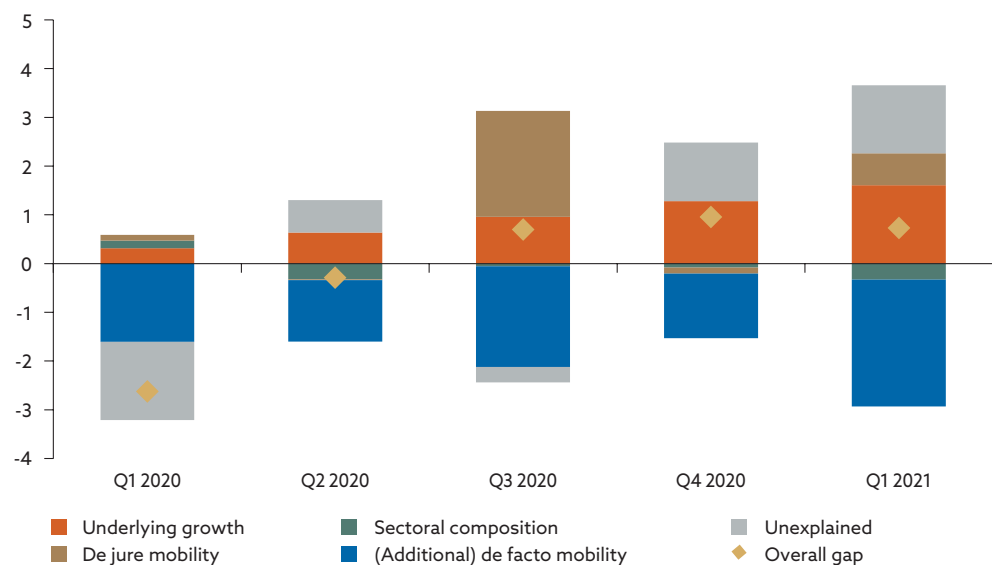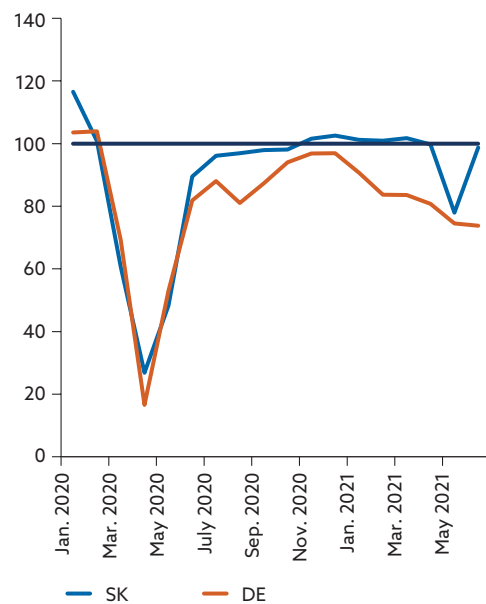

Source: NBS calculations.

Although the pandemic should have a more adverse impact on the Slovak economy than on the German economy, Slovakia has progressed further than Germany in returning to its late-2019 GDP level and therefore part of the activity gap, mainly towards the end of the period under review, remains unexplained. One reason appears to be the economies'

dependence on the automotive industry and that industry's struggles with component supply bottlenecks. In both countries, car production accounts for a significant share of overall output, but there are differences in car production developments (Chart 8). In its early phase, the pandemic crisis affected each country's car industry to a similar extent, but car producers in Slovakia managed to regain almost all their lost ground very rapidly. In Germany, car producers were affected earlier by the global shortage of components (Chart 9), while their Slovak counterparts did not begin struggling with this issue until May 2021. In this regard, Slovakia's car producers were aided by the structure of their car production. In deciding on where to allocate stocks and supplies of semiconductor chips, their parent companies were probably also taking into account intra-group financial flows. Since Slovakia makes higher-end cars and cars for which there is higher demand, the parent institutions diverted available stocks here in order to maintain group profits. Another factor in this regard appears to have been the transition to electric car production in Germany.
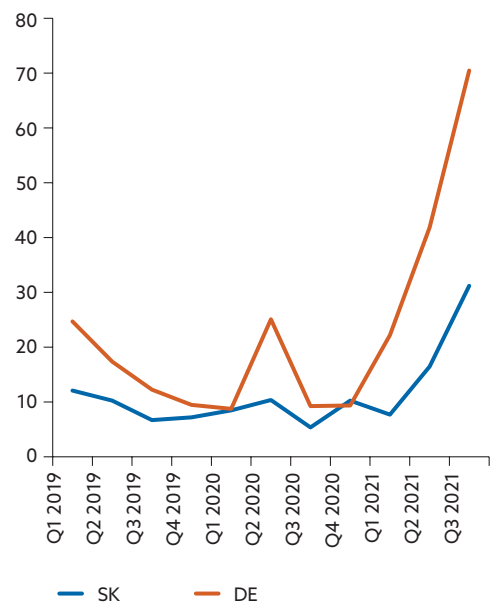
Chart 8

Car manufacturing output (seasonally adjusted; index Q4 2019 = 100)

SK   DE

Sources: Macrobond, SO SR, and NBS calculations.

Chart 9

Shortage of material and/or equipment as a factor limiting production (percentage balances)

SK   DE

Source: European Commission.

Box 2
Decomposition of Slovakia's activity gap with Italy

Source: NBS calculations.

As in the comparison with Germany, the pre-pandemic underlying trend growth has a positive impact in all periods. In the December 2019 Eurosystem staff macroeconomic projections for the euro area, Slovakia's GDP growth was expected to be higher than Italy's.

The impact of sectoral composition is more differentiated. During the first wave (and to some extent also in spring 2021) Slovakia was losing ground because industry has a greater weight in its GDP and its industry was performing worse than Italy's. Although the pandemic had a greater impact on certain services (financial activities, real estate activities), the lower share of these sectors in its GDP was to Slovakia's advantage. We expected the pandemic to have a larger impact on tourism in Italy, but here the aggregation of data is a problem. Accommodation and food service activities are included in one sector together with trade, which fared relatively well despite the pandemic (increased food purchases owing to people working remotely; a shift toward online shopping). The impact on tourism is therefore seen mainly in the sector of real estate activities, probably also owing to a decline in holiday apartment rentals.

For almost the entire period under review, containment measures were more moderate in Slovakia than in Italy. The difference was particularly marked in the first quarter of 2020, when Italy was the first European country to be struck by the pandemic. Hence, compared with Italy, the impact of de jure mobility on Slovakia's GDP was relatively positive. The im-

pact of de facto mobility was largely negative, particularly during the second wave (from Q3 2020). This in fact means that Slovaks engaged in voluntary social distancing, i.e. mobility reduction beyond what would be implied by containment measures, to a greater extent than did Italians. The more negative impact of this "additional" mobility reduction can be explained by the fact that people in Italy were reducing their mobility in accordance with stringent containment measures, while people in Slovakia were reducing their mobility to a similar extent even though containment measures were less restrictive. This may be partly caused by the naturally lower mobility among people in Slovakia (fewer holidays, less labour migration, etc.).

After applying all three layers, a considerable part of the activity gap still remains unexplained by the model. One reason for Slovakia's more positive relative performance is the Italian economy's dependence on tourism and hence on the mobility of people in surrounding countries. In winter and spring almost all EU countries restricted travelling and holiday-making in response to the strong pandemic wave, so services in Italy were harder hit than the pandemic figures alone would imply.

Box 3
Graphical comparison with selected countries

Chart A
GDP (index: Q4 2019 = 100)
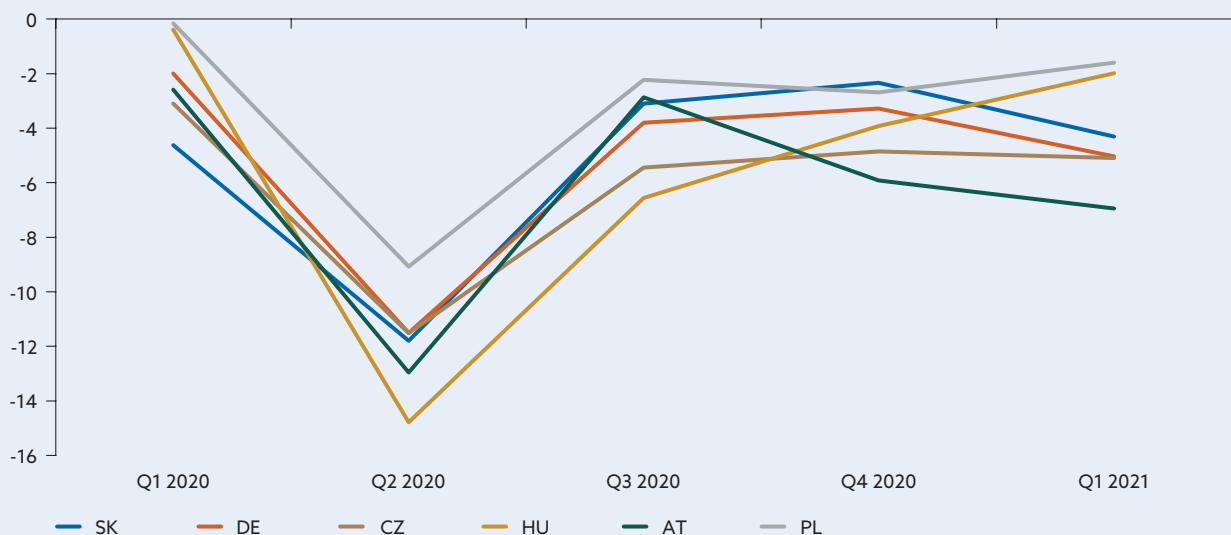
Sources: Eurostat, and NBS calculations.

Chart B

Decomposition of GDP gaps of selected countries relative to Germany (percentage point contributions)

CZ

Underlying growth
Sectoral composition
De jure mobility
(Additional) de facto mobility
Unexplained
Overall gap

HU

Underlying growth
Sectoral composition
De jure mobility
(Additional) de facto mobility
Unexplained
Overall gap

PL

Underlying growth
Sectoral composition
De jure mobility
(Additional) de facto mobility
Unexplained
Overall gap

AT

Underlying growth
Sectoral composition
De jure mobility
(Additional) de facto mobility
Unexplained
Overall gap

Source: NBS calculations.

Chart C

Decomposition in selected countries (relative to Germany)

Q2 2020

Q1 2021

Legend:
- Underlying growth
- De jure mobility
- Unexplained
- Sectoral composition
- (Additional) de facto mobility
- Overall gap
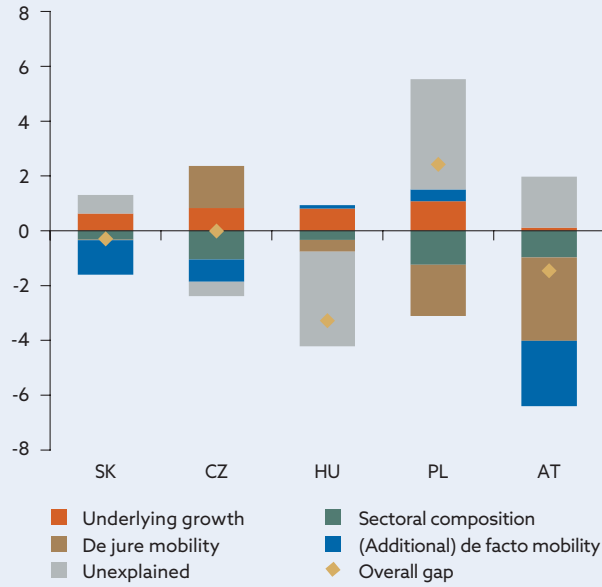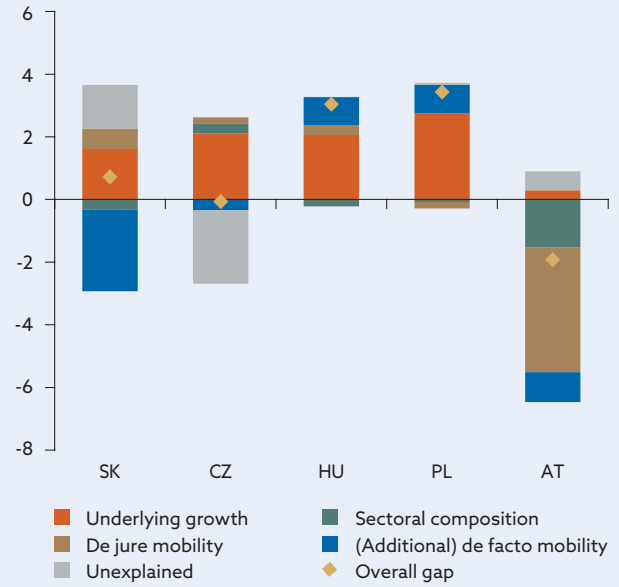
Source: NBS calculations.

Special annex 2

A pandemic model for Slovakia – the BSIHR model

Our new Behavioural Susceptible-Infectious-Hospitalized-Recovered (BSIHR) model is based on a paper by Andrew Atkeson of the University of California, Los Angeles.[1] His work expands the Behavioural Susceptible-Infectious-Recovered (BSIR) model, in which, put simply, the virus transmission rate responds to the pandemic's current evolution. This implies that the trans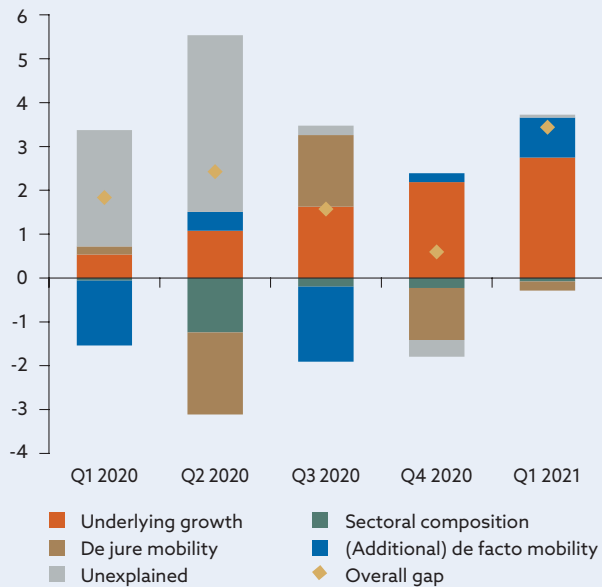mission rate declines endogenously in response to rising numbers of infected, hospitalised and dead people. Hence this approach comprises both the introduction of mandatory measures as well as the voluntary reduction of individual activities. Atkeson (2021) expands this model to include seasonality in transmission (the peak rate is in January and the trough is in July) and so-called pandemic fatigue, modelled as a one-time reduction in the sensitivity of the transmission rate to the number of deaths. In order to depict the pandemic's progress in Slovakia and to forecast its future evolution, we have extended the theoretical model to include vaccination.

How does the model work?

In the basic SIR model, the whole population is divided into three groups: (1) the number of people susceptible to infection with the virus (S); (2) the number of people infected with the virus (I), i.e. those spreading the virus; and (3) the number of people who have recovered from the disease (R) and are thus immune to the virus. A proportion of the infected population will recover and swell group R, while a proportion will succumb to the disease. As soon as the virus emerges and, with a reproduction number higher than one, starts to spread in the population, the infected population will increase exponentially. The wave will, however, stop at a certain point, specifically when a sufficient number of people have acquired immunity and the virus can no longer, as it were, accelerate as fast as it did before.

The model's basic parameters include inter alia the following: recovery rate; vaccination rate; death rate; hospitalisation rate; and, in particular, the transmission rate, which might also be termed the aggressivity of the virus. Aggressivity affects the virus's basic reproduction number.

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[1] Atkeson, A., "A Parsimonious Behavioral SEIR Model of the 2020 COVID Epidemic in the United States and the United Kingdom", *NBER Working Paper*, No 28434, February 2021.

In the behavioural version of the model, the transmission responds endogenously to the number of hospitalisations – if the number is high, the transmission rate declines, so the pandemic wave will be suppressed. If the number of hospitalisations declines, the transmission rate will increase again. Since, because of the suppression of the previous wave, the share of immune individuals did not increase as much as it would have done had the wave not been suppressed, there may happen a resurgence in the infected population. Thus, the BSIR model can theoretically explain the recurrence of pandemic waves.[2]

Box 1
Technical description of the BSIHR model

This box presents a version of the SIR model with compartments for hospitalised and vaccinated shares of population. In the model language, vaccination implies an outflow from the group of people susceptible to infection with the virus (S). To better depict the evolution of the pandemic, we introduce another group, hospitalised (H).

Time is discrete and frequency is daily. In each period t, the population is divided into seven groups: (1) the share of the population susceptible to infection with the virus (S_t); (2) the share of the population infected with the virus (I_t), (3) the share of population infected with a new variant of the virus ($I_{v,t}$); (4) the share of the population hospitalised with the virus (H_t); (5) the share of the population that has recovered from the virus (R_t); (6) the share of the population vaccinated against the virus (V_t); and (7) the share of the population that died from the virus (D_t).

The model dynamics are given, as in a standard epidemiological SIR model, by

$$1 = S_t + I_t + I_{v,t} + H_t + R_t + V_t + D_t. \tag{1}$$

The share of susceptible people at time t is denoted by K_t with a transmission rate β_t. All variables and parameters with the subindex relate to the new Delta variant, an example being the transmission rate $\beta_{v,t}$.

$$K_t = \beta_t S_t I_t \tag{2}$$

$$K_{v,t} = \beta_{v,t} S_t I_{v,t} \tag{3}$$

The susceptible population S_t, evolves according to the equation

$$S_{t+1} = S_t - (K_t + K_{v,t}) - \omega_t S_t \tag{4}$$

where ω_t denotes the time-varying vaccination rate, which is given exogenously. The shares of infected people are given as follows

$$I_{t+1} = I_t + K_t - (\gamma^I + \lambda) I_t \tag{5}$$

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[2] See also https://johnhcochrane.blogspot.com/2020/05/an-sir-model-with-behavior.html

$$I_{v,t+1} = I_{v,t} + K_{v,t} - (\gamma^I + \lambda)\, I_{v,t} \tag{6}$$

where γ^I denotes the recovery rate from state I to R, and λ is the hospitalisation rate, i.e. the rate of flow from state I to H.

The share of hospitalised people H is given by the following equation

$$H_{t+1} = H_t + \lambda\, (\, I_t + I_{v,t}) - (\gamma^H + \delta_t)\, H_t \tag{7}$$

where γ^H denotes the recovery rate from state H to R, and δ_t is the time-varying death rate, i.e. the rate of flow from state I to D. The share of the recovered population R is given by equation (8); the share of the vaccinated population, by equation (9). In the model, people from both group S and R get vaccinated.

$$R_{t+1} = R_t + \gamma^I\, (\, I_t + I_{v,t}) + \gamma^H H_t - \omega_t\, R_t \tag{8}$$

$$V_{t+1} = V_t + \omega_t\, S_t + \omega_t\, R_t \tag{9}$$

The share of the population which succumbs to the disease is given by $D_{t+1} = D_t + \delta_t\, H_t$.

The virus transmission rate β_t is modelled as follows

$$\beta_t = \bar{\beta}\, exp\, (\, -\kappa_t \textstyle\sum_{i=t-20}^{t-10} H_i + \psi_t) \tag{10}$$

$$\beta_{v.t} = Dummy_{v.t}\, \beta_t \tag{11}$$

$$\psi_t = \frac{-0.1}{2}\, cos\, (t\,\frac{2\pi}{365} - 1) \tag{12}$$

$$\kappa_t = \bar{\kappa}(1\text{-}normcdf(t,\mu,\sigma)) + fatiguesize\; \bar{\kappa}\; normcdf(t,\mu,\sigma) \tag{13}$$

where time-varying parameter κ_t captures the sensitivity of agents' response to the number of hospitalisations H at time t. In other words, as equation (10) shows, the transmission rate is assumed to respond to the number of hospitalisations measured as the sum of people hospitalised with the virus between t-20 and t-10.

Hence, the endogeneity in the model implicitly constitutes a stringency index that captures the stringency of mandatory containment measures or households' endogenous voluntary reduction of their activities.

ψ_t denotes the seasonality of the transmission rate, which has a peak in January and a trough in July.

The parameters $\bar{\kappa}$, *fatiguesize*, $\bar{\beta}$, $Dummy_{v.t}$, μ, σ, as well as ω_t, δ_t, γ^H, γ^I and λ, are calibrated according to the data so that the model dynamics are as close as possible to the observed evolution of the pandemic in Slovakia.

Use of the model

As Chart 1 shows, the model framework is able to capture the pandemic's evolution in Slovakia from July 2020 until today. When it comes to forecasting its future evolution, there are many uncertainties; nevertheless, through the prism of a model whose mechanism and calibration can reproduce the course of the pandemic wave in Slovakia reasonably well, we can quantify and review different assumptions about the third wave.

Chart 1
Evolution and estimation of the pandemic

Legend: Hospitalisations – real data / BSIHR model
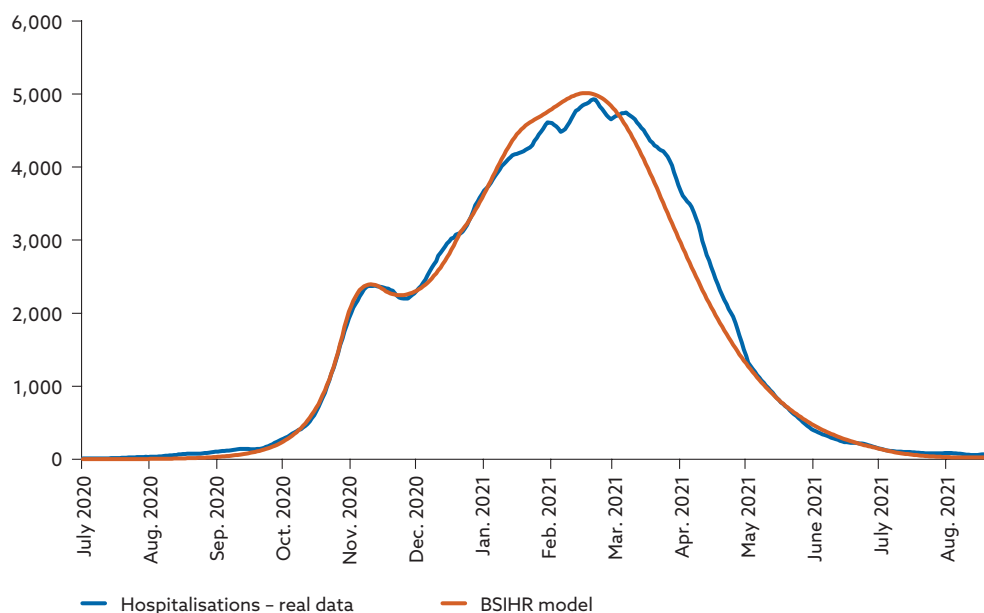
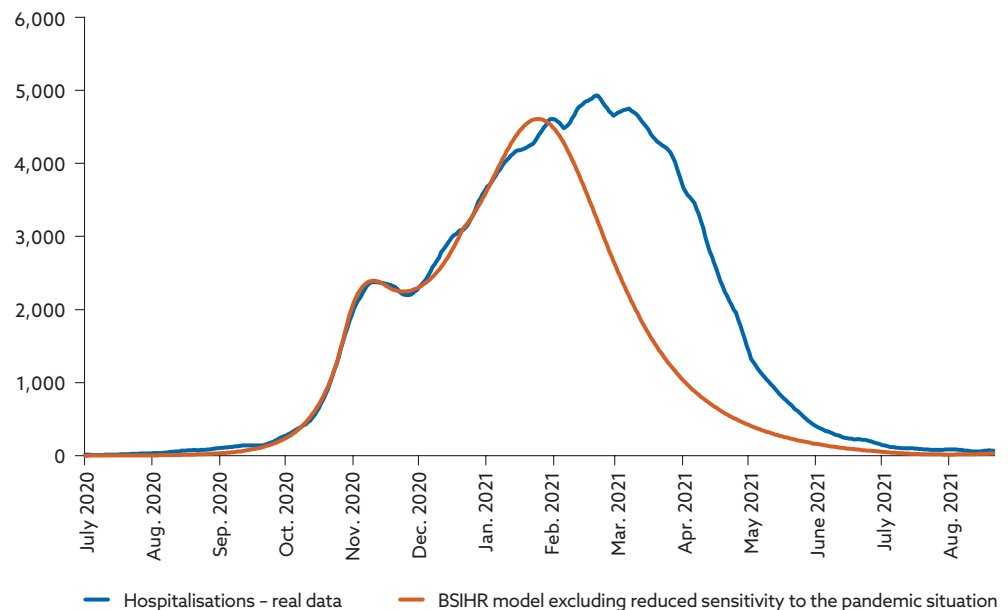Source: NBS calculations.

The second pandemic wave

Chart 2 shows the pandemic's evolution from 1 July 2020 in terms of the number of hospitalisations. The blue curve represents the actual seven-day moving average of the number of people hospitalised with confirmed or suspected COVID-19. As we can see, in late September/early October 2020 the number of hospitalisations began to rise sharply and reached a local peak in early November. There followed a temporary decrease that can be attributed to the impact of mass testing, which in the model context, caused a short-term drop in the transmission rate and, consequently, in the number of people infected and hospitalised with the virus.

The model is calibrated as follows. The start of the pandemic's second wave is a result of the SIR model excluding the behavioural aspect, i.e. excluding the endogenous response to the number of people hospitalised with the virus. At the time of mass testing (in the model calibration, the time span is from 28 October 2020 to 14 November 2020), the transmission rate expe-

riences a shock and falls to 54%. The model shows that from 15 November 2020 the exogenous shock of the reduced transmission rate is fading out and that the endogenous mechanism of the behavioural response to the number of hospitalisations is stepping in. This mechanism manages to explain with reasonable accuracy the increase in cases in November and December as well as the hospitalisation peak in late January/early February 2020. However, as can be seen from Chart 2, given the rate of response to the number of hospitalisations, the model forecasts a faster receding of the second wave than we observed in reality.

Chart 2
Model evolution of the pandemic excluding changes in sensitivity

Hospitalisations – real data — BSIHR model excluding reduced sensitivity to the pandemic situation

Source: NBS calculations.

Change in sensitivity to containment measures and to the Alpha variant

Atkeson (2021) introduces a so-called pandemic fatigue shock, which appears as a one-time reduction in sensitivity to the number of hospitalisations. In other words, the implementation rate of containment measures decreases, as does compliance with these measures. Atkeson (2021) uses this shock to explain the pandemic wave in the United Kingdom in late 2020 and early 2021.

In our model version, a one-time reduction in sensitivity to the number of hospitalisations (κ) is also a way in which to account for the emergence of the Alpha variant, as well as for the potentially weaker compliance with measures. The effect of these two factors results in a prolonged peak and a later receding of the second wave. In particular, reducing sensitivity to 49% of its original value produces a pandemic evolution very similar to

that shown by the observed data. The gap between the red and blue curves in Chart 2 illustrates the increase in hospitalisations due to the factors mentioned.

The **impact of seasonality** is shown in Chart 3. As we can see, the main implication of seasonality was a faster increase of cases and hospitalisations at the onset of the second wave and correspondingly its higher level.

Chart 3

Model evolution of the pandemic excluding seasonality in the transmission rate

— Hospitalisations – real data   — BSIHR model excluding seasonality
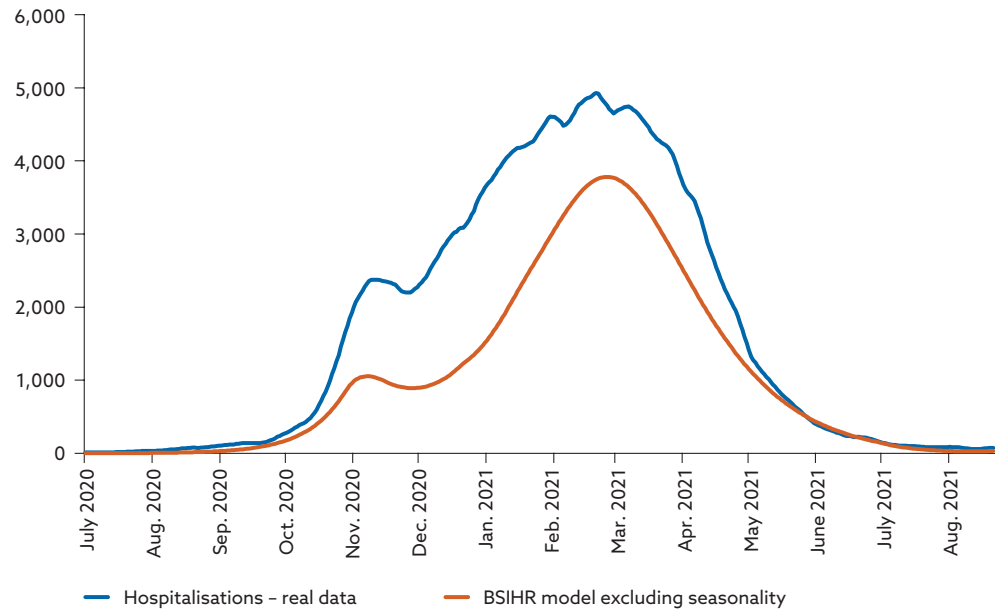
Source: NBS calculations.

The model has been applied to quantify specific assumptions about the pandemic's evolution. Its outcomes are then used to inform our forecast and assumptions about the stringency of government measures, which in turn enter our model of household short-term consumption.

Special annex 3

Firms have maintained price competitiveness during the pandemic period

Since the outbreak of the pandemic crisis, Slovakia's nominal effective exchange rate (NEER) has appreciated. The negative difference between domestic and foreign inflation (the inflation differential) has reversed the loss of competitiveness caused by a stronger nominal exchange rate. Hence, after temporarily surging, the real effective exchange rate (REER) has fallen back to below pre-pandemic levels. The REER's weakening against estimated equilibrium level further confirms the maintenance of price competitiveness.

The NEER[1] is currently[2] 1.9% stronger than it was prior to the pandemic.[3] Its rapid appreciation following the pandemic's outbreak (Chart 1) reflected the perception of the euro as a relatively safe currency at a time of heightened uncertainty.

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[1] The construction of effective exchange rates is explained in a document entitled "Effective exchange rate methodology in the NBS", published on the NBS website.

[2] At the data cut-off date for this report, the most recent available REER data were for July 2021.

[3] The comparison is between the period of relatively stable movement prior to the pandemic, i.e. the average rate for the period from January 2019 to January 2020, and the current average, for the period from November 2020 to July 2021, after the REER returned back to its pre-pandemic level. The end of the pre-pandemic period is set at January 2020, since in February 2020 the real exchange rate was already starting to appreciate significantly. This movement reflected rising producer prices in manufacturing, possibly related to the threat of supply chain disruptions following the initial spread of COVID-19 in China, a major link in the industrial production chain.

Chart 1
Nominal and real effective exchange rates (index: 2019 = 100)
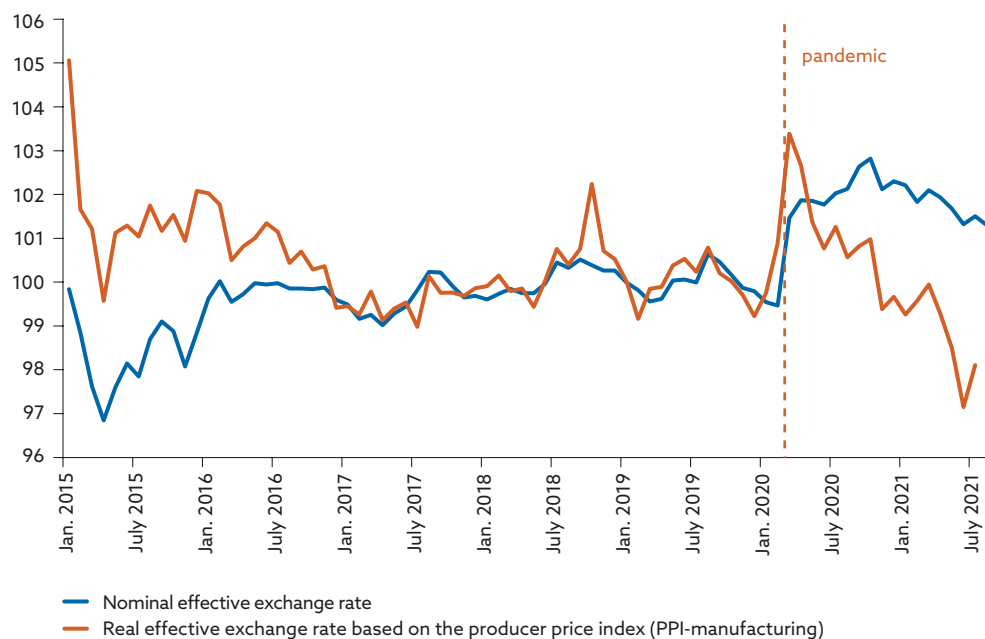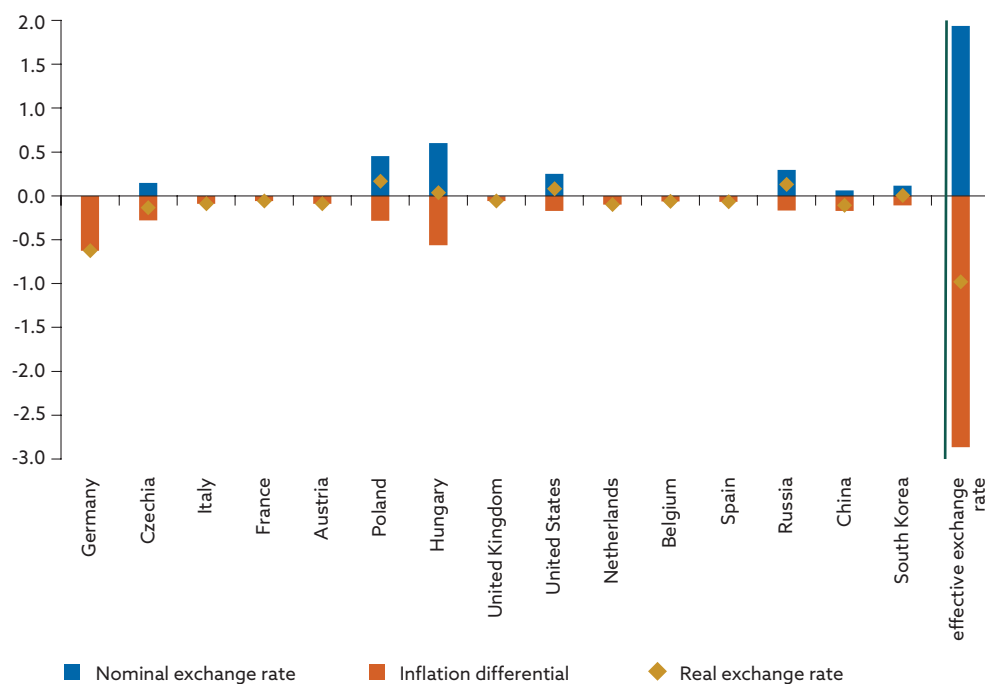

Source: NBS calculations.
Note: An increase in the effective exchange rate denotes appreciation.

After a temporary surge, the REER has gradually fallen back to below pre-pandemic levels. It was weaker by 1.0% on average in the recent period starting in November 2020. Domestic producers have managed to regain price competitiveness as prices have decreased more markedly in Slovakia than in the external environment. In Slovakia, **the change in manufacturing prices during the period under review was 2.9 percentage points lower** than the weighted average for its principal trading partners.

The negative difference between domestic and foreign inflation (the inflation differential) **has reversed the loss of competitiveness caused by a stronger nominal exchange rate.** The overall result in the form of the real effective exchange rate (Chart 2) may mask different, mutually offsetting contributions of nominal exchange rates and of inflation differentials vis-à-vis Slovakia's trading partners.

Chart 2

Trading partners' contributions to the shift in the REER and in its components (percentage points)

Source: NBS calculations.
Notes: The shift is between the pre-pandemic period, i.e. the average for the period from January 2019 to January 2020, and the average for the period from November 2020 to July 2021, i.e. after the REER returned to its pre-pandemic level. An exchange rate increase denotes appreciation.

The largest contributor to the REER's appreciation was the bilateral real exchange rate vis-à-vis **Poland.** Although the actual contribution of the euro's stronger nominal exchange rate with the Hungarian forint was higher, the strengthening of the corresponding real exchange rate was curbed by the inflation rate, which was higher in Hungary than in Slovakia. All trading partners recorded higher inflation compared with Slovakia. **Higher inflation in Germany was the main contributor to the maintenance of Slovakia's price competitiveness.** By contrast, Slovakia's competitiveness was dented by the appreciation of the euro's nominal exchange rate with the currencies of all non-euro area trading partners apart from the United Kingdom.

The weights applied to the trading partners' contributions mask the overall extent of the movement in nominal exchange rates and inflation differentials. In Chart 2, the countries are shown in order of their weight size. Particularly with countries that lie more to the right, the exchange rate or price movements may therefore be expected to be greater than the countries' lower-weighted contributions would imply. Chart 3 shows changes in nominal exchange rates and inflation differentials vis-à-vis Slovakia's main trading partners.

The bilateral euro exchange rate that showed the largest appreciation during the period under review was that with the Russian rouble, followed by the currencies of Hungary, the United States and Poland. Against the currency of a country to the right of Chart 3's vertical axis, the euro's nominal exchange rate appreciated; against the currency of a country to the left, it depreciated. Only against the UK currency did the euro weaken, and then only marginally. Slovakia's euro area trading partners are positioned directly on the vertical axis. Slovakia's nominal exchange rate vis-à-vis these countries is unchanged, since the same currency, the euro, is used by all. The stronger Slovakia's nominal exchange rate, the higher the prices of Slovak exports on foreign markets and the lower the prices of imports on the domestic market, implying a reduction in domestic firms' price competitiveness.

The loss of competitiveness caused by the considerable strengthening of the exchange rate with the rouble is partly offset by the inflation rate being lower in Slovakia than in Russia. A position above the horizontal axis in Chart 3 would imply that inflation was higher in Slovakia than in the given country. All Slovakia's main trading partners are positioned below the horizontal axis because they all have higher inflation compared with Slovakia. Slovakia is therefore gaining price competitiveness.

Chart 3

Changes in components of real bilateral exchange rates and of the effective exchange rate (percentages; percentage points)
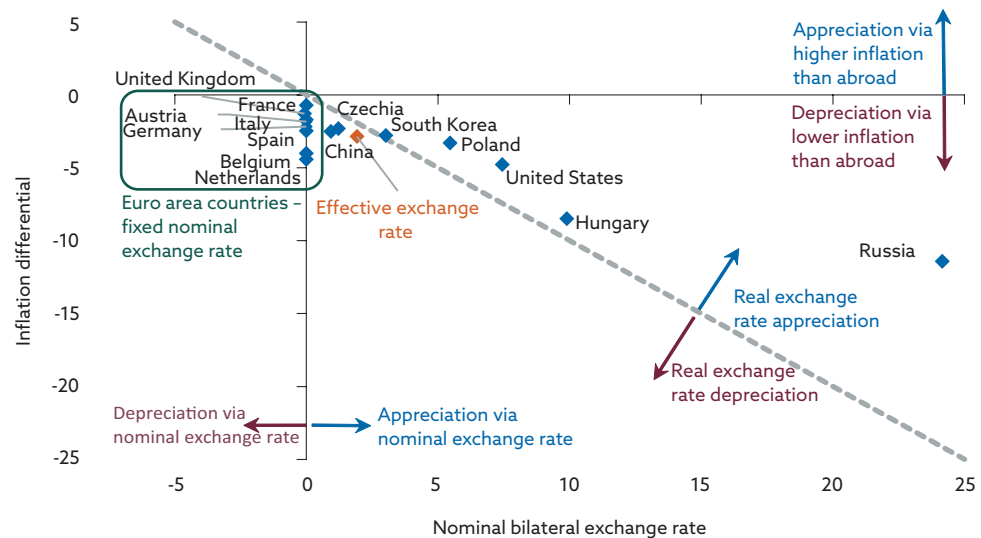
Source: NBS calculations.
Note: The shift is between the average for the pre-pandemic period from January 2019 to January 2020 and the average for the period from November 2020 to July 2021, i.e. after the REER returned to its pre-pandemic level.

The largest real exchange rate appreciation was vis-à-vis Russia (a 10.0% movement). Real bilateral exchange rate movements comprise the change in the nominal exchange rate (on the horizontal axis) and the difference between inflation in Slovakia and in the given country (on the vertical axis). If these values are inverse, they are mutually offsetting and the real exchange rate with the given country is unchanged. In that case, the point denoting the real exchange rate vis-à-vis the given country is located on the diagonal line across Chart 3. South Korea lies on this line, as the strengthening of the euro nominal exchange rate against its currency was approximately offset by the lower inflation in Slovakia.

In Chart 3, a leftward movement resulting from nominal exchange rate weakening, or a downward movement resulting from an inflation differential decrease, implies an increase in Slovakia's price competitiveness. If a country's resulting position lies below or to the left of the diagonal, it means that Slovak producers' competitive position vis-à-vis that country has improved during the period under review, i.e. Slovakia's real exchange rate with that country's currency has depreciated. Because of lower inflation in Slovakia, this is what has happened with respect to most of Slovakia's euro area trading partners as well as, to a lesser extent, China, the United Kingdom and Czechia. The REER, a weighted average of bilateral real exchanges, is in a similar position indicating an improvement in competitiveness.

A rightward movement resulting from nominal exchange rate appreciation, or an upward movement resulting from an inflation differential increase, implies a loss of Slovakia's price competitiveness. If a country shifts above or to the right of the diagonal, it means that Slovak producers have lost competitiveness with that country during the pandemic, i.e. Slovakia's real exchange rate with that country's currency has appreciated. This has happened most notably with Russia. The nominal appreciation of the real exchange rate with Russia, Hungary, the United States and Poland has been only partly counterbalanced by Slovakia's relatively lower inflation rate.

The higher inflation in the mentioned countries could be influenced by the depreciation of their currencies. A weaker currency directly pushes up inflation via the higher prices of imported goods. A weakened exchange rate also supports overall demand, since domestic consumers increasingly prefer domestic goods to more expensive foreign goods and likewise foreign consumers prefer the cheaper imports. This results in upward pressure on prices in the domestic economy.

Slovakia's real effective exchange rate is weaker than its estimated equilibrium level (the EREER),[4] so it is not expected to pose a risk to the country's price competitiveness. The EREER estimation confirms previous conclusions based on the assessment of exchange rate and price movements. The loosened exchange rate component of monetary policy is supporting the economy's growth and its return to equilibrium after the pandemic-induced slump.

Chart 4
Estimation of the equilibrium real effective exchange rate

Equilibrium band – MTF2021Q3   REER   EREER – MTF-2021Q3
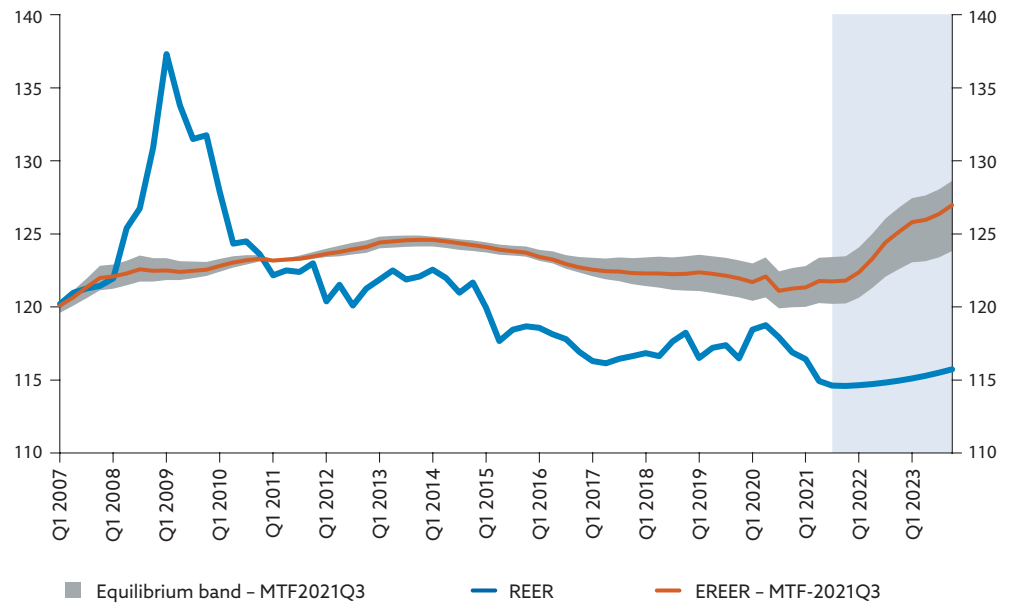
Source: NBS calculations.
Notes: An increase in the REER denotes appreciation. The equilibrium rate (EREER) represents the average of the results of all three models used. The equilibrium band is based on the overall range of results.

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[4] The equilibrium real effective exchange rate (EREER) is an unobservable quantity, so its path has to be estimated. There is no single best recommended way of doing this. We are using two of the most widely used approaches: the behavioural equilibrium exchange rate (BEER) approach, in two variants, and the fundamental equilibrium exchange rate (FEER) approach. Under the BEER approach, a long-run equilibrium relationship is sought between the exchange rate and related macroeconomic indicators. Under the FEER approach, the exchange rate is one of the tools used for simultaneously maintaining the economy's internal and external equilibria.

The real effective exchange rate (REER) is defined using the nominal effective exchange rate (NEER) and manufacturing prices in Slovakia and its 15 most significant trading partners. This approach is described in more detail in Gylánik, M., "Equilibrium real effective exchange rate estimation for the Slovak economy", NBS, March 2012.