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How have profits been shaping domestic price pressures in Austria?

Friedrich Fritzer, Doris Prammer, Lukas Reiss, Martin Schneider

There is an ongoing public debate on the factors that have been driving domestic price pressures in Austria and in the euro area. A recurrent theme is whether the sharp increases in inflation may have been fueled by an excessive rise in corporate profits in some sectors. We address this question by decomposing sectoral value added deflators into their income components.

These deflators record the price development of domestic value added without imported intermediate inputs. Value added is composed of compensation of employees, net taxes on production (= other indirect taxes on production less other subsidies), depreciation and profits (net operating surpluses). By decomposing value added, we can infer the contribution to price developments for each of these components.

In 2022, the deflator for the overall economy (except for the real estate sector, the information and communication sector and the public sector, which we excluded due to data issues) rose by 6.4%, more than half of which (4.0 percentage points) was attributable to increased profits. In order to examine whether the contribution from profits was driven by an above- or below-average development of profits, we split the profit contribution into two components: a distribution-neutral profit contribution, assuming that all income components grow at the same rate, which means that the respective shares (wage and profit share) remain constant; and a nonneutral profit contribution, which is characterized by a below- or above-average rise in profits in relation to the other income components. In 2022, the nonneutral profit contribution accounts for more than a third (2.5 percentage points) of the deflator increase; thus, corporate profits were a relevant price driver.

From a sectoral perspective, three sectors exhibited pronounced above-average contributions from profit. These sectors were energy (including mining as well as water supply and sewerage services), construction, and agriculture (including forestry). At the same time, profit development in the manufacturing sector was below average. Thus, inflation driven by energy prices contributed to a reallocation within the business sector in 2022.

In the first quarter of 2023, the increase of the value-added deflator for the overall economy (excluding the above-mentioned sectors) accelerated to 10.7%, well beyond the figure for 2022 as a whole (6.4%). In addition to the afore-mentioned sectors (energy, including mining; water supply and wastewater services; and construction and agriculture, including forestry), financial and insurance services showed a strong profit-driven deflator increase by 23%.

In its latest forecast, the OeNB expected profits to come under pressure in the remainder of 2023 and in 2024 due to slow economic growth, sharply increasing unit labor costs and mounting replacement costs for capital driving depreciation and amortization; for 2024, the OeNB forecast even points to a dampening effect on inflation.

From a distribution-neutrality perspective, we find the contribution from corporate profits to the value-added deflator to be slightly above average in the period from 2020 to 2024.

Energy price shock poses additional challenge to Austria's price competitiveness

Thomas Url, Klaus Vondra, Ursula Glauninger

How competitive are Austrian goods and service exports? The first step toward answering this question is to compare the value of the Austrian currency against a basket of other currencies in a way that reflects the relative importance of trading partners. This is what the so-called nominal effective exchange rate index does. For Austria, this index is being provided by the Oesterreichische Nationalbank (OeNB) and the Austrian Institute of Economic Research (WIFO). When this index goes up, Austrian exports become more expensive in other countries. When this index goes down, Austrian exports become less expensive. By adding information on the relative development of prices or costs, i.e. by comparing the prices or the costs of production in Austria with each trading partner, we arrive at the real effective exchange rate index. Austria's real effective exchange rate index is, thus, an indicator of Austria's international price or cost competitiveness. With this article, we publish the latest update of weights used to compute the nominal and real exchange rate index for Austria in four segments of the economy: (1) manufactured goods, (2) food and beverages, (3) raw materials and energy products, (4) services and (4a) tourism services. Our calculations relate to up to 55 trading partners, which account for more than 95% of all exports from and imports to Austria. The key consequence of updating the effective exchange rate is the reweighting of the individual currencies to reflect ongoing changes in the relative importance of the individual trading partners. In this article, we update the calculations published in 2021 by reflecting more recent data from 2016 to 2018 on trade flows in the weighting matrix.

The index recalculation and the extension of the calculations until mid-2023 show that in nominal terms the Austrian economy has lost some competitiveness over time, but in real terms (deflated by the (harmonized) index of consumer prices) the situation is almost unchanged compared to 1999. After the COVID-19 crisis, the Austrian economy exhibited a clear improvement in its competitiveness position, owing to a nominal devaluation and lower inflation rates compared to its trading partners. However, both driving factors have since turned around, resulting in a V-shaped development of the effective exchange rates and clear losses in both nominal and real terms since fall 2022. Current forecasts show that the inflation differential to the euro area will shrink while unit labor costs will be driven due to comparatively higher wage agreements in Austria. Hence, Austria will exhibit further competitiveness losses. The authors expect these losses to have a dampening effect on the Austrian economy of around 1 percent between 2022 and 2025.

Nontechnical summaries in German

Die Rolle der Gewinne für die Entwicklung des binnenwirtschaftlichen Preisdrucks in Österreich

Friedrich Fritzer, Doris Prammer, Lukas Reiss, Martin Schneider

Seit einiger Zeit gibt es sowohl in Österreich wie auch im Euroraum eine öffentliche Diskussion über die Ursachen des binnenwirtschaftlichen Preisdrucks. Konkret geht es um die Frage, ob es in manchen Sektoren im Zuge der hohen Teuerung zu einem übermäßigen Anstieg der Unternehmensprofite kam. Wir beantworten diese Frage mit einer Zerlegung von sektoralen Wertschöpfungsdeflatoren: Diese erfassen die Preisentwicklung der inländischen Wertschöpfung ohne importierte Vorleistungen. Die Wertschöpfung setzt sich zusammen aus Arbeitnehmerentgelten, Nettoproduktionsabgaben (= sonstige indirekte Produktionsabgaben abzüglich sonstiger Subventionen), Abschreibungen und Gewinnen (Nettobetriebsüberschüssen). Durch die Zerlegung kann man jeder dieser Komponenten ihren Beitrag zur Preisentwicklung zuordnen.

Für das Jahr 2022 stieg der Deflator für die Gesamtwirtschaft (die Immobilienwirtschaft, Information und Kommunikation sowie der öffentliche Sektor wurden aus Datengründen exkludiert) um 6,4 %. Mehr als die Hälfte davon (4,0 %-Punkte) wurde durch Gewinnanstiege erklärt. Um zu klären, ob dieser Beitrag durch eine über- oder unterdurchschnittliche Gewinnentwicklung getrieben wird, zerlegen wir den Gewinnbeitrag in zwei Komponenten: einen verteilungsneutralen Gewinnbeitrag, bei dem alle Einkommenskomponenten annahmegemäß gleich stark wachsen, und daher die jeweiligen Quoten (Lohn- bzw. Gewinnquote) konstant bleiben; und in einen nicht-neutralen Gewinnbeitrag, der durch ein im Verhältnis zu den anderen Einkommenskomponenten unter- oder überdurchschnittliches Wachstum der Gewinne bestimmt wird. Im Jahr 2022 erklärt der nicht-neutrale Gewinnbeitrag mehr als ein Drittel (2,5 %-Punkte) des Deflatoranstiegs; damit waren Unternehmensgewinne ein relevanter Preistreiber.

Auf sektoraler Ebene waren im Jahr 2022 in den drei Sektoren Energie (inkl. Bergbau sowie Wasser und Abwasser), Bau sowie Land- und Forstwirtschaft überdurchschnittliche Gewinnbeiträge zu verzeichnen. Gleichzeitig war die Gewinnentwicklung in den Unternehmen der Sachgütererzeugung unterdurchschnittlich. Die energiepreisgetriebene Inflation 2022 trug damit zu einer Umverteilung innerhalb des Unternehmenssektors bei.

Im ersten Quartal 2023 beschleunigte sich der Anstieg des Wertschöpfungsdeflators für die Gesamtwirtschaft (ohne die von uns exkludierten Sektoren) und lag mit +10,7 % deutlich über dem Gesamtjahr 2022 (+6,6 %). Neben den Bereichen Energie (inkl. Bergbau sowie Wasser und Abwasser) sowie Bau und Landwirtschaft war bei den Finanz- und Versicherungsdienstleistungen ein starker gewinngetriebener Deflatoranstieg in der Höhe von +23 % zu verzeichnen. Für den Rest des Jahres 2023 und im Jahr 2024 werden die Gewinne laut der aktuellen OeNB-Prognose durch das niedrige Wirtschaftswachstum, stark steigende Lohnstückkosten und steigende Wiederbeschaffungskosten für die Abschreibung des Kapitalstocks unter Druck kommen; im Jahr 2024 werden sie sogar inflationsdämpfend wirken.

Im gesamten Zeitraum 2020 bis 2024 tragen Gewinne – im Sinne der Verteilungsneutralität – geringfügig überdurchschnittliche zum Wachstum des Wertschöpfungsdeflators bei.

Energiepreisschock bedroht preisliche Wettbewerbsfähigkeit Österreichs

Thomas Url, Klaus Vondra, Ursula Glauninger

Der nominelle effektive Wechselkursindex ist ein handelsgewichteter Durchschnitt der bilateralen Wechselkurse eines Landes mit den wichtigsten Handelspartnern. Ein höherer Indexwert signalisiert aus makroökonomischer Sicht eine Aufwertung gegenüber den Handelspartnern, ein sinkender eine Abwertung. Durch die Integration der relativen Preis- oder Kostenbewegungen in den nominellen Wechselkursindex erhält man einen real effektiven Wechselkursindex. Dieser ist ein Indikator für die internationale Preis- oder Kostenwettbewerbsfähigkeit eines Landes, je nachdem ob Preis- oder Lohnkostenindizes verglichen werden. Im vorliegenden Beitrag aktualisieren die Oesterreichische Nationalbank (OeNB) und das Österreichische Institut für Wirtschaftsforschung (WIFO) den nominellen und realen Wechselkursindex für Österreich für vier Branchen: (1) Industriewaren, (2) Nahrungsmittel und Getränke, (3) Rohstoffe und Energieprodukte, (4) Dienstleistungen und (4a) den Tourismus. In den Berechnungen werden bis zu 55 Handelspartner und damit mehr als 95 % des österreichischen Handels berücksichtigt. Die entscheidende Komponente in der Berechnung der Wechselkurse ist die Gewichtsmatrix, in der das Gewicht der einzelnen Handelspartner festgelegt wird. Im vorliegenden Artikel wurde diese Gewichtsmatrix mit nun zur Verfügung stehenden Daten für die Jahre 2016 bis 2018 neu berechnet und somit die Ergebnisse der letzten OeNB/WIFO- Berechnungen aus dem Jahr 2021 aktualisiert.

Die neuen Gewichte und die Verlängerung der Berechnungen bis Mitte 2023 zeigen, dass die österreichische Wirtschaft im Laufe der Zeit nominell etwas an Wettbewerbsfähigkeit verloren hat, während die reale Position (deflationiert mit dem HVPI/VPI) gegenüber 1999 nahezu unverändert blieb. Nach der COVID-19-Pandemie kam es zunächst zu einer nominellen Abwertung; im Vergleich zu den Handelspartnern niedrigere Inflationsraten in Österreich ließen den Effekt real noch stärker ausfallen. Allerdings haben sich beide treibenden Faktoren in der jüngeren Vergangenheit umgekehrt. Dies zeigt sich in einem V-förmigen Verlauf der effektiven Wechselkursindizes seit Herbst 2022, beide haben in diesem Zeitraum deutlich aufgewertet. Aktuelle Prognosen zeigen, dass sich der Inflationsunterschied zum Euroraum zwar verringern wird. Da die Lohnabschlüsse in Österreich aber vergleichsweise höher sein werden, sollten die Lohnstückkosten in Österreich stärker steigen als im Euroraum; mit entsprechend negativen Auswirkungen auf die preisliche Wettbewerbsfähigkeit. Die Autoren rechnen damit, dass dieser Verlust zwischen 2022 und 2025 die Wirtschaftsentwicklung in Österreich im Ausmaß von rund einem Prozent dämpfen wird.

Höhere Inflation trägt in der Regel zu einem höheren Wachstum der Staatseinnahmen bei, doch der Gesamteffekt der Teuerung auf den Staatshaushalt ist nicht eindeutig. Um festzustellen, wie sich der aktuelle Inflationsschock auf Österreichs Staatsfinanzen auswirkt, berücksichtigen wir in unserer Analyse insbesondere seine spezielle Ausprägung: der aktuelle Preisanstieg ist primär das Resultat des starken Anstiegs der internationalen Energiepreise und hat damit einen negativen Effekt auf das reale BIP. Unter diesen Voraussetzungen kommen wir zu dem Schluss, dass die Auswirkungen der hohen Inflation auf die öffentlichen Finanzen insgesamt eindeutig negativ sind, auch wenn sich kurzfristig ein kleiner positiver Effekt ergibt. Der kurzfristig positive Effekt auf den Staatshaushalt fällt allerdings viel kleiner aus als das Volumen der bereits verabschiedeten staatlichen Unterstützungen zur Abfederung der negativen Auswirkungen der Inflation auf Haushaltseinkommen und Unternehmen. Auch die Staatsschuldenquote geht kurzfristig zurück. Die laufende Verschlechterung des Budgetdefizits infolge der hohen Inflation lässt die Schuldenquote ab 2026 aber ansteigen. Darüber hinaus vergrößert die kürzlich in Österreich eingeführte Abschaffung der kalten Progression und die Indexierung der Familienleistungen die negativen Effekte des aktuellen Inflationsschocks auf den Budgetsaldo.

Austria's economy set to recover after period of stagflation

Economic outlook for Austria from 2023 to 2025 (June 2023)

Friedrich Fritzer, Mathias Moser, Christian Ragacs, Lukas Reiss, Alfred Stiglbauer and Klaus Vondra[1]

Cutoff date: May 31, 2023

Austria's economic recovery following the COVID-19 pandemic came to a complete halt in the second half of 2022. Since then, we have seen a period of stagflation triggered by uncertainties related to Russia's war against Ukraine, the weaker momentum in the international economic environment and the sharp rise in inflation triggered by soaring energy prices. This means that stagnating economic growth has been accompanied by high inflation rates. Unlike in Germany, however, there is currently no risk of a recession in Austria for 2023 as a whole.

In the course of 2023, global economic activity will be recovering slowly, but domestic inflationary pressures will remain high. We do not expect notable real GDP growth in Austria before the second half of 2023. For 2023 as a whole, Austria's economy is set to grow by a weak 0.5%. Inflationary pressures will weaken in 2024, and domestic activity will become the main economic driver. Given the particularities of the wage-setting process in Austria, there is an inherent lag in wage compensation for inflation. This, in turn, leads to a sharp rise in real wages and thus in private consumption. Consequently, economic growth will accelerate to 1.7%. Economic growth in Austria (1.6%) will continue to be driven by strong consumption in 2025 as well. The Austrian labor market continues to be characterized by persistent labor shortages. Therefore, despite the weak economic situation, we do not expect any significant effects on the unemployment rate in 2023 (6.4%). In 2024 and 2025, we expect the unemployment rate to decline again. Inflation as measured by the Harmonized Index of Consumer Prices (HICP) peaked at 8.6% in 2022, driven by energy prices. Inflation will ease between 2023 and 2025 but will still remain well above its long-term average in 2025 (2.9%). Despite stagflation, Austria's budget balance will decline to –2.6% of GDP in 2023, reflecting the phasing-out of temporary fiscal measures (and COVID-19-related measures in particular). The expected further improve-

Table 1

OeNB June 2023 outlook for Austria – main results

	2022	2023	2024	2025
	Annual change in % (real)			
Gross domestic product (GDP)	4.9	0.5	1.7	1.6
Harmonised Index of Consumer Prices (HICP)	8.6	7.4	4.1	2.9
Unemployment rate (national definition)	6.3	6.4	6.2	6.1
	% of nominal GDP			
Current account balance	0.7	1.3	1.9	2.3
Budget balance	–3.2	–2.6	–1.9	–1.9
Government debt	78.4	75.2	72.7	70.9

Source: 2022: Statistics Austria; 2023 to 2025: OeNB June 2023 outlook.

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ment of the budget balance to –1.9% of GDP in 2024 can be attributed to the rebound in economic activity and the phasing-out of Austria's energy relief packages. The debt-to-GDP ratio will fall from 78.4% in 2022 to 70.9% in 2025, mainly because of high growth in nominal GDP due to inflation.

1 Export growth loses considerable momentum and remains below average

Global monetary policy tightening to contain inflation, the uncertainty stemming from the continuing war in Ukraine and increasing geo-economic fragmentation are reflected in the weak growth of both the global economy and global trade flows. Growth dynamics will be slowing down significantly in 2023 in almost all advanced economies around the world; in the United States, for instance, economic growth will halve from 2.1% in 2022 to 1% in 2023. By contrast, China's growth rate will double in 2023, coming to 6% year on year, following the relaxation of the country's strict COVID-19-related measures. However, this high annual figure masks the fact that, following a strong first quarter, the pace of economic activity in China will weaken significantly in the coming quarters. Overall, at 3.1%, the global economy excluding the euro area will grow somewhat more slowly in 2023 than in 2022 (3.3%) and will not gain much momentum in the years ahead, either. In the euro area, economic activity is also set to lose considerable momentum in 2023 (0.9%). After that, however, and despite rising interest rates, euro area growth will pick up again (2024: 1.5%, 2025: 1.6%).

Most of the above developments were expected in very similar terms in the OeNB's economic outlook of December 2022. Growth in Austria's export markets will be somewhat weaker in 2023 and 2025 than anticipated in our previous outlook, the euro has appreciated somewhat, and oil prices are expected to be somewhat lower and interest rates slightly higher over the forecast horizon. Overall, the changed external environment has only a small impact on the OeNB's current outlook. Our assumption here is that Russia's war against Ukraine will not escalate further and that the supply of natural gas to Austria will not be disrupted over the forecast horizon.

A number of leading export indicators point to a slowdown in the first half of 2023. Order backlogs are declining, given that new orders are dwindling and pent-up export orders have been reduced after supply chain problems have largely dissolved. However, the winter tourism season of 2022/2023 was successful, remaining only around 5% below the 2019 peak season. Exports of services currently play a greater role in the development of Austria's overall exports than in recent years. Following exceptionally high post-pandemic growth of 13%, driven by catch-up effects, in 2022, Austria's real export growth is projected to slow to 2.9% in 2023. Over the next two years, export growth will be supported by a rebound in export demand in the second half of 2023 and the recovery of inbound tourism from overseas. Overall, however, Austrian export growth rates

Table 2

Austria's foreign trade and current account

	2022	2023	2024	2025
	Annual change in %			
Exports (real)	13.0	2.9	2.7	3.0
Imports (real)	7.8	2.7	2.2	2.6
	% of nominal GDP			
Current account balance	0.7	1.3	1.9	2.3

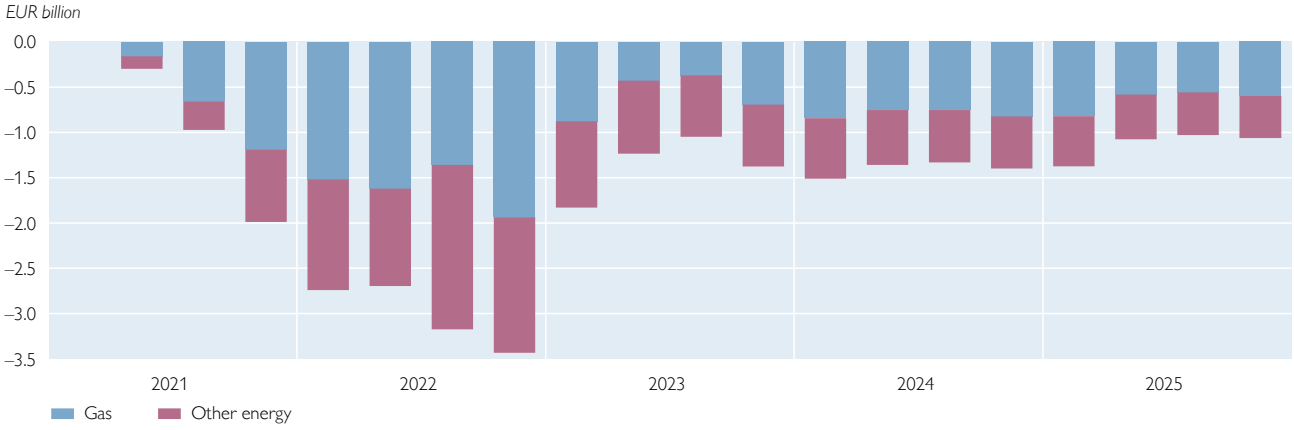
Source: 2022: Statistics Austria; 2023 to 2025: OeNB June 2023 outlook.

will remain well below the long-term average observed prior to the COVID-19 pandemic (2000 to 2019: 4.4%). Growth in exports and the significant recovery in domestic demand will lead to stronger import growth from the second half of 2023. Starting from the low level reached in 2021 due to the pandemic, Austria's current account balance is set to improve over the entire forecast horizon, which attests to the high degree of competitiveness of the Austrian economy. However, the rather significant increase in relative unit labor costs poses a downside risk to our outlook, especially if wage moderation does not materialize in 2024 and 2025 as assumed.

Although net exports will make a slightly positive contribution to economic growth from 2021 until the end of the forecast horizon, Austria's high dependence on energy imports has led to significant outflows of income to the rest of the world since 2021. Global energy prices had already been rising above pre-pandemic levels during the second half of 2021. 2022 saw a further surge as a result of Russia's war of aggression against Ukraine. Consequently, the price of Austria's energy imports went up significantly. Chart 1 shows the income losses in the foreign trade balance caused by the higher prices of energy goods from the beginning of 2021 until the end of the forecast horizon in 2025. The expected decline in energy prices will cause income outflows from Austria to slow down, but they will remain negative over the entire forecast horizon. In the fourth quarter of 2022, income outflows peaked at –EUR 3.4 billion against Q1 21. In cumulative terms, we expect an income outflow of just over EUR 30 billion over the entire forecast horizon (2021–2025). This corresponds to an average annual outflow of around 1.5% of nominal GDP.

Chart 1

Income terms-of-trade effect (energy) relative to Q1 21



Source: OeNB, Eurosystem, Statistics Austria.

2 Investment activity in Austria is very subdued

While the Austrian economy grew at a very dynamic pace in 2022, gross fixed capital formation virtually stagnated. The deterioration in business sentiment triggered by Russia's war against Ukraine, high energy costs and rising financing costs left their mark. Many of these factors will continue to weigh on investment decisions over the forecast horizon.

Having completed a pronounced cycle, housing investment plays a special role. Housing construction activity in Austria peaked in 2021 with 71,200 completed dwellings. Together with a slowdown in population growth, this has helped reduce the previous housing shortage and establish a relatively high degree of equilibrium in Austria's housing market. Over the forecast horizon, higher interest rates on housing loans will impact the affordability of and, consequently, the demand for housing loans. Tighter lending standards for residential real estate financing, high land and construction costs as well as labor shortages will put an additional brake on housing investment. However, according to the current euro area bank lending survey, relevant and restrictive effects on lending much rather stem from demand-side than from supply-side developments (chart 2). Trends in building permits indicate a decline in housing construction activity in 2023 and 2024.

Total gross fixed capital formation will practically stagnate again, at 0.4%, in 2023, while being fraught with a

Table 3

Investment activity in Austria

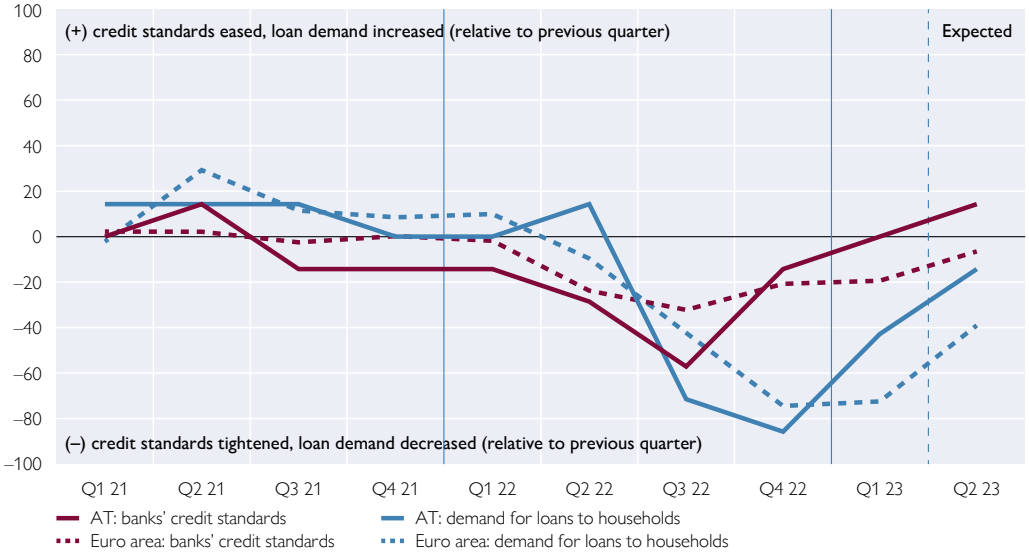
	2022	2023	2024	2025
	Annual change in %			
Gross fixed capital formation (real)	0.4	0.4	0.6	1.4
Investment in plant and equipment	*–1.2*	*–1.3*	*0.9*	*1.6*
Residential construction investment	*–3.2*	*–4.7*	*–3.3*	*0.8*
Nonresidential construction investment and other investment	*0.5*	*3.1*	*1.2*	*0.9*
Investment in research and development	*5.8*	*3.1*	*2.1*	*2.2*

Source: 2022: Statistics Austria; 2023 to 2025: OeNB June 2023 outlook.

Chart 2

Euro area bank lending survey – housing loans to households

Net percentage, quarter-on-quarter change



Source: ECB.

considerable downside risk. Despite a slight pickup in economic activity in the next two years, real gross fixed capital formation growth will remain well below its long-term pre-pandemic average in 2024 (0.6%) and 2025 (1.4%) (2000 to 2019: 1.7%). For both years, we expect weak growth in all subsectors of investment with the exception of residential investment, which will continue to decline in 2024. The investment-to-GDP ratio is forecast to decline from 26.1% in 2023 to 25.3% in 2025.

3 Robust labor market amid inflation-induced high wage gains

Total employment growth (employed and self-employed persons) in Austria is set to decelerate significantly, to 0.8% in 2023, from the very high levels recorded in 2022 (2.6%). In 2024 and 2025 (at 1.0% in both years), it will also continue to be in line with the long-term average. However, the number of total hours worked will fall by 0.1% (see box 1 for details on trends in hours worked), as firms try to maintain employment levels in particular in view of the continued labor shortages.

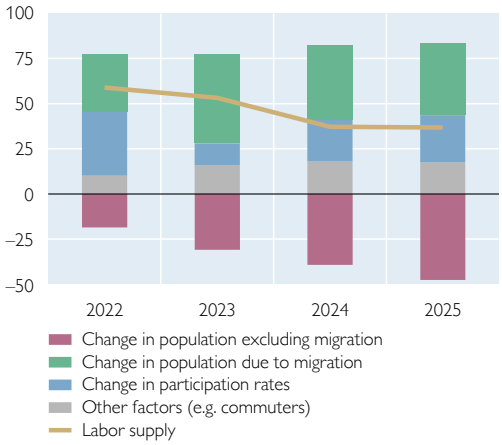
Labor supply growth will moderate slightly over the forecast horizon (chart 3). Austria's labor force will stagnate in 2024 and decline slightly in 2025. The participation rate will increase marginally, mainly because the statutory retirement age for women will be raised. So far, the integration of Ukrainian refugees into the Austrian labor market has contributed only a small share (15,000 persons) to the growth of labor supply.

Despite the marked slowdown in economic activity, the unemployment rate (national definition) will rise only slightly in 2023, from 6.3% to 6.4%, while the unemployment rate according to Eurostat's definition will increase from 4.8% to 5%. In 2024 and 2025, Austria's unemployment rate will decline as the economy is set to recover (figures for 2025, national definition: 6.1%; Eurostat definition: 4.6%).

We expect collective wages to be raised by 7.6% in 2023, 6.5% in 2024 and 4.2% in 2025 (see box 2 for details

Chart 3

Change in labor supply in Austria (resident population aged 15 to 64 years)



Source: Statistics Austria, OeNB.

Table 4

Labor market and wage developments in Austria

	2022	2023	2024	2025
	Annual change in %			
Total employment (persons)	2.6	0.8	1.0	1.0
Total hours worked	3.0	–0.1	0.9	0.9
Compensation per employee				
Gross[1] compensation (nominal)	4.6	7.6	6.6	4.3
Collectively agreed wages and salaries[2]	3.1	7.6	6.5	4.2
Wage drift	1.5	0.0	0.1	0.1
Private consumption deflator	8.6	7.4	4.1	2.9
Gross[1] compensation, real (HICP)	–3.7	0.2	2.4	1.3
Net[3] compensation, real (HICP)	–3.1	0.9	3.3	1.4
Unemployment rate	*% of labor supply*			
Eurostat definition	4.8	5.0	4.8	4.6
National definition	6.3	6.4	6.2	6.1

Source: 2022: Statistics Austria; 2023 to 2025: OeNB June 2023 outlook.

[1] *Including employers' social security contributions.*
[2] *Overall economy.*
[3] *After tax and social security contributions.*

on the wage-setting process in Austria). Nominal gross compensation per employee will rise at a similar rate as negotiated wages and we do not expect any significant overpayment.

Gross real wages per employee (deflated by the Harmonised Index of Consumer Prices) will hardly increase in 2023, following a pronounced decline in 2022. Net real wages will go up by 0.7% in 2023. We expect gross and net real wages to rise significantly in 2024 and 2025. The wage share of GDP will increase in 2023 and 2024, and hover around ½ percentage point above its 2019 pre-crisis level in 2025.

Box 1

Average working hours have gone down sharply since COVID-19 crisis

Growth in total hours[2] worked in Austria has remained well below the comparable euro area rate since the pandemic. In 2022, it had not even reached the pre-crisis level of 2019. The table below shows the average annual change in labor volume (total hours worked) in Austria for selected periods, broken down into the part that is attributable to changes in average hours worked per employed person (at constant employment numbers) and the part that is attributable to changes in the number of employed persons (at constant average hours worked).

The number of total hours worked in Austria decreased by an average of –0.5% per year between 2020 and 2022 (euro area +0.1; table B1, top section), which is mainly attributable to the strong decline in average hours worked, namely by –1.5%. This decline was significantly stronger in Austria than in the euro area as a whole (–0.7%) and well above the average decline in hours worked per employee recorded in the period from 1999 to 2019 (table B1, middle section; –0.5%). This sharp contraction in average hours worked is remarkable also because average real GDP growth between 2020 and 2022 was even higher in Austria, at 0.9%, than in the euro area (0.7%).

Table B1

Average annual change in total hours worked in Austria

	Austria	Euro area
2020 to 2022		
Change in total hours worked	–0.5	0.1
of which: change in average working hours	*–1.5*	*–0.7*
of which: change in number of employees	*1.0*	*0.8*
1999 to 2019		
Change in total hours worked	0.5	0.5
of which: change in average working hours	*–0.5*	*–0.3*
of which: change in number of employees	*1.0*	*0.8*
2023 to 2025		
Change in total hours worked	0.6	0.9
of which: change in average working hours	*–0.3*	*0.2*
of which: change in number of employees	*0.9*	*0.6*

Source: Eurostat (national accounts), OeNB.

According to the European Union Labour Force Survey (LFS), positive employment growth in Austria has been exclusively attributable to part-time work since 2019. While the number of full-time employees declined somewhat, that of persons working part-time has gone up significantly. By comparison, full-time employment growth in the euro area, which also stands at +2% according to LFS data, is almost entirely attributable to full-time employment. The part-time employment rate in Austria reached 30.3% at end-2022 (women: 50.3%, men: 12.5%), a historic high that is well above the euro area average of 21.4% (women: 34.1%, men 10.1%). A disaggregated analysis by age groups also shows that the largest increase in part-time work between 2019 and 2022 can be observed among persons aged 50 to 64. With regard to education levels, part-time work among men is found to have risen at about equal rates among those who have completed secondary and those who have completed tertiary

[2] *All figures refer to total employment (employed and self-employed persons).*

education. For women, by contrast, part-time employment has risen predominantly among those who have completed tertiary education.

In the present outlook, we assume that, until the end of the forecast period in 2025, the average number of hours worked per employee will continue to decline in Austria, albeit at a somewhat slower pace than the long-term average (–0.3%) The Eurosystem staff macroeconomic projections for the euro area, by contrast, even point to a slight increase in average hours worked (+0.2%), which means that total hours worked are expected to grow more strongly in the euro area than in Austria (see table B1, bottom section).

Box 2

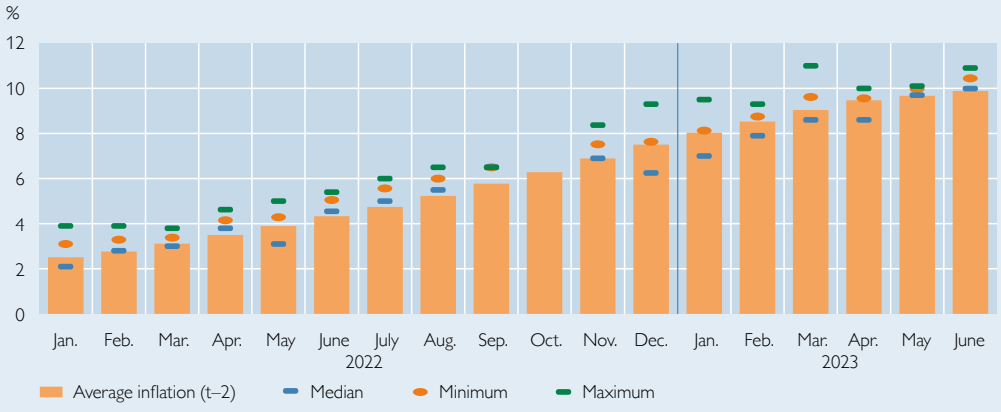
How wage-setting works in Austria

In Austria, collectively agreed wages are quasi-automatically indexed to inflation. It is common practice to base collective wage bargaining on the average rate of consumer price growth observed over the past 12 months. And indeed, since the beginning of 2022, average collectively agreed wages in Austria have increased in line with average inflation (chart B2.1).

Wage settlements thus roughly follow the rule that wage increases should equal past inflation plus the growth rate of labor productivity. This rule aims at keeping the wage share constant. Usually "past inflation" is interpreted as consumer price inflation. (As we have seen, wage settlements in the past two years indeed followed consumer prices.) However, the defining equation of the wage share implies that to keep the wage share constant, wages should rise in accordance with output prices (i.e. the growth rate of the GDP deflator) rather than in accordance with consumer price inflation. In the past, these two price measures – consumer price inflation and the GDP deflator – have differed only marginally. However, as a result of the strongly negative terms-of-trade shock caused by the rise in import prices (mainly energy), the two measures have begun to diverge strongly (chart B2.2). For instance, if next fall's wage settlement round for metal workers (traditionally the trendsetters for negotiations in other areas) considered consumer price inflation – including medium-term aggregate productivity growth – that would imply a rise in agreed wages by around 10%. If, by contrast, negotiations were based on the GDP deflator, this would result in a lower rise, by 7.6%.

Chart B2.1

Collective wage settlements and inflation in Austria since January 2022

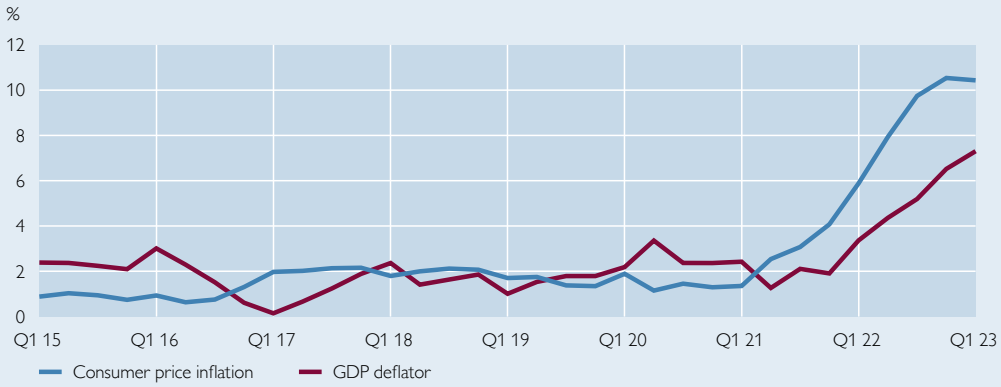


Source: ÖGB, Statistics Austria, OeNB.

Note: Average inflation: moving average of consumer price inflation over the last 12 months, with a two-month lag. Wage settlements are assigned to individual months according to ÖGB publication dates. In September 2022, only one settlement was reached; in October 2022 none. Latest observation: June 6, 2023.

Chart B2.2

Consumer price inflation vs. GDP deflator



Source: Statistics Austria.

The OeNB's present economic outlook for Austria assumes a certain degree of wage moderation for the collective agreements. We thus assume that the negotiations in the upcoming wage rounds will be based on the GDP deflator as a price measure and not on consumer price developments. Consequently, the growth of negotiated wages, viewed in terms of the overall economy, is projected to decline from a rate of 7.6% in 2023 to 6.5% in 2024.

4 Wage increases lead to sharp rise in private consumption

At 3.1%, the agreed rise in wages for 2022 was well below the inflation rate measured that year. However, strong employment growth and government support measures dampened the resulting income losses, which meant that real disposable household income rose by 0.6%.[3] Wage settlements for 2023 are very high by historical standards. However, many pandemic-related measures are being phased out (temporary payments to pensioners and the unemployed, "climate bonus" and inflation compensation). As a result, government net transfers have dampened disposable household income. Overall, real income growth is expected to be negative in 2023. Household consumption will decline a lot less strongly, however, as parts of consumption are financed through savings. Compared

Table 5

Household income and consumption in Austria

	2022	2023	2024	2025
	Annual change in %			
Disposable household income (real)	0.6	–0.9	3.3	2.5
Private consumption (real)	4.9	–0.2	2.3	1.6
	% of nominal disposable household income			
Saving ratio	8.4	7.4	8.2	9.0

Source: 2022: Statistics Austria; 2023 to 2025: OeNB June 2023 outlook.

[3] *In the OeNB outlook, disposable household income is based on national accounts and sector accounts data. To ensure consistency with other national accounts data, the OeNB uses the consumption deflator to deflate nominal household income, even though consumers rather rely on the consumer price index (or the HICP). Normally, the dynamics of the consumption deflator and the HICP are very similar. However, they began to differ significantly in 2022 and the first quarter of 2023, meaning that the consumption deflator will grow more strongly than HICP inflation in 2023. Chart 4 therefore also shows the growth in real disposable household income deflated by HICP inflation. Real disposable household income growth deflated by HICP inflation will be slightly positive in 2023.*

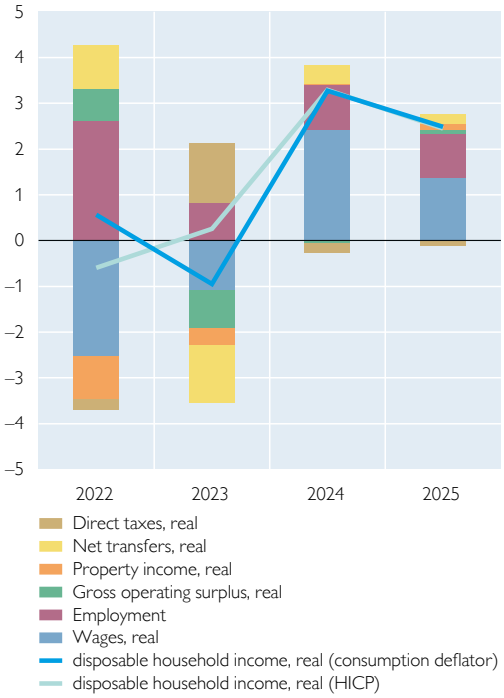
with 2022, the saving ratio in Austria will fall.

In 2024, real wage growth is expected to be very strong, reflecting the expected decline in inflation and continued high wage settlements. Developments in real disposable household income are further supported by continued high employment growth and an increase in pension payments. For similar reasons, real disposable household income will continue to rise strongly in 2025, albeit at a slower pace than in 2024. Households will use only some of these income gains for consumption purposes and will, instead, return to saving more. The saving ratio will rise to 9% of nominal disposable household income by the end of the forecast horizon, almost reaching its historic pre-pandemic average (2000–2019: 9.4%).

Chart 4

Composition of real disposable household income growth

Disposable income in %, contributions in percentage points



Source: Statistics Austria, OeNB.

5 HICP inflation will come to 7.4% in 2023 and is expected to fall to just below 3% by 2025

Inflation in Austria rose to 8.6% in 2022. While initially, energy prices were the main driver of this marked rise in prices, in the second half of the year contributions also came from all other subcomponents. The expected decline in the inflation rate in 2023 will mainly be attributable to the weaker upward pressure on energy prices, but the dynamic price increase recorded in 2022 also has a dampening effect on annual inflation rates in 2023 as these are calculated in relation to the previous year's prices. The futures prices for crude oil underlying this outlook will decline steadily until the end of 2025. Household energy prices on international wholesale markets have fallen sharply in recent months. This should dampen end user prices, especially from the second half of 2023 onward. However, as of mid-2024, the phasing-out of anti-inflationary measures (in particular the electricity price cap) will exert upward pressure on inflation. According to OeNB calculations, the direct downward impact of fiscal policy measures on HICP inflation in 2023 will amount to 1 percentage point (2022: 0.4 percentage points). The phasing-out of anti-inflationary measures will drive up inflation by 1 percentage point in 2024 and 0.4 percentage points in 2025.[4]

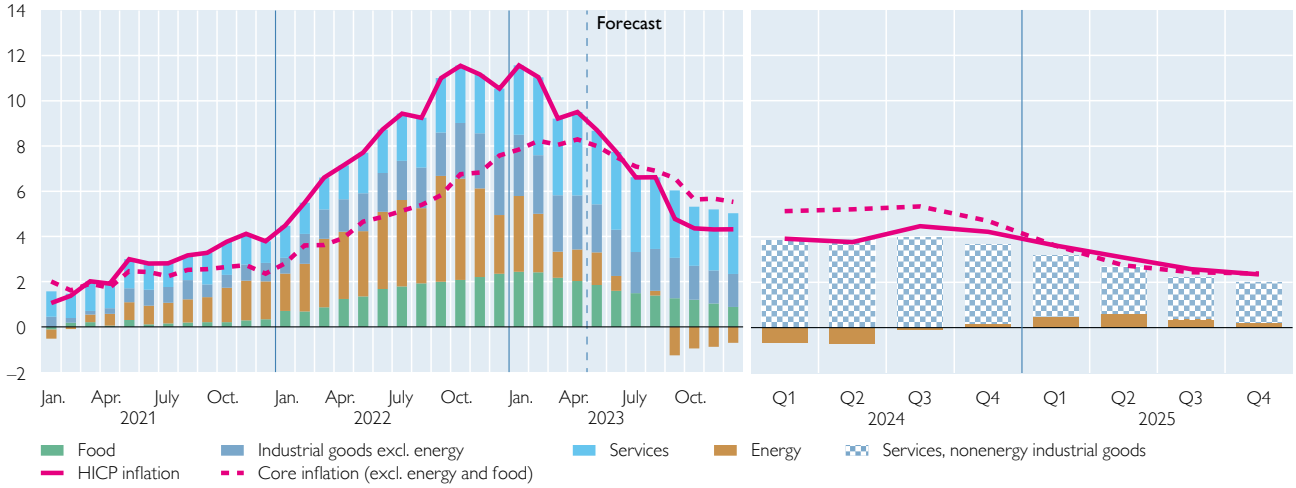
Core inflation (excluding energy and food) is expected to increase to 7.1% in 2023 (2022: 5.1%). The main reason for this is the sharp rise in wage costs due to lags in wage compensation for inflation. In 2024 and 2025, core inflation will fall to 5.1% and 2.8%, respectively, thus remaining above the long-term average over

[4] *Only direct inflation effects are taken into account.*

Chart 5

Contributions to HICP inflation in Austria

Inflation in %, contributions in percentage points



Source: OeNB, Statistics Austria.

Table 6

Inflation in Austria

	June 2023 outlook			Revision to March 2023 outlook		
	2022	2023	2024	2025	2022	2023	2024
	Annual change in %				*Percentage points*		
HICP	8.6	7.4	4.1	2.9	0.5	0.1	–0.2
Food	9.0	9.8	3.9	2.3	0.7	–1.4	–0.7
Unprocessed food	*10.3*	*6.8*	*x*	*x*	*0.2*	*x*	*x*
Processed food	*8.7*	*10.5*	*x*	*x*	*0.8*	*x*	*x*
Industrial goods excluding energy	5.8	6.7	x	x	1.3	x	x
Energy	39.8	5.6	–3.7	4.6	–3.8	–3.3	1.4
Services	4.6	7.2	x	x	0.8	x	x
HICP excluding energy	5.8	7.6	4.9	2.7	0.9	0.5	–0.4
HICP excluding energy und food	5.1	7.1	5.1	2.8	1.0	0.8	–0.3

Source: 2022: Statistics Austria; 2023 to 2025: OeNB June 2023 outlook.

the entire forecast horizon. Core inflation has accelerated to date, which – together with the expected strong wage increases – caused our current projection exercise to produce higher results than projected in our latest exercise in March 2023 (table 6).

Stronger food price inflation in 2023 is partly attributable to rising price pressures stemming from wage increases. In addition, the decline in production costs is passed on to end user prices with a time lag. The decline in agricultural commodity prices and the marked fall in energy prices (fuels, gas and electricity) have so far been reflected only moderately in producer prices but should have an impact over the remainder of the forecast horizon. We expect food price inflation to slow down to 3.9% in 2024 and 2.3% in 2025. This means that, in 2025, inflation

in this segment will only be slightly above the long-term average observed in the period from 1999 to 2019 (2.2%).

Box 3

Austria's fiscal energy relief measures only reduce inflation with a lag and by a small margin

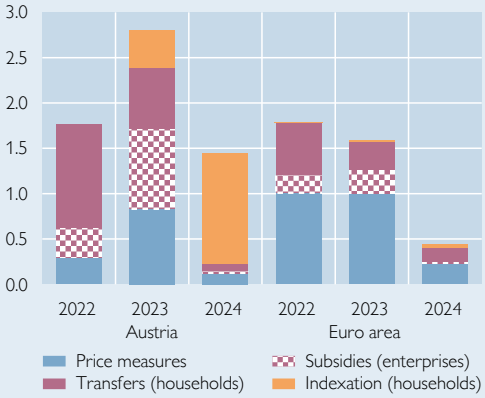
This box shows what impact the fiscal energy relief measures the Austrian government took to support households and businesses had on inflation in Austria. It also presents a hypothetical scenario for Austria, based on the calculated impact we would have seen if Austria had implemented the same measures (in terms of size and structure) as the euro area.[5, 6]

With regard to the total volume of measures over the period from 2022 to 2024,[7] *we find that – in relation to GDP – the packages Austria adopted to mitigate the effects of inflation on households are around 50% larger than the euro area average (6% vs 3.8%, exclusive of financing measures). A key factor explaining this difference is that, in Austria, wage tax, income tax and family benefits are now automatically indexed to inflation, and these components account for just under one-quarter of Austria's support measures.*

Chart B3.1

Size and composition of fiscal measures

Percentage points of nominal GDP



Source: OeNB.

Indexation also plays an important role when comparing the structure of measures: Here, we must distinguish between price-related interventions (e.g. via indirect taxes), income-related measures (via direct transfers to households and income taxes) and subsidies to enterprises. For the period from 2022 to 2024, we see that Austria increasingly concentrates on income support measures (chart B3.1, purple/orange columns), whereas the euro area on average relies much more heavily on price measures (blue columns).

[5] *This analysis expands and updates the assessment presented in "Österreichs Fiskal-Maßnahmen zur Inflationsbekämpfung unterschieden sich 2022 deutlich von jenen des Euroraum-Schnitts" (in German only). For the purpose of this analysis, we also took into account support measures for businesses and used information provided by the national central banks and the ECB that allow for higher precision in assigning time- and content-related information. As these are internal Eurosystem data, they are only comparable with the euro area aggregate.*

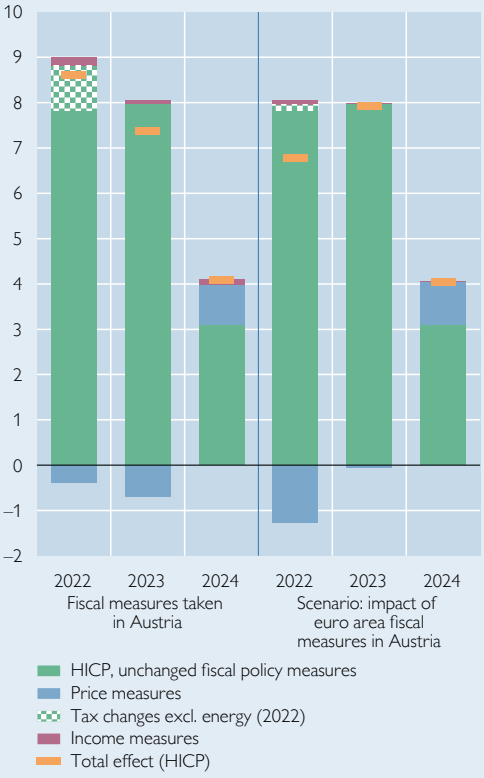
[6] *Our analysis is limited to the impact of fiscal measures. Price caps are only taken into account if they trigger government expenditure (to directly subsidize prices and/or to cover losses incurred by energy producers). Purely government-imposed price caps without budgetary effects are therefore not considered, for example.*

[7] *A small proportion of the measures taken in the euro area began to be effective already in 2021, and their effects have been added to the results for 2022 to improve comparability. Germany's electricity and gas price caps are classified as price measures in line with Bankowski et al. (2023).*

Chart B3.2

HICP inflation effects of fiscal policy measures

HICP inflation (year-on-year change in percentage points)



Source: OeNB.

The effect of Austria's fiscal energy relief measures on the HICP was around –0.2 percentage points in 2022 as the dampening effect of price measures (chart B3.2, blue columns) was significantly stronger than the upward effect of income measures (purple columns) of the same size. This contrasts strongly with our hypothetical scenario considering the impact the euro area measures would have had on Austria, as the euro area measures relied much less on transfer payments and much more on price measures in 2022. Moreover, in 2022 the fact that the temporary reduction of the value-added tax (VAT) rate on hotel, restaurant and cultural services expired in Austria had an effect of around +1 percentage point (chart B3.2, hatched green columns);[8] the euro area aggregate did not show any comparable effect.[9] Overall, Austria's inflation rate would have been 1.8 percentage points lower in 2022 if Austria had applied the same measures as the euro area average, or 1 percentage point lower if we exclude the expiry of the temporary VAT rate cut (COVID-19-related measures).

In 2023, thanks to the electricity price cap and subsidies on energy bills, the overall downward impact of Austria's fiscal measures on the HICP (–0.6 percentage points) will be stronger than in the hypothetical scenario. In 2024, under a "no policy change" assumption in both scenarios, many price measures can be expected to be dropped, which will result in a clear rebound effect. This effect will be marginally reinforced by the elimination of bracket creep in Austria (chart B3.2, included in the purple columns).

[8] *Tax cuts expiring in 2022 are shown separately in the hatched green columns in chart B3.2, given their direct relevance for the HICP, and are not subsumed under "HICP, unchanged fiscal policy measures" (green columns), although technically speaking they are not discretionary measures taken in response to the energy and inflation crises. The green columns therefore show the residual resulting from expiring tax cuts plus energy relief measures and thus also include the effects of other fiscal measures, e.g. the discontinuation of the remaining COVID-19-related income support measures.*

[9] *According to Eurostat data, the direct contribution of nonenergy tax changes to HICP inflation was 1 percentage point in Austria and 0.1 percentage point in the euro area.*

Box 4

Corporate profits contributed heavily to domestic price pressures in 2022, with strong second-round effects in subsequent years[10]

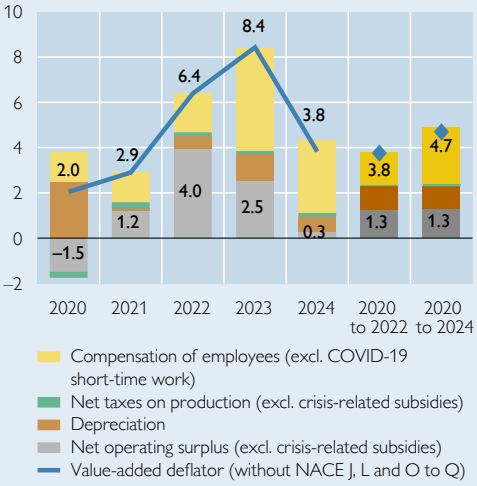
This box discusses whether corporate profits have fueled inflation in Austria in recent years. We look at the contribution of corporate profits to the increase in the value-added deflator, which is a measure of domestic price pressures that excludes imported or domestically purchased intermediate goods.[11]

Corporate profits typically display a procyclical pattern: They rise during economic upturns and slow down during downturns. This pattern has also been observed over the past three years. In 2020, following the outbreak of the COVID-19 pandemic, corporate profits in Austria fell sharply (–14% year on year) and dampened inflation by 1.5 percentage points (as measured by the value-added deflator, inflation in Austria stood at 2% at the time, see below). This was followed by a recovery in 2021, when corporate profits went up by 10%, accounting for 1.2 percentage points of headline inflation (2.9%). In the 2022 boom year, when GDP grew by almost 5%, corporate profits soared (+24%) and thus contributed 4 percentage points (i.e. almost two-thirds) to the 6.4% increase in the value-added deflator. This is remarkable even though the economy expanded strongly in that year, as energy import prices rose sharply in the wake of the war in Ukraine and the resulting deterioration in terms of trade weighed on corporate profits. Corporate profits therefore played a key role in domestic price pressures in 2022. Over the period from 2020 to 2022, around one-third of headline inflation was attributable to corporate profits, which is a slightly higher share than the one-quarter share of profits in total value added.

Chart 4.1

Contributions to change in value-added deflator

Change on previous year in %, growth contribution in percentage points



Source: Statistics Austria, OeNB calculations.

Huge differences across sectors

The above result masks the high degree of heterogeneity across sectors observable in 2022. A small number of sectors have significantly increased their profits, while this rise is partly offset by developments in other sectors. The largest price increases were recorded in the energy, mining and water supply (NACE BDE) sectors (+35%), followed by construction (NACE F, +13%), agriculture and forestry (NACE A, +14%) and the transportation and storage sector (NACE H, +4.2%). In these sectors, inflation developments are almost entirely attributable to

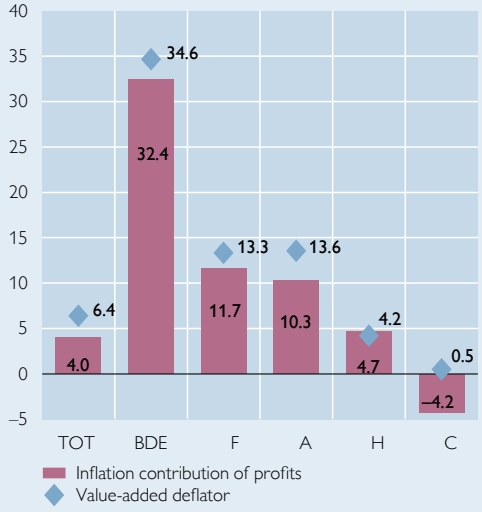
[10] *Authors: friedrich.fritzer@oenb.at, lukas.reiss@oenb.at and martin.schneider@oenb.at, Business Cycle Analysis Section, OeNB.*

[11] *The contributions of corporate profits to this inflation measure are carefully adjusted for depreciation and amortization, taxes on production and subsidies. For reasons of data availability, the real estate sector, the information and communication sector and the public sector were excluded from the calculation.*

Chart B4.2

Profit contributions to change in value-added deflator on a sectoral basis (2022)

Growth in % (deflator); contributions in percentage points



Source: Statistics Austria, OeNB calculations.

Note: TOT: Total economy (without NACE J, L and O to Q); BDE: Mining, energy, water supply; F: Construction; A: Agriculture and forestry; H: Transportation and storage; C: Manufacturing

profits. By contrast, the manufacturing sector (NACE C), which is strongly exposed to international competition, was unable to pass on cost increases in full and thus recorded a marked decline in profits by 18% in 2022. Given high, energy price-driven inflation in 2022, a significant share of profits was shifted within the corporate sector.

2023–2024: Corporate profits no longer drive inflation, but strong second-round effects make inflation highly persistent

In the first quarter of 2023, the value-added deflator continued to rise more quickly, by 10.7% compared to 8.6% in Q4 22. About half of this increase is attributable to corporate profits. Like the energy, mining, water supply, construction, agriculture and forestry sectors, financial and insurance services also saw a strong, profit-driven rise in the value-added deflator. We expect corporate profits in Austria to come under pressure during the remainder of 2023 and in 2024. The fact that inflation was high in 2022 (due to energy price developments and corporate profits) will lead to second-round effects in 2023 and 2024 via stronger (delayed) wage increases and sharply rising replacement costs of capital stock depreciation. As a result, according to the OeNB's present outlook, corporate profits will no longer be the main direct driver of inflation in 2023 and 2024.

6 Budget deficit well below 3% of GDP as temporary measures are being phased out

Over the forecast horizon, Austria's budget balance is expected to improve gradually to –2.6% of GDP in 2023 and –1.9% of GDP in 2024 and 2025, respectively (from –3.2% of GDP in 2022). To illustrate the underlying factors, chart 6 breaks down the change in the budget balance vis-à-vis 2019 (+0.6% of GDP) into the contributions of various sets of discretionary measures, of changes in interest expenditure and of economic activity (other macroeconomic and windfall effects).

We find that the expected further improvements in the budget balance over the forecast horizon will be attributable to the phasing-out of a series of temporary fiscal measures. In 2023, these will be, in particular, COVID-19-related measures, such as subsidies paid out by the Austrian COVID-19 financing agency (COFAG) and COVID-19 testing (chart 6, blue columns), while energy relief packages (green columns) will be discontinued during 2024 and 2025. The slowdown in economic activity and the lagged impact of the rise in inflation on government expenditure will worsen macroeconomic effects (chart 6, purple columns). The elimination of bracket creep will contribute to a deterioration of the budget balance in 2024 and 2025: In 2024, the inflation reference value for raising tax brackets and tax allow-

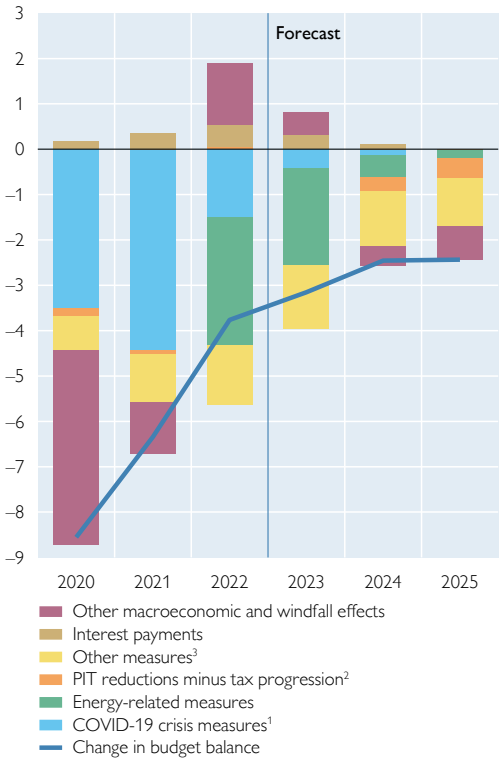
ances will be close to 10%, but increases in pensions and, in particular, wages will be significantly lower. As a result, revenue from wage and income tax will grow at a clearly slower pace than the tax base (the orange columns in chart 6 indicate this net effect).

Thanks to lower budget deficits and very high nominal economic growth, Austria's debt-to-GDP ratio will fall sharply over the forecast horizon, to just under 71% of GDP in 2025. However, the strong rise in the yield curve leads to a marked increase in interest payments (chart 6, brown columns).

Chart 6

Change in Austria's budget balance since 2019

Budget balance in % of GDP, contributions in percentage points



Source: OeNB, Statistics Austria.

[1] Subsidies, income support, testing, etc.
[2] Income tax cuts minus tax progression due to income growth
[3] COVID-19 stimulus, eco-social tax reform, etc.

From 2023 onward, the volume of discretionary measures is not only set to decline strongly (sum of green, blue and yellow columns in chart 6, blue marks in chart 7), but there will also be a sizeable shift in the structure of these measures. COVID-19-related measures consisted mostly of payments to companies (mainly funds paid out by COFAG) and expenditure on goods and services (especially on COVID-19 testing). When these measures began to expire and the energy crisis started to evolve, government measures shifted toward supporting real household incomes. These measures comprised measures increasing nominal household income (mainly one-off payments; orange columns in chart 7) and measures reducing energy prices (mainly reduction of energy taxes and electricity price cap; green columns).[12] These measures offset part of the terms-of-trade losses for households discussed in section 1. Chart 8 shows that, despite the macroeconomic recovery, real disposable household income would have been around 5% (6%) below pre-crisis levels in 2022 (2023) in the absence of fiscal measures (purple columns[13]). Given that these measures offset most of the losses incurred (around 90% in 2022 and around two-thirds in 2023), household incomes came in at only just below pre-crisis levels in both years. The strong real growth in wages and pensions expected for 2024 and 2025 will lead to a recovery of household incomes, but at the same time measures will be diminishing. This particularly concerns price measures such as the temporary reduction of energy taxes and the

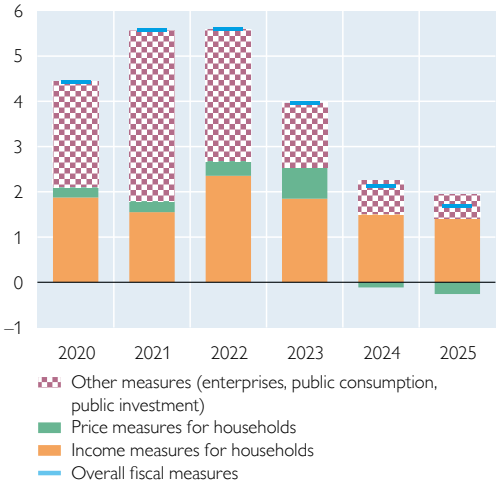
[12] However, the energy relief packages also comprised two other major measures, namely the setting up of a strategic gas reserve in 2022 (around 0.8% of GDP) and energy bill subsidies for companies for 2022 and 2023.

[13] In the calculation of real income excluding fiscal measures, second-round effects were not taken into account, i.e. the volumes of measures were simply subtracted from actual developments in real income.

Chart 7

Total volume of fiscal measures in Austria

Change on 2019 in % of GDP

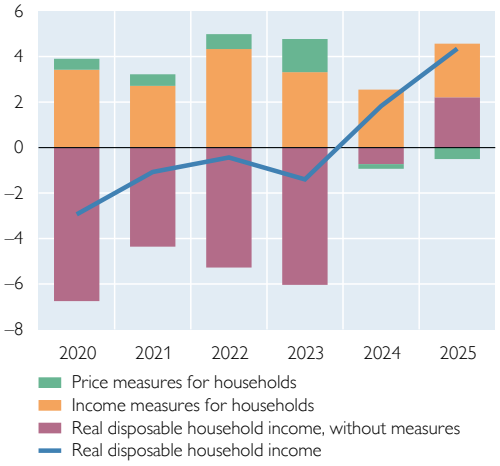


Source: OeNB.

Chart 8

Effect on real disposable household income

Change on previous year in %; contribution in percentage points



Source: OeNB.

electricity price cap, while the CO_2 tax, which has been in force since end-2022, will be increasing gradually.

7 Annex of tables

Table A1

Main results of the forecast

	June 2023				Revisions since Dec. 2022			
	2022	2023	2024	2025	2022	2023	2024	2025
Economic activity	*Annual change in % (real)*							
Gross domestic product (GDP)	4.9	0.5	1.7	1.6	0.1	–0.1	–0.1	0.1
Private consumption	4.9	–0.2	2.3	1.6	0.3	–0.3	0.2	0.2
Government consumption	3.6	–0.3	0.0	0.7	2.5	0.2	–0.4	0.1
Gross fixed capital formation	0.4	0.4	0.6	1.4	2.6	1.8	–1.1	–0.6
Exports of goods and services	13.0	2.9	2.7	3.0	4.3	1.2	–0.6	–0.7
Imports of goods and services	7.8	2.7	2.2	2.6	5.6	2.2	–0.9	–1.0
	% of nominal GDP							
Current account balance	0.7	1.3	1.9	2.3	0.2	0.4	0.3	–0.2
Import-adjusted contributions to real GDP growth[1]	*Percentage points*							
Private consumption	1.6	–0.2	0.8	0.5	–0.4	–0.3	0.1	0.1
Government consumption	0.6	–0.1	0.0	0.1	0.4	0.0	–0.1	0.0
Gross fixed capital formation	0.0	0.0	0.1	0.2	–0.1	0.2	–0.1	0.0
Domestic demand (excluding changes in inventories)	2.3	–0.3	0.9	0.8	–0.1	–0.1	0.0	0.1
Exports	3.5	0.5	0.8	0.9	0.3	–0.1	–0.1	0.0
Changes in inventories (including statistical discrepancy)	–0.8	0.3	0.0	0.0	–0.2	0.2	0.0	0.0
Prices	*Annual change in %*							
Harmonised Index of Consumer Prices (HICP)	8.6	7.4	4.1	2.9	0.0	0.9	0.5	0.0
Private consumption expenditure (PCE) deflator	7.4	8.7	4.1	2.9	–1.1	2.3	0.3	–0.2
GDP deflator	4.9	7.7	4.7	3.7	–1.8	1.9	0.7	0.1
Unit labor costs (overall economy)	2.2	7.9	5.9	3.6	0.4	1.1	0.6	0.6
Compensation per employee (nominal)	4.6	7.6	6.6	4.3	0.3	0.4	0.5	0.7
Compensation per hour worked (nominal)	4.5	8.4	6.6	4.3	0.8	0.3	0.6	0.9
Import prices	11.7	3.1	2.5	2.2	–0.8	–2.4	0.2	0.2
Export prices	7.9	3.8	3.6	3.0	–0.6	–0.1	0.3	–0.2
Terms of trade	–3.4	0.7	1.0	0.8	0.1	2.2	0.0	–0.4
Income and savings								
Real disposable household income	0.6	–0.9	3.3	2.5	3.0	–0.7	–0.8	0.5
	% of nominal disposable household income							
Saving ratio	8.4	7.4	8.2	9.0	2.8	2.2	1.3	1.6
Labor market	*Annual change in %*							
Payroll employment	2.9	1.1	1.1	1.0	0.0	0.6	0.1	0.1
Hours worked (payroll employment)	3.0	0.3	1.1	1.0	–0.6	0.7	0.0	–0.1
	% of labor supply							
Unemployment rate (Eurostat definition)	4.8	5.0	4.8	4.6	–0.1	0.1	0.1	0.0
Unemployment rate (national definition)	6.3	6.4	6.2	6.1	0.0	–0.2	–0.2	–0.2
Public finances	*% of nominal GDP*							
Budget balance	–3.2	–2.6	–1.9	–1.9	–0.3	–0.6	0.3	0.3
Government debt	78.4	75.2	72.7	70.9	1.2	0.8	0.2	–0.2

Source: 2022: Statistics Austria; 2023 to 2025: OeNB June 2023 outlook.

[1] *The import-adjusted growth contributions were calculated by offsetting each final demand component with corresponding imports, which were obtained from input-output tables.*

Tabelle A2

Underlying global economic conditions

	2022	2023	2024	2025
Gross domestic product	*Annual change in % (real)*			
World excluding the euro area	3.3	3.1	3.1	3.3
USA	2.1	1.0	0.6	1.6
China	3.0	6.0	4.7	4.5
India	6.8	5.6	6.5	6.8
Japan	1.0	1.1	1.1	1.0
Latin America	3.8	1.8	2.1	2.4
United Kingdom	4.1	0.2	0.7	1.1
CESEE EU member states[1]	–2.8	0.9	2.0	2.0
Switzerland	2.1	0.7	1.2	1.4
Euro area[2]	3.5	0.9	1.5	1.6
World trade (imports of goods and services)	*Annual change in % (real)*			
World	6.0	1.5	3.4	3.3
World excluding the euro area	5.3	1.3	3.4	3.4
Growth of euro area export markets (real)	6.3	0.5	3.1	3.1
Growth of Austrian export markets (real	7.1	1.0	3.3	3.1
Prices				
Oil price, USD/barrel (Brent)	103.7	78.0	72.6	70.4
Three-month interest rate, %	0.3	3.4	3.4	2.9
Long-term interest rate, %	1.7	3.1	3.2	3.3
USD/EUR exchange rate	1.1	1.1	1.1	1.1
Nominal effective exchange rate of the euro (euro area index)	116.8	121.2	121.5	121.5

Source: Eurosystem.

[1] *Bulgaria, Croatia, Czechia, Hungary, Poland and Romania.*
[2] *2022: Eurostat; 2023 to 2025: results of the Eurosystem staff macroeconomic projections for the euro area of June 2023.*

Table A3

Foreign trade

	2022	2023	2024	2025
Exports	*Annual change in %*			
Competitor prices in Austria's export markets	16.2	0.0	2.8	2.4
Export deflator	7.9	3.8	3.6	3.0
Changes in price competitiveness[1]	8.3	–3.8	–0.8	–0.6
Import demand in Austria's export markets (real)	7.1	1.0	3.3	3.1
Austrian exports of goods and services (real)	13.0	2.9	2.7	3.0
Austrian market share	5.9	1.8	–0.6	–0.1
Imports	*Annual change in %*			
International competitor prices in the Austrian market	14.3	1.3	3.1	2.4
Import deflator	11.7	3.1	2.5	2.2
Austrian imports of goods and services (real)	7.8	2.7	2.2	2.6
Terms of trade	–3.4	0.7	1.0	0.8
	Percentage points of real GDP			
Contribution of net exports to GDP growth	3.1	0.2	0.4	0.4
	% of nominal GDP			
Export ratio	61.8	61.0	60.9	61.3
Import ratio	60.4	59.0	58.1	57.8

Source: 2022: Statistics Austria; 2023 to 2025: OeNB June 2023 outlook.

[1] *Changes in price competitiveness are defined as the difference between changes in competitor prices in Austria's export markets and changes in the export deflator.*

Table A4

Current account

	2022	2023	2024	2025
	% of nominal GDP			
Balance of trade	1.4	2.1	2.7	3.1
Balance of goods	–0.1	0.2	0.5	0.7
Balance of services	1.6	1.8	2.2	2.5
Balance of primary income[1]	–0.2	–0.2	–0.2	–0.2
Balance of secondary income[2]	–0.5	–0.6	–0.6	–0.6
Current account balance	0.7	1.3	1.9	2.3

Source: 2022: Statistics Austria; 2023 to 2025: OeNB June 2023 outlook.

[1] *Balance of income (e.g. labor compensation, investment income).*
[2] *Balance of current transfers.*

Table A5

Household income and private consumption

	2022	2023	2024	2025
	Annual change in %			
Payroll employment	2.9	1.1	1.1	1.0
Wages and salaries per employee	4.6	7.6	6.6	4.3
Compensation of employees	7.6	8.7	7.8	5.4
Property income	–4.1	3.7	4.4	4.8
Self-employment income and operating surpluses (net)	12.0	3.2	3.8	3.4
	Contribution to household disposable income growth in percentage points			
Compensation of employees	6.7	7.6	6.9	4.8
Property income	–0.4	0.3	0.3	0.3
Self-employment income and operating surpluses (net)	1.9	0.5	0.6	0.5
Net transfers less direct taxes[1]	–0.1	–0.9	–0.2	–0.2
	Annual change in %			
Disposable household income (nominal)	8.0	7.6	7.5	5.4
Consumption deflator	7.4	8.7	4.1	2.9
Disposable household income (real)	0.6	–0.9	3.3	2.5
Private consumption (real)	4.9	–0.2	2.3	1.6
	% of nominal disposable household income growth			
Saving ratio	8.4	7.4	8.2	9.0

Source: 2022: Statistics Austria; 2023 to 2025: OeNB June 2023 outlook.

[1] *Negative values indicate an increase in (negative) net transfers less direct taxes; positive values indicate a decrease.*

Table A6

Investment

	2022	2023	2024	2025
	Annual change in %			
Total gross fixed capital formation (real)	0.4	0.4	0.6	1.4
of which:				
investment in plant and equipment	*–1.2*	*–1.3*	*0.9*	*1.6*
residential construction investment	*–3.2*	*–4.7*	*–3.3*	*0.8*
nonresidential construction investment and other investment	*0.5*	*3.1*	*1.2*	*0.9*
investment in research and development	*5.8*	*3.1*	*2.1*	*2.2*
public sector investment	*–3.4*	*6.1*	*2.2*	*1.6*
private investment	*1.0*	*–0.4*	*0.4*	*1.4*
Contribution to real gross fixed capital formation growth	*Percentage points*			
Investment in plant and equipment	–0.4	–0.4	0.3	0.5
Residential construction investment	–0.6	–0.8	–0.6	0.1
Nonresidential construction investment and other investment	0.1	0.8	0.3	0.2
Investment in research and development	1.3	0.7	0.5	0.5
	Percentage points			
Total gross fixed capital formation	0.1	0.1	0.1	0.3
Changes in inventories	–0.8	0.0	–0.1	0.0
	% of nominal GDP			
Investment ratio	26.1	25.9	25.4	25.3

Source: 2022: Statistics Austria; 2023 to 2025: OeNB June 2023 outlook.

Table A7

Labor market

	2022	2023	2024	2025
Employment	*Annual change in %*			
Total employment (persons)	2.6	0.8	1.0	1.0
Payroll employmen (persons)	2.9	1.1	1.1	1.0
of which: public sector employees	*1.0*	*0.4*	*0.4*	*0.4*
Self-employment (persons)	0.5	–1.1	0.2	0.4
Total hours worked	3.0	–0.1	0.9	0.9
Payroll employment (hours)	3.0	0.3	1.1	1.0
Self-employment (hours)	3.0	–1.8	0.1	0.2
Labor supply	1.2	1.1	0.8	0.7
Registered unemployment	–21.5	7.2	–3.9	–3.9
Unemployment rate	*% of labor supply*			
Eurostat definition	4.8	5.0	4.8	4.6
National definition	6.3	6.4	6.2	6.1

Source: 2022: Statistics Austria; 2023 to 2025: OeNB June 2023 outlook.

Table A8

Compensation of employees

	2022	2023	2024	2025
Gross wages and salaries[1]	*Annual change in %*			
In nominal terms	7.6	8.7	7.8	5.4
Consumption deflator	7.4	8.7	4.1	2.9
In real terms	0.3	0.0	3.7	2.5
Collectively agreed wages and salaries[1]	3.1	7.6	6.5	4.2
Wage drift	1.5	0.0	0.1	0.1
Compensation per employee				
Gross[2] compensation (nominal)	4.6	7.6	6.6	4.3
Gross compensation (real, private consumption expenditure deflator)	–2.5	–1.1	2.4	1.4
Net[3] compensation (real, private consumption expenditure deflator)	–2.0	–0.3	3.3	1.5
Compensation per hour worked				
Gross compensation (nominal)	4.5	8.4	6.6	4.3
Gross compensation (real, private consumption expenditure deflator)	–2.7	–0.2	2.4	1.4
	% of nominal GDP			
Wage share	48.4	48.6	49.2	49.2

Source: 2022: Statistics Austria; 2023 to 2025: OeNB June 2023 outlook.

[1] *Overall economy.*
[2] *Including employers' social security contributions.*
[3] *After tax and social security contributions.*

Table A9

Prices

	2022	2023	2024	2025
HICP and subcomponents	*Annual change in %*			
Harmonised Index of Consumer Prices (HICP)	8.6	7.4	4.1	2.9
Food	9.0	9.8	3.9	2.3
Unprocessed food	10.2	5.4	×	×
Processed food	8.5	8.6	×	×
Industrial goods excluding energy	5.6	5.3	×	×
Energy	39.8	5.6	–3.7	4.6
Electricity	11.1	1.5	19.1	8.1
Natural gas	80.9	28.9	–2.8	–17.2
Liquid fuels	47.8	–11.8	–5.9	–2.8
Services	4.6	5.9	×	×
HICP excluding energy	5.8	7.6	4.9	2.7
HICP excluding energy and unprocessed food	5.1	7.1	5.1	2.8
Deflators (national accounts)				
Private consumption expenditure (PCE) deflator	7.4	8.7	4.1	2.9
Investment deflator	8.3	6.8	4.0	3.5
Import deflator	11.7	3.1	2.5	2.2
Export deflator	7.9	3.8	3.6	3.0
Terms of trade	–3.4	0.7	1.0	0.8
GDP deflator at factor costs	4.8	6.4	4.7	3.7

Source: 2022: Statistics Austria; 2023 to 2025: OeNB June 2023 outlook.

Table A10

Breakdown of revisions to the outlook

	2023	2024	2025	2023	2024	2025
	Annual change in %					
June 2023 outlook	0.5	1.7	1.6	7.4	4.1	2.9
December 2022 outlook	0.6	1.7	1.6	6.5	3.6	2.9
Difference	–0.1	–0.1	0.1	0.9	0.5	0.0
Caused by:	*Percentage points*					
External assumptions	0.1	0.0	–0.1	–0.6	0.2	0.0
New data[1]	0.3	0.0	0.0	0.0	0.0	0.0
of which:						
revisions to historical data up to Q3 22	*–0.1*	*0.0*	*0.0*	*0.0*	*0.0*	*0.0*
projection errors for Q4 22 and Q1 23	*0.5*	*0.0*	*0.0*	*0.6*	*0.0*	*0.0*
Other reasons[2]	–0.4	–0.1	0.2	0.9	0.3	0.0

Source: 2022: OeNB June 2023 and December 2023 outlook. The sum of growth contributions subject to individual revisions may differ from the overall revision due to differences in rounding.

[1] *"New data" refer to data on GDP and/or inflation that have become available since the publication of the preceding OeNB outlook.*
[2] *Different assumptions about trends in domestic variables such as wages, government consumption, effects of tax measures, other changes in assessments and model changes.*

Table A11

Comparison of current economic forecasts for Austria

	OeNB			WIFO		IHS		OECD		IMF		European Commission	
	June 2023			March 2023		March 2023		June 2023		April 2023		May 2023	
	2023	2024	2025	2023	2024	2023	2025	2023	2024	2023	2024	2023	2024
Main results	*Annual change in %*												
GDP (real)	0.5	1.7	1.6	0.3	1.8	0.5	1.4	0.2	1.6	0.4	1.1	0.4	1.6
Private consumption (real)	–0.2	2.3	1.6	1.3	2.0	0.6	1.8	–0.2	2.3	x	x	1.4	2.1
Government consumption (real)	–0.3	0.0	0.7	0.2	0.6	–1.3	–0.8	–0.2	0.6	x	x	–0.4	0.3
Gross fixed capital formation (real)	0.4	0.6	1.4	0.0	1.0	–0.7	1.0	0.3	1.1	x	x	0.0	1.1
Exports (real)	2.9	2.7	3.0	2.0	3.3	1.7	3.2	3.2	2.7	5.9	2.1	1.5	2.5
Imports (real)	2.7	2.2	2.6	2.1	3.2	1.1	3.2	2.8	2.7	4.6	1.7	2.0	2.3
Labor productivity[1]	–0.3	0.7	0.7	–0.1	0.8	–0.5	0.5	1.0	1.0	x	x	–0.2	0.7
GDP deflator	7.7	4.7	3.7	7.1	4.2	6.4	3.7	7.5	3.5	7.8	2.6	7.2	4.2
CPI	x	x	x	7.1	3.8	7.5	3.5	x	x	x	x	x	x
HICP	7.4	4.1	2.9	7.3	3.5	7.5	3.5	8.0	3.9	8.2	3.0	7.1	3.8
Unit labor costs	7.9	5.9	3.6	8.7	7.2	8.1	5.7	1.3	1.3	x	x	8.5	5.9
Payroll employment[2]	0.8	1.0	1.0	0.8	1.3	1.0	0.9	1.4	0.6	–0.1	0.3	0.6	0.9
	% of labor supply												
Unemployment rate[3] (Eurostat definition)	5.0	4.8	4.6	4.7	4.5	4.9	4.8	5.0	5.1	5.3	5.6	4.9	5.0
	% of nominal GDP												
Current account balance	1.3	1.9	2.3	1.6	2.1	x	x	1.4	1.3	1.2	0.6	0.8	1.2
Budget balance (Maastricht definition)	–2.6	–1.9	–1.9	–1.8	–0.4	–2.9	–2.3	–3.2	–1.6	–2.7	–1.5	–2.4	–1.3
Technical assumptions													
Oil price, USD/barrel (Brent)	78.0	72.6	70.4	84.0	80.0	82.0	77.0	77.4	75.0	73.1	68.9	85.0	78.0
Short-term interest rate, %	3.4	3.4	2.9	3.9	4.7	3.6	3.9	3.2	3.4	2.8	3.0	3.3	3.3
USD/EUR exchange rate	1.08	1.09	1.09	1.09	1.20	1.08	1.08	1.04	1.04	1.06	1.05	1.09	1.10
	Annual change in %												
Euro area GDP (real)	0.9	1.5	1.6	0.7	1.6	0.6	1.5	0.9	1.5	0.8	1.4	1.1	1.6
US GDP (real)	1.0	0.6	1.6	1.0	1.5	1.1	1.3	1.6	1.0	1.6	1.1	1.4	1.0
World GDP (real)	2.9	2.9	3.1	x	x	2.6	2.9	2.7	2.9	2.8	3.0	2.8	3.1
World trade[4]	1.5	3.4	3.3	x	x	1.3	3.7	1.6	3.8	2.4	3.5	1.6	3.1

Source: OeNB, WIFO, IHS, OECD, IMF, European Commission. Note: x = no data available.

[1] *OeNB, WIFO: GDP per hour worked. IHS, OECD, European Commission: GDP per employee.*
[2] *WIFO, IHS: based on active payroll.*
[3] *WIFO: percentage of persons in payroll employment (national definition).*
[4] *IHS: goods according to CPB; European Commission: world imports.*

Table A12

Quarterly outlook results

	2022	2023	2024	2025	2022				2023	
					Q1	Q2	Q3	Q4	Q1	Q2
Prices, wages and costs	*Annual change in %*									
HICP	8.6	7.4	4.1	2.9	5.5	7.9	9.9	11.1	10.6	8.8
HICP excluding energy and food	5.8	7.6	4.9	2.7	3.5	5.2	6.5	8.1	9.1	8.5
Private consumption expenditure deflator	7.4	8.7	4.1	2.9	4.3	6.6	8.7	9.7	11.1	9.5
Gross fixed capital formation deflator	8.3	6.8	4.0	3.5	7.0	8.3	8.9	8.9	8.6	6.9
GDP deflator	4.9	7.7	4.7	3.7	3.4	4.4	5.2	6.5	7.3	8.3
Unit labor costs	2.2	7.9	5.9	3.6	0.8	1.6	3.6	3.0	4.5	8.9
Nominal wages per employee	4.6	7.6	6.6	4.3	4.9	5.0	4.2	4.4	4.9	7.9
Productivity	2.3	–0.3	0.7	0.7	4.0	3.3	0.6	1.4	0.4	–0.8
Real wages per employee	–2.5	–1.1	2.4	1.4	0.5	–1.6	–4.1	–4.9	–5.6	–1.4
Import deflator	11.7	3.1	2.5	2.2	11.4	13.1	12.4	9.9	5.3	2.3
Export deflator	7.9	3.8	3.6	3.0	7.6	8.7	8.3	6.9	4.4	3.0
Terms of trade	–3.4	0.7	1.0	0.8	–3.4	–3.9	–3.6	–2.7	–0.9	0.6
Economic activity	*Annual and/or quarterly changes in % (real)*									
GDP	4.9	0.5	1.7	1.6	1.3	1.7	0.0	–0.1	0.1	–0.2
Private consumption	4.9	–0.2	2.3	1.6	2.9	–0.5	–0.6	–1.5	0.4	0.7
Government consumption	3.6	–0.3	0.0	0.7	0.3	0.8	0.2	3.0	–2.7	0.0
Gross fixed capital formation	0.4	0.4	0.6	1.4	2.2	–1.7	–0.4	3.8	–1.5	–0.4
Exports	13.0	2.9	2.7	3.0	1.9	4.3	1.5	0.3	0.9	–0.5
Imports	7.8	2.7	2.2	2.6	2.4	0.2	0.9	–0.1	1.9	–0.2
	Contribution to real GDP growth in percentage points									
Domestic demand	2.3	–0.3	0.9	0.8	0.8	0.4	–0.4	0.3	–0.6	0.1
Net exports	3.5	0.5	0.8	0.9	0.0	1.9	0.3	0.1	0.0	–0.3
Changes in inventories	–0.8	0.3	0.0	0.0	0.4	–0.6	0.2	–0.5	0.7	0.0
Labor market	*% of labor supply*									
Unemployment rate (Eurostat definition)	4.8	5.0	4.8	4.6	4.6	4.4	5.0	5.0	4.8	5.0
	Annual and/or quarterly changes in %									
Total employment	2.6	0.8	1.0	1.0	0.7	0.4	0.1	0.3	0.5	–0.2
of which: private sector	*2.9*	*0.9*	*1.1*	*1.1*	*0.8*	*0.4*	*0.1*	*0.4*	*0.6*	*–0.3*
Payroll employment	2.9	1.1	1.1	1.0	0.7	0.5	0.2	0.5	0.6	–0.1
Additional variables	*Annual and/or quarterly changes in % (real)*									
Disposable household income	0.6	–0.9	3.3	2.5	–0.9	–2.0	10.2	–10.3	–0.1	4.3
	% of real GDP									
Output gap	0.4	–0.5	–0.3	0.0	–0.3	1.0	0.7	0.3	0.0	–0.6

Source: 2022: Statistics Austria; 2023 to 2025: OeNB June 2023 outlook. Note: Quarterly values based on seasonally and working day-adjusted data.

Table A12 continued

Quarterly outlook results

	2023		2024				2025			
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Prices, wages and costs	*Annual change in %*									
HICP	6.0	4.4	3.9	3.8	4.5	4.2	3.6	3.1	2.6	2.3
HICP excluding energy and food	7.1	5.8	5.1	5.0	5.0	4.4	3.4	2.7	2.4	2.3
Private consumption expenditure deflator	7.7	6.6	5.0	4.0	3.7	3.9	3.5	3.2	2.6	2.3
Gross fixed capital formation deflator	6.1	5.6	4.5	4.1	3.8	3.6	3.5	3.5	3.5	3.4
GDP deflator	8.0	7.3	5.7	4.4	4.4	4.5	4.2	3.9	3.5	3.1
Unit labor costs	9.3	9.0	8.6	5.3	5.0	4.8	4.4	3.8	3.2	2.8
Nominal wages per employee	8.5	8.8	9.3	6.0	5.8	5.6	4.9	4.5	3.9	3.7
Productivity	–0.7	–0.2	0.6	0.7	0.7	0.7	0.5	0.7	0.7	0.9
Real wages per employee	0.8	2.1	4.1	2.0	2.0	1.6	1.4	1.3	1.3	1.4
Import deflator	2.1	2.6	2.9	2.6	2.3	2.3	2.5	2.4	2.1	1.7
Export deflator	3.2	4.8	4.1	3.7	3.3	3.2	3.1	3.1	3.0	2.8
Terms of trade	1.1	2.1	1.2	1.0	1.0	0.9	0.7	0.6	0.8	1.0
Economic activity	*Annual and/or quarterly changes in % (real)*									
GDP	0.1	0.4	0.6	0.5	0.5	0.4	0.4	0.4	0.3	0.3
Private consumption	0.7	0.6	0.6	0.6	0.6	0.5	0.4	0.3	0.3	0.3
Government consumption	–0.1	0.0	0.0	0.1	0.0	0.2	0.3	0.2	0.2	0.1
Gross fixed capital formation	–0.1	0.2	0.2	0.2	0.3	0.4	0.4	0.3	0.3	0.3
Exports	0.3	0.8	1.0	0.8	0.7	0.7	0.8	0.8	0.7	0.7
Imports	0.6	0.7	0.5	0.6	0.6	0.7	0.7	0.6	0.6	0.6
	Contribution to real GDP growth in percentage points									
Domestic demand	0.1	0.2	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.1
Net exports	0.0	0.2	0.4	0.3	0.2	0.2	0.2	0.2	0.2	0.2
Changes in inventories	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Labor market	*% of labor supply*									
Unemployment rate (Eurostat definition)	5.1	5.0	5.0	4.8	4.7	4.6	4.6	4.6	4.5	4.6
	Annual and/or quarterly changes in %									
Total employment	0.0	0.3	0.3	0.4	0.3	0.3	0.2	0.1	0.1	0.1
of which: private sector	*0.0*	*0.3*	*0.3*	*0.5*	*0.4*	*0.4*	*0.3*	*0.1*	*0.1*	*0.1*
Payroll employment	–0.1	0.2	0.3	0.5	0.5	0.4	0.2	0.1	0.1	0.0
Additional variables	*Annual and/or quarterly changes in % (real)*									
Disposable household income	–0.6	0.3	0.8	1.1	0.9	0.9	0.6	0.4	0.1	0.2
	% of real GDP									
Output gap	–0.8	–0.8	–0.5	–0.3	–0.2	–0.1	–0.1	0.0	0.0	0.0

Source: 2022: Statistics Austria; 2023 to 2025: OeNB June 2023 outlook. Note: Quarterly values based on seasonally and working day-adjusted data.

Studies

How have profits been shaping domestic price pressures in Austria?

Friedrich Fritzer, Doris Prammer, Lukas Reiss, Martin Schneider[1]
Refereed by: Josef Baumgartner, WIFO

There is an ongoing debate as to whether profits have been driving inflation in Austria and in the euro area. We address this question by decomposing the value added deflator for the Austrian economy into its income components: compensation of employees, net operating surplus, consumption of fixed capital and taxes less subsidies on production. Furthermore, we conduct this decomposition not only for the economy as a whole but also for major sectors of the economy. In 2022, the value added deflator for the Austrian economy grew at a rate of 6.4%. Profits contributed 4.0 percentage points thereof, thus accounting for more than half of value added inflation. To assess whether profits have been driving up inflation disproportionately, we calculate the contribution of all income components on a balanced growth path, which leaves the income components' impact on value added constant, and define any growth above this threshold as nonneutral or disproportionate. We thus see that in 2022 nonneutral profits explained more than one-third (2.5 percentage points) of domestic inflation. With respect to sectoral developments, energy (including water supply and waste management), construction and agriculture (including forestry) as well as financial and insurance activities contributed most to the growth of the value added deflator. In 2023 and 2024, the inflation contribution of profits will decline owing to the expected strong growth of unit labor costs and the increasing contribution of depreciation. Over the period from 2020 to 2024, the average nonneutral profit contribution to the growth of the value added deflator will be minor judging from the OeNB's most recent macroeconomic projections.

JEL classification: E31, D33
Keywords: domestic price pressure, profit share

Energy imports were the main driver of the high inflation rates measured in 2022. With enterprises and their employees seeking to sustain their real income levels by charging higher prices and demanding higher wages, respectively, inflation has since spread to other product groups. Given the cause-and-effect relationship between rising wages and rising prices and their potential to spark inflation further, the ECB has been keeping an eye on these developments (Arce et al., 2023). In Austria, a public debate has emerged about the sources of the domestic price pressures. A recurrent theme is whether the sharp increases in inflation have been fueled by an excessive rise in corporate profits[2] in some sectors.

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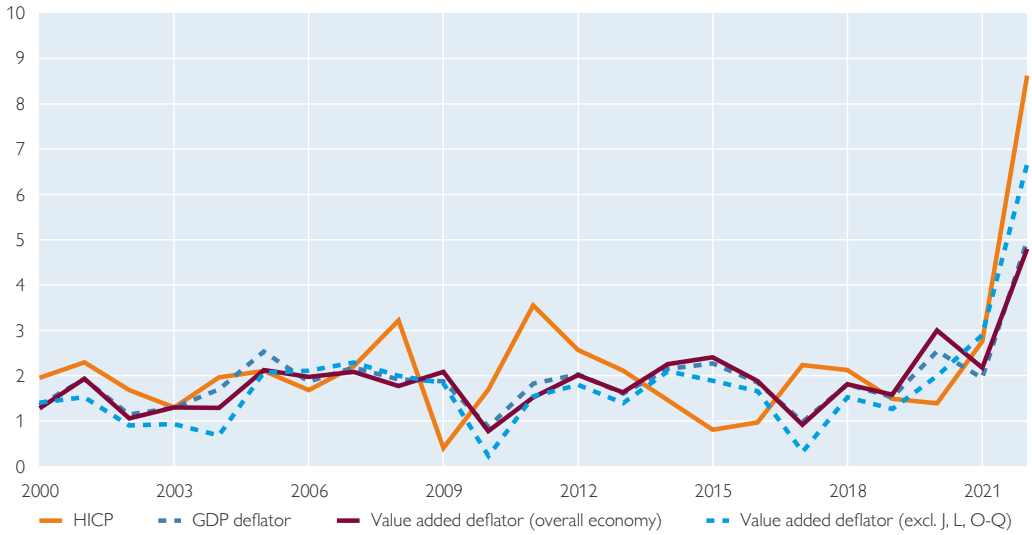
[2] *Excessive rise in profits refers to the part of the profit increase that is caused by a growth of profits that exceeds the growth of the other value added components.*

Chart 1

Inflation according to different measures

Annual change in %



Source: Statistics Austria.

This publication addresses this question by decomposing the value added deflator for the economy as a whole and for individual sectors. Value added deflators measure the price of value added through the domestic production of goods and services. This perspective significantly differs from tracking the prices payable by consumers for goods and services (including imports), which we do with the Harmonised Index of Consumer Prices (HICP). Moreover, value added goes beyond the production of consumer goods and services by covering also the production of the other demand components (exports, gross capital formation and public consumption). As is evident from chart 1, the value added deflator for the economy as a whole and HICP inflation moved broadly in sync between 2000 and 2021. In 2022, the rising cost of energy imports pushed up the HICP by 8.6%, well beyond the 4.7% increase of the value added deflator for the overall economy.[3] Note that, due to data issues, the analysis below does not cover the real estate sector, the information and communication sector and the public sector. When we exclude these sectors, the value added deflator for the Austrian economy rose by 6.4% in 2022.

Method for decomposing the value added deflator

The value added deflator for industry *i* describes domestic price pressures, recording the development of prices for domestic value added, excluding imported and

[3] *The value added deflator is calculated using basic prices, whereas the GDP deflator is calculated from purchasers' prices. Therefore, the GDP deflator also reflects taxes on products (VAT, mineral oil tax, energy tax, etc.) but excludes subsidies on products (e.g. the current electricity price cap). Historically, the value added deflator and the GDP deflator were broadly aligned. At the same time, they tended to move apart when major fiscal measures related to production taxes or subsidies entered into force or were withdrawn. In 2023, the value added deflator will be higher than the GDP deflator (in particular due to the electricity price cap), and in 2024 this relationship will be reversed (due to the phasing out of numerous fiscal energy measures).*

domestically produced intermediate goods.[4] Value added consists of compensation of employees,[5] net taxes on production (= other indirect taxes on production less other subsidies), depreciation and amortization and net operating surplus or profit.[6] A simple decomposition (for details see annex 1) shows the percentage change of the value added deflator for each sector i ($\Delta p_{i,t}$) expressed as the weighted sum of unit cost changes.

$$\Delta p_{i,t} = \Delta UW_{i,t} w_{i,t-1}^{UW} + \Delta UT_{i,t} w_{i,t-1}^{UT} + \Delta UD_{i,t} w_{i,t-1}^{UD} + \Delta UP_{i,t} w_{i,t-1}^{UP} \quad (1)$$

where *UW* shows compensation of employees per unit of value added (= unit labor costs), *UT* shows net taxes on production per unit, *UD* shows depreciation and amortization per unit and *UP* shows net operating surplus per unit. The annual national accounts data allow for decomposing all 64 NACE sectors until 2021.

Calculation of necessary data for 2022

Since detailed national accounts data for 2022 were not yet available at the time of writing, we proxy the decomposition of gross value added for 2022[7]. To this end, we use the quarterly national accounts data that are available until the first quarter 2023. However, these data are less detailed, with a rougher sectoral breakdown (13 NACE sections) and just two income-related value added components, namely gross value added ($VA_{i,t}$) and compensation of employees[8] ($W_{i,t}$).[9] In order to calculate the net operating surplus ($NBU_{i,t}$) as a residual, we need to estimate net taxes on production ($T_{i,t}$) and depreciation and amortization ($D_{i,t}$) for each of the 13 NACE sections.

$$NBU_{i,t} = VA_{i,t} - W_{i,t} - T_{i,t} - D_{i,t}$$

[4] *In order to decompose the overall product price increases, we would have to include intermediate goods (domestic or imported) using an input-output analysis.*

[5] *We adjust compensation of employees and profits for pandemic-related subsidies (above all short-time work, compensation for sales lost due to the pandemic and lockdowns, fixed cost grants, compensation for losses) and subsidies launched to ease the impact of the current energy crisis, since these subsidies have had little to no impact on corporate price-setting behavior. Therefore, the charts only show the development of profit from business operations without those special subsidies.*

[6] *In this paper, we use the net operating surplus of nonfinancial corporations (national accounts terminology) synonymously with corporate profits, although there are some conceptual differences: For example, the net operating surplus of nonfinancial corporations does not reflect valuation gains or losses, and it includes net interest payments. According to recent national accounts data, interest payments of nonfinancial corporations only increased marginally between 2021 and 2022, though.*

[7] *The national accounts data for 2022 were released on September 28, 2023.*

[8] *For a number of exercises, it is common practice to add self-employed income included in the net operating surplus to compensation of employees. However, we do not proceed that way since compensation of employees is mostly agreed one year in advance during the wage settlement rounds while both self-employed individuals and enterprises can also increase their prices later in the year.*

[9] *In the nonfinancial sector accounts, corporate depreciation and amortization data (excluding sectoral breakdowns) are available up to the fourth quarter of 2022. According to Statistics Austria, however, these are merely trend projections and, with growth of 4% in 2022, are well below our own estimate of 9.4% (see below).*

Net taxes on production

For our assessment, we divide net taxes on production into *short-time work subsidies* ($KASUB_{i,t}$), *other crisis-related subsidies* ($SCSUB_{i,t}$) and *net taxes on production without crisis-related subsidies* ($NPAEXCSUB_{i,t}$).

$$T_{it} = KASUB_{i,t} + SCSUB_{i,t} + NPAEXCSUB_{i,t}$$

The breakdown of *short-time work subsidies* was derived from detailed data provided by the labor ministry. *Other crisis-related subsidies* include other pandemic-related subsidies (in particular net turnover compensation, fixed cost grants, compensation for losses) as well as energy bill subsidies in the context of the current crisis. We allocated *short-time work subsidies* to economic sectors (using data from the Austrian COVID-19 financing agency COFAG and the finance ministry) and made quarterly breakdowns (using aggregated Statistics Austria data). We allocated the energy bill subsidies provided for 2022 to the eligible economic sectors using input-output data for electricity and gas expenditure. We calculated *net taxes on production without crisis-related subsidies*[10] as follows: EU agricultural subsidies come as a separate aggregate in the quarterly nonfinancial sector accounts. As the remaining net taxes on production are relatively stable, we used the 2019 structure for allocating the data for 2022 across sectors, with the quarterly breakdown made in line with the aggregate's development. See chart A2 in annex 3 for detailed quarterly figures for the individual components of net taxes on production.

Depreciation and amortization

The gross operating surplus remaining after net taxes on production include the net operating surplus and *depreciation and amortization*. Depreciation and amortization data are available from the annual national accounts up to 2021. To calculate the annual figures for 2022 and the forecasts for 2023 and 2024, we used the perpetual inventory method (see annex 2). As depreciation and amortization are driven by the replacement cost of capital, the most recent price increases lead to significantly higher depreciation and amortization from 2022 to 2024 than in previous years.

Net operating surplus

The net operating surplus is calculated as gross operating surplus less depreciation and amortization.

Compensation of employees and net operating surplus adjusted for crisis-related subsidies

The net operating surplus, including subsidies received less taxes paid on production, recorded in the national accounts constitutes accounting profits (as opposed to operating profit excluding subsidies). Apart from agricultural subsidies, subsidies are insignificant in normal times, since their share is low (2000–2019: 1.7% of

[10] *The other taxes on production included in the "net taxes on production without crisis-related subsidies" comprise, above all, payroll taxes (in particular employer contributions to the family burden equalization fund and local government taxes), property taxes and parafiscal charges payable by enterprises; other subsidies covered mainly consist of payments under the EU's common agricultural policy, labor market support (phased retirement, ...), research funding and compensation for nondeductible input tax in the areas of health and long-term care.*

gross value added) and stable over time. However, in 2020 and 2021, the share of crisis-related subsidies increased to 7.1%.

Since crisis-related subsidies do not impact enterprises' price-setting behavior, operating profit is more relevant for our exercise as we seek to establish to what extent labor and capital have contributed to the price increases. Both short-time work subsidies (paid to enterprises, but essentially benefiting employees) as well as other crisis-related subsidies aim to prevent an increase in unemployment and/or corporate insolvencies, rather than seeking to reduce consumer prices.

Short-time work subsidies directly benefited labor. In many other countries, these subsidies were recorded in the national accounts as direct transfers to households, while in Austria they were recorded under subsidies and compensation of employees alike. Hence we deduct the subsidies from compensation of employees to increase international comparability.

Regarding the lavish support provided through the other COVID-19 subsidies (net turnover compensation, fixed cost grants, compensation for losses), we can assume that these subsidies primarily lowered losses or bolstered profits rather than leading to price cuts. Therefore, we deduct these subsidies directly from the net operating surplus, and the initial retroactive energy bill subsidy for 2022 as well.

Thus, we adjust both the net operating surplus and the compensation of employees for the respective crisis-related subsidies:

$$\widetilde{NBU}_{i,t} = NBU_{i,t} - SCSUB_{it} \text{ or, } \widetilde{ANE}_{i,t} = ANE_{i,t} - KASUB_{i,t}$$

Chart 2 (left-hand panel) shows the result of these adjustments for the overall economy. In 2020, nominal (unadjusted) compensation of employees fell by 2%. If we subtract the short-time work subsidies employees received, their compensation would have fallen by 6%. Likewise, the other COVID-19 subsidies led to a significantly smaller decrease in net operating surplus (–4% instead of –14%). In 2021, unadjusted compensation of employees (+4%) rose less strongly than adjusted compensation of employees (+7%), owing to the decline in short-time work. Firms' unadjusted net operating surplus including COVID-19 subsidies (+13%) rose more sharply than the adjusted one (+10%) due to the expansion of COVID-19 funding. Growth of the net operating surplus in 2022 was high (+13%) but distorted downward by the decrease in COVID-19 subsidies, and remained well below the growth of operating profits excluding subsidies (+25%).

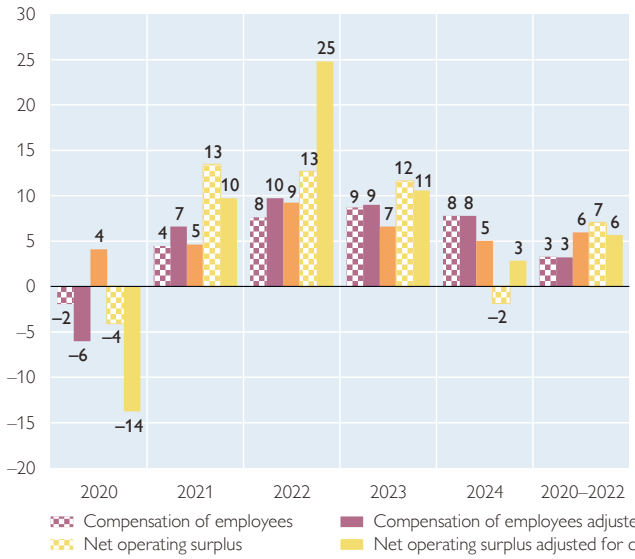
Chart 2 (right-hand panel) also shows the unit costs relevant for the decomposition (= nominal value added component divided by real value added).

Chart 2

Nominal value added and its deflator by components of income

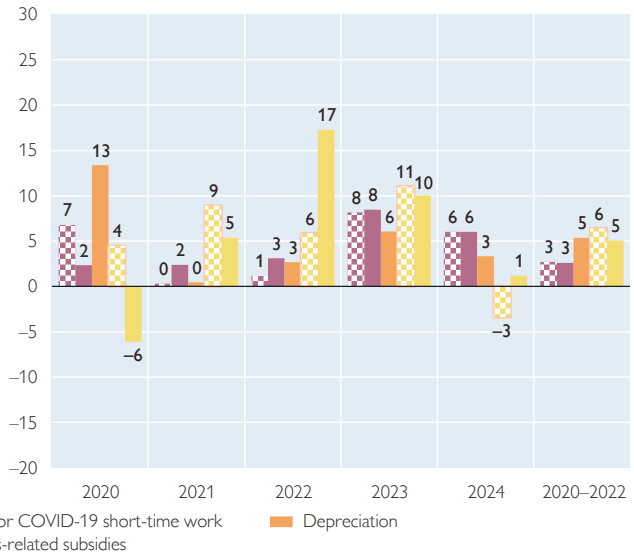
Value added growth by component (nominal)

Annual change (from 2019) in %



Unit cost growth (nominal value added divided by real value added)

Annual change (from 2019) in %



Source: Statistics Austria, authors' calculations.

Results of decomposition for the overall economy

The growth in the value added deflator for the overall economy (excluding NACE J, L and O–Q)[11] accelerated from 2.0% in 2021 to 6.4% in 2022. Between 2020 and 2022, the deflator rose by 3.8% on average. Chart 3 (left-hand panel) shows the results of the decomposition in this period.

In 2020, both compensation of employees and net operating surplus were on the decline. However, since value added fell more sharply, unit labor costs and unit profits increased. Only depreciation and amortization (calculated on the basis of capital stock and investment) rose this year, accounting for most of the increase in the deflator. *In 2021,* compensation of employees and net operating surplus contributed roughly equally to the increase in the deflator. *In 2022,* the net operating surplus accounted for more than half of the increase in the deflator at 4.0 percentage points.

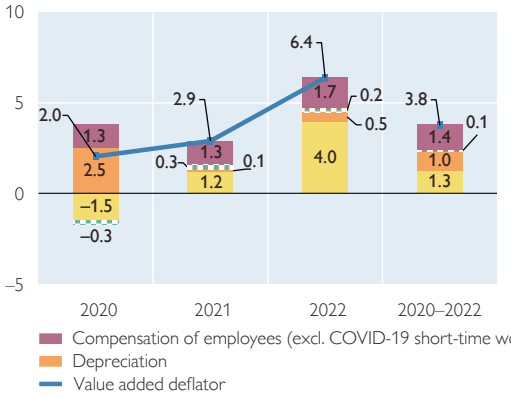
[11] *Our analysis does not include data on information and communication (NACE J), real estate (NACE L) and public administration (NACE O–Q), for the following reasons. In the real estate sector, imputed rents account for more than half (55%) of value added. Imputed rents are added to the net operating surplus on the income side and thus overstate them massively. In the information and communication sector we are dealing with data issues and in the public sector we also have measurement problems. The sectors excluded from the analysis amount to up to 1/3 of value added for all NACE sectors during 2019 to 2022.*

Chart 3

Overall economy (without NACE J, L and O-Q)

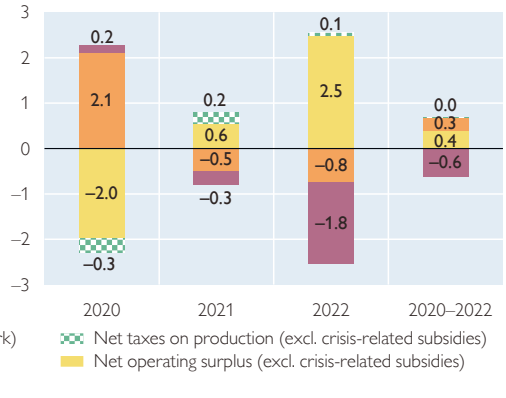
Contribution to change in value added deflator

Annual change (from 2019) in %, growth contribution in percentage points



Gap to distribution-neutral scenario with equal growth of all components

Annual change (from 2019) in %, growth contribution in percentage points



Compensation of employees (excl. COVID-19 short-time work)
Depreciation
Value added deflator
Net taxes on production (excl. crisis-related subsidies)
Net operating surplus (excl. crisis-related subsidies)

Source: Statistics Austria, authors' calculations.

Box 1

Definition of "nonneutral unit-profit contribution"

In order to establish whether a given contribution to inflation stemming from profits is attributable to average or above-average profit developments, we compare the results of our decomposition with a hypothetical distribution-neutral scenario where all value added components grow at the same rate as the value added deflator, meaning that wage and profit shares remain unchanged. Therefore, we decompose the growth of the deflator as follows:

$$\Delta p_{i,t} = \Delta p_{i,t} w^{UW}_{i,t-1} + \Delta p_{i,t} w^{UT}_{i,t-1} + \Delta p_{i,t} w^{UD}_{i,t-1} + \Delta p_{i,t} w^{UP}_{i,t-1}$$

As a result, the contribution of the "distribution-neutral unit-profit increase" is $\Delta p_{i,t}\, w^{UP}_{i,t-1}$. *We define the above-average contribution of unit profits as the difference between the unit-profit contribution yielded by decomposition* $\left(\Delta UP_{i,t} w^{UP}_{i,t-1}\right)$ *and the distribution-neutral rise in unit profits:*

$$Nonneutral\ unit - profit\ contribution = \left(\Delta UP_{i,t} - \Delta p_{i,t}\right) w^{UP}_{i,t-1}$$

In other words, an above-average unit-profit contribution reflects the weighted difference between growth in unit profits and growth in the deflator. A positive contribution is thus equivalent to an above-average increase in unit profits in comparison with the deflator.

However, a positive above-average contribution of profits for a given period is never more than a snapshot, as profits are much more volatile than compensation of employees. A rising profit share resulting in above-average profit contributions is often the inevitable result of lagged wage adjustments, which are inherent in Austria's wage-setting process, in particular in periods of rapid inflation increases. However, these above-average profit contributions are typically offset as wages increase in the following years. That is, profit developments would have to be assessed from a longer-term perspective.

In 2022, excess profit contribution amounted to 2.5 percentage points, thus accounting for *one-third of the increase in the deflator.* Yet, the *period from 2019 to 2022* shows only slightly *above-average profit contributions for the overall economy* (0.4 percentage points), given the sharp drop in net operating surplus that was

observed in 2020. At the same time, we noticed an offsetting contribution from compensation of employees compared with the distribution-neutral scenario.

Box 2

The role of crisis-related subsidies in decomposing the value added deflator

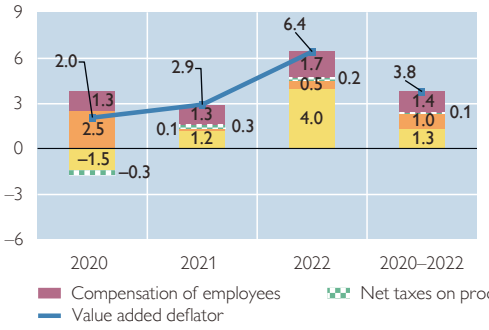
Chart B1 compares the contributions from production to the growth of the value added deflators excluding (left-hand panel) and including (right-hand panel) crisis-related subsidies. In the unadjusted decomposition, compensation of employees contributes 3.7 percentage points to deflator growth in 2020. However, the actual increase in unit labor costs for enterprises that are relevant for the deflator was significantly lower owing to short-time work subsidies. If we subtract granted short-time work subsidies from compensation of employees, the contribution sinks to 1.3 percentage points, which is a more realistic depiction of costs.

Chart B1

Role of subsidies in value added deflator decomposition – overall economy (without NACE J, L and O-Q)

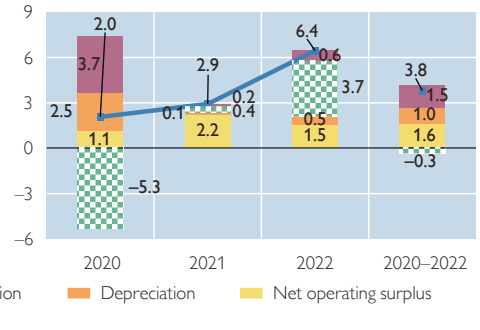
Contribution to change in value added deflator (adjusted contributions)

Annual change (from 2019) in %, growth contribution in percentage points



Contribution to change in value added deflator (unadjusted contributions)

Annual change (from 2019) in %, growth contribution in percentage points



Compensation of employees
Net taxes on production
Depreciation
Net operating surplus
Value added deflator

Source: Statistics Austria, authors' calculations.

Similarly, the unadjusted calculation for 2022 yields only a small share of the net operating surplus of 1.5 percentage points. However, this figure only reflects a base effect, as the crisis-related subsidies granted in the previous two years have largely been phased out,[12] leading to a subsequent reduction in corporate profits. Decomposing the adjusted data shows a significantly higher contribution of the net operating surplus of 4.0 percentage points for 2022. This comparison clearly shows the importance of the adjustment for crisis subsidies as well as of the calculation of depreciation and amortization.

[12] *COVID-19 subsidies without short-time work decreased from around EUR 9 billion to almost EUR 2 billion in 2022. However, the government subsidized firms with almost EUR 1 billion in view of the energy crisis (in particular the initial energy bill subsidies).*

Forecast for 2023 and 2024 suggests negative excess profit contribution

Our analysis of the relative importance of profits versus wages is a snapshot over a short period of time, which was moreover distorted by the pandemic conditions. Therefore, we add a *forecasting exercise for 2023 and 2024.*

According to quarterly national accounts data, the increase of the value added deflator for the overall economy (excluding the above-mentioned sectors) accelerated to *10.7%* in the *first quarter of 2023,* well above the figure for 2022 as a whole (+6.6%). In addition to the sectors energy (including water supply and waste management), construction and agriculture (including forestry), *financial and insurance services showed a strong profit-driven deflator increase, namely by 23%.*

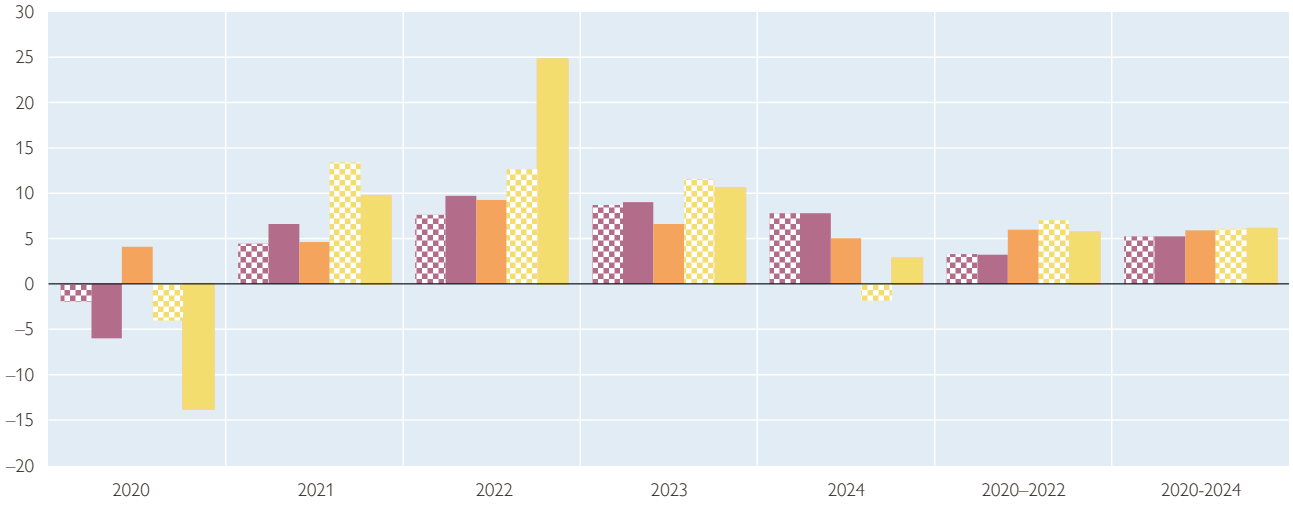
For the remainder of 2023 and in 2024, profits will come under pressure from several angles. First, economic growth will be moderate in both years. According to the OeNB's latest projections from June 2023, real economic growth will be just 0.5% in 2023 and then accelerate to 1.7% in 2024. *Second,* compensation of employees will rise sharply in both years, following the inherent *lags and spikes in wage adjustments* to inflation. According to the *OeNB wage tracker,* negotiated wage growth will accelerate significantly already in the first quarter of 2023 (+6.6%) owing to the wage settlements negotiated in 2022 (+3.1%), ultimately coming to 7.6% in 2023 as a whole. According to the wage tracker, there are signs of continued strong negotiated wage growth in the first three quarters of 2024. In addition, given the *current labor shortage,* many enterprises can be expected to maintain employment despite the weak business situation expected in 2023, further pushing up unit labor costs. According to the OeNB's June 2023 projections, unit labor costs will be marked by strong growth in 2023 (+7.9%) and 2024 (+5.9%). *Third,* due to high inflation, *replacement costs of capital driving depreciation and amortization* will, once again, rise sharply in 2023 (+6.8%). At +4.9%, growth in depreciation and amortization will be weaker again in 2024. This suggests that the net operating surplus will contribute significantly less to inflation in 2023 and 2024 than it did in 2022. The level of short-time work subsidies will be close to zero in 2023 and 2024; due to continued energy bill subsidies, the other crisis-related subsidies will increase slightly in 2023 compared to 2022, but they will also approach zero in 2024 (based on a "no policy change" assumption).

Chart 4

Overall economy until 2024 (without NACE J, L and O-Q)

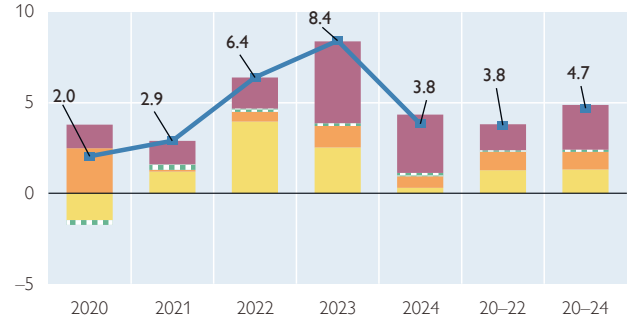
Value added growth by component (excl. net taxes on production)

Annual change in %



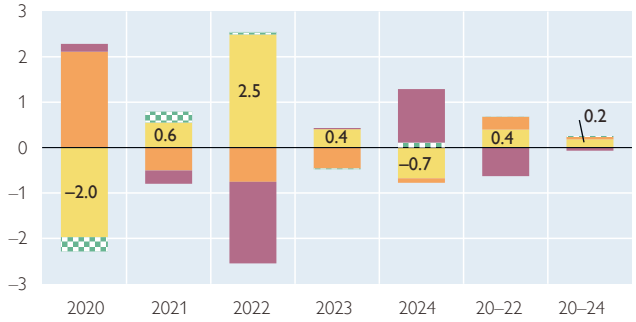
Contribution to change in value added deflator – wages and profits excl. COVID-19 subsidies

Annual change in %, growth contribution in percentage points



Gap to distribution-neutral scenario with equal growth of all components

Annual change in %, growth contribution in percentage points



Compensation of employees (excl. COVID-19 short-time work)
Net operating surplus (excl. crisis-related subsidies)
Net taxes on production (excl. crisis-related subsidies)
Value added deflator
Depreciation

Source: Statistics Austria, authors' calculations.

Under these assumptions, net operating surplus excluding crisis-related subsidies will only rise by 11% and 3% in 2023 and 2024, respectively (after +25% in 2022). Thus, net operating surplus will contribute 2.5 and 0.3 percentage points, respectively, to the changes in the value added deflator, which has been forecast to grow by 8.4% in 2023 and by 3.8% in 2024. In comparison with a hypothetical scenario where all value added components grow at the same rate, the *above-average profit contribution is negative in 2024. Over the entire observation period between 2020 and 2024, the above-average profit contribution approaches zero, with 0.2 percentage points per annum.* Similarly, the "excess contribution" from the compensation of employees will increase in 2023 and 2024, meaning that it is almost neutral throughout the 2020–2024 period.

In contrast to corporate profits, the concept of net operating surplus includes net interest payments. According to recent national accounts data, interest payments

made by nonfinancial corporations were relatively stable from 2019 to 2022.[13] However, they will increase substantially in 2023 and 2024 due to changes in the interest rate environment. Therefore, corporate profits of the nonfinancial sector will – ceteris paribus – increase less than net operating surplus in those two years.

Overview of sectoral results

When we decompose the deflator for the overall economy, it becomes apparent that there were no notable nonneutral profits in the entire period from 2020 to 2022. However, this result masks the high degree of heterogeneity across sectors observable.

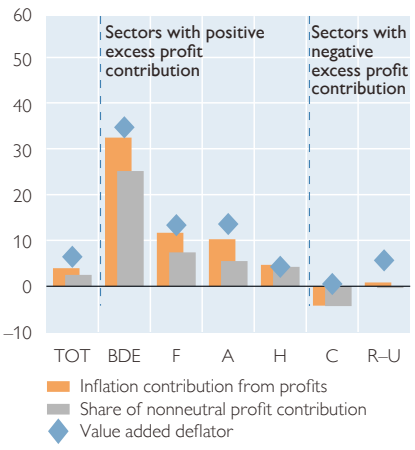
Chart 5 (left-hand panel) shows inflation according to the value added deflator *in 2022* in connection with the overall contribution of profits to inflation and above-average profit contributions for selected sectors. *Mining, energy, water supply and waste management* (NACE B, D and E) showed the strongest deflator rise (+35%), most of which is attributable to the contribution from profits. In the quarterly national accounts data, the data on the energy sector (NACE D) come as an aggregate including the data on mining (NACE B) and water supply and waste management (NACE E). The energy sector's (NACE D) share of value added of this aggregate was 54% in 2021. Assuming that the mining and water/waste management sectors only experienced average deflator increases, the increases in the energy sector are likely to have been almost twice as high.

Chart 5

Inflation contribution from profits by sector

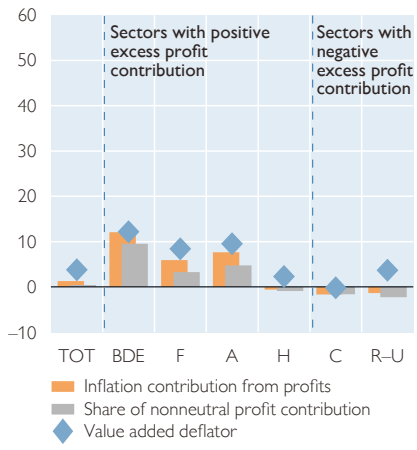
Profit contribution by sector, 2022

Growth in % (value added deflator), contribution in percentage points



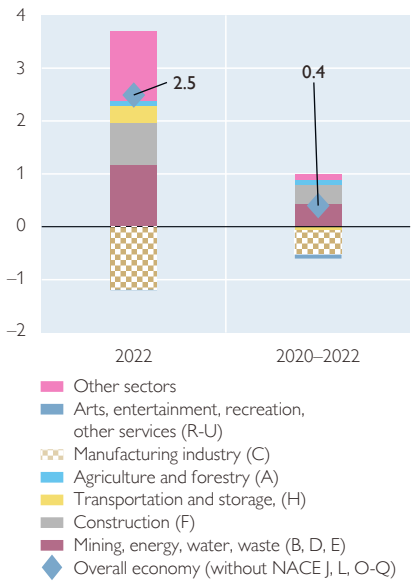
Profit contribution by sector, 2020-2022

Growth in % (value added deflator), contribution in percentage points



Sectoral contribution to nonneutral profit contribution in the overall economy

Percentage points



Source: Statistics Austria, authors' calculations.

[13] *In 2022, this is also due to a strong increase in the imputed consumption of financial services (because of higher interest rate margins of banks), which is reflected in intermediate consumption and thereby excluded from net operating surplus.*

In the *construction sector* (NACE F), the value added deflator has risen sharply for some time now as a result of surging property prices. The annual increases between 2011 and 2020 (+4.1%) were almost three times as high as the increase for the overall economy in that period (+1.5%). The construction-related increases were largely driven by unit labor costs. In contrast, the deflator increases calculated for the past three years (2020: +6.0%, 2021: +6.1%, 2022: +13.3%) are essentially attributable to the development of profits. The above-average profit contribution in 2022 accounts for just under two-thirds (7.4 percentage points of 11.7%) of the respective deflator increase.

The *agriculture and forestry sector* (NACE A) benefited from the strong increases in global food and wood prices, which significantly boosted profits. An above-average profit contribution (5.5 percentage points) accounted for just under half of the 13.6% increase in the value added deflator in 2022. The deflator increase in the *transporting and storage sector* (NACE H), while significantly weaker than the three afore-mentioned sectoral increases (+4.2%), was almost entirely driven by an above-average profit contribution. The *manufacturing sector* (NACE C) recorded a major decline in *profits (–18%)* in 2022, having been unable to pass on cost increases in full given strong international competition. As a result, the profit contribution to inflation from manufacturing was clearly negative (–4.2 percentage points) and entirely attributable to the development of profits.

Chart 5 moreover shows the decomposition results for 2022 compared with pre-crisis data for 2019 *(middle panel)*. For the energy sector, the cumulative results for the period from 2019 to 2022 are rather similar to the results for 2022. In the construction and agriculture/forestry sectors, the cumulative three-year increase of the deflator up to 2022 was around twice as high as the year-on-year increase in 2022.

Finally, *chart 5 (right-hand panel)* shows the contributions of the sectoral above-average profit contributions to the increase in the deflator for the overall economy. In order to calculate the above-average profit contributions, we weighted the respective sectoral contributions with the sectoral shares of value added. This shows that, in 2022, the above-average profit contribution was driven entirely by the *energy and construction sectors,* with *manufacturing absorbing* a significant *share of the deflator increases* (i.e. manufacturers did not pass on price increases in full, but reduced profit margins).

For the detailed results for all sectors, see table A1 and charts A1 to A11 in annex 3. The quarterly results for the sectors are shown in chart A13 in annex 3.

Comparison of Austria with the euro area

To conclude, we compare the data for Austria with the data for the euro area. ECB staff members have published a decomposition of the GDP deflator for the period under review (see Arce et al., 2023), yet without examining crisis-related subsidies separately, which is why the ECB decomposition differs from ours in chart 6.

The value added deflators for Austria and the euro area developed similarly. The contribution from compensation of employees is higher in Austria even after adjustment for short-time work subsidies, but only in 2021.[14] The combined

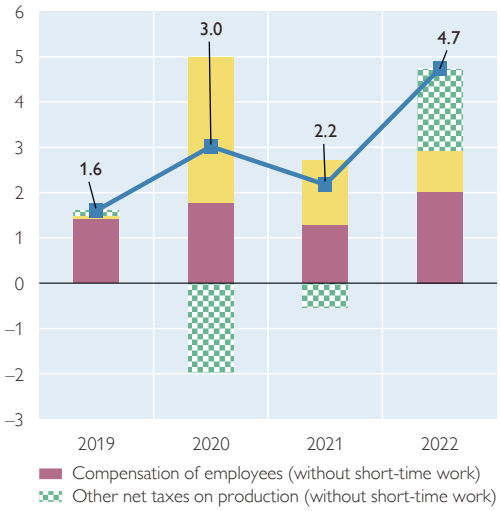
[14] *We subtracted short-time work subsidies in Germany, Spain, the Netherlands and Austria from the compensation of employees for the chart on the euro area, as the other large euro area economies (Italy, France and Belgium) only record short-time work among transfers to households (rather than subsidies). As short-time work subsidies in the other euro area countries are not available by industry, chart 6 refers to the overall economy.*

Chart 6

Comparison of value added deflators

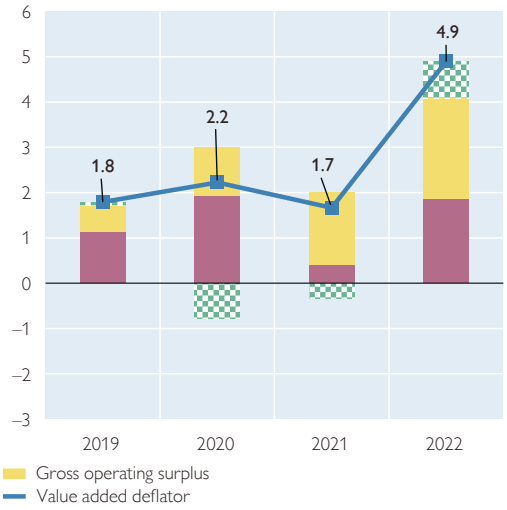
Value added deflator for Austria

Annual change in %, contribution in percentage points



Value added deflator for the euro area-20

Annual change in %, contribution in percentage points



Source: Eurostat, ECB, OeNB.

contribution of gross operating surplus (= net operating surplus and depreciation and amortization) and other net taxes on production is, thus, quite similar – also except for 2021. Other crisis-related subsidies (i.e. compensation for sales lost due to the pandemic and lockdowns and for eligible fixed and energy costs) should be examined together with the gross operating surplus, as they are the main driver behind the remaining volatility of other net taxes on production (excluding short-time work).

Conclusions

In 2022, the nonneutral profit contribution accounts for more than a third (2.5 percentage points) of the increase in the value added deflator, making it a relevant driver of inflation in Austria. From a sectoral perspective, three sectors exhibited pronounced above-average contributions from profit. These sectors were energy (including mining, water supply and waste management), construction, and agriculture (including forestry). Their profit contributions were to some extent counterbalanced by the inflation-dampening profit contribution of manufacturing, i.e. there has been a reallocation of profits within the business sector in 2022.

However, in its latest forecast, the OeNB expected profits to come under pressure in the remainder of 2023 and in 2024 due to slow economic growth, sharply increasing unit labor costs and mounting replacement costs for capital driving depreciation and amortization; for 2024, the OeNB forecast even points to a dampening effect on inflation.

Furthermore, the value added deflators for the Austrian economy as a whole and the euro area economy as a whole developed similarly.

References

Arce, O., E. Hahn and G. Koester. 2023. How tit-for-tat inflation can make everyone poorer (europa.eu). ECB blog, March 30.

Annex 1

Decomposing the value added deflator

This annex describes how we decomposed the value added deflator. We define the total nominal value added by sector *i* in period *t* ($p_{i,t}Y_{i,t}$) as the sum of compensation of employees (including employers' contributions) (W), net taxes on production (= other taxes on production less other subsidies[15], T), depreciation and amortization (D) and net operating surplus (P).

$$p_{i,t}Y_{i,t} = W_{i,t} + T_{i,t} + D_{i,t} + P_{i,t}$$

Dividing this equation by real value added, we obtain an equation that defines the GDP deflator as the sum of its unit cost components: compensation of employees per unit of value added (= unit labor cost, UW), net taxes on production per unit (UT), depreciation and amortization per unit (UD) and net operating surplus per unit (UP).

$$p_{i,t} = \frac{W_{i,t}}{Y_{i,t}} + \frac{T_{i,t}}{Y_{i,t}} + \frac{D_{i,t}}{Y_{i,t}} + \frac{P_{i,t}}{Y_{i,t}} = UW_{i,t} + UT_{i,t} + UD_{i,t} + UP_{i,t}$$

We now calculate the first difference and divide it by the previous year's GDP deflator. In addition, we extend every term on the right side by its previous year value. We thus define the percentage change in the GDP deflator as the sum of the percentage changes in its unit cost components weighted with the unit cost share of the previous year's deflator.

$$\frac{dp_{i,t}}{p_{i,t-1}} = \frac{dUW_{i,t}}{UW_{i,t-1}}\frac{UW_{i,t-1}}{p_{i,t-1}} + \frac{dUT_{i,t}}{UT_{i,t-1}}\frac{UT_{i,t-1}}{p_{i,t-1}} + \frac{dUD_{i,t}}{UD_{i,t-1}}\frac{UD_{i,t-1}}{p_{i,t-1}} + \frac{dUP_{i,t}}{UP_{i,t-1}}\frac{UP_{i,t-1}}{p_{i,t-1}}$$

or

$$\Delta p_{i,t} = \Delta UW_{i,t}w_{i,t-1}^{UW} + \Delta UT_{i,t}w_{i,t-1}^{UT} + \Delta UD_{i,t}w_{i,t-1}^{UD} + \Delta UP_{i,t}w_{i,t-1}^{UP}$$

where Δ models the percentage change in the respective size and w models the weight.

[15] *Other taxes on production are primarily taxes paid by enterprises for the use of their factors of production (real estate taxes, local government taxes, employer contributions to the family burden equalization fund, and various fees). Other subsidies include virtually all subsidies beyond public transport subsidies and the 2022 energy price cap (and similar measures).*

Annex 2

Calculating depreciation and amortization

We calculate depreciation and amortization on the basis of the perpetual inventory method (PIM) used by Statistics Austria, obtaining the capital stock of year t from the previous year's capital stock in addition to the investment[16] in year *t* less depreciation and amortization. The capital stock of t–1 is depreciated using the depreciation rate r_i; the investment in year *t* is depreciated with half the rate.

$$K_{i,t} = K_{i,t-1} + I_t - D_t = K_{i,t-1} * (1 - \mathrm{r}_i) + I_t * (1 - 0.5 * \mathrm{r}_i)$$

(Real) depreciation and amortization results from

$$D_{i,t} = r_i\left(K_{i,t-1} + 0.5 * I_t\right)$$

Since the capital stock in the national accounts must be valued at replacement costs rather than at historical acquisition costs (the latter being the requirement for business accounts), real depreciation and amortization must be adjusted to inflation with the capital stock deflator in the end. As the capital stock deflator is only available up to 2021, we extrapolated this value with the change in the investment deflator.

$$D_{i,2022}^{nom} = D_{i,t} * \frac{ITD_{i,2022}}{ITD_{i,2021}} * KTD_{i,2021}$$

This calculation yields growth of nominal depreciation and amortization for the overall economy of +9.4% in 2022. Depreciation and amortization data on the sectoral level are available in the annual national accounts until 2021. We obtained the annual figures using a temporal disaggregation method (Chow-Lin), using the quarterly gross operating surplus as an indicator method to allocate them to the quarters.

[16] *We identified the required sectoral investment by allocating growth of investment in the overall economy to the sectors on the basis of plausibility considerations (nominal and real).*

Annex 3

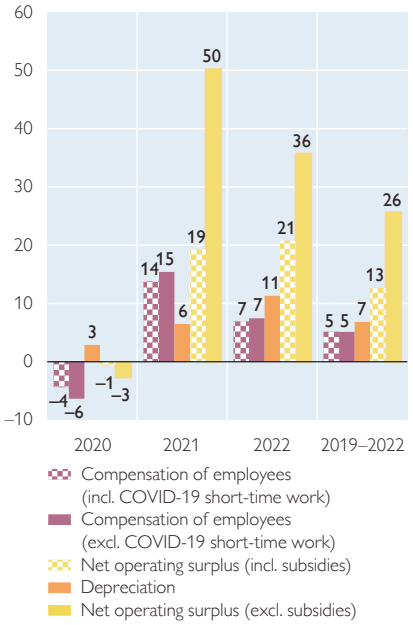
Results of the sectoral decomposition

Chart A1

Agriculture and forestry (NACE A)

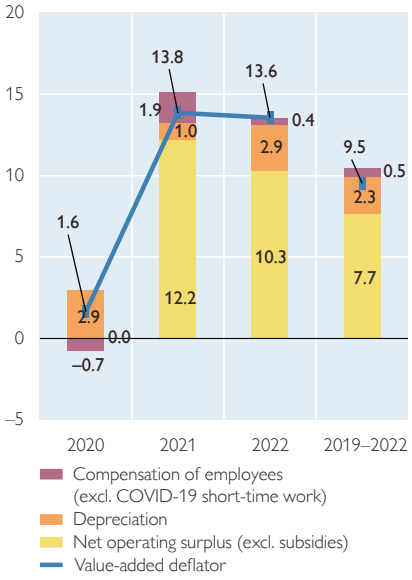
Value added growth by component (excl. net taxes on production)

Annual change in %



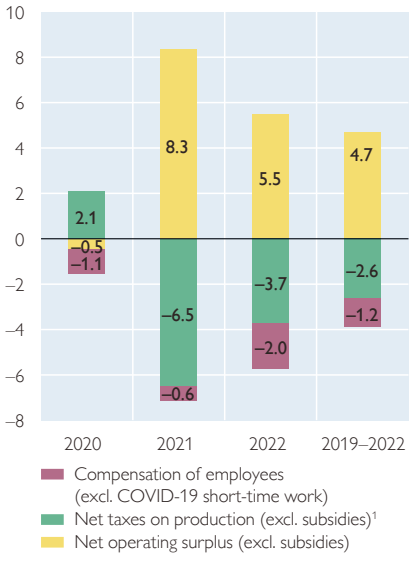
Contribution to change in value-added deflator – wages and profits excl. COVID-19 subsidies

Annual change in %, growth contribution in percentage points



Gap to distribution-neutral scenario with equal growth of all components

Annual change in %, growth contribution in percentage points



Source: Statistics Austria, authors' calculations.

[1] *Net taxes on production in agriculture and forestry are negative due to high subsidies, leading to implausible results in the decomposition, which is why we subtracted them from the net operating surplus.*

Chart A2

Manufacturing industry (NACE C)

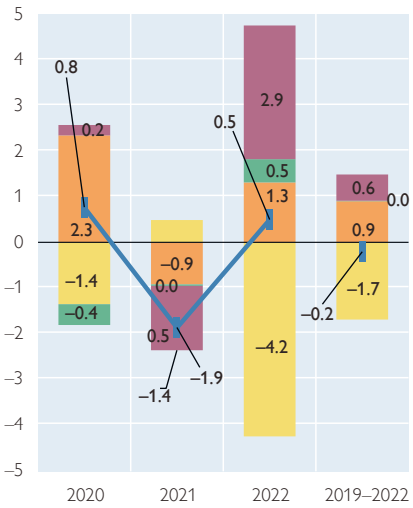
Value added growth by component (excl. net taxes on production)

Annual change in %

Compensation of employees (incl. COVID-19 short-time work)
Compensation of employees (excl. COVID-19 short-time work)
Depreciation
Net operating surplus (incl. subsidies)
Net operating surplus (excl. subsidies)

Contribution to change in value added deflator – wages and profits excl. COVID-19 subsidies

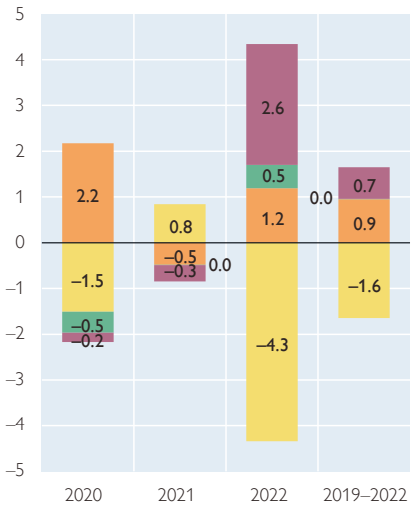
Annual change in %, growth contribution in percentage points



Compensation of employees (excl. COVID-19 short-time work)
Depreciation
Net operating surplus (excl. subsidies)
Net taxes on production (excl. subsidies)
Value-added deflator

Gap to distribution-neutral scenario with equal growth of all components

Annual change in %, growth contribution in percentage points



Compensation of employees (excl. COVID-19 short-time work)
Depreciation
Net operating surplus (excl. subsidies)
Net taxes on production (excl. subsidies)[1]

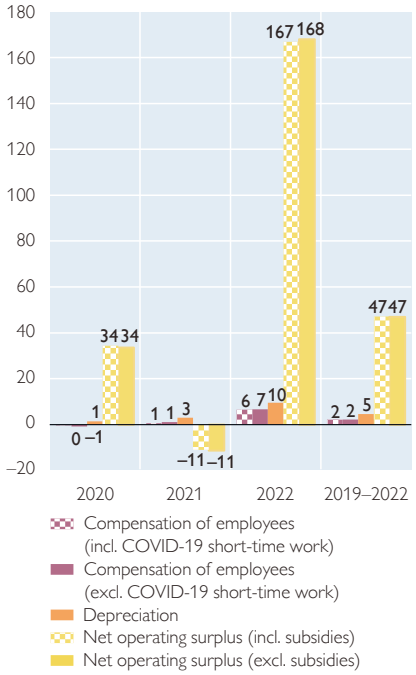
Source: Statistics Austria, authors' calculations.

Chart A3

Mining, energy, water and waste (NACE B, D-E)

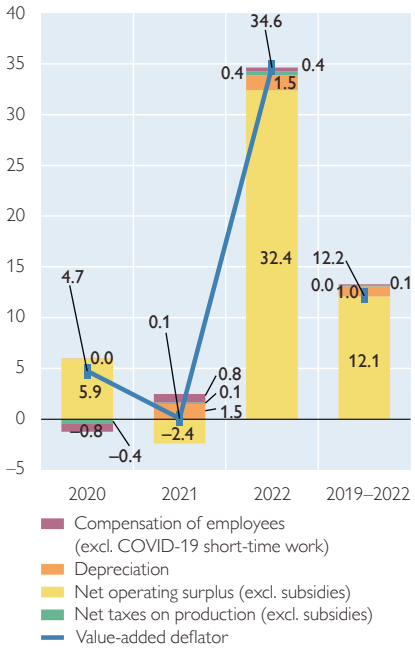
Value added growth by component (excl. net taxes on production)

Annual change in %



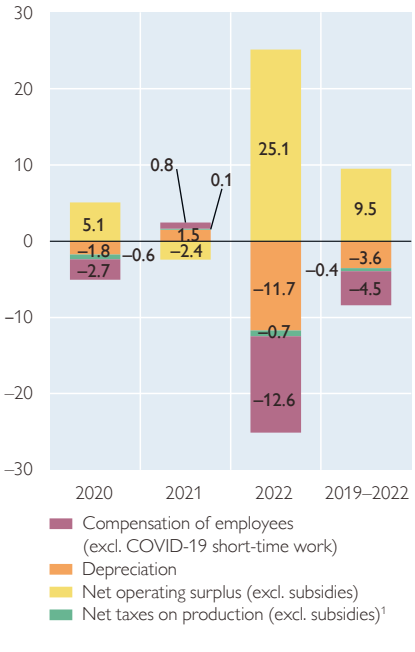
Contribution to change in value added deflator – wages and profits excl. COVID-19 subsidies

Annual change in %, growth contribution in percentage points



Gap to distribution-neutral scenario with equal growth of all components

Annual change in %, growth contribution in percentage points



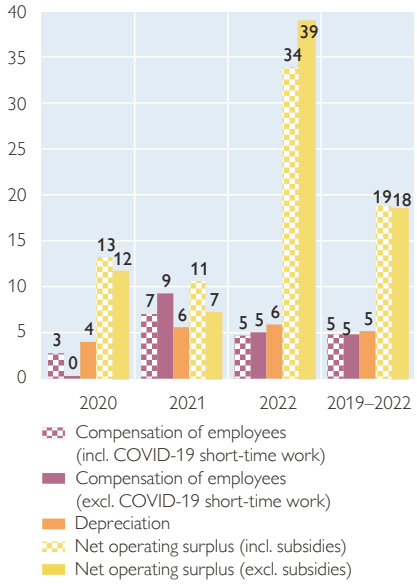
Source: Statistics Austria, authors' calculations.

Chart A4

Construction (NACE F)

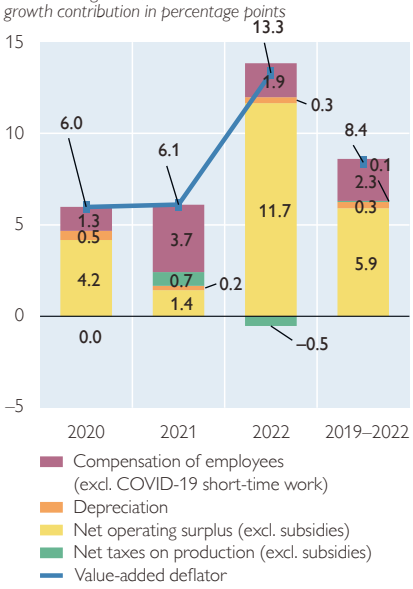
Value added growth by component (excl. net taxes on production)

Annual change in %



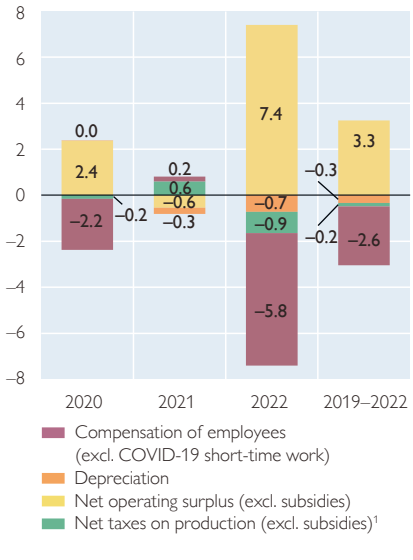
Contribution to change in value added deflator – wages and profits excl. COVID-19 subsidies

Annual change in %, growth contribution in percentage points



Gap to distribution-neutral scenario with equal growth of all components

Annual change in %, growth contribution in percentage points



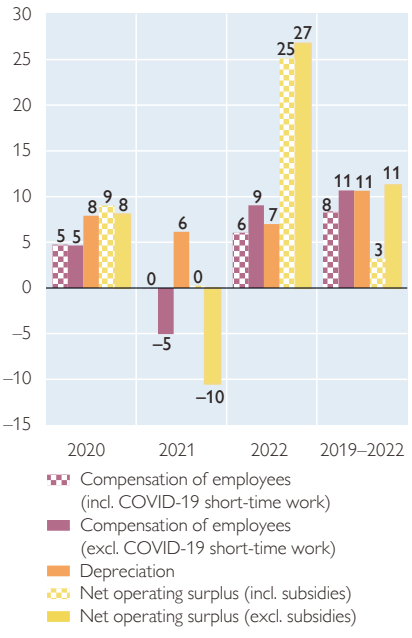
Source: Statistics Austria, authors' calculations.

Chart A5

Wholesale trade and motor vehicles (NACE G)

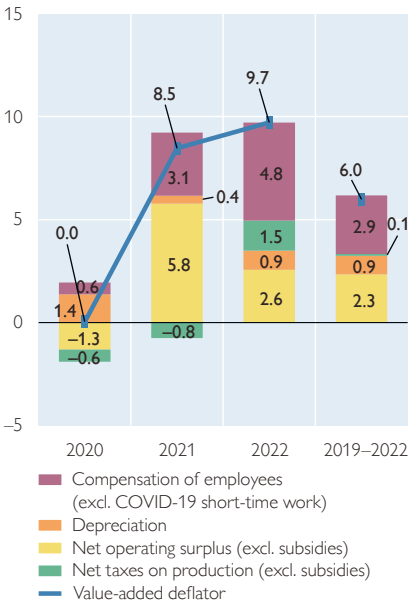
Value added growth by component (excl. net taxes on production)

Annual change in %



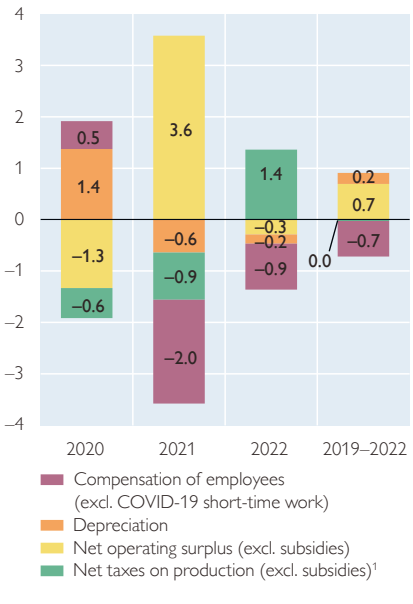
Contribution to change in value added deflator – wages and profits excl. COVID-19 subsidies

Annual change in %, growth contribution in percentage points



Gap to distribution-neutral scenario with equal growth of all components

Annual change in %, growth contribution in percentage points



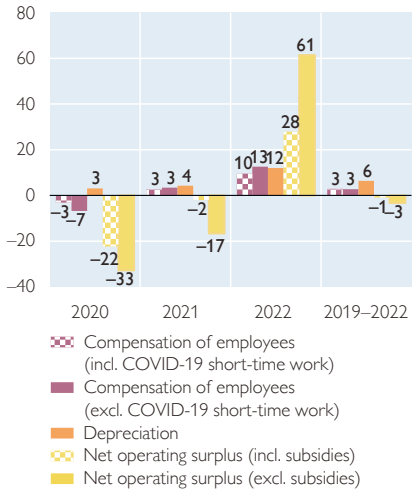
Source: Statistics Austria, authors' calculations.

Chart A6

Transportation and storage (NACE H)

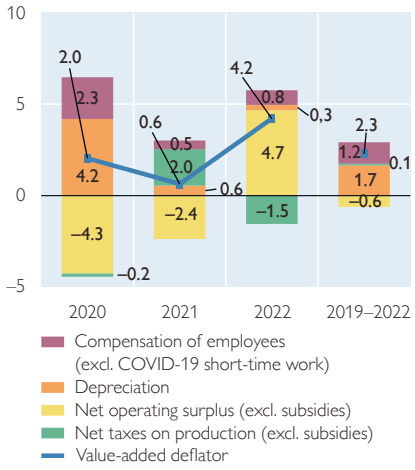
Value added growth by component (excl. net taxes on production)

Annual change in %



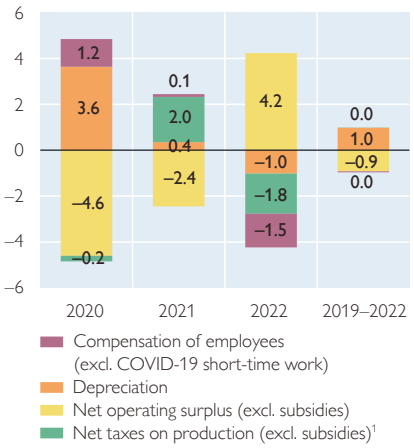
Contribution to change in value added deflator – wages and profits excl. COVID-19 subsidies

Annual change in %, growth contribution in percentage points



Gap to distribution-neutral scenario with equal growth of all components

Annual change in %, growth contribution in percentage points



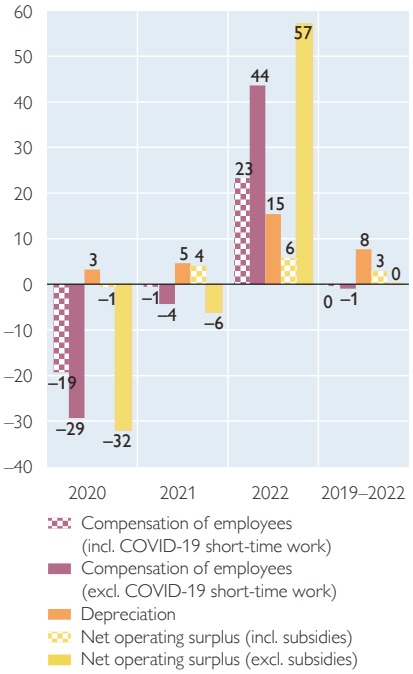
Source: Statistics Austria, authors' calculations.

Chart A7

Accommodation and food services (NACE I)

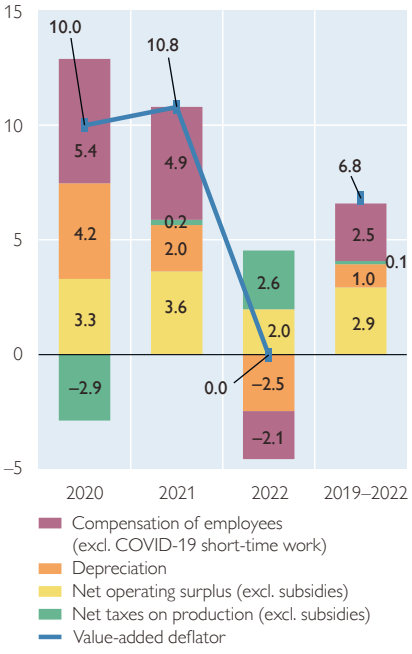
Value added growth by component (excl. net taxes on production)

Annual change in %



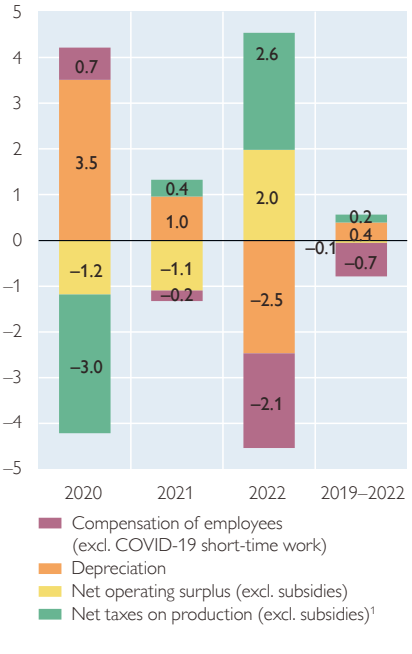
Contribution to change in value added deflator – wages and profits excl. COVID-19 subsidies

Annual change in %, growth contribution in percentage points



Gap to distribution-neutral scenario with equal growth of all components

Annual change in %, growth contribution in percentage points



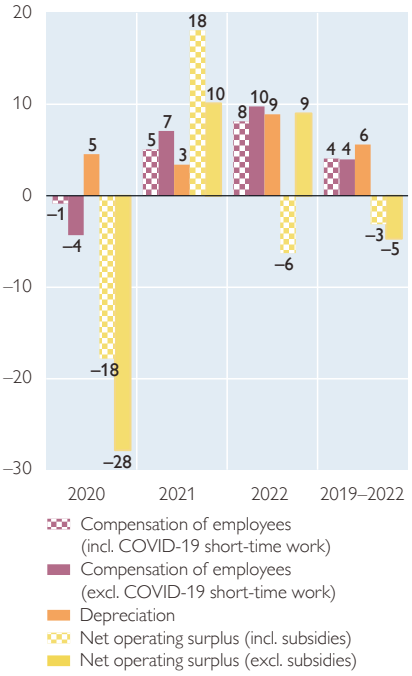
Source: Statistics Austria, authors' calculations.

Chart A8

Other private sector services (NACE K, M-N, R, T-U)

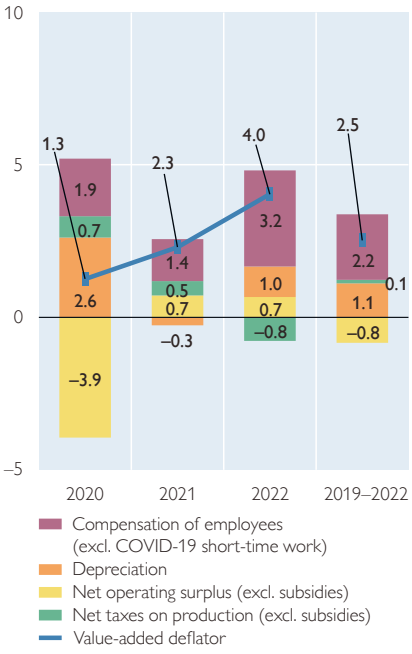
Value added growth by component (excl. net taxes on production)

Annual change in %



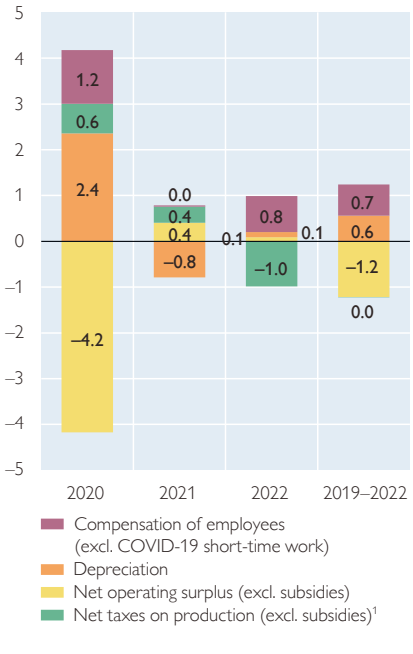
Contribution to change in value added deflator – wages and profits excl. COVID-19 subsidies

Annual change in %, growth contribution in percentage points



Gap to distribution-neutral scenario with equal growth of all components

Annual change in %, growth contribution in percentage points



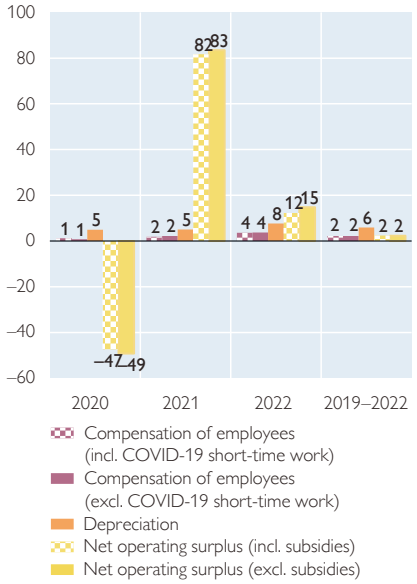
Source: Statistics Austria, authors' calculations.

Chart A9

Financial and insurance services (NACE K)

Value added growth by component (excl. net taxes on production)

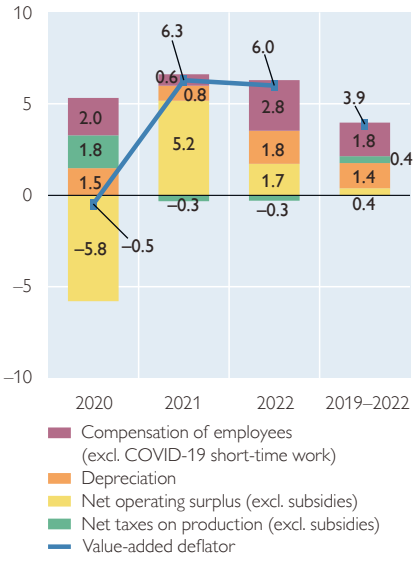
Annual change in %



Compensation of employees (incl. COVID-19 short-time work)
Compensation of employees (excl. COVID-19 short-time work)
Depreciation
Net operating surplus (incl. subsidies)
Net operating surplus (excl. subsidies)

Contribution to change in value added deflator – wages and profits excl. COVID-19 subsidies

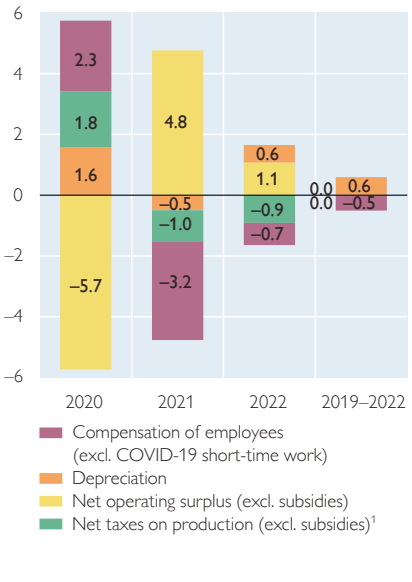
Annual change in %, growth contribution in percentage points



Compensation of employees (excl. COVID-19 short-time work)
Depreciation
Net operating surplus (excl. subsidies)
Net taxes on production (excl. subsidies)
Value-added deflator

Gap to distribution-neutral scenario with equal growth of all components

Annual change in %, growth contribution in percentage points



Compensation of employees (excl. COVID-19 short-time work)
Depreciation
Net operating surplus (excl. subsidies)
Net taxes on production (excl. subsidies)[1]

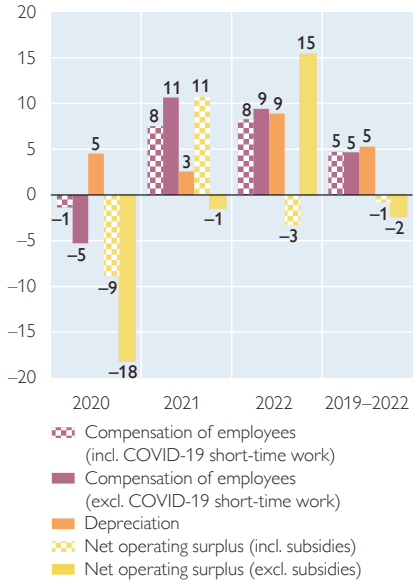
Source: Statistics Austria, authors' calculations.

Chart A10

Other financial services (NACE M-N)

Value added growth by component (excl. net taxes on production)

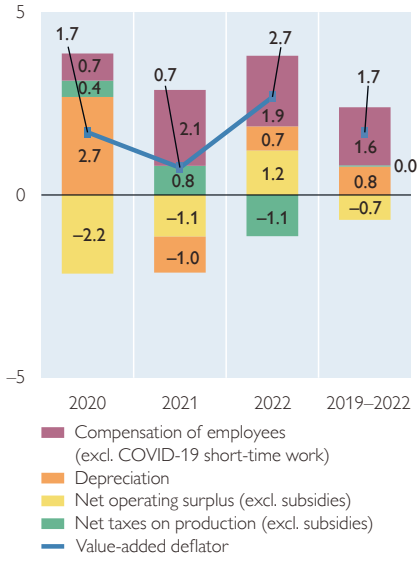
Annual change in %



Compensation of employees (incl. COVID-19 short-time work)
Compensation of employees (excl. COVID-19 short-time work)
Depreciation
Net operating surplus (incl. subsidies)
Net operating surplus (excl. subsidies)

Contribution to change in value added deflator – wages and profits excl. COVID-19 subsidies

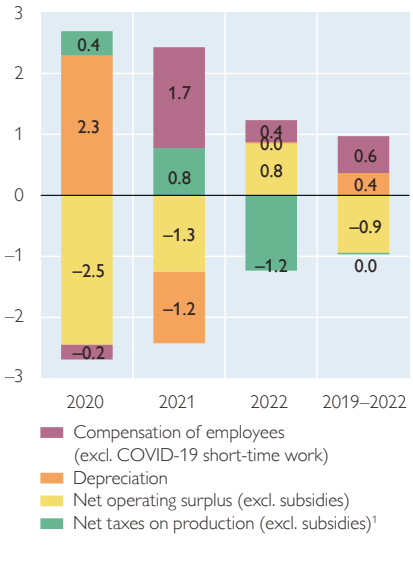
Annual change in %, growth contribution in percentage points



Compensation of employees (excl. COVID-19 short-time work)
Depreciation
Net operating surplus (excl. subsidies)
Net taxes on production (excl. subsidies)
Value-added deflator

Gap to distribution-neutral scenario with equal growth of all components

Annual change in %, growth contribution in percentage points



Compensation of employees (excl. COVID-19 short-time work)
Depreciation
Net operating surplus (excl. subsidies)
Net taxes on production (excl. subsidies)[1]

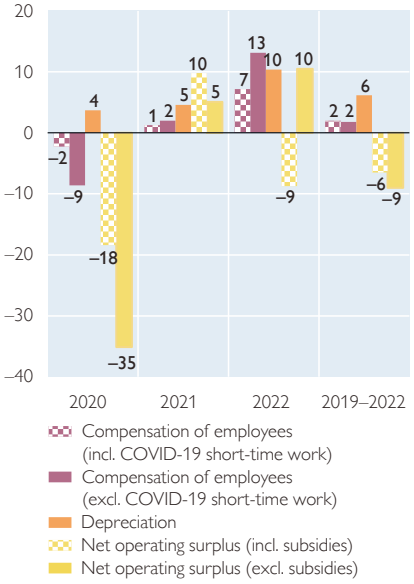
Source: Statistics Austria, authors' calculations.

Chart A11

Arts, entertainment, recreation (NACE R, T-U)

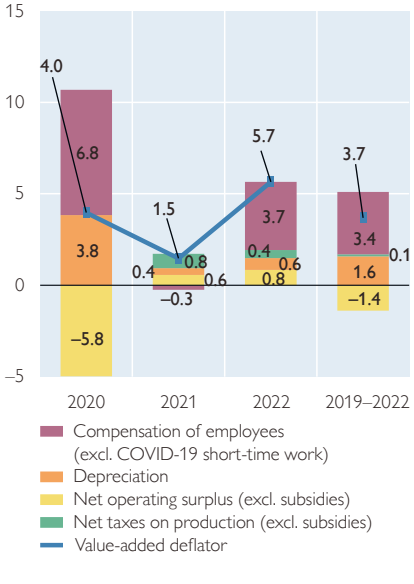
Value added growth by component (excl. net taxes on production)

Annual change in %



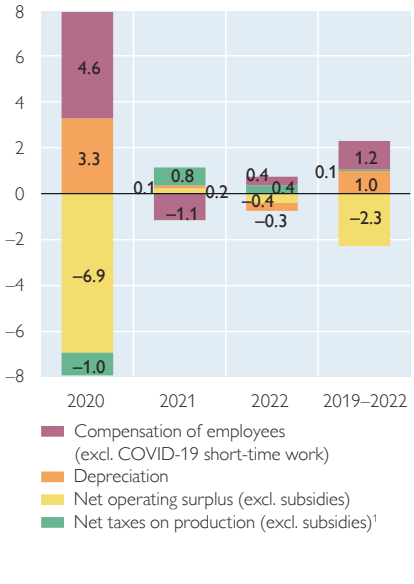
Contribution to change in value added deflator – wages and profits excl. COVID-19 subsidies

Annual change in %, growth contribution in percentage points



Gap to distribution-neutral scenario with equal growth of all components

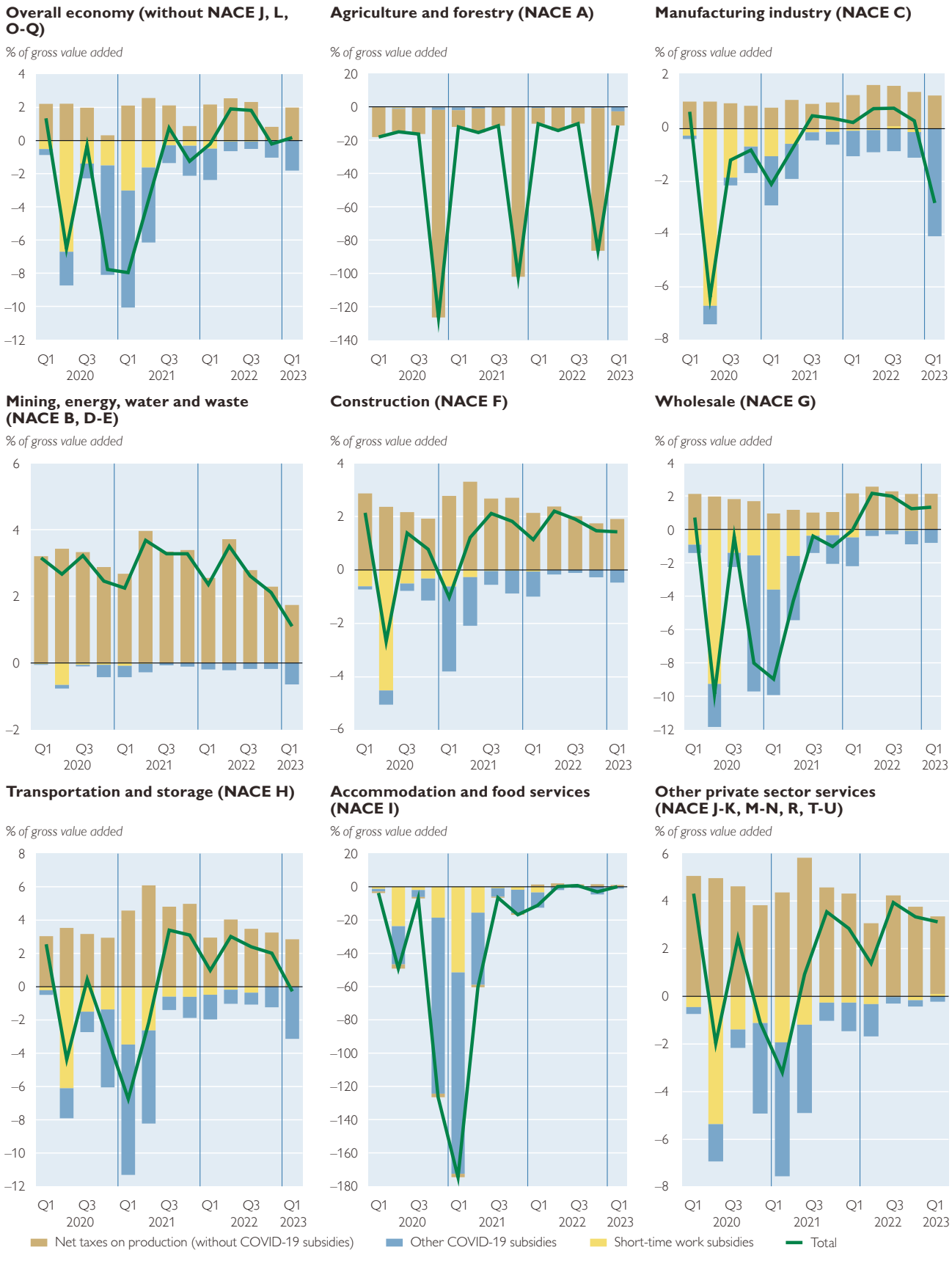
Annual change in %, growth contribution in percentage points



Source: Statistics Austria, authors' calculations.

Chart A12

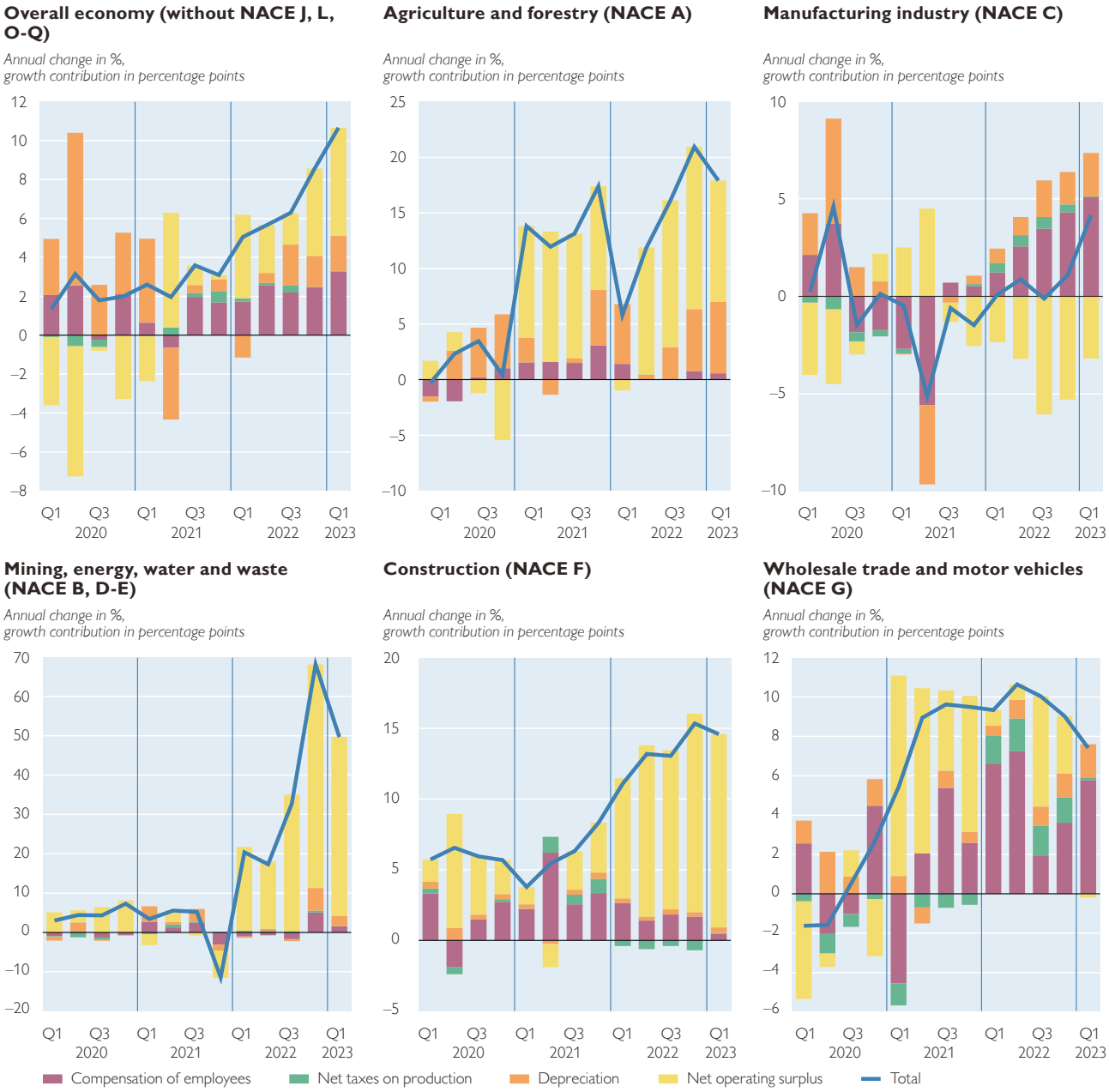
Components of net taxes on production



Source: Statistics Austria, authors' calculations.

Chart A13

Contributions to value added deflator growth (quarterly data)



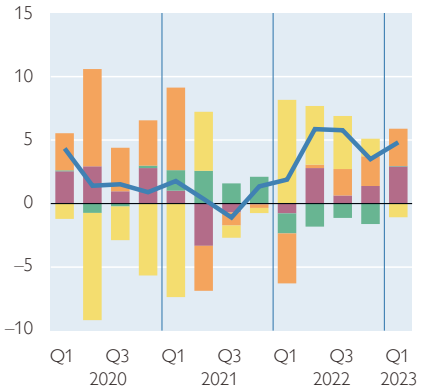
Source: Statistics Austria, authors' calculations.

Chart A13 continued

Contributions to value added deflator growth (quarterly data)

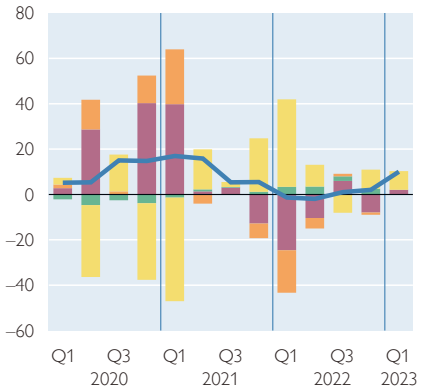
Transportation and storage (NACE H)

Annual change in %,
growth contribution in percentage points



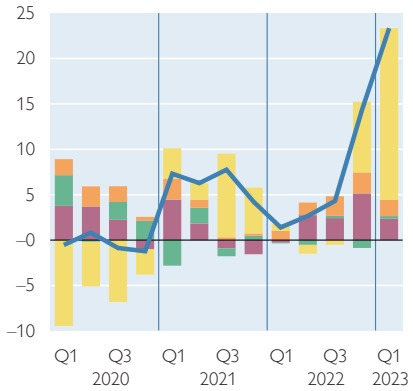
Agriculture and forestry (NACE A)

Annual change in %,
growth contribution in percentage points



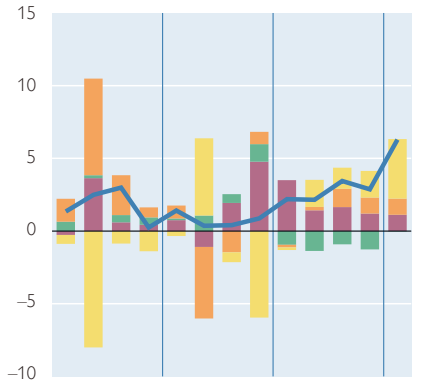
Manufacturing industry (NACE C)

Annual change in %,
growth contribution in percentage points



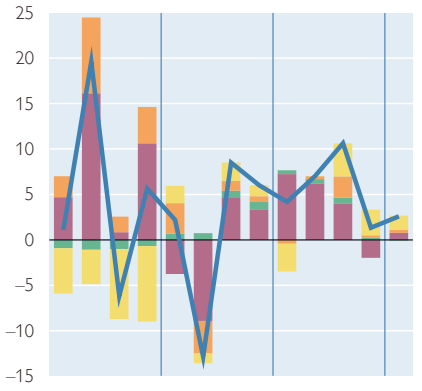
Other financial services (NACE M-N)

Annual change in %,
growth contribution in percentage points



Arts, entertainment, recreation (NACE R, T-U)

Annual change in %,
growth contribution in percentage points



Source: Statistics Austria, authors' calculations.

Table A1

Overview of sectoral results

Contribution of profits to growth in value added deflator by sector

	Share of value added 2021	2022					2020 to 2022			
		Deflator growth	Profit contribution		Above-average contribution		Deflator growth	Profit contribution	Above-average contribution	
			Contribution, sector	Contribution, economy[1]	Contribution, sector	Contribution, economy[1]			Contribution, sector	Contribution, economy[1]
Overall economy (without J, L, O-Q)	100.0	6.4	4.0	4.0	2.5	2.5	3.8	1.3	0.4	0.4
Agriculture, forestry and fishing (NACE A)	2.0	13.6	10.3	0.2	5.5	0.1	9.5	7.7	4.7	0.1
Manufacturing industry (NACE C)	27.4	0.5	–4.2	–1.2	–4.3	–1.2	–0.2	–1.7	–1.6	–0.5
Mining, energy, water and waste (NACE B, D-E)	4.6	34.6	32.4	1.5	25.1	1.2	12.2	12.1	9.5	0.4
Construction (NACE F)	10.7	13.3	11.7	1.3	7.4	0.8	8.4	5.9	3.3	0.3
Wholesale and retail trade, repair of motor vehicles (NACE G)	17.8	9.7	2.6	0.5	–0.3	–0.1	6.0	2.3	0.7	0.1
Transportation and storage, (NACE H)	7.4	4.2	4.7	0.3	4.2	0.3	2.3	–0.6	–0.9	–0.1
Accommodation and food services, (NACE I)	5.1	–0.0	2.0	0.1	2.0	0.1	6.8	2.9	–0.1	–0.0
Other private sector services (NACE K, K, M-N, R, T-U)	24.9	4.0	0.7	0.2	0.1	0.0	2.5	–0.8	–1.2	–0.3
Financial and insurance services, (NACE K)	6.4	6.0	1.7	0.1	1.1	0.1	3.9	0.4	0.0	0.0
Other financial services (NACE M-N)	14.9	2.7	1.2	0.2	0.8	0.1	1.7	–0.7	–0.9	–0.1
Arts entertainment, recreation, other services, (NACE R, T-U)	3.6	5.7	0.8	0.0	–0.4	–0.0	3.7	–1.4	–2.3	–0.1

Source: Statistics Austria, authors' calculations.

[1] *Growth contribution of a sector's above-average profits to growth in the value-added deflator for the economy as a whole.*

Energy price shock poses additional challenge to Austria's price competitiveness

Thomas Url, Klaus Vondra, Ursula Glauninger[1]
Refereed by: Benjamin Bitschi (WIFO), Julia Grübler (UNCTAD)

This article reports on the latest update of Austria's effective exchange rate indices, which aggregate bilateral exchange rates and relative prices or costs into indicators of Austria's short- to medium-term international competitive position. The weighting scheme on which the indicators are based uses bilateral trade data for Austria's 55 most important trading partners. With the latest update, the three-year averaging period was moved forward to 2016-2018. The main results are as follows: Based on the recalculated country weights, we confirm the preliminary finding of a medium-term worsening of Austria's competitive position, although alternative price indices would appear to provide conflicting signals. In particular, measures based on producer prices and unit labor costs indicate competitiveness gains, while the HICP/CPI-based index shows marked losses. These diverging signals, however, merely reflect data availability at the current edge. With regard to the geographical focus of Austria's international trade relations, we observe a further shift toward overseas markets in the US dollar area and China, away from Western Europe and Russia. The real effective exchange rate for the tourism industry, which we developed during the previous update and enhanced during this update, reflects a more pronounced appreciation in the tourism sector than in the service sector as a whole. However, according to the latest figures on overnight stays this loss in price competitiveness has had no significant dampening effect on tourism demand in recent months. Finally, we address the economic costs of Austria's current inflation differential to the euro area, which has induced a real appreciation. In two simulations, we quantify realized effects and calculate expected future losses driven by higher unit labor costs. In total, we find that the loss in price competitiveness may cause the Austrian economy to shrink by around ¾ to 1 percentage point between 2022 and 2025.

JEL classification: C43, F14, F47
Keywords: international competitiveness, effective exchange rate index, tourism services

International trade in goods and services usually implies a corresponding payment stream in foreign currency, requiring the trading partners to exchange domestic currency into foreign currency or vice versa. An exemption from this are cross-border transactions within a currency union like the euro area, where both trading partners use the same currency. Cross-border payments outside currency unions will be either based on the respective bilateral exchange rate or on a vehicle currency from a third country – like the US dollar, the euro, the yen or increasingly the renminbi yuan (Gopinath and Itskhoki, 2022; Boz et al., 2022).

Fluctuations in the bilateral exchange rate will affect the terms of trade between the exporting and the importing firm, i.e. they have an impact on the profitability of the exporter or the costs of foreign inputs for the importer. To get a more general – economy-wide – perspective on the development of the terms of trade, bilateral exchange rates of the key trading partner countries are mapped into a nominal effective exchange rate index. The mapping of bilateral exchange rates into an index is based on weights reflecting the importance of a partner country in

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cross-border trade. Thus, the nominal effective exchange rate index is a trade-weighted basket of currencies expressed as an index and it shows the relative price of the domestic currency vis-à-vis the currencies of the main trading partners.

From a consumer perspective, a rising exchange rate index implies an appreciation and thus a gain in purchasing power because in the short term – i.e. for given prices in foreign currency – consumers will pay less for a given bundle of goods and services upon conversion into domestic currency. A falling index implies a depreciation and hence a loss in purchasing power. From the perspective of producers, an upward movement in the nominal effective exchange rate index signals that the relative price between domestic and foreign goods and services has increased; hence a rising index implies a short-term deterioration of price competitiveness.[2] In turn, a declining index signals an improvement in price competitiveness.

When we add relative price indices from the home and foreign country pairs to the nominal effective exchange rate, we can take the development of domestic and foreign prices into account. The resulting real effective exchange rate index allows to apply a medium to longer-term perspective, accounting for price adjustments. The OeNB and WIFO (Austrian Institute of Economic Research) compile and update the effective exchange rate indices based on bilateral exchange rates between the euro and the currencies of Austria's 55 biggest trading partners, including 37 non-euro area countries. The computation is based on the harmonized Eurosystem methodology (ECB, 2020). We continue to use the conceptual framework outlined in Köhler-Töglhofer and Magerl (2013) and Köhler-Töglhofer (1999) and implement the 2021 release of OECD-TiVA (Trade in Value Added) input-output tables on bilateral foreign trade flows to update the country weights. With the current update, the three-year averaging period for adjusting the bilateral exchange rate weights is moved forward from 2013–2015 to 2016–2018, a period not yet affected by the COVID-19-induced turbulences in foreign trade. The previous update of the Austrian indices was based on the 2018 release of the OECD-TiVA input-output tables (Glauninger et al., 2021). The new weights based on the 2016–2018 period apply to all observations beginning with January 2016. Earlier observations have been chain-linked to the new exchange rate indices; i.e. we freeze previous country weights based on successive waves of three-year averages.

The aggregate index is a trade-weighted average of four subindices calculated separately for

- manufactured goods,
- food and beverages,
- raw materials/energy products, and
- services,

each subindex featuring country weights reflecting Austria's bilateral export and import flows in this subcategory. The individual country weights in the subindex for manufactured goods continue to be calculated on the basis of single (bilateral) import and double (multilateral) export weights. Double export weights reflect competition on third markets from domestic firms as well as from firms of other trading partners (depicted in competition matrices; see table A2 in the annex). The

[2] *At the same time, producers benefit from an upward movement of the exchange rate if they use large amounts of imported components or energy in their production process.*

share of each subcomponent in total exports reflects the relative importance of each subindex for the effective exchange rate index. For example, manufactured goods account for 61.3% of total exports, food and beverages for 5.1%, raw materials/energy products for 3.7%, and finally services for 29.9%.

The computation of the real effective exchange rate index needs pairs of relative price indices between Austria and each trading partner. This requirement – in combination with the number of countries included in the basket – limits the set of available price indices. The HICP/CPI (Harmonized Index of Consumer Prices, Consumer Price Index) is the only price index published by all 55 countries included in the basket which enables us to compute real effective exchange rates based on HICP/CPI indices for the four subindices as well as for the aggregate index.[3] The current sample of 55 countries covers 96% of Austrian exports. We continue to add the export shares of countries not included in the index (rest of the world, RoW) to the weight of the USA, based on the assumption that these trade flows are invoiced in US dollars (Gopinath and Itskhoki, 2022; see table A1 in the annex).

We also use three additional price indices reflecting the competitive position of more narrow sectors of the Austrian economy vis-à-vis a less comprehensive group of countries.[4]

For many activities, wages are the largest cost component. A real effective exchange rate index based on unit labor costs (ULC) – rather than consumer prices – will therefore provide a better indication of shifts in the cost competitiveness of Austrian firms. Data on the economy-wide wage bill are only available for 31 countries out of the total sample of 55 countries. We compute the real effective exchange rate deflated with unit labor costs for the total economy and for the service sector.[5]

The key advantages of the HICP/CPI are timely availability and international comparability. The HICP/CPI, however, covers goods and services consumed by private households. Hence, the prices of nontradable goods are also included, making them an imperfect indicator of variations in international price competitiveness. The producer price index (PPI) measures the development of the average selling prices received by domestic producers of goods and services. It is focused on producers and thus mirrors their pricing behavior with respect to trade flows better. The PPIs are published for 26 countries accounting for 80% of foreign trade in goods, and we use the PPI to compute an alternative real effective exchange rate subindex for manufacturing.

Austria's surplus in international trade of tourism services warrants a separate effective exchange rate more closely related to travel expenditures. We improve the effective exchange rate index for international trade in tourism services presented in Glauninger et al. (2021) by extracting tourism-related services from total international trade in services and compute a basket with country weights

[3] *We use deflators provided by the OECD, the IMF and Eurostat. In case of missing data, we complete the time series with information from national statistical offices.*

[4] *For a thorough discussion of the merits and demerits of each deflator, see Köhler-Töglhofer (1999).*

[5] *For the full list of countries, see table A1 in the annex. Unit labor costs are available for Belgium, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, the United Kingdom, Norway, Switzerland, Australia, Canada, Israel, Japan, New Zealand, South Korea, and the United States.*

Table 1

Overview of composition and publication frequency for real exchange rate indices based on different deflators

	HICP (CPI)	COICOP 11	ULC	PPI
Number of countries	55	40	31	26
Representing .. percent of AT trade	96% of total trade	92% of trade in tourism services	82% of total trade	79% of trade in goods
Frequency	monthly	monthly	quarterly	quarterly
Latest available data	July 2023	July 2023	Q1 23	Q4 22

Source: OeNB/WIFO.

based purely on bilateral tourism exports and imports. The weights based on trade in tourism services should better reflect the competitive position vis-à-vis direct competitors in this market. We combine the nominal effective exchange rate index with price indices for restaurants and hotels in the HICP/CPI (COICOP division 11). The resulting real effective index covers changes in the competitive position of Austria's tourism sector better than headline inflation rates. The COICOP 11 division of the HICP/CPI is available for 40 countries accounting for 92% of Austria's trade in tourism services.[6]

Table 1 compares the four real effective exchange rate indices with respect to their composition and their timeliness of publication. In what follows, section 1 addresses the recalculation of the country weights based on the trade relations prevailing during the period 2016–2018. In section 2, the developments of the different exchange rate specifications are presented and described. Section 3 is dedicated to the current inflation differential of the Austrian economy to the euro area and the possible consequences for Austria's price competitiveness.

1 Country weights – ranking of Austria's trading partners comparatively stable

After joining the European Union, Austria integrated well into the EU-manufacturing core and benefited strongly from the prevailing agglomeration and specialization trends (Stehrer, 2020). Between 1995 and 2022, the ratio of exports to GDP increased by 28 percentage points to 61.6%. This ratio also reflects the growing volume of inter- and intra-firm trade, i.e. imported intermediate goods that are further processed in Austria and reexported. Consequently, the share of foreign value added embodied in Austrian gross exports increased from 21.1% in 1995 to 31.8% in 2020.[7] Higher foreign trade volumes were associated with a geographical redistribution of trading activities away from Western Europe towards CESEE countries (Central-, Eastern and Southeastern Europe) and overseas destination. Both directions fit well to the outcomes predicted by the gravity theory of foreign trade (Anderson and van Wincoop, 2003). While a stronger concentration on neighboring CESEE countries results from the opening of borders and relatively

[6] *These countries are: Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxemburg, Malta, the Netherlands, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Australia, Canada, Chile, Iceland, Israel, Japan, Mexico, New Zealand, Norway, South Korea, Switzerland, Turkey, the United Kingdom, and the United States.*

[7] *Source OECD Trade in Value Added data base (preliminary release 2022).*

lower transport costs, increased trade with overseas markets is concentrated on large destination countries.

1.1 Short-run changes in country weights

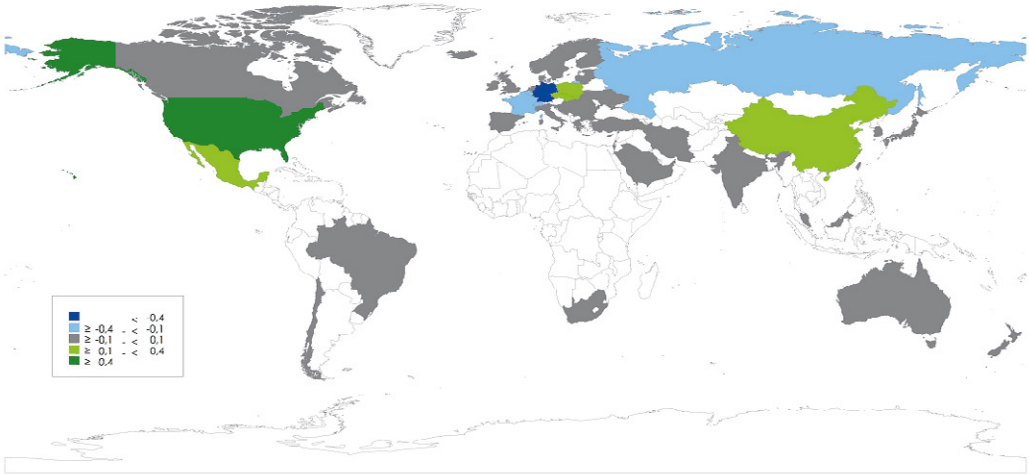
When we look at the changes between the reference periods 2013–2015 and 2016–2018, we see that trade in manufactured goods between Austria and its single largest trading partner, Germany, has been trailing behind the aggregate. In sum, the weight of Germany declined by 0.7 percentage points (to 30.4%). The only other countries with a sizable decline in their weights between the two reference periods were Russia (–0.4 percentage points) and Switzerland and France (–0.2 percentage points). Russia's downturn was to a large extent triggered by sanctions imposed by the EU on trade with Russia after the annexation of Crimea in 2014. The Swiss franc was subject to a sizable appreciation during the European government debt crisis, while Austrian manufacturing exports with France suffered from a decline of beverages and passenger cars exports.

Reflecting the continuing shift towards overseas and CESEE markets, the short-run gains are concentrated on the USA-RoW (+0.8), Poland (+0.4), and Czechia (+0.3). The USA-RoW (8%) and China (7.8%) continued their neck-and-neck race for the second largest weight in the trade basket, with the USA-RoW benefiting from the role of the US dollar as a reference currency in international trade, while China's position is firmly based on its competitive position on third markets.

Figure 1 gives an overview of the short-run rebalancing of Austria's international trade pattern: Countries showing sizable gains in their weight are colored in green while countries experiencing trade divergence are colored in blue. All countries with a minor variation in their weights (+/– 0.1 percentage points) are presented in grey. Beyond the USA and CESEE, Austrian firms intensified their trading relations with Mexican and Chinese firms.

Figure 1

Short-run changes in country weights for the Austrian effective exchange rate index (2016–2018 versus 2013–2015)



Source: OeNB/WIFO.

Note: Double weights based on imports and exports of manufactured goods with 55 countries.

1.2 Long-run changes in country weights

Comparing the data from the current reference period 2016–2018 with the base period 1998–2000, we see a substantial decline in the weight of Austria's EU trading partners (by 7.5 percentage points to 65.1%) and an even more pronounced decline for members of the euro area (EA19: by 10.3 percentage points to 52.9%). The shift away from the euro area reflects the rebalancing of trade relations towards CESEE countries in Austria's close neighborhood featuring high income growth. With respect to the base period, CESEE countries gained 5.7 percentage points and now hold a trade weight of 16.6%. This shift was mainly due to higher trade volumes with countries outside the euro area but within the EU-27[8] (2.8 percentage points to 12.1%). For these countries, the positive effects from trade integration outweigh higher nominal exchange rate uncertainty, which is absent for countries with a stable nominal exchange rate against the euro. Southeast and East Asian countries also benefitted from highly dynamic economic growth and the more intensified international division of labor. The trade weight of this group of countries moved up by 5.4 percentage points to 13%.

1.3 The role of competition from third countries on foreign markets

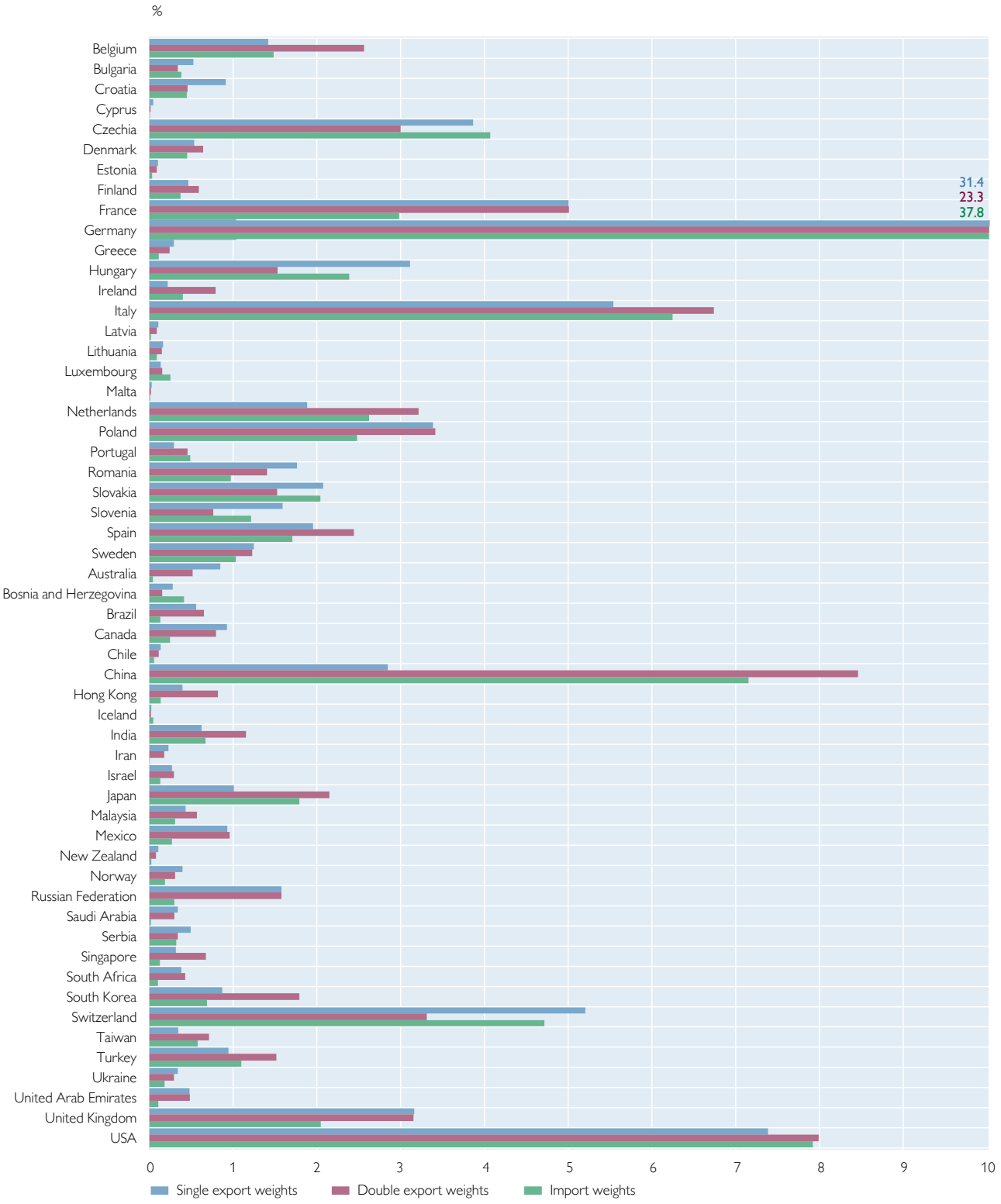
The calculation of the weights for the manufactured goods subindex relies on double export weights because Austrian firms face competition from foreign firms located in third countries on every destination market. For instance, Austrian exports to Germany face competition from German firms and so do Austrian exports to other countries. The strength of competition from a trading partner can be illustrated by comparing the single export weights of a country with its double export weights. This is done in chart 1, where the axis has been cut at 10% due to the outsized weight of Germany. Cutting the axis facilitates the comparison between single and double weights for countries having smaller weights. For exact numbers, including the exact figures for Germany, see table A3 in the annex.

In countries where the single export weight is bigger than the double export weight, local firms are strong competitors for Austrian firms on their home market, but they are less important with respect to other destination markets. For example, Germany has a single export weight of 31.4% and a double weight of 23.3%, which means that German firms compete more intensively with Austrian firms on the German market itself, rather than on third country markets. One explanation for this pattern could be that German lead firms manage the activities of exporters within the integrated supply chains of the central European manufacturing core (Stehrer and Stöllinger, 2015). The manufacturing core comprises Germany, Austria and the four Visegrad countries. As can be seen in chart 1, the single export weight is above the double export weight for most members of the manufacturing core. Similarly, Switzerland as a home base for large multinational firms shows a distinctively higher single export weight.

[8] *Bulgaria, Croatia, Czechia, Denmark, Hungary, Poland, Romania, and Sweden; throughout the paper, we use the EU-27 post-Brexit aggregate for the EU countries; meanwhile, Croatia joined the euro area in January 2023.*

Chart 1

Single and double export weights in the Austrian manufactured goods subindex (2016–2018)



Source: UN Comstat, OECD, authors' calculations.

Note: The axis is cut at 10% to facilitate the comparison for countries with smaller weights. The values for Germany are 31.4 (single weights), 23.3 (double weights) and 37.8 (imports).

There are several countries in the basket for the effective exchange rate with a relatively higher double export weight. China stands out as a country with a particularly high double export weight; the difference being two times its single weight. This shows the strong competitive pressure for Austrian firms emanating from Chinese exporters, while China's home market for manufactured products appears relatively less penetrated. To a lesser extent, this also holds for firms from the Netherlands, Italy, Belgium and Japan.

Table A3 in the annex compares the values for the current reference period 2016–2018 with values from the base period 1998–2000, thus reflecting the development of double export weights over the last two decades. French and US exporters have become smaller competitors on Austrian destination markets. To a weaker extent, producers domiciled in Germany, Japan, the UK or Italy have also shifted their focus toward alternative markets. The competitive pressure from Chinese firms on Austrian export markets, on the other hand, moved from almost irrelevant at the turn of the century into the range of the fiercest competitors in recent years. The Netherlands moved from a neutral toward a more competitive position, while firms from Hungary and Switzerland intensified their pressure on established Austrian export markets.

The country weights for Austria's international trade in services are based on single export and imports weights. They show only small changes over time and – compared to goods – Austria's foreign trade in services is more concentrated on the EU27. The share of exports/imports concerning the EU27 was 73.1%, and that for the euro area (EA19) 58.7%. Individual countries showing a high trading intensity with Austria are Germany (35.4%), the USA-RoW (7.5%) and Switzerland (6.2%). The biggest category among Austria's services exports are expenditures by foreigners for travel. According to current account data for the average from 2016 through 2018, this category amounted to 30.7% of total services exports. Exports of other business-related services reached 22.7%, while transport captured 23.2% and telecommunication made up 9.8% of services exports.

The computation of the weights for imports and exports of raw materials and energy is also based on single export weights. Due to the geographical distribution of raw material producers, non-EU27 countries have a higher share (41%) in total imports. Again, Germany tops the country ranking with 29.4%. Other important source countries for energy and raw material imports include the USA-RoW (16.2%) and Russia (14.5%).

The weights in the subindex for food and beverages are very concentrated on countries in close proximity to Austria. The EU27 receives 72.6% of Austria's exports and accounts for 82% of its imports. Austria's main trading partner is Germany with a share of 34.6% in exports and 37.6% imports, followed by Italy with a share of 11.5% in exports and 10.9% in imports.

2 Price competitiveness after the European government debt crisis

The reference period 2016–2018 covers the aftermath of the European government debt crisis with financial markets becoming calmer. Contrary to the previous update of weights for the effective exchange rate indices (Glauninger et al., 2021), this round did not change the overall impression of developments over time: The adjustment to the weights from the new 2016–2018 reference period modified the index after 2015 just by around one tenth of a percentage point.

The development from the beginning of 2016 until July 2023 was characterized by a nominal and real appreciation of 4½%. The wave-like pattern shows peaks in September 2018, December 2020 and the most recent observation from July 2023, and troughs in February 2017, January 2020 and 2022. Yearly changes in the nominal and real effective exchange rate closely follow variations in the euro-dollar relation (see chart 7 in Url, 2023).

The relative monetary policy stance between the central banks in America and Europe has a strong short-term influence on the nominal exchange rate. The US Federal Reserve Bank (Fed) started to lift its target rate in December 2015, well ahead of the European Central Bank (ECB). The sudden reversal of the Fed's policy from a tightening cycle to providing cheap liquidity to the markets at the start of the COVID-19 pandemic supported the euro, and Austria's effective exchange rate appreciated swiftly over the course of the year. Extensive disruptions of international trade flows and supply chains due to the COVID-19-related lockdowns did not weigh heavily on the euro's nominal exchange rate. The surge in energy prices after the Russian attack on Ukraine put inflationary concerns back on the agenda of monetary policy committees. As the Fed started tightening its monetary policy stance earlier and with bigger steps, we recorded nominal exchange rate movements along the tightening process. On top, we notice a special effect in the Austrian effective exchange rate, namely the development of the Turkish lira. Turkey's exceptionally expansive monetary policy generated a devaluation of the lira vis-à-vis the euro by 800% between the start of 2016 and July 2023. Despite the small weight of the lira in the Austrian index (1.16%) the large devaluation contributed significantly to the nominal appreciation of the Austrian effective exchange rate. In real terms, however, the appreciation of the euro vis-à-vis the lira was compensated by the considerable inflation differential.

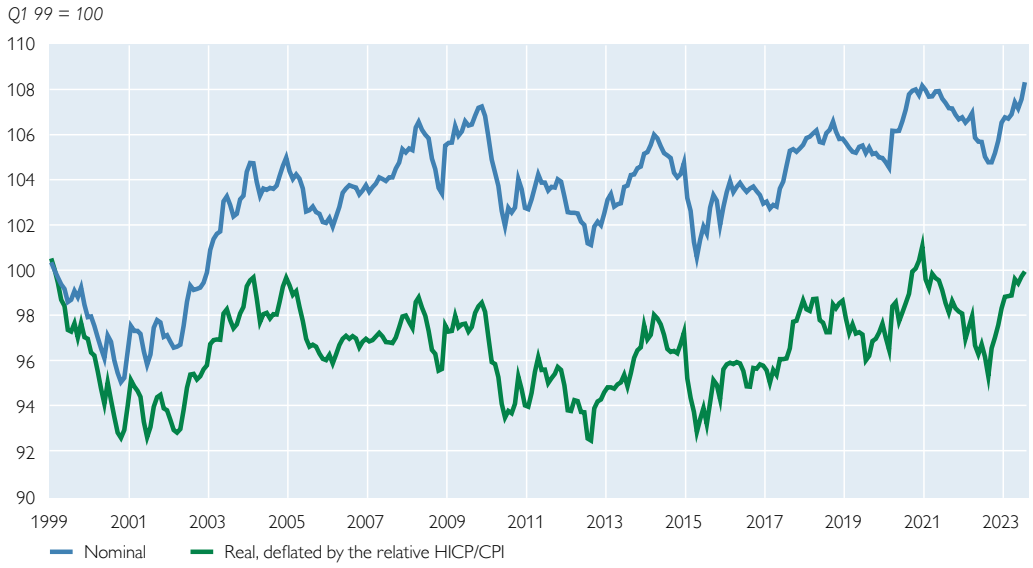
2.1 Energy price shock widened inflation differential in the euro area

The recent development in the real effective exchange rate is also characterized by the energy price shock resulting from several waves of EU sanctions against Russia and retaliatory cuts in the supply of Russian gas to Europe. Besides structural differences regarding the energy mix (renewable, fossil, nuclear), those countries whose retail contracts for energy are closely linked to wholesale prices faced a quick and considerable upward adjustment of energy prices, followed by a wave of pass-throughs into other products and services (Netherlands and the Baltic countries). Additionally, the regulatory and fiscal policy response of European governments to the energy price shock either depressed price hikes or let them happen. Baumgartner et al. (2022) review 60 interventions that were implemented in 2022 by 18 members of the euro area. Some countries, like France, Spain and Malta, introduced caps on energy prices and lowered energy taxes. These countries experienced a comparatively low inflation episode. Other countries, like Austria, instead implemented compensating fiscal transfers to households and businesses (see Fenz et al., 2023).

The varying degree of indexation and implementation of regulatory measures to cap prices created large inflation differentials within the euro area. The maximum spread occurred in August 2022 with a span in the inflation rate of 18.6 percentage points between Estonia and France. The direct effect on energy-related items in the consumer basket was considerably larger in the Baltic countries, and

Chart 2

Chained aggregate nominal and real index of Austria's price competitiveness since 1999



Source: OeNB/WIFO.

the Netherlands. France, Spain and Malta, on the other hand, experienced a low contribution of energy-related inflation to the general inflation rate. During the year 2022, the contribution of energy prices to the general inflation rate was lower in Austria than the euro area average. This pattern changed in early 2023, when falling wholesale price for energy were not fully passed on to Austrian customers. Moreover, the pass-through of higher energy costs into other product and services prices accelerated and, finally, wage demands in negotiations between employers and unions responded to the drop in purchasing power.

2.2 Real appreciation reinforced by positive inflation differential

The real effective exchange rate index deflated by the HICP/CPI (chart 2) follows the short-term dynamics of its nominal counterpart but it does not drift upward. In Austria, nominal appreciations have been offset by comparatively lower domestic inflation rates in the medium term. Nominal appreciations have typically been compensated by higher productivity growth and lower wage inflation (Marin, 1985) as is evidenced by chart 2: between January 1999 and June 2023, the nominal effective exchange rate index gained 7.2%, while the real effective exchange rate remained quite stable (–0.8%). Moreover, the depreciation between 2021 and autumn 2022 was even reinforced by relatively lower inflation in Austria.

However, this picture reverses at the end of the sample. A positive inflation differential emerged between Austria and the euro area, and the loss in price competitiveness due to the nominal appreciation since the start of the Ukraine war was reinforced by higher inflation in Austria. Furthermore, Austria has seen a comparatively stronger pass-through of high energy prices into the prices of other items covered in the consumer basket. Measured in nominal terms, the competitive position of Austria has deteriorated only slightly since February 2022 (+0.8%

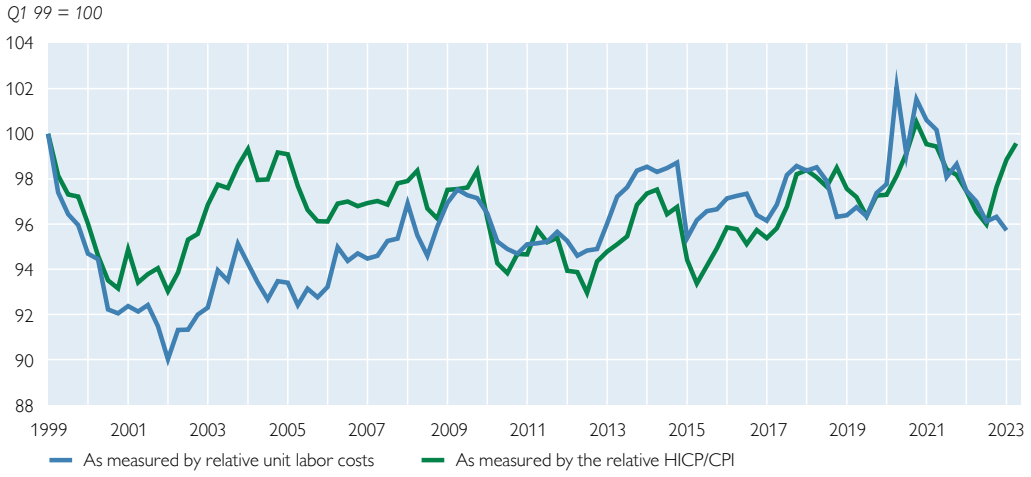
appreciation). In real terms, however, Austria's HICP/CPI-deflated index gained 2.3% until June 2023.

The HICP/CPI covers selling prices for consumers across the most important items in the consumer basket. Besides the fact that such an index includes many non-traded goods and services, variations in selling prices can also result from adjustments in the trading margin of domestic retailers. Such changes affect neither Austria's exporters nor its import-competing firms. The use of alternative price indices allows a closer view on the competitive position of Austrian firms from different angles. For example, the use a unit labor cost (ULC) index opens a perspective more related to cost competitiveness. Unit labor costs show the ratio between the gross compensation paid to employees and the output produced. Increases in wages will drive up unit labor costs while higher productivity will dampen unit labor costs. We use unit labor costs for the total economy for a sample of 31 countries at the quarterly frequency.

Chart 3 presents quarterly data for the HICP/CPI-deflated and the ULC-deflated real effective exchange rate indices for the total economy. The two indices have moved grossly in tandem, and their levels have been converging over the last few years – except in the second quarter of 2020 and the following winter season, when the widespread use of short-term work measures led to a spike in Austria's relative unit labor costs. Additional factors creating a bias in international comparisons of unit labor costs during the COVID-19 pandemic are summarized by Ragacs and Vondra (2021, box 4). Due to a publication lag, the ULC-based exchange rate index ends in the first quarter of 2023. In this specific quarter, consumer prices diverged strongly from unit labor costs, because Austrian wage contracts covering the year 2023 did not fully reflect the strong upswing in the HICP during the second half of 2022. Thus, the cost competitiveness of Austrian firms continued to improve in early 2023. Subsequent rounds of wage negotiations during the first half of 2023 – not yet recorded in unit labor costs – took greater account of the upswing in inflation and may drive the ULC-based effective exchange rate closer to the timelier HICP/CPI version. We therefore expect the ULC-deflated index to worsen during 2023 (see section 3).

Chart 3

Import- and export-weighted real effective exchange rate indices for Austria: aggregate indicator



Source: OeNB/WIFO.

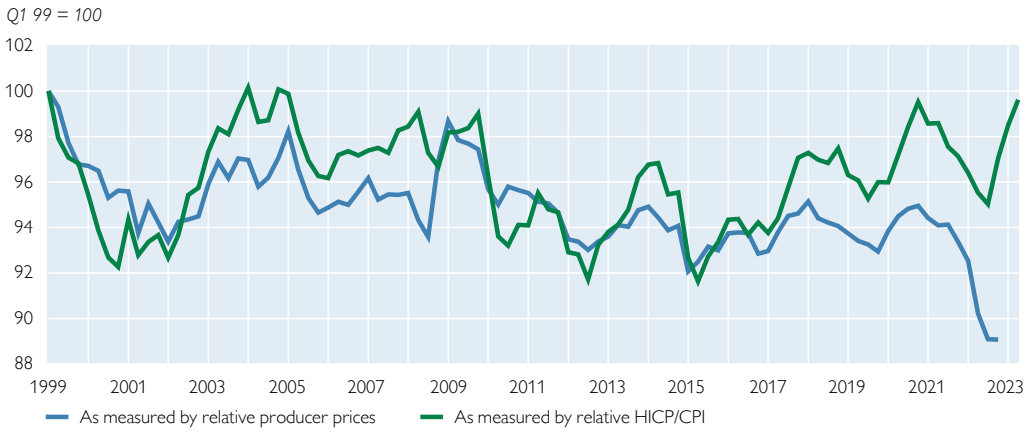
The sudden worsening of cost competitiveness related to the COVID-19 pandemic had been fully corrected by the first quarter of 2023. This adjustment was primarily a consequence of normalized working hours and output levels once the pandemic was over. Because the monetary transfers stabilizing the wage income of workers during a short-term work episode are accounted as wage payments in the national accounts, these schemes moved the ratio between the gross wage bill and output sharply up, thus creating a temporary upward bias in unit labor costs. Since the beginning of 1999, the ULC-based index has declined by 4.3%, indicating an improvement of Austria's cost competitiveness.

The real effective appreciation resulting from high domestic inflation in consumer prices does not necessarily reflect the position of Austrian manufacturing firms with respect to international competitors. Chart 4 compares the HICP/CPI-based real effective index with the index based on producer prices (PPI) using the weights for manufactured goods trade. By definition, the producer price index focuses on manufactured goods, i.e. leaving aside services, and on prices received by manufacturing firms rather than paid by consumers. Furthermore, the sample of 26 trading partners is considerably smaller, and the PPI has a lower reporting frequency (quarterly) and a longer publication lag. The PPI is now available until the end of 2022. During 2022, the HCPI/CPI-based effective exchange rate index remained almost constant (–0.1%) while the PPI-based index depreciated by 4.6%. The widening gap is not related to the smaller sample of the PPI-based index. If we restrict the set of countries in the HICP/CPI-based index to the smaller PPI sample, a similar divergence emerges. The deviation between both price indices points to relatively higher inflation for services in Austria.

Service exports generated a substantial surplus of EUR 7.1 billion in the 2022 current account, which was still significantly smaller than the surplus from 2019 (EUR 9.7 billion). Lockdowns and travel restrictions continued to impair international trade flows during the first half of 2022. The real effective exchange rate indices for services are depicted in chart 5. The deflators used are either the HICP/

Chart 4

Export-weighted real effective exchange rate indices for manufactured goods in Austria



Source: OeNB/WIFO.

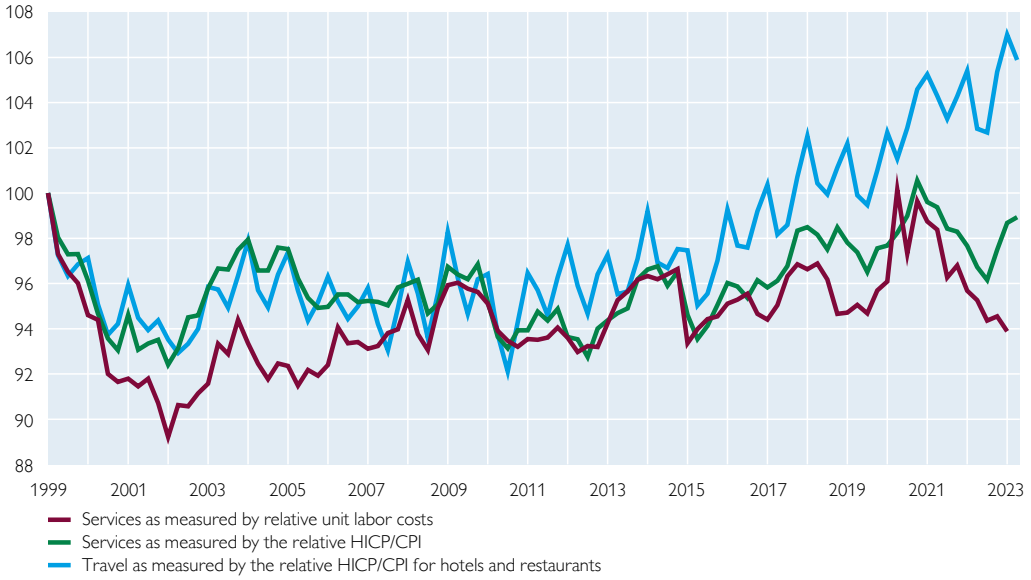
CPI or unit labor costs for the total economy, and the country weights are computed on the basis of import and export flows in services. Similar to chart 4, the HICP/CPI-based index shows a marked appreciation starting in the second half of 2022 and still ongoing. Since the start of 2022, the HICP/CPI-based real effective exchange rate has increased by 0.4%. The ULC-based index, on the other hand, decreased by 3.0%, reflecting the restrained adjustment of wages in the first quarter of 2023. In the long run, both indices show a small decrease by 6.1% (ULC) and 1.3% (HICP/CPI) until the first quarter of 2023.

Within international trade in services, tourism-related activities take a special role. Although lockdowns and travel restrictions continued to impair the tourism industry during the first half of 2022, revenues from exports have been slowly returning to levels seen before the outbreak of the COVID-19 pandemic. Guests from overseas were slow to return Austria, whose closer vicinity to the war zone in Ukraine created an additional obstacle for guests from overseas. Added to this is the challenge posed by the relatively sharp rise in Austrian restaurant and hotel prices (COICOP 11). Higher prices and the weaker growth expectations slightly dampen overall tourism exports (Fritz and Ehn-Fragner, 2023). The exact response of foreign consumers to higher prices is not yet apparent; it may range from fewer or shorter trips to visitors opting for offers in lower quality segments or restraining travel-related expenses. Because expenditures on hotels and restaurants are part of the regular HICP basket, data for this price index are available on a monthly frequency up to June 2023. Due to the strong seasonality in the series (on chart 5), we compute only annual growth rates in the real effective subindex for tourism. At +2.9% in the second quarter 2023, the development over the last year implies a relative loss in price competitiveness. Since the beginning of 1999, the real effective exchange rate for tourism services climbed by 5.9%; with respect to the lowest level of the index in the third quarter 2010, the real appreciation amounts to 14.9%. If the COICOP 11 component of the HICP/CPI correctly accounts for quality improvements, Austria's tourism industry experienced a serious loss in price competitiveness. Besides

Chart 5

Real effective exchange rate indices for services provided in Austria

Q1 99 = 100



Source: OeNB/WIFO.

negative COVID-19 effects during 2021, this contributes to Austria's loss in market share of international tourism exports in 2021 (Peneder et al., 2023).

3 Austria's higher inflation jeopardizes competitiveness position

The aftereffects of the COVID-19 pandemic in combination with economic consequences of the Russian invasion in Ukraine led to a steep rise in inflation in Europe, predominately driven by rising energy price inflation, which peaked around the turn of the year 2022/23. Depending on country-specific structural conditions (indexation regimes, wage negotiation procedures, etc.) and policy interventions (direct price interventions such as price caps, or floating prices but in turn transfers to soften welfare losses) inflation has either returned quickly to values around the price stability target (HICP inflation compared to previous year, average June to August 2023: 1.9% in Belgium and 2.0% in Spain) or else inflation remained at high levels (Austria: 7.5%, Germany: 6.6%), reflecting stronger second-round effects onto the service sector. During the summer of 2022, the Austrian HICP inflation rate surpassed the euro area aggregate rate, a differential that increased up to 3 percentage points in early 2023 and fell to around 2 percentage points in autumn 2023.

The differential is usually traced back to three key differences between Austria and the euro area aggregate (Fritzer 2023):

1. *Fiscal policy mix:* The Austrian government did not set direct price interventions as quickly and comprehensively as other euro area countries, but instead handed out substantial transfer payments to households and companies (see Prammer and Reiss, 2023; and Fritzer et al., 2023, for more details). This policy mix was

recommended by big Austrian economic research institutes (Neusser et al., 2022) in order not to undermine the effects of price signals.

2. *Delayed transmission of global energy prices to end users.* The price adjustment frequency of regulated energy price contracts is lower in Austria than in other euro area countries. Therefore, the contribution of rising energy prices to inflation was initially lower but increased substantially with a lag of around one year.
3. *Higher inflation of restaurant prices and increasing contribution of nonenergy industrial goods.* During the first half of 2023, the Austrian HICP inflation rate for hotel and restaurant services surpassed its euro area equivalent by more than 4 percentage points. The contribution from hotels and restaurants to HICP inflation is further amplified by higher weights of these items in the Austrian consumer basket compared to the euro area average. These two facts explain more than half of the inflation differential in the services sector. In the nonenergy industrial goods sector, a higher market concentration in some sectors (furniture trade, drugstores, DIY stores) could be a driver of stronger price increases in Austria.

On top of these current developments there are several structural reasons why HICP inflation tended to be higher in Austria (around 0.6 percentage points above the euro area rate since the great financial crisis): A delayed change in energy policy (i.e. still a high dependence on energy imports from Russia, several subsidies which promote urban sprawl, etc.), unused potential in the labor market (i.e. women not participating in the labor market due to childcare or caretaking responsibilities). Currently the differential is a multiple of its historic size. Based on the first estimate, HICP inflation in Austria was 4.9% in October 2023, compared with 2.9% for the euro area. Nevertheless, based on the OeNB/Eurosystem June 2023 projections[9] the differential is expected to narrow and return to average values seen in the past, but it will not vanish completely by the end of the projection horizon (2025).

This sizable inflation differential is a cause of concern. The nominal appreciation and the increases in unit labor costs that follow from the wage bargaining process may jeopardize the price competitiveness of the Austrian economy. In the following, we will therefore take a closer look at two issues: (1) How might the REER (real effective exchange rate) have evolved since the second half of 2022 if the Austrian inflation rate had corresponded to that in the euro area (i.e. no inflation differential to the euro area). (2) What are the economic consequences regarding output and employment, given not only past developments but also current inflation forecasts, which indicate a sizable differential in future unit labor costs.

3.1 Realized inflation differential explains half of past appreciation and has induced a loss in price competitiveness

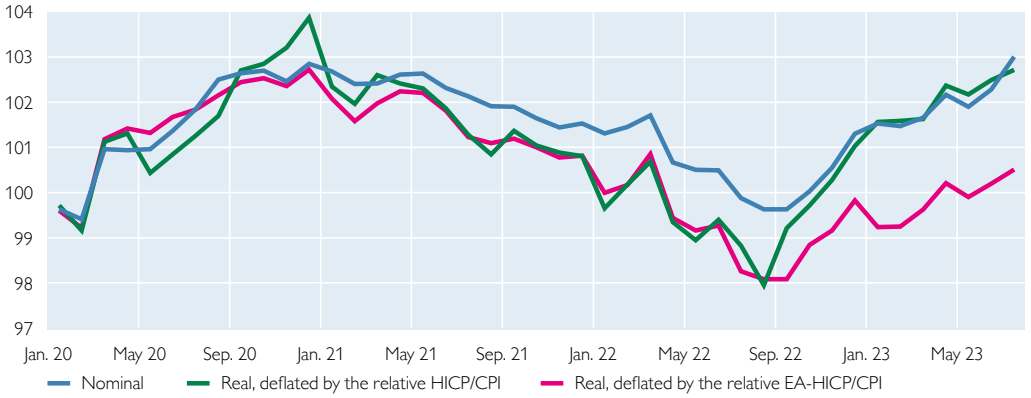
Trading partners within the monetary union are not subject to nominal exchange rate movements. Still, countries within a currency union may re- or devalue in real terms relative to their currency union partners if prolonged periods with inflation differentials realize. While short-run deviations will not trigger second-round

[9] *The ECB confirmed the inflation path from the June projection in its September projection; the OeNB revised its projection only slightly. Both projections had not been published before the cutoff date for this paper.*

Chart 6

Scenario: alternative real effective exchange rate index

Q1 20 = 100



Source: OeNB/WIFO.

effects, persistent deviations are likely to cause second-round effects (via wage and price indexation schemes) and may induce persistent real effects. A prominent example are the southern European countries Italy, Spain, Portugal and Greece prior to the great financial crisis.

Building upon the calculations in section 2, we thus aim to, first, quantify the already realized effects. We do this by comparing the actual real effective exchange rate index shown in chart 2 with a counterfactual one, which we construct by deflating the nominal effective exchange rate for the Austrian economy with the euro area inflation rate. In contrast to all other charts, which are normalized to 1999 Q1=100, in chart 6 we focus only on the most recent development, hence we normalize the exchange rates to 2020 Q1 = 100. Until summer 2022, the inflation rates in Austria and the euro area (relative to all Austrian trading partners) moved in sync but then diverged, reflecting the increasing inflation differential discussed above. So, the inflation differential induced a stronger appreciation. Between August 2022 and July 2023, the difference was 2.4 percentage points. Given total real appreciation in the last twelve months of 4.9 percent, this means that roughly ½ of the overall real appreciation can be attributed to the higher inflation.

What are the effects of this real appreciation on output and employment? To assess the macroeconomic effect of this shock we use the OeNB's Austrian Quarterly Model (Schneider und Leibrecht, 2006), which is regularly used for forecasting exercises and macroeconomic shock simulations. We shock the competitors' export prices in domestic currency with the HICP inflation rate differential from Austria to the euro area between 2022 Q3 to 2023 Q2 – corrected for the historical average (2011–2019) of the quarterly HICP differential of 0.6 percentage points. For the second half of 2023, we hold the (annualized) effect constant and set the shock to zero thereafter. The model results are as follows: The growing inflation differential to the euro area, which reached around 2 percentage points (corrected for the historical differential), induced a negative GDP effect of 0.2 percentage points in 2023 and will dampen GDP growth in 2024 by 0.1 percentage point. This GDP effect corresponds to a loss of around 7,500 jobs in 2023. According to this

simulation, the real appreciation should already have had a sizable effect on GDP growth and employment in Austria. In the next section we will focus on the second-round effects of the currently high inflation episode and highlight the resulting challenges for the Austrian economy.

3.2 Stronger wage growth partly explains persistent inflation gap, fuels unit labor cost growth and induces a further appreciation

In autumn 2023, representatives of the employees' unions and employers' chambers of commerce will negotiate the wage settlements for 2024. In Austria, wage settlements have typically been guided by the so-called Benya rule (average HICP inflation rate of the past 12 months plus past medium-term productivity growth). While the OeNB's June forecast assumed wage moderation (proposing an alternative Benya rule that replaces HICP inflation with the GDP deflator to keep the labor share constant), wage growth in Austria is projected to exceed wage growth in Germany and the euro area. The OeNB and the Eurosystem project the cumulative wage growth for Austria/Germany/euro area at 20%, 16% and 14% respectively for the years 2023-25. As productivity growth is projected to be next to nil, this implies that unit labor cost growth in Austria will be a cumulated 6 percentage points stronger than in the euro area by the end of the forecast horizon.

The effects of a permanent deterioration in Austria's cost competitiveness relative to its trading partners by 6 percentage points were also simulated using the OeNB's macro model. In the medium term, GDP will be almost ¾ percentage points lower, and almost 18,000 jobs would be at risk.

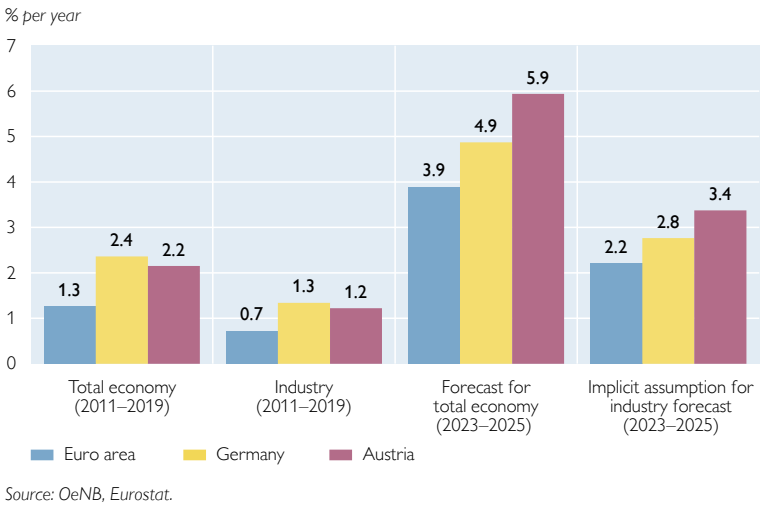
The OeNB model does not permit a breakdown of the effects or shock inputs by sector. For this reason, forecasts and scenarios are simulated at the economy-wide level with an increase in unit labor costs measured at the economy level. But since historically unit labor costs have risen less sharply in the trade-exposed sector, this may invite the conclusion that the simulation results represent an upper bound.

However, the OeNB's model is empirically estimated on the structures and relationships observed in the past and thus also implicitly takes into account lower growth in unit labor costs in industry compared to the economy as a whole in the calibration of an economy-wide unit labor cost shock. Assuming that the past patterns can be extrapolated into the future and that unit labor costs in industry will keep growing around half as much as for the whole economy, the above simulation results should not systematically overestimate the effects.

If the manufacturing industry reduces its profit margins as a result of an increase in unit labor costs to a higher degree than historically this would

Chart 7

Growth of unadjusted unit labor costs



Source: OeNB, Eurostat.

result in lower effects. However, a value-added deflator decomposition in the OeNB's June 2023 forecast (Fritzer et al., 2023) showed a negative contribution of manufacturing profits to the value-added deflator for the high inflation period so far. The absorption potential of this sector for the projection period is therefore expected to be minor.

By contrast, wages are expected to grow at nearly the same rate in the manufacturing industry and the economy as a whole in 2023 and 2024. The first wage negotiations in autumn (for workers of the metal industry and other industrial sectors) usually set the bar for the successive negotiations into 2024. If the past is any indication, strong sectoral differences are unlikely. Inflation rates have dwarfed productivity growth since the second half of 2021, which will render relative differences in wage settlements between the highly productive industry and more labor-intensive service sectors negligible. This would imply that the simulation results presented above rather represent a lower bound of effects, as it can be assumed that unit labor costs of the industry will develop more in line with the total economy and not half its rate as in the past.

Summary

Macroeconomic topics have been gaining a more prominent role in public debates. High inflation has been accompanied by a decline in disposable income, rising interest rates and recession fears. The upcoming wage negotiations for 2024 will be exceptionally important, with warnings ranging from an increase in poverty given too low wage growth to a significant loss in price competitiveness given high settlements.

This article aimed at shedding some light on the latter by quantifying the effects of above-average inflation and wage developments in Austria on its competitive position in international trade. While in the long run the macroeconomic competitiveness position depends on structural factors, in the short run it is determined by price and cost competitiveness of the tradeable goods and services sectors (Peneder et al., 2021).

Using data on trade flows of Austria and its 55 key trading partners over the period 2016–2018 the OeNB, in cooperation with WIFO (Austrian Institute of Economic Research), has recalculated the aggregate real effective exchange rate index and its four subindices from January 2016 onward. Our four subindices cover manufactured goods, food and beverages, raw materials and energy products, and services. Individual country weights in the subindex for manufactured goods continue to be calculated on the basis of single (bilateral) import and double (multilateral) export weights. The remaining subindices use only single (bilateral) import and export weights. All in all, we use four different deflators to calculate the harmonized price competitiveness indicators, each having its own pros and cons in terms of timely availability across countries, international comparability, and the degree of focus on tradable goods. The four deflators are the HICP/CPI, the tourism-related components of the HICP/CPI, producer prices, and the unit labor costs of the total economy.

The newly derived weighting schemes show that the geographical focus of Austria's international trade relations between 2016 and 2018 shifted toward overseas markets in the USA (including the rest of the world), China and Mexico but also towards CESEE countries like Poland and Czechia. We record strong reduc-

tions in the direct bilateral and double weights of Germany, but also vis-à-vis France and Switzerland. Russia also experienced a significant drop in the weight, which was at that time already mainly the consequence of the sanctions following the occupation of Crimea.

Looking at the latest developments, the new calculations confirm the impression that Austria's competitive position has deteriorated, mainly as a result of nominal exchange rate movements, but recently also due to relatively higher inflation in Austria. This development is visible in the parallel movement of the nominal and real effective exchange rate indices (deflated by HICP inflation). Although the real effective exchange rate indices deflated by relative unit labor costs or producer prices, respectively, do not show a deterioration in price competitiveness until the first quarter of 2023, we expect a V-shaped appreciation over the next few quarters based on relatively high wage settlements and producer price inflation in Austria. According to the most recent forecasts, Austria will face a stronger wage growth and higher unit labor costs than their euro area peers and hence a real appreciation in 2024 and 2025. We quantified this loss in price competitiveness in terms of lower real GDP growth and employment in two steps: first we assess the direct losses due to higher inflation with a counterfactual analysis assuming that Austria had the same inflation path as the euro area up until mid-2023. In a second step we employ the most recent ULC forecasts and simulate potential future losses in price competitiveness of second-round effects. Both shocks are not orthogonal and hence cannot be added up. As outlined in the main text, there is reason to believe that our estimated impacts of the second-round effects represent a lower bound. Thus, the sum of the overall negative GDP impact is likely to be around ¾ to 1 percentage point between 2022 and 2025.

Recently, the service sector exhibited a V-shaped evolution of the real effective exchange rate too. In contrast to manufacturing, tourism, as the main exposed service sector, continued its gradual appreciation since 2015. Despite its loss in price competitiveness, the Austrian tourism industry recorded the second highest number of overnight stays in the summer season of 2023 since 1980, but lower real spending by foreign guests already hints at declining tourism spending.

Appendix

Table A1

Weighting scheme of the exchange rate index

	Austrian exports								Austrian imports			
	Manufactured goods	Raw materials, energy products	Food	Goods	Services	Travel	Services without travel	Total	Manufactured goods	Raw materials, energy products	Food	Goods
	Country weights in %, recalculated for the period from 2016 to 2018											
Belgium	2.56	0.55	1.02	2.34	1.51	1.89	1.34	2.09	1.48	0.50	1.69	1.38
Bulgaria	0.34	0.24	0.48	0.34	0.46	0.32	0.52	0.38	0.38	0.12	0.34	0.35
Croatia	0.46	0.98	1.40	0.55	0.65	0.47	0.73	0.58	0.45	0.52	0.54	0.46
Cyprus	0.02	0.00	0.09	0.02	0.25	0.04	0.34	0.09	0.01	0.01	0.10	0.01
Czechia	3.00	4.30	2.42	3.03	2.50	2.29	2.59	2.87	4.07	7.17	2.94	4.36
Denmark	0.64	0.25	0.71	0.63	0.65	0.96	0.52	0.63	0.45	0.22	0.63	0.44
Estonia	0.09	0.04	0.13	0.09	0.07	0.07	0.07	0.08	0.03	0.04	0.01	0.03
Finland	0.59	0.19	0.28	0.55	0.62	0.36	0.74	0.57	0.37	0.29	0.05	0.34
France	5.01	1.39	2.29	4.62	2.16	1.40	2.50	3.89	2.98	0.74	3.14	2.73
Germany	23.29	22.71	34.58	24.09	40.32	46.69	37.50	28.92	37.84	29.41	37.61	36.83
Greece	0.24	0.14	0.69	0.27	0.27	0.18	0.31	0.27	0.11	0.12	0.79	0.16
Hungary	1.53	9.41	3.80	2.12	2.62	3.59	2.19	2.27	2.39	3.02	5.30	2.67
Ireland	0.79	0.02	0.18	0.71	1.18	0.29	1.57	0.85	0.40	0.06	0.68	0.38
Italy	6.74	18.07	11.52	7.70	4.66	4.17	4.88	6.79	6.25	3.94	10.94	6.31
Latvia	0.09	0.06	0.06	0.08	0.09	0.10	0.09	0.09	0.02	0.06	0.05	0.03
Lithuania	0.15	0.11	0.14	0.15	0.09	0.10	0.09	0.13	0.09	0.05	0.20	0.09
Luxembourg	0.15	0.04	0.06	0.14	0.85	0.43	1.04	0.35	0.25	0.01	0.09	0.21
Malta	0.02	0.03	0.08	0.02	0.31	0.03	0.43	0.11	0.01	0.00	0.00	0.01
Netherlands	3.22	0.89	2.72	3.06	4.23	6.63	3.17	3.41	2.62	2.02	4.83	2.71
Poland	3.41	1.18	1.91	3.18	1.64	1.29	1.80	2.72	2.48	2.42	4.30	2.61
Portugal	0.46	0.15	0.17	0.42	0.19	0.12	0.22	0.35	0.49	0.06	0.16	0.41
Romania	1.41	1.09	1.28	1.38	1.61	1.44	1.68	1.45	0.97	0.76	0.99	0.95
Slovakia	1.53	4.51	1.70	1.70	1.55	1.52	1.57	1.66	2.04	3.55	1.50	2.18
Slovenia	0.76	9.31	2.87	1.37	1.07	1.26	0.98	1.28	1.21	2.64	0.87	1.36
Spain	2.44	0.76	1.20	2.26	0.87	0.61	0.98	1.85	1.71	0.38	3.99	1.72
Sweden	1.23	0.25	0.90	1.15	1.44	1.00	1.63	1.24	1.03	0.93	0.23	0.96
Australia	0.52	0.09	1.11	0.54	0.27	0.43	0.20	0.46	0.04	0.37	0.13	0.09
Bosnia and Herzegovina	0.15	0.18	0.36	0.17	0.18	0.19	0.17	0.17	0.42	0.31	0.08	0.38
Brazil	0.65	0.13	0.44	0.61	0.14	0.18	0.13	0.47	0.13	0.62	0.99	0.25
Canada	0.80	0.03	0.19	0.71	0.42	0.34	0.45	0.62	0.25	0.16	0.10	0.23
Chile	0.11	0.00	0.23	0.12	0.05	0.03	0.06	0.10	0.06	0.16	0.37	0.09
China	8.46	3.68	0.51	7.63	1.01	0.92	1.06	5.66	7.15	0.48	0.60	5.89
Hong Kong	0.82	0.19	0.22	0.74	0.16	0.16	0.17	0.57	0.14	0.00	0.00	0.11
Iceland	0.02	0.00	0.05	0.02	0.04	0.05	0.03	0.03	0.05	0.00	0.02	0.04
India	1.16	0.74	0.25	1.07	0.21	0.22	0.20	0.81	0.67	0.15	0.37	0.59
Iran	0.18	0.02	0.08	0.16	0.07	0.00	0.10	0.13	0.01	1.24	0.06	0.16
Israel	0.30	0.34	0.20	0.29	0.24	0.45	0.15	0.28	0.13	0.04	0.09	0.12
Japan	2.15	1.41	0.70	2.01	0.45	0.49	0.43	1.54	1.79	0.04	0.05	1.46
Malaysia	0.57	0.01	0.04	0.50	0.10	0.03	0.14	0.38	0.31	0.01	0.02	0.25
Mexico	0.96	0.04	0.03	0.84	0.17	0.10	0.20	0.64	0.27	0.39	0.21	0.28
New Zealand	0.08	0.00	0.08	0.08	0.06	0.04	0.07	0.07	0.03	0.02	0.20	0.04
Norway	0.31	0.03	0.20	0.28	0.41	0.39	0.42	0.32	0.19	0.24	0.40	0.21
Russian Federation	1.58	0.87	1.29	1.52	1.51	1.38	1.57	1.52	0.30	14.47	0.07	1.96
Saudi Arabia	0.30	0.04	0.24	0.28	0.28	0.36	0.25	0.28	0.02	0.44	0.00	0.07
Serbia	0.34	0.37	0.42	0.35	0.32	0.33	0.31	0.34	0.32	0.17	0.67	0.33
Singapore	0.68	0.00	0.09	0.60	0.19	0.10	0.23	0.48	0.13	0.05	0.01	0.11
South Africa	0.43	0.04	0.29	0.40	0.11	0.09	0.12	0.31	0.11	0.95	0.41	0.23
South Korea	1.79	0.72	0.73	1.66	0.24	0.29	0.21	1.24	0.69	0.05	0.05	0.57
Switzerland	3.31	6.50	3.80	3.52	7.87	6.88	8.32	4.81	4.72	0.89	3.00	4.14
Taiwan	0.71	0.14	0.09	0.64	0.09	0.18	0.06	0.48	0.58	0.01	0.01	0.47
Turkey	1.52	1.54	0.84	1.47	0.97	0.44	1.21	1.32	1.10	0.47	2.13	1.10
Ukraine	0.30	0.34	0.29	0.30	0.31	0.43	0.26	0.30	0.18	2.10	0.37	0.42
United Arab Emirates	0.48	0.11	0.26	0.45	0.55	0.45	0.59	0.48	0.11	0.02	0.01	0.09
United Kingdom	3.16	1.75	1.96	2.99	4.37	3.86	4.59	3.40	2.05	0.94	1.05	1.84
USA	7.99	4.02	12.37	8.10	7.35	3.93	8.86	7.88	7.92	16.20	6.58	8.80
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: OeNB/WIFO.

Table A1 continued

Weighting scheme of the exchange rate index

	Austrian imports				Austrian exports and imports							
	Services	Travel	Services without travel	Total	Manufactured goods	Raw materials, energy products	Food	Goods	Services	Travel	Services without travel	Total
	Country weights in %, recalculated for the period from 2016 to 2018											
Belgium	1.89	0.59	2.19	1.51	2.03	0.51	1.36	1.85	1.68	1.45	1.76	1.81
Bulgaria	1.17	0.35	1.36	0.55	0.36	0.16	0.41	0.35	0.78	0.33	0.93	0.46
Croatia	2.54	8.91	1.04	0.99	0.45	0.66	0.96	0.51	1.51	3.33	0.88	0.78
Cyprus	0.33	0.40	0.32	0.09	0.01	0.01	0.09	0.02	0.29	0.16	0.33	0.09
Czechia	2.75	1.81	2.97	3.95	3.52	6.29	2.68	3.70	2.61	2.13	2.78	3.40
Denmark	0.41	0.41	0.42	0.43	0.55	0.23	0.67	0.53	0.54	0.77	0.47	0.53
Estonia	0.16	0.16	0.16	0.07	0.06	0.04	0.07	0.06	0.11	0.10	0.11	0.07
Finland	1.04	0.28	1.23	0.52	0.48	0.26	0.17	0.44	0.81	0.33	0.98	0.54
France	2.24	3.20	2.01	2.61	4.02	0.94	2.72	3.66	2.20	2.01	2.26	3.25
Germany	29.54	23.56	30.94	34.99	30.41	27.37	36.12	30.56	35.43	38.84	34.27	31.91
Greece	1.05	3.60	0.45	0.39	0.18	0.13	0.74	0.22	0.62	1.34	0.38	0.33
Hungary	3.27	2.98	3.34	2.82	1.95	4.97	4.56	2.40	2.92	3.38	2.76	2.54
Ireland	2.26	0.81	2.60	0.86	0.60	0.05	0.43	0.54	1.67	0.47	2.08	0.85
Italy	5.67	15.40	3.39	6.15	6.50	8.24	11.22	6.99	5.12	7.98	4.15	6.48
Latvia	0.17	0.19	0.16	0.06	0.06	0.06	0.05	0.06	0.13	0.13	0.13	0.08
Lithuania	0.69	0.10	0.83	0.24	0.12	0.07	0.17	0.12	0.36	0.10	0.45	0.19
Luxembourg	1.08	0.17	1.29	0.43	0.20	0.02	0.07	0.18	0.96	0.34	1.16	0.39
Malta	0.21	0.30	0.19	0.06	0.02	0.01	0.04	0.02	0.26	0.12	0.31	0.08
Netherlands	2.94	0.83	3.43	2.77	2.93	1.67	3.79	2.88	3.64	4.66	3.30	3.09
Poland	2.86	0.82	3.34	2.67	2.96	2.04	3.12	2.89	2.19	1.13	2.55	2.70
Portugal	0.48	0.95	0.37	0.43	0.47	0.09	0.16	0.42	0.32	0.40	0.29	0.39
Romania	2.82	0.52	3.36	1.42	1.19	0.86	1.13	1.16	2.16	1.13	2.51	1.43
Slovakia	2.85	0.67	3.37	2.35	1.78	3.84	1.60	1.94	2.14	1.23	2.45	2.00
Slovenia	2.26	2.62	2.18	1.59	0.98	4.67	1.85	1.36	1.61	1.72	1.57	1.43
Spain	1.94	5.25	1.16	1.77	2.08	0.50	2.61	1.98	1.36	2.18	1.07	1.81
Sweden	1.89	0.83	2.14	1.20	1.13	0.72	0.56	1.05	1.64	0.94	1.88	1.22
Australia	0.32	0.72	0.23	0.15	0.29	0.28	0.62	0.31	0.30	0.53	0.22	0.31
Bosnia and Herzegovina	0.28	0.42	0.24	0.35	0.28	0.27	0.22	0.28	0.22	0.27	0.21	0.26
Brazil	0.29	0.32	0.28	0.26	0.40	0.47	0.72	0.43	0.21	0.23	0.20	0.37
Canada	0.38	0.62	0.32	0.27	0.53	0.12	0.14	0.47	0.40	0.43	0.39	0.45
Chile	0.05	0.11	0.04	0.08	0.09	0.11	0.30	0.10	0.05	0.06	0.05	0.09
China	0.87	0.59	0.94	4.62	7.82	1.46	0.56	6.74	0.95	0.80	1.00	5.15
Hong Kong	0.26	0.27	0.25	0.15	0.49	0.06	0.11	0.42	0.21	0.20	0.21	0.36
Iceland	0.11	0.45	0.03	0.06	0.03	0.00	0.03	0.03	0.07	0.19	0.03	0.04
India	0.37	0.28	0.40	0.53	0.92	0.33	0.31	0.82	0.28	0.24	0.30	0.67
Iran	0.08	0.00	0.10	0.14	0.09	0.87	0.07	0.16	0.07	0.00	0.10	0.14
Israel	0.22	0.26	0.21	0.14	0.22	0.13	0.15	0.20	0.23	0.39	0.18	0.21
Japan	0.27	0.39	0.24	1.16	1.97	0.46	0.37	1.73	0.37	0.46	0.34	1.35
Malaysia	0.35	0.10	0.41	0.28	0.44	0.01	0.03	0.37	0.22	0.05	0.27	0.33
Mexico	0.14	0.23	0.11	0.24	0.62	0.28	0.12	0.56	0.16	0.15	0.16	0.45
New Zealand	0.07	0.24	0.04	0.05	0.05	0.02	0.14	0.06	0.07	0.11	0.05	0.06
Norway	0.28	0.53	0.23	0.23	0.25	0.17	0.30	0.25	0.35	0.44	0.32	0.28
Russian Federation	1.47	0.56	1.68	1.83	0.95	10.33	0.67	1.74	1.49	1.10	1.62	1.67
Saudi Arabia	0.17	0.06	0.20	0.10	0.16	0.32	0.12	0.17	0.23	0.26	0.22	0.19
Serbia	0.45	0.49	0.44	0.36	0.33	0.23	0.55	0.34	0.38	0.39	0.37	0.35
Singapore	0.24	0.29	0.22	0.14	0.41	0.03	0.05	0.35	0.21	0.16	0.23	0.31
South Africa	0.40	0.44	0.39	0.27	0.27	0.67	0.35	0.31	0.24	0.21	0.26	0.29
South Korea	0.16	0.22	0.15	0.46	1.25	0.25	0.38	1.10	0.20	0.27	0.18	0.85
Switzerland	4.14	2.32	4.57	4.14	4.00	2.60	3.40	3.83	6.18	5.33	6.47	4.48
Taiwan	0.16	0.09	0.17	0.39	0.65	0.05	0.05	0.55	0.12	0.15	0.11	0.43
Turkey	0.72	1.47	0.55	1.00	1.31	0.80	1.49	1.28	0.86	0.79	0.88	1.16
Ukraine	0.64	0.16	0.76	0.48	0.24	1.56	0.33	0.36	0.46	0.34	0.50	0.39
United Arab Emirates	0.60	0.72	0.57	0.22	0.30	0.04	0.13	0.27	0.57	0.54	0.58	0.35
United Kingdom	4.41	2.81	4.78	2.49	2.61	1.19	1.50	2.41	4.38	3.50	4.69	2.95
USA	7.58	9.10	7.22	8.49	7.96	12.49	9.44	8.46	7.45	5.69	8.06	8.18
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Source: OeNB/WIFO.

Table A2

Competition matrix for manufactured goods exports

	Destinations									
Competing countries	Belgium	Bulgaria	Croatia	Cyprus	Czechia	Denmark	Estonia	Finland	France	Germany
	Market shares in %, calculated for the period from 2016 to 2018									
Belgium	8.76	2.47	1.68	1.76	1.93	2.58	1.81	1.54	6.14	3.51
Bulgaria	0.30	28.49	0.47	0.52	0.27	0.14	0.14	0.04	0.13	0.20
Croatia	0.08	0.21	34.36	0.29	0.12	0.04	0.07	0.03	0.05	0.10
Cyprus	0.01	0.05	0.01	11.17	0.02	0.02	0.02	0.00	0.00	0.01
Czechia	1.32	2.31	2.13	0.95	27.41	1.59	1.71	0.80	1.17	3.29
Denmark	0.45	0.23	0.41	0.33	0.31	36.48	1.01	1.24	0.31	0.60
Estonia	0.06	0.06	0.01	0.22	0.04	0.25	26.66	1.48	0.03	0.04
Finland	0.46	0.23	0.13	2.16	0.17	0.70	6.40	61.56	0.18	0.47
France	8.81	2.46	1.81	1.71	2.79	2.47	1.65	1.61	42.01	4.08
Germany	13.75	11.83	12.67	6.97	24.60	15.73	9.92	8.48	13.48	51.81
Greece	0.06	3.23	0.29	12.48	0.10	0.08	0.04	0.04	0.08	0.08
Hungary	0.70	3.54	4.16	0.35	2.64	0.70	1.08	0.29	0.61	1.74
Ireland	5.91	0.29	0.18	0.26	0.27	0.57	0.16	0.15	0.62	0.58
Italy	4.56	7.00	10.28	7.41	3.64	2.46	2.47	1.38	5.92	3.22
Latvia	0.03	0.08	0.02	0.14	0.08	0.35	5.28	0.17	0.02	0.04
Lithuania	0.09	0.16	0.10	0.08	0.14	0.57	4.24	0.32	0.07	0.09
Luxembourg	0.45	0.08	0.03	0.08	0.10	0.10	0.05	0.04	0.23	0.18
Malta	0.00	0.02	0.02	0.04	0.01	0.01	0.00	0.01	0.03	0.03
Netherlands	10.84	2.78	1.99	3.26	4.20	4.26	4.48	2.59	3.82	4.31
Poland	1.41	2.60	2.41	1.63	6.98	2.99	5.61	1.23	1.40	3.14
Portugal	0.38	0.23	0.17	0.35	0.22	0.34	0.15	0.12	0.92	0.41
Romania	0.37	4.22	0.62	0.33	1.12	0.24	0.39	0.17	0.60	0.91
Slovakia	0.37	1.55	1.65	0.57	4.88	0.66	0.68	0.19	0.68	1.05
Slovenia	0.14	0.73	7.42	0.17	0.43	0.32	0.29	0.07	0.22	0.37
Spain	2.20	1.60	1.37	2.39	1.27	1.25	0.96	0.70	4.64	1.64
Sweden	1.90	0.44	0.38	0.39	0.65	7.56	5.80	5.93	0.65	0.76
Australia	0.07	0.03	0.01	0.03	0.01	0.04	0.02	0.02	0.03	0.03
Bosnia and Herzegovina	0.01	0.06	1.69	0.01	0.05	0.01	0.00	0.00	0.01	0.05
Brazil	0.28	0.02	0.03	1.08	0.03	0.20	0.12	0.06	0.11	0.13
Canada	0.68	0.22	0.06	0.10	0.09	0.18	0.07	0.20	0.22	0.12
Chile	0.12	0.00	0.00	0.00	0.00	0.12	0.00	0.00	0.08	0.01
China	5.17	3.81	4.68	5.65	5.73	5.87	5.44	2.39	3.53	4.08
Hong Kong	0.83	0.35	0.23	0.61	0.68	0.42	0.84	0.30	0.59	0.55
Iceland	0.01	0.00	0.01	0.00	0.01	0.02	0.00	0.00	0.01	0.01
India	1.80	0.58	0.51	0.59	0.26	0.65	0.40	0.21	0.52	0.44
Iran	0.03	0.17	0.01	0.01	0.00	0.01	0.00	0.00	0.00	0.01
Israel	0.80	0.13	0.09	4.85	0.09	0.07	0.07	0.05	0.18	0.09
Japan	1.98	0.32	0.17	1.96	0.79	0.40	0.74	0.32	0.79	1.02
Malaysia	0.34	0.19	0.08	0.15	0.23	0.11	0.07	0.07	0.18	0.34
Mexico	0.30	0.00	0.04	0.03	0.11	0.08	0.03	0.08	0.18	0.32
New Zealand	0.01	0.00	0.00	0.01	0.00	0.04	0.00	0.00	0.01	0.01
Norway	0.18	0.04	0.12	0.67	0.09	1.29	0.67	0.46	0.10	0.14
Russian Federation	1.51	1.65	0.31	1.66	0.67	0.41	4.70	1.95	0.09	0.21
Saudi Arabia	0.61	0.02	0.02	0.09	0.00	0.01	0.30	0.01	0.05	0.01
Serbia	0.05	1.23	1.75	0.08	0.26	0.05	0.03	0.02	0.05	0.11
Singapore	1.75	0.16	0.03	0.06	0.27	0.11	0.05	0.09	0.44	0.34
South Africa	0.76	0.06	0.02	0.05	0.08	0.03	0.10	0.02	0.07	0.31
South Korea	0.90	0.45	1.39	11.33	1.37	0.91	0.41	0.26	0.37	0.47
Switzerland	1.86	1.19	0.97	1.00	0.93	0.88	0.62	0.56	1.81	2.37
Taiwan	0.44	0.36	0.19	0.21	0.26	0.32	0.51	0.21	0.21	0.38
Turkey	0.98	7.84	1.29	7.73	0.58	0.93	0.65	0.24	0.84	0.87
Ukraine	0.04	1.33	0.11	0.18	0.22	0.13	0.51	0.06	0.02	0.07
United Arab Emirates	1.43	0.39	0.06	0.78	0.05	0.04	0.07	0.02	0.12	0.09
United Kingdom	4.32	1.68	0.86	4.21	1.59	2.70	1.42	1.32	3.10	2.38
USA	9.31	0.80	0.50	0.86	1.16	1.50	1.08	0.92	2.30	2.41
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Single export weights	1.37	0.51	0.88	0.05	3.73	0.52	0.10	0.45	4.82	30.28

Source: OeNB/WIFO.

Table A2 continued

Competition matrix for manufactured goods exports

	Destinations									
Competing countries	Greece	Hungary	Ireland	Italy	Latvia	Lithuania	Luxem-bourg	Malta	Nether-lands	Poland
	Market shares in %, calculated for the period from 2016 to 2018									
Belgium	2.44	2.54	1.23	2.24	1.81	3.29	14.47	1.03	6.74	2.48
Bulgaria	1.76	0.43	0.02	0.24	0.18	0.26	0.01	0.26	0.11	0.18
Croatia	0.08	0.27	0.02	0.14	0.08	0.12	0.23	0.12	0.05	0.06
Cyprus	0.36	0.00	0.03	0.00	0.03	0.03	0.00	0.35	0.01	0.00
Czechia	0.58	5.10	0.53	0.73	1.45	2.48	0.71	0.44	1.28	3.01
Denmark	0.29	0.54	0.39	0.16	1.20	1.61	0.18	0.32	0.68	0.55
Estonia	0.01	0.04	0.01	0.01	4.11	2.51	0.00	0.03	0.03	0.07
Finland	0.15	0.29	0.13	0.13	1.75	1.28	0.07	0.56	0.70	0.42
France	2.82	3.75	1.61	3.43	1.31	2.39	5.79	4.32	2.84	2.99
Germany	7.92	27.40	5.27	7.24	9.38	13.38	15.85	7.29	15.17	18.16
Greece	46.13	0.12	0.04	0.18	0.07	0.11	0.04	0.81	0.08	0.11
Hungary	0.59	12.14	0.15	0.49	0.98	0.93	0.33	0.14	0.73	1.36
Ireland	0.65	0.36	64.41	0.33	0.15	0.12	0.28	0.69	1.34	0.41
Italy	6.34	5.21	1.23	65.21	2.40	3.64	1.75	13.60	2.05	4.26
Latvia	0.02	0.05	0.01	0.02	32.48	5.89	0.04	0.09	0.04	0.13
Lithuania	0.04	0.19	0.05	0.04	8.24	21.73	0.04	0.05	0.11	0.39
Luxembourg	0.04	0.08	0.03	0.06	0.05	0.09	41.08	0.02	0.16	0.10
Malta	0.01	0.01	0.00	0.02	0.00	0.01	0.00	12.07	0.01	0.01
Netherlands	2.44	3.71	1.74	1.81	2.31	3.59	3.52	2.51	23.24	3.43
Poland	1.11	5.47	0.41	1.01	6.65	10.49	1.15	0.48	1.59	40.87
Portugal	0.21	0.29	0.21	0.20	0.15	0.27	0.26	0.26	0.37	0.18
Romania	0.79	2.93	0.06	0.79	0.10	0.33	0.07	0.10	0.29	0.66
Slovakia	0.40	3.90	0.10	0.52	1.03	0.76	0.34	0.15	0.44	1.84
Slovenia	0.16	0.78	0.03	0.29	0.25	0.33	0.08	0.18	0.12	0.31
Spain	2.59	1.77	0.96	2.00	0.70	1.10	0.96	1.65	1.32	1.58
Sweden	0.45	0.65	0.30	0.38	1.88	2.33	0.36	0.27	1.20	1.09
Australia	0.02	0.03	0.04	0.02	0.03	0.01	0.05	0.01	0.12	0.01
Bosnia and Herzegovina	0.01	0.14	0.00	0.07	0.01	0.03	0.14	0.01	0.03	0.02
Brazil	0.03	0.16	0.13	0.14	0.04	0.04	0.07	0.02	0.37	0.05
Canada	0.04	0.06	0.19	0.13	2.14	0.20	0.28	2.97	0.30	0.12
Chile	0.10	0.01	0.00	0.06	0.00	0.00	0.00	0.02	0.12	0.00
China	8.19	6.43	1.87	3.28	6.31	6.42	3.09	17.66	13.86	5.73
Hong Kong	0.26	1.95	0.17	0.39	0.51	0.68	0.26	0.23	1.79	0.46
Iceland	0.00	0.05	0.00	0.00	0.01	0.01	0.00	0.01	0.27	0.00
India	0.55	0.43	0.30	0.52	0.58	0.35	0.04	1.51	0.68	0.41
Iran	0.03	0.00	0.00	0.04	0.00	0.01	0.00	0.00	0.01	0.01
Israel	0.54	0.13	0.05	0.10	0.15	0.15	0.06	1.45	0.42	0.07
Japan	0.47	1.51	0.51	0.51	0.32	0.21	1.81	6.02	2.52	0.61
Malaysia	0.14	0.44	0.12	0.09	0.27	0.07	0.03	0.44	1.00	0.12
Mexico	0.02	0.21	0.15	0.11	0.02	0.00	0.09	0.00	0.30	0.06
New Zealand	0.00	0.00	0.01	0.02	0.01	0.00	0.00	0.01	0.04	0.00
Norway	0.06	0.08	0.23	0.05	0.22	0.52	0.10	0.41	0.64	0.25
Russian Federation	1.07	0.46	0.12	0.24	4.66	3.82	0.04	0.15	0.97	0.65
Saudi Arabia	0.24	0.00	0.01	0.08	0.00	0.01	0.01	0.28	0.12	0.11
Serbia	0.21	0.54	0.00	0.24	0.03	0.13	0.03	0.02	0.05	0.12
Singapore	0.05	0.29	0.18	0.07	0.11	0.04	0.16	0.87	1.47	0.09
South Africa	0.07	0.10	0.04	0.06	0.02	0.16	0.04	0.10	0.22	0.04
South Korea	2.88	1.47	0.39	0.42	0.37	1.28	0.07	8.68	0.75	1.10
Switzerland	1.26	1.01	0.67	1.37	0.86	0.55	1.33	0.91	1.24	0.74
Taiwan	0.23	0.55	0.16	0.24	0.63	0.50	0.37	0.30	1.08	0.28
Turkey	2.20	1.21	0.36	0.90	0.75	1.14	0.17	2.24	0.74	0.94
Ukraine	0.17	1.03	0.00	0.18	0.62	0.63	0.02	0.14	0.08	0.56
United Arab Emirates	0.14	0.04	0.03	0.10	0.15	0.11	0.11	0.22	0.34	0.05
United Kingdom	1.68	1.88	10.58	1.36	1.24	1.83	0.95	6.32	3.40	1.78
USA	0.97	1.75	4.73	1.56	1.20	2.01	3.08	1.20	6.40	0.92
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Single export weights	0.28	3.00	0.21	5.34	0.10	0.16	0.13	0.03	1.82	3.26

Source: OeNB/WIFO.

Table A2 continued

Competition matrix for manufactured goods exports

	Destinations									
Competing countries	Portugal	Romania	Slovakia	Slovenia	Spain	Sweden	Australia	Bosnia and Herzegovina	Brazil	Canada
	Market shares in %, calculated for the period from 2016 to 2018									
Belgium	2.13	1.57	1.38	1.76	2.22	3.30	0.61	1.00	0.43	0.39
Bulgaria	0.07	1.55	0.22	0.35	0.09	0.10	0.01	0.74	0.00	0.01
Croatia	0.06	0.14	0.20	3.01	0.05	0.06	0.00	8.33	0.00	0.01
Cyprus	0.00	0.02	0.06	0.01	0.00	0.03	0.00	0.01	0.00	0.00
Czechia	0.62	2.04	13.75	2.09	1.17	1.43	0.13	1.64	0.04	0.05
Denmark	0.15	0.16	0.26	0.22	0.29	3.34	0.22	0.16	0.05	0.07
Estonia	0.01	0.08	0.04	0.03	0.02	0.87	0.00	0.01	0.00	0.01
Finland	0.15	0.14	0.12	0.20	0.20	2.09	0.17	0.05	0.05	0.07
France	4.89	3.67	3.73	2.65	6.85	2.51	0.76	1.18	0.66	0.47
Germany	9.92	13.20	16.82	14.17	9.56	13.22	3.30	11.06	1.36	1.78
Greece	0.11	0.62	0.05	0.13	0.12	0.05	0.02	0.35	0.00	0.01
Hungary	0.48	3.69	6.01	2.59	0.69	0.75	0.14	3.34	0.03	0.04
Ireland	0.45	0.29	0.09	0.18	0.60	0.34	0.37	0.20	0.04	0.19
Italy	4.39	6.64	3.86	9.97	4.92	2.19	1.21	8.86	0.52	0.60
Latvia	0.01	0.01	0.06	0.03	0.02	0.32	0.00	0.04	0.00	0.00
Lithuania	0.07	0.07	0.11	0.07	0.05	0.59	0.01	0.03	0.00	0.01
Luxembourg	0.06	0.05	0.06	0.10	0.07	0.10	0.00	0.01	0.00	0.01
Malta	0.01	0.02	0.01	0.00	0.01	0.01	0.00	0.00	0.00	0.00
Netherlands	2.65	1.99	1.74	2.17	2.56	3.54	0.72	1.48	0.29	0.33
Poland	0.88	2.96	5.53	1.98	1.15	2.78	0.18	2.46	0.05	0.19
Portugal	43.31	0.40	0.42	0.19	2.54	0.26	0.05	0.03	0.06	0.04
Romania	0.19	44.07	1.47	1.06	0.38	0.31	0.02	0.86	0.03	0.03
Slovakia	0.31	1.71	29.66	1.53	0.54	0.60	0.06	1.25	0.01	0.06
Slovenia	0.12	0.42	0.59	26.28	0.13	0.18	0.04	8.68	0.01	0.02
Spain	17.15	1.89	1.23	1.43	49.94	0.93	0.49	0.71	0.27	0.23
Sweden	0.38	0.28	0.41	0.44	0.42	46.38	0.52	0.25	0.12	0.19
Australia	0.01	0.03	0.01	0.02	0.02	0.03	54.85	0.00	0.02	0.06
Bosnia and Herzegovina	0.00	0.07	0.09	1.22	0.02	0.02	0.00	29.60	0.00	0.00
Brazil	0.38	0.04	0.03	0.04	0.13	0.09	0.09	0.01	84.71	0.12
Canada	0.09	0.06	0.03	0.05	0.14	0.18	0.38	0.03	0.17	46.42
Chile	0.01	0.00	0.00	0.00	0.07	0.01	0.03	0.00	0.24	0.10
China	3.70	3.38	3.39	8.91	4.85	3.51	12.73	1.02	3.93	5.07
Hong Kong	0.37	0.40	0.35	0.23	0.42	0.44	1.41	0.22	0.21	0.38
Iceland	0.01	0.00	0.01	0.00	0.07	0.00	0.01	0.00	0.00	0.01
India	0.66	0.29	0.18	0.67	0.72	0.35	0.73	0.18	0.39	0.33
Iran	0.00	0.03	0.00	0.02	0.02	0.00	0.01	0.03	0.01	0.00
Israel	0.12	0.11	0.02	0.82	0.18	0.07	0.16	0.02	0.13	0.11
Japan	0.46	0.34	0.25	0.33	0.65	0.65	3.81	0.04	0.46	1.36
Malaysia	0.08	0.10	0.10	1.03	0.10	0.13	1.13	0.01	0.10	0.12
Mexico	0.05	0.06	0.02	0.03	0.17	0.03	0.21	0.00	0.47	1.74
New Zealand	0.00	0.00	0.00	0.00	0.01	0.01	0.77	0.00	0.00	0.02
Norway	0.11	0.07	0.05	0.02	0.14	1.33	0.05	0.03	0.03	0.04
Russian Federation	0.09	0.42	0.39	0.13	0.10	0.21	0.03	0.42	0.27	0.05
Saudi Arabia	0.07	0.01	0.00	0.04	0.14	0.04	0.11	0.00	0.06	0.01
Serbia	0.02	0.49	0.39	1.28	0.04	0.07	0.00	9.55	0.00	0.00
Singapore	0.09	0.05	0.03	0.11	0.07	0.09	1.78	0.01	0.15	0.11
South Africa	0.06	0.03	0.00	0.07	0.17	0.06	0.23	0.01	0.04	0.03
South Korea	0.49	0.42	3.52	5.14	0.58	0.46	2.69	0.05	0.70	0.83
Switzerland	0.89	0.66	0.71	1.73	1.27	0.67	0.75	0.95	0.32	0.58
Taiwan	0.40	0.16	0.37	0.44	0.23	0.30	0.93	0.04	0.16	0.36
Turkey	0.89	2.76	0.54	3.32	1.32	0.64	0.15	4.19	0.05	0.15
Ukraine	0.08	0.49	0.38	0.06	0.04	0.03	0.00	0.17	0.00	0.01
United Arab Emirates	0.03	0.03	0.00	0.04	0.08	0.02	0.16	0.11	0.01	0.04
United Kingdom	1.69	1.29	0.90	0.88	2.26	2.79	1.59	0.37	0.33	0.91
USA	0.54	0.54	0.31	0.70	1.42	1.49	6.19	0.18	3.00	36.25
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Single export weights	0.28	1.70	2.00	1.53	1.88	1.20	0.82	0.27	0.54	0.89

Source: OeNB/WIFO.

Table A2 continued

Competition matrix for manufactured goods exports

	Destinations									
Competing countries	Chile	China	Hong Kong	Iceland	India	Iran	Israel	Japan	Malaysia	Mexico
	Market shares in %, calculated for the period from 2016 to 2018									
Belgium	0.49	0.05	0.42	1.77	0.70	0.38	2.57	0.15	0.23	0.23
Bulgaria	0.01	0.00	0.01	0.03	0.01	0.04	0.07	0.00	0.01	0.01
Croatia	0.00	0.00	0.01	0.05	0.00	0.00	0.04	0.00	0.00	0.00
Cyprus	0.00	0.00	0.01	0.00	0.00	0.01	0.06	0.00	0.00	0.00
Czechia	0.08	0.02	0.06	0.99	0.05	0.05	1.08	0.03	0.08	0.14
Denmark	0.18	0.02	0.06	7.06	0.03	0.13	0.13	0.03	0.05	0.07
Estonia	0.00	0.00	0.00	0.34	0.00	0.00	0.01	0.00	0.00	0.02
Finland	0.28	0.02	0.03	0.79	0.04	0.09	0.09	0.03	0.05	0.06
France	1.11	0.15	1.07	3.53	0.42	0.93	1.57	0.26	0.77	0.67
Germany	2.99	0.76	1.23	11.57	0.93	2.36	5.05	0.96	2.20	2.52
Greece	0.02	0.00	0.01	0.05	0.00	0.02	0.27	0.00	0.00	0.02
Hungary	0.08	0.02	0.05	0.19	0.02	0.03	0.33	0.03	0.06	0.15
Ireland	0.10	0.03	0.11	0.56	0.03	0.10	0.79	0.14	0.08	0.28
Italy	1.20	0.11	1.17	2.11	0.30	1.58	2.71	0.27	0.52	0.81
Latvia	0.00	0.00	0.00	0.42	0.00	0.00	0.02	0.00	0.00	0.00
Lithuania	0.01	0.00	0.01	0.66	0.00	0.00	0.04	0.00	0.00	0.00
Luxembourg	0.01	0.00	0.00	0.12	0.00	0.01	0.03	0.00	0.01	0.01
Malta	0.01	0.00	0.03	0.02	0.00	0.00	0.00	0.00	0.00	0.00
Netherlands	0.62	0.07	0.26	9.66	0.14	0.60	2.31	0.15	0.36	0.25
Poland	0.15	0.02	0.03	2.33	0.04	0.08	0.43	0.02	0.05	0.11
Portugal	0.16	0.00	0.03	0.28	0.01	0.03	0.12	0.00	0.01	0.06
Romania	0.05	0.01	0.01	0.16	0.02	0.29	0.23	0.01	0.01	0.03
Slovakia	0.06	0.01	0.01	0.43	0.00	0.02	0.39	0.01	0.01	0.04
Slovenia	0.02	0.00	0.01	0.06	0.01	0.05	0.06	0.01	0.01	0.02
Spain	1.72	0.03	0.15	1.57	0.10	0.40	1.64	0.08	0.26	0.82
Sweden	0.35	0.05	0.08	5.61	0.08	0.33	0.30	0.09	0.13	0.12
Australia	0.11	0.03	0.23	0.02	0.04	0.01	0.08	0.08	0.59	0.02
Bosnia and Herzegovina	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Brazil	3.17	0.03	0.04	0.02	0.05	0.13	0.16	0.05	0.05	0.65
Canada	0.43	0.04	0.15	0.64	0.12	0.02	0.33	0.09	0.15	0.74
Chile	52.87	0.07	0.00	0.01	0.00	0.00	0.00	0.01	0.01	0.10
China	16.17	91.90	49.52	2.29	5.23	13.60	9.36	5.65	15.67	6.52
Hong Kong	0.77	2.18	5.24	0.31	1.38	0.17	2.25	0.72	1.59	0.70
Iceland	0.00	0.00	0.00	27.07	0.00	0.00	0.00	0.00	0.00	0.00
India	0.86	0.06	2.42	0.18	83.62	1.09	2.25	0.12	1.24	0.64
Iran	0.00	0.04	0.00	0.00	0.13	61.38	0.00	0.00	0.03	0.01
Israel	0.14	0.03	0.78	0.06	0.17	0.00	40.21	0.04	0.08	0.07
Japan	1.67	0.98	4.53	1.37	0.69	0.58	2.11	85.05	4.72	1.94
Malaysia	0.17	0.17	2.23	0.03	0.35	0.13	0.00	0.45	47.19	0.35
Mexico	1.84	0.03	0.09	0.00	0.05	0.00	0.20	0.07	0.18	44.76
New Zealand	0.05	0.00	0.02	0.05	0.00	0.00	0.02	0.04	0.03	0.01
Norway	0.12	0.01	0.01	3.70	0.01	0.01	0.02	0.02	0.05	0.01
Russian Federation	0.04	0.04	0.11	0.23	0.34	0.63	0.95	0.08	0.10	0.24
Saudi Arabia	0.02	0.06	0.05	0.01	0.20	0.00	0.00	0.04	0.56	0.01
Serbia	0.00	0.00	0.00	0.03	0.00	0.01	0.02	0.00	0.00	0.00
Singapore	0.07	0.33	7.05	0.03	0.75	0.13	0.79	0.69	11.14	0.19
South Africa	0.05	0.01	0.16	0.11	0.05	0.06	0.25	0.14	0.12	0.02
South Korea	1.67	1.10	6.84	0.65	1.03	2.81	1.41	0.96	2.73	1.90
Switzerland	0.34	0.09	1.12	0.48	0.13	0.41	1.16	0.33	0.30	0.25
Taiwan	0.28	0.69	7.07	0.10	0.25	0.47	0.76	0.89	3.60	0.40
Turkey	0.32	0.01	0.10	1.38	0.04	2.54	3.46	0.01	0.08	0.09
Ukraine	0.00	0.00	0.00	0.01	0.02	0.02	0.22	0.00	0.00	0.01
United Arab Emirates	0.10	0.04	0.85	0.02	0.75	8.03	0.00	0.05	0.24	0.01
United Kingdom	0.72	0.11	1.47	8.47	0.35	0.18	1.49	0.31	0.64	0.29
USA	8.28	0.57	5.06	2.39	1.29	0.04	12.15	1.83	3.98	33.62
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Single export weights	0.13	2.75	0.38	0.02	0.60	0.22	0.26	0.97	0.42	0.90

Source: OeNB/WIFO.

Table A2 continued

Competition matrix for manufactured goods exports

	Destinations									
Competing countries	New Zealand	Norway	Russian Federation	Saudi Arabia	Serbia	Singapore	South Africa	South Korea	Switzer-land	Taiwan
	Market shares in %, calculated for the period from 2016 to 2018									
Belgium	0.45	1.49	0.59	0.69	2.18	0.45	1.04	0.12	1.68	0.17
Bulgaria	0.01	0.03	0.09	0.02	1.71	0.01	0.02	0.00	0.06	0.01
Croatia	0.00	0.07	0.03	0.03	2.11	0.00	0.01	0.00	0.06	0.00
Cyprus	0.00	0.16	0.01	0.01	0.02	0.03	0.00	0.00	0.01	0.00
Czechia	0.16	0.73	0.55	0.22	2.12	0.11	0.41	0.03	0.94	0.05
Denmark	0.18	4.24	0.10	0.11	0.59	0.13	0.19	0.04	0.24	0.04
Estonia	0.00	0.47	0.19	0.00	0.04	0.00	0.01	0.00	0.02	0.00
Finland	0.11	1.30	0.50	0.09	0.14	0.07	0.22	0.05	0.14	0.04
France	0.81	1.46	0.88	1.74	1.96	2.54	1.35	0.35	5.40	0.51
Germany	2.50	8.70	4.21	2.85	11.68	2.74	7.81	1.48	19.71	1.85
Greece	0.02	0.04	0.03	0.03	1.05	0.02	0.05	0.00	0.04	0.00
Hungary	0.12	0.16	0.25	0.04	4.80	0.07	0.17	0.04	0.34	0.03
Ireland	0.15	0.19	0.06	0.29	0.32	0.27	0.16	0.06	2.70	0.06
Italy	0.95	1.47	1.26	1.60	7.72	0.72	1.31	0.37	7.42	0.32
Latvia	0.01	0.23	0.11	0.00	0.02	0.01	0.01	0.00	0.02	0.00
Lithuania	0.02	0.67	0.57	0.00	0.06	0.02	0.01	0.00	0.05	0.00
Luxembourg	0.01	0.04	0.01	0.02	0.04	0.01	0.03	0.00	0.04	0.00
Malta	0.00	0.00	0.00	0.00	0.01	0.06	0.01	0.00	0.01	0.00
Netherlands	0.75	3.02	0.74	0.84	1.80	0.88	1.15	0.43	1.84	0.84
Poland	0.26	2.31	1.02	0.20	3.24	0.13	0.42	0.04	0.71	0.03
Portugal	0.04	0.13	0.02	0.05	0.10	0.02	0.13	0.01	0.21	0.05
Romania	0.01	0.36	0.18	0.06	2.39	0.01	0.14	0.02	0.15	0.01
Slovakia	0.05	0.20	0.26	0.05	1.60	0.01	0.10	0.01	0.49	0.01
Slovenia	0.02	0.08	0.14	0.03	4.23	0.01	0.03	0.01	0.23	0.01
Spain	0.33	0.89	0.29	0.98	1.01	0.26	0.85	0.10	1.46	0.08
Sweden	0.27	11.89	0.30	0.31	0.50	0.27	0.54	0.11	0.40	0.10
Australia	8.65	0.04	0.01	0.20	0.01	0.43	0.21	0.10	0.04	0.22
Bosnia and Herzegovina	0.00	0.01	0.01	0.01	1.27	0.00	0.00	0.00	0.02	0.00
Brazil	0.06	0.08	0.06	0.00	0.03	0.24	0.66	0.06	0.05	0.04
Canada	0.44	0.35	0.06	0.46	0.03	0.29	0.19	0.08	0.35	0.11
Chile	0.04	0.02	0.00	0.00	0.00	0.01	0.06	0.15	0.02	0.17
China	8.91	2.32	6.50	8.02	2.43	14.22	10.97	7.62	1.28	9.07
Hong Kong	1.02	0.18	0.46	0.46	0.46	2.91	0.89	0.56	1.29	1.98
Iceland	0.00	0.06	0.01	0.00	0.00	0.00	0.01	0.00	0.01	0.00
India	0.52	0.22	0.25	1.41	0.23	1.45	2.18	0.23	0.39	0.27
Iran	0.00	0.00	0.01	0.00	0.04	0.00	0.02	0.02	0.00	0.07
Israel	0.11	0.04	0.07	0.00	0.10	0.18	0.19	0.06	0.52	0.14
Japan	3.78	0.86	0.95	1.90	0.07	5.10	1.81	3.50	0.58	8.12
Malaysia	0.84	0.09	0.07	0.22	0.02	8.37	0.33	0.35	0.09	0.97
Mexico	0.13	0.02	0.02	0.05	0.00	0.18	0.08	0.05	0.11	0.05
New Zealand	57.61	0.02	0.00	0.01	0.00	0.06	0.03	0.02	0.01	0.01
Norway	0.09	44.23	0.03	0.03	0.04	0.17	0.03	0.06	0.10	0.01
Russian Federation	0.01	0.22	75.32	0.05	1.73	0.07	0.06	0.07	0.82	0.38
Saudi Arabia	0.20	0.02	0.00	59.74	0.00	1.13	0.34	0.06	0.03	0.15
Serbia	0.00	0.02	0.10	0.00	34.78	0.00	0.00	0.00	0.04	0.00
Singapore	1.76	0.52	0.09	0.26	0.02	36.42	0.25	1.16	0.71	3.27
South Africa	0.13	0.03	0.01	0.09	0.01	0.12	58.52	0.06	0.27	0.07
South Korea	1.49	3.47	0.97	2.17	0.50	2.94	0.69	78.27	0.19	2.67
Switzerland	0.35	0.60	0.33	0.83	1.08	1.50	0.48	0.24	39.40	0.38
Taiwan	0.79	0.16	0.16	0.45	0.13	5.56	0.46	1.02	0.19	63.17
Turkey	0.15	0.48	0.30	1.01	4.08	0.12	0.32	0.04	0.25	0.03
Ukraine	0.00	0.01	0.48	0.07	0.25	0.03	0.01	0.00	0.02	0.01
United Arab Emirates	0.13	0.06	0.12	4.80	0.10	0.48	0.44	0.04	1.38	0.09
United Kingdom	1.82	3.32	0.52	2.21	0.80	2.00	1.68	0.36	2.82	0.28
USA	3.74	2.25	0.69	5.26	0.38	7.15	2.93	2.50	4.64	4.05
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Single export weights	0.11	0.38	1.52	0.33	0.48	0.31	0.37	0.84	5.02	0.33

Source: OeNB/WIFO.

Table A2 continued

Competition matrix for manufactured goods exports

Competing countries	Destinations						Double export weights
	Turkey	Ukraine	United Arab Emirates	United Kingdom	USA	Rest of the world	
	Market shares in %, calculated for the period from 2016 to 2018						
Belgium	1.10	1.05	1.71	3.79	0.34	1.26	2.56
Bulgaria	0.35	0.25	0.03	0.07	0.01	0.12	0.34
Croatia	0.02	0.06	0.01	0.03	0.01	0.09	0.46
Cyprus	0.00	0.01	0.01	0.02	0.00	0.06	0.02
Czechia	0.53	1.96	0.34	1.12	0.06	0.69	3.00
Denmark	0.13	0.36	0.14	0.60	0.07	1.09	0.64
Estonia	0.01	0.17	0.02	0.03	0.01	0.02	0.09
Finland	0.16	0.30	0.11	0.24	0.07	0.24	0.59
France	1.68	1.30	1.49	3.60	0.57	2.89	5.01
Germany	5.32	7.70	5.50	11.02	2.07	7.40	23.29
Greece	0.15	0.08	0.09	0.09	0.01	0.11	0.24
Hungary	0.47	2.66	0.08	0.47	0.06	0.43	1.53
Ireland	0.13	0.07	0.17	1.39	0.66	0.33	0.79
Italy	2.37	2.36	2.39	2.83	0.69	2.99	6.74
Latvia	0.01	0.15	0.03	0.04	0.01	0.03	0.09
Lithuania	0.01	0.52	0.02	0.11	0.01	0.12	0.15
Luxembourg	0.04	0.03	0.03	0.06	0.00	0.02	0.15
Malta	0.00	0.00	0.00	0.01	0.01	0.02	0.02
Netherlands	1.17	1.25	0.97	3.84	0.30	1.47	3.22
Poland	0.71	6.55	0.22	1.48	0.09	0.61	3.41
Portugal	0.09	0.04	0.07	0.48	0.04	0.31	0.46
Romania	0.39	0.79	0.09	0.35	0.02	0.31	1.41
Slovakia	0.19	0.69	0.07	0.51	0.04	0.36	1.53
Slovenia	0.07	0.27	0.04	0.07	0.01	0.19	0.76
Spain	1.32	0.57	0.66	2.08	0.17	1.90	2.44
Sweden	0.27	0.63	0.23	0.69	0.16	0.42	1.23
Australia	0.03	0.01	0.26	0.21	0.09	0.41	0.52
Bosnia and Herzegovina	0.02	0.01	0.00	0.01	0.00	0.05	0.15
Brazil	0.18	0.05	0.21	0.12	0.31	1.89	0.65
Canada	0.08	0.08	0.29	0.28	3.13	0.37	0.80
Chile	0.04	0.00	0.01	0.01	0.07	0.30	0.11
China	4.16	9.28	13.01	7.01	7.21	26.64	8.46
Hong Kong	0.24	0.39	2.94	0.81	0.74	2.56	0.82
Iceland	0.00	0.00	0.00	0.02	0.00	0.00	0.02
India	0.83	0.46	8.82	1.02	0.68	3.20	1.16
Iran	0.31	0.02	0.70	0.00	0.00	0.63	0.18
Israel	0.32	0.24	0.00	0.55	0.29	0.38	0.30
Japan	0.73	0.66	3.39	1.35	2.17	6.49	2.15
Malaysia	0.32	0.09	1.09	0.26	0.34	1.71	0.57
Mexico	0.02	0.01	0.10	0.16	4.84	0.87	0.96
New Zealand	0.00	0.00	0.03	0.03	0.02	0.07	0.08
Norway	0.05	0.06	0.09	0.27	0.03	0.14	0.31
Russian Federation	1.12	7.36	0.40	0.16	0.10	2.02	1.58
Saudi Arabia	0.45	0.07	2.98	0.07	0.03	0.96	0.30
Serbia	0.06	0.17	0.02	0.03	0.00	0.10	0.34
Singapore	0.11	0.02	1.38	0.38	0.41	3.59	0.68
South Africa	0.05	0.01	0.59	0.38	0.09	1.14	0.43
South Korea	1.41	0.46	2.12	0.91	1.12	6.51	1.79
Switzerland	0.42	0.50	1.34	1.42	0.60	1.19	3.31
Taiwan	0.32	0.21	0.51	0.47	0.61	2.01	0.71
Turkey	69.17	2.00	1.25	1.17	0.12	1.99	1.52
Ukraine	0.31	45.53	0.09	0.03	0.01	0.30	0.30
United Arab Emirates	0.39	0.17	34.28	0.41	0.10	2.89	0.48
United Kingdom	1.22	0.85	3.66	43.08	0.94	1.63	3.16
USA	0.95	1.48	5.93	4.36	70.50	6.48	7.99
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00
Single export weights	0.91	0.33	0.46	3.05	7.12	3.63	100.00

Source: OeNB/WIFO.

Table A3

Comparison of the weights for manufactured goods across different calculation periods

	1998 to 2000				2013 to 2015	
	Austrian exports (single weights)	Austrian exports (double weights)	Austrian imports	Total	Austrian exports (single weights)	Austrian exports (double weights)
	%					
Belgium	1.82	2.77	2.21	2.48	1.47	2.53
Bulgaria	0.34	0.19	0.11	0.15	0.54	0.34
Croatia	0.98	0.51	0.34	0.42	0.97	0.47
Cyprus	0.05	0.02	0.00	0.01	0.10	0.02
Czechia	2.78	2.14	2.13	2.14	3.56	2.81
Denmark	0.86	0.80	0.64	0.72	0.58	0.66
Estonia	0.05	0.04	0.03	0.03	0.09	0.08
Finland	0.62	0.91	1.12	1.02	0.42	0.55
France	4.75	6.61	5.22	5.89	5.30	5.18
Germany	36.82	29.95	43.28	36.86	31.04	23.56
Greece	0.45	0.34	0.15	0.24	0.30	0.27
Hungary	4.93	2.50	3.02	2.77	3.03	1.57
Ireland	0.32	0.82	0.75	0.78	0.44	0.75
Italy	6.85	8.74	7.80	8.25	5.38	6.66
Latvia	0.06	0.03	0.02	0.03	0.13	0.08
Lithuania	0.08	0.06	0.04	0.05	0.14	0.16
Luxembourg	0.20	0.18	0.17	0.18	0.15	0.13
Malta	0.02	0.02	0.01	0.02	0.03	0.02
Netherlands	2.45	2.40	2.95	2.68	1.68	3.14
Poland	1.69	1.61	0.76	1.17	3.34	3.19
Portugal	0.49	0.58	0.56	0.57	0.26	0.41
Romania	0.68	0.50	0.42	0.46	1.60	1.27
Slovakia	1.11	0.78	1.07	0.93	2.01	1.52
Slovenia	1.68	0.93	1.00	0.97	1.49	0.78
Spain	3.06	3.15	1.41	2.25	1.84	2.44
Sweden	1.22	1.58	1.49	1.53	1.22	1.28
Australia	0.50	0.41	0.03	0.22	0.65	0.43
Bosnia and Herzegovina	–	–	–	–	0.27	0.15
Brazil	0.42	0.55	0.13	0.33	0.64	0.76
Canada	0.76	0.68	0.55	0.61	0.91	0.80
Chile	0.05	0.07	0.01	0.04	0.14	0.11
China	0.74	1.71	1.66	1.68	2.87	8.16
Hong Kong	0.57	0.88	0.34	0.60	0.48	0.81
Iceland	0.03	0.03	0.02	0.02	0.02	0.02
India	0.17	0.38	0.24	0.30	0.57	1.08
Iran	0.32	0.30	0.03	0.16	0.19	0.16
Israel	0.23	0.29	0.15	0.22	0.23	0.29
Japan	1.03	3.14	2.97	3.05	1.04	2.10
Malaysia	0.13	0.35	0.31	0.33	0.43	0.52
Mexico	0.23	0.41	0.14	0.27	0.60	0.77
New Zealand	0.07	0.05	0.01	0.03	0.12	0.08
Norway	0.47	0.44	0.15	0.29	0.42	0.36
Russian Federation	0.92	1.03	0.29	0.64	2.52	2.23
Saudi Arabia	0.27	0.17	0.01	0.09	0.62	0.41
Serbia	–	–	–	–	0.42	0.32
Singapore	0.28	0.54	0.20	0.37	0.36	0.66
South Africa	0.38	0.41	0.07	0.23	0.44	0.44
South Korea	0.34	0.96	0.51	0.73	0.70	1.66
Switzerland	6.24	3.68	3.39	3.53	5.33	3.61
Taiwan	0.37	0.90	0.94	0.92	0.34	0.67
Thailand	0.20	0.31	0.26	0.28	0.25	0.54
Turkey	0.78	0.94	0.54	0.73	1.07	1.46
Ukraine	0.29	0.32	0.12	0.22	0.42	0.35
United Arab Emirates	0.22	0.10	0.01	0.05	0.62	0.40
United Kingdom	4.71	5.47	3.37	4.38	3.39	3.29
USA	4.93	7.32	6.86	7.08	6.85	7.49
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: OeNB/WIFO.

Note: Thailand is no longer included in the 2016 to 2018 matrix, as Austria's export of goods to Thailand averaged less than 2% between 2016 and 2018.

Table A3 continued

Comparison of the weights for manufactured goods across different calculation periods

	2013 to 2015		2016 to 2018			
	Austrian imports	Total	Austrian exports (single weights)	Austrian exports (double weights)	Austrian imports	Total
	%					
Belgium	1.72	2.14	1.42	2.56	1.48	2.03
Bulgaria	0.35	0.35	0.53	0.34	0.38	0.36
Croatia	0.45	0.46	0.91	0.46	0.45	0.45
Cyprus	0.03	0.03	0.05	0.02	0.01	0.01
Czechia	3.68	3.22	3.87	3.00	4.07	3.52
Denmark	0.43	0.55	0.54	0.64	0.45	0.55
Estonia	0.03	0.05	0.10	0.09	0.03	0.06
Finland	0.40	0.48	0.47	0.59	0.37	0.48
France	3.13	4.21	5.00	5.01	2.98	4.02
Germany	39.34	31.07	31.42	23.29	37.84	30.41
Greece	0.10	0.19	0.29	0.24	0.11	0.18
Hungary	2.51	2.02	3.11	1.53	2.39	1.95
Ireland	0.63	0.69	0.22	0.79	0.40	0.60
Italy	6.32	6.50	5.54	6.74	6.25	6.50
Latvia	0.02	0.05	0.11	0.09	0.02	0.06
Lithuania	0.06	0.11	0.17	0.15	0.09	0.12
Luxembourg	0.23	0.18	0.13	0.15	0.25	0.20
Malta	0.01	0.02	0.03	0.02	0.01	0.02
Netherlands	2.61	2.89	1.88	3.22	2.62	2.93
Poland	1.96	2.61	3.39	3.41	2.48	2.96
Portugal	0.45	0.43	0.29	0.46	0.49	0.47
Romania	0.97	1.13	1.77	1.41	0.97	1.19
Slovakia	1.81	1.66	2.08	1.53	2.04	1.78
Slovenia	1.14	0.95	1.59	0.76	1.21	0.98
Spain	1.80	2.13	1.95	2.44	1.71	2.08
Sweden	1.11	1.20	1.25	1.23	1.03	1.13
Australia	0.04	0.24	0.85	0.52	0.04	0.29
Bosnia and Herzegovina	0.35	0.25	0.28	0.15	0.42	0.28
Brazil	0.11	0.45	0.56	0.65	0.13	0.40
Canada	0.33	0.58	0.93	0.80	0.25	0.53
Chile	0.04	0.08	0.14	0.11	0.06	0.09
China	7.16	7.68	2.85	8.46	7.15	7.82
Hong Kong	0.08	0.46	0.40	0.82	0.14	0.49
Iceland	0.01	0.02	0.02	0.02	0.05	0.03
India	0.58	0.84	0.63	1.16	0.67	0.92
Iran	0.01	0.09	0.23	0.18	0.01	0.09
Israel	0.14	0.22	0.27	0.30	0.13	0.22
Japan	1.73	1.92	1.01	2.15	1.79	1.97
Malaysia	0.31	0.42	0.44	0.57	0.31	0.44
Mexico	0.21	0.51	0.93	0.96	0.27	0.62
New Zealand	0.02	0.06	0.11	0.08	0.03	0.05
Norway	0.16	0.27	0.40	0.31	0.19	0.25
Russian Federation	0.32	1.32	1.58	1.58	0.30	0.95
Saudi Arabia	0.03	0.23	0.34	0.30	0.02	0.16
Serbia	0.24	0.28	0.49	0.34	0.32	0.33
Singapore	0.11	0.39	0.32	0.68	0.13	0.41
South Africa	0.08	0.27	0.38	0.43	0.11	0.27
South Korea	0.75	1.23	0.87	1.79	0.69	1.25
Switzerland	4.80	4.18	5.21	3.31	4.72	4.00
Taiwan	0.55	0.61	0.35	0.71	0.58	0.65
Thailand	0.46	0.50	-	-	-	-
Turkey	1.06	1.27	0.95	1.52	1.10	1.31
Ukraine	0.17	0.26	0.34	0.30	0.18	0.24
United Arab Emirates	0.16	0.29	0.48	0.48	0.11	0.30
United Kingdom	1.95	2.65	3.16	3.16	2.05	2.61
USA	6.76	7.14	7.39	7.99	7.92	7.96
Total	100.00	100.00	100.00	100.00	100.00	100.00

Source: OeNB/WIFO.

Note: Thailand is no longer included in the 2016 to 2018 matrix, as Austria's export of goods to Thailand averaged less than 2% between 2016 and 2018.

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Monetary policy in uncertain times: toward robustness and resilience

Key findings from the 50th OeNB Economics Conference and 60th SUERF Anniversary Conference (May 22 and 23, 2023)

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When central banks of advanced economies conducted monetary policy strategy reviews in the early 2020s, they did so during a period characterized by a persistent undershooting of inflation targets. Thus, the key objective of the reviews was to explore ways of increasing the effectiveness of monetary policy in bringing inflation and inflation expectations back to target at the effective lower bound. Given that in 2021 the tides turned to a dramatic overshooting of inflation targets, the question arises whether the analyses made at the time were overly focused on a particular state of the world and failed to be adequately robust to accommodate the possibility of dramatically and fast-changing circumstances. The current environment is characterized by higher volatility and increased uncertainty about economic conditions and has shown how large and sudden shocks can sharply change economic and financial conditions in a matter of months, not only locally but also globally.

Marking the 50th anniversary of the OeNB's Annual Economic Conference and SUERF's 60th anniversary, the OeNB and SUERF jointly organized a two-day high-level research and policy conference, which was attended by 781 participants (315 at the Vienna Museumsquartier and 466 online). The conference explored avenues to render central banks' strategies and analytical tools more robust and resilient to unexpected changes in the conditions under which they may need to operate; how to make monetary policy decisions robust and resilient to uncertain outcomes; the importance of interaction between fiscal policy and monetary policy and how to tailor central bank communication to high inflation and high uncertainty. Additionally, the conference presented research by a select group of young economists on inflation and the transmission of monetary policy.

1 Robustness and resilience in an uncertain and complex world: implications for monetary policy

The opening keynote "Robustness and resilience in an uncertain and complex world: implications for monetary policy" was held by *Markus Brunnermeier* (Edwards S. Sanford Professor of Economics, Princeton University). In his presentation, Brunnermeier explained that, in order to deliver on their mandate, central banks may seek to put in place a robust monetary policy framework to block shocks or disruptions in the first place, and/or take measures to build resilience, i.e. aim at contributing to strengthening the ability of the economy to recover from significant shocks. As the economy is often confronted with shocks that cannot be avoided, resilience is, at any rate, key to fostering stability and promoting sustainable economic growth.

Proper risk management by central banks includes not only quantifying the probability that a shock materializes but also the size of its effect. Trying to avoid all risks and focusing on robustness would imply pursuing a rather aggressive

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policy, which might dampen the growth path of the economy. Alternatively, following a resilient strategy instead, the main aim would be to work toward enabling the economy to recover from shocks and transform to a "new normal." If this "new normal" leaves the economy and society even better off, this is known as over-resilience. One recent example of over-resilience is the COVID-19 pandemic, which boosted the development of new technologies and innovations in various sectors of the economy. A resilient system is a highly dynamic and flexible one, which fluctuates around a solid growth path. In this sense, volatility does not necessarily relate to weakness but can also mean strength.

Resilience can be enhanced, or destroyed, by a range of factors. The resilience of the economy can be fortified through the implementation of buffers. For instance, high equity capital buffers, such as those enforced by macroprudential policies, create a safeguard against severe shocks. For resilience to thrive, it is moreover essential to increase flexibility and reduce redundancies. This ensures that the system can withstand shocks while retaining the ability to redeploy resources and adapt swiftly. The two approaches reinforce each other: Liquidity acts as a lifeline during crises while adaptability empowers entities to adjust their strategies and operations in the face of change. Resilience is further strengthened when there is social cohesion, a shared aim and an environment that allows for thinking outside the box and learning from smaller crises to effectively manage larger ones. Together, these factors create the basis for a bounce-back in the event of disruptions.

On the other hand, the economy may lose resilience when it is being caught in a feedback loop or hits a tipping point. Traps like liquidity traps or the zero lower bound on interest rates, i.e. situations where the economy is unable to bounce back after a severe shock, are best avoided with the pursuit of robust policies. The same applies to situations where the negative effects of second-round shocks will likely lead to adverse repercussions spreading to the entire system. Examples include the negative effects of climate change or financial bubbles. Cases like this would best be tackled with a robust policy strategy rather than a resilient one.

When it comes to monetary policy, its power lies in the ability to promote resilience and to facilitate a bounce-back through monetary stimulus. For resilience, maintaining a stable and credible inflation anchor is crucial. An inflation anchor serves as a convention and, to be effective, should be well known and its level needs to be widely accepted. A credible inflation anchor ensures that central banks can react to shocks without risking a permanent deviation from target. However, according to Brunnermeier there is a resilience barrier, where insufficient credibility or an excessively large shock can de-anchor inflation expectations, hindering the ability to recover. Moreover, high uncertainty adds complexity to understanding other agents' perspectives, making it harder to gauge their possible reactions to a large shock. Hence, central banks need to act decisively to avoid the costly consequences of de-anchoring. Clear and effective communication is essential in maintaining the credibility of the inflation anchor. Changing the inflation target (as is currently advocated by some commentators) would weaken resilience, as it would blur the clarity of the central bank's signal on its inflation anchor.

Monetary policy is confronted with two critical traps: the financial and the fiscal dominance traps. The financial dominance trap poses the question of whether a central bank remains in a position to raise interest rates to combat inflation when

financial stability is at risk. Good macroprudential regulation, such as ensuring well-capitalized banks, aids monetary policy in avoiding this trap. In a low inflation environment, there is often a concurrence between price stability and financial stability. However, when inflation is high, a trade-off emerges, with price stability and financial stability moving in opposite directions. The belief that monetary policy interventions are infeasible due to concerns about risks to the financial sector can lead to the de-anchoring of inflation expectations and a weakening of resilience.

The fiscal dominance trap pertains to the link between fiscal and monetary policy. When policymakers perceive that inflation is much higher than the policy rate, they may engage in unrestrained spending. This, however, gives rise to the risk of central banks being pressured to keep the policy rate low. While central banks are legally independent, pressures from policymakers can undermine their independence. A well-capitalized central bank with a strong balance sheet is vital to mitigate the risk of being pressured by fiscal authorities.

Proper risk management also includes being aware of transition phases. In recent times, those encompass green transition, remote work, demographic changes, de-globalization, and the digital euro. Monetary policy may not be designed for structural change but must accommodate change and must be prepared for its implications. For example, a green transition leading to increased investment can result in a higher natural rate of interest (r*), necessitating higher nominal and real interest rates. Demographic changes implying dissaving among the elderly, de-globalization and the consequent loss in efficiency may also affect r*. Moreover, the emergence of a digital euro introduces additional complexities that need careful consideration.

To sum up, adopting a risk management approach is crucial for fostering resilience. It involves assessing the entire distribution of potential scenarios and gauging the severity of their impact. By anticipating different outcomes and their consequences, policymakers and central banks can develop strategies to effectively respond to such challenges and promote stability.

2 Shock identification and optimal monetary policy responses in an uncertain and complex environment

A key question for future successful monetary policies is how to correctly identify the nature of shocks, their duration, their relative strength (e.g. supply versus demand), and their transmission in an increasingly uncertain and complex environment. What lessons have we learned during the COVID-19 and energy crises to improve central banks' tools? Would such improvements change monetary policy strategies and the conduct of monetary policy? These key questions were discussed in a session moderated by *Ernest Gnan* (Secretary General of SUERF and Honorary Economic Advisor to the OeNB Governor).

Boris Hofmann (Research Advisor, Monetary and Economics Department, Bank for International Settlements – BIS), offered insights into current BIS thinking on how to identify the shocks driving inflation and how fiscal and monetary policy may have to change to ensure a return to macroeconomic stability soon. He showed that, using straightforward analytical tools, it is possible to extract signals of surging inflation in a very complex environment: Inflation was driven by very strong demand, which hit very tight supply conditions. This applies to the United States and to the euro area alike. Also, money growth signaled the inflation surge quite

clearly, and the use of monetary aggregates helps explain inflation forecast errors. This possibly reflected the state-dependent relationship between money and inflation during high-inflation regimes. He also argued that monetary and fiscal policy responses in the period 1985–2019 were, overall, far more expansionary than in the period 1970–1984. While policy responses in recent crises were always compelling at each point in time, cumulatively they pushed policies to their limits. Policymakers should thus look beyond the short-term challenges and aim to preserve policy buffers over the cycle.

Raffaella Giacomini (Professor at University College London and Economic Advisor, Federal Reserve Bank of Chicago) highlighted the many open issues which economic researchers face in identifying and measuring economic shocks. What we call a shock depends on the identifying assumptions. As we cannot compare studies using different shock identification assumptions, there is no uncontroversial answer to what the effect of shocks is. To address uncertain shock identification, Giacomini proposed two broad approaches: First, researchers might rely on identifying assumptions. This allows the data "to speak." However, this approach yields intervals rather than clear points; if the intervals are overly wide, the findings become less informative. Second, instead of intervals, one might report a point that minimizes the maximum loss over the interval. This is easier to communicate but the loss function applied is arbitrary. Regarding uncertainty about the measurement of shocks, a first approach is to use a narrative, i.e. to measure shocks directly by text analysis and changes in market expectations around policy announcements. If these are true shocks, one can get dynamic causal effects by performing local projections of point estimates. However, it is uncertain whether the narrative captures the true shocks. Hence, one may also treat the narrative measures as instruments for the shock and then use instrument variable estimation. This approach does not need to assume that shocks are correctly measured. At the same time, the instrument may be invalid and weak or not exogenous. As a case in point, some historical episodes that we call "shocks" were in fact anticipated. A solution to this problem is to apply narrative restrictions by focusing on a few historical episodes that we can agree are shocks and then impose these as identifying assumptions. While this approach imposes minimal assumptions, it only yields range estimates. A final approach is to use sparse instruments, considering the above-mentioned few historical episodes as an instrument. This approach yields point estimates that efficiently extract information from a few episodes that are truly exogenous. To sum up, Giacomini identified as the most promising approaches a) to relax identifying assumptions and accept intervals and uncertainty; and b) to extract information from only a few historical episodes that are noisy measurements of shocks. She concluded with a quote from Charles F. Manski: "Knowing what we do not know is an important premise for policy decisions without incredible certitude."

Adrian Penalver (Deputy Director, Monetary and Financial Studies, Directorate-General Statistics, Economics and International, Banque de France) then zoomed in on monetary policy, asking the question whether caution and gradualism – as advocated in some of the economic literature and by several policymakers – are really the best approach for monetary policy decisions in a world where inflation expectations cannot be taken to be firmly anchored forever and unconditionally. He recalled that "Brainard uncertainty," a principle developed by the economist

William Brainard, only refers to uncertainty about the strength of the policy instrument but not to uncertainty about the state of the economy. This drives Brainard's result to attenuate the policy response to avoid large mistakes. But what if inflation is driven by expectations? If economic agents realize that the central bank will fight inflation only with attenuated policy responses, then inflation and inflation expectations will rise. If the central bank then again reacts with policy attenuation, inflation deviates further from target, and so on. The more the central bank is forced to act, the greater the policy-induced variance will become, and the more the central bank will be willing to trade off a deviation from the inflation target for a reduction of this variance. So, with full information, the central bank should not attenuate its policy. There is some room for attenuation if inflation expectations are not based on full information; but the central bank will eventually have to track the natural rate of interest. The current policy challenges include uncertainty about the transmission of policy measures, the possibility of a financial crisis and uncertainty about the effects of new instruments. Penalver also emphasized the distinction between attenuation (doing less) as opposed to gradualism (the timing of policy steps). Central banks should, however, not ignore uncertainty about the effectiveness of their instruments. Indeed, there is the risk of overshooting. But one should also not ignore the risk that inflation expectations might become de-anchored. Having put in place the Transmission Protection Instrument (TPI) as a backstop against sovereign debt crises, the ECB has increased its policy scope for decisive action in combating inflation, which in turn should increase the ECB's credibility.

Inspired by Alfred Einstein's quote "Problems cannot be solved with the same mindset that created them," *Sandra Eickmeier* (Research Economist, Economic Research Center, Deutsche Bundesbank) questioned established methods and approaches to respond to current shocks. She advocated a wider and deeper view of the world's current multiple crises, or meta crisis. An understanding of the world's current problems requires thinking beyond the economic sphere; it needs to go back to humankind's worldview, mindset, and values to re-align economic and ethical values. The dominating view in economics that "separate individuals maximize their own material well-being and compete with others for scarce resources" is not conducive to solving current challenges. Markets are fraught with externalities; the market mechanism fosters narrow thinking, which neglects the bigger picture that includes well-being and environmental sustainability. A change in mindset, which encompasses economic goals, leadership, communication, dealing with uncertainty, etc. is needed to act as an effective coordination mechanism. This way, crises would be addressed jointly and thus more effectively, and mankind would switch from reacting to crises toward shaping change consciously.

3 The Great Volatility: How to cope? What is different this time? How to manage side effects and trade-offs

In this panel moderated by *Robert Holzmann* (Governor of the OeNB), *Tobias Adrian* (Financial Counselor and Director of the Monetary and Capital Markets Department at the International Monetary Fund), *Claudio Borio* (Head of the Monetary and Economic Department at the BIS and SUERF Fellow), *Sarah Breeden* (Executive Director at the Bank of England), and *Philip Lane* (Member of the Executive Board of the ECB) discussed the policy reactions and measures taken during volatile times. Two broad topics were debated.

The first topic addressed the question of whether the recent increase in volatility and elevated financial risks has posed a threat to the separation principle, which suggests that monetary policy and financial stability can be treated separately with different instruments. While the consensus was that a regime of uncontrolled risks prioritizing financial stability was not currently present, the panelists debated whether rising risks necessitated a shift in policymaking. They also discussed the influence of recent bank failures on the current assessment.

Borio highlighted the policy challenges and risks associated with a focus on financial markets. He emphasized the vulnerability resulting from a combination of unprecedented monetary policy tightening and macroeconomic factors. Drawing comparisons to past tightening episodes since World War II, such as the inflation-reducing episodes in the mid-1980s, he pointed out that the difference to today stems from financial liberalization that has increased the scope for financial expansions and contractions. Borio expressed concerns about interest rate and credit risks materializing and stressed the importance of assessing the resilience of banks and nonbank financial institutions (NBFI) in the face of potential stress. According to him, private credit markets, commercial real estate markets, and vulnerabilities in government bond and foreign exchange (FX) markets, particularly FX swap markets, may serve as pressure points within the NBFI sector.

Breeden argued that the separation principle between monetary policy and financial stability still applies. While the UK's financial system experienced stress quite recently, including distortions in the gilt market, she praised the resilience of the banking system in the United Kingdom. She attributed this resilience to enhanced supervision, stress tests, and capitalization measures implemented since the 2008 financial crisis. However, Breeden acknowledged the need to monitor conditions more broadly and highlighted the importance of cooperation among the committees responsible for monetary policy and financial stability. She discussed the measures taken to build resilience and contain risks, such as stress-testing major banks and implementing countercyclical capital buffers, given the need to build up resilience in advance of periods of stress.

Lane also supported the notion that the separation principle still applies and emphasized the ECB's commitment to price stability. He reassured that the ECB has successfully managed liquidity provision, and markets have demonstrated confidence in its ability to maintain price stability. Lane emphasized the importance of anchoring inflation expectations and stressed the need to keep inflation at its target.

Adrian discussed the resilience of global financial stability, which has been tested over the past year. He highlighted the evolving factors driving volatility and the interconnectedness between monetary policy, financial conditions and vulnerabilities. Adrian noted that bank lending conditions have tightened further, but financial stability concerns have not yet undermined monetary policy. While acknowledging the presence of downside risks, he reassured that the global economy is currently experiencing a soft landing. However, Adrian cautioned that if more systemic issues arise, central banks may need to provide additional liquidity, potentially leading to a trade-off between financial and price stability.

The second question focused on the development of a resolution regime for banks under stress to prevent financial instability and government intervention in the form of bailouts. The panelists continued to discuss recent developments in the

United States and Switzerland, where resolution regimes were not utilized and where government and central bank support became necessary.

Breeden cited the example of the resolution process for a UK subsidiary of the Silicon Valley Bank, highlighting the importance of maintaining enhanced standards and developing a prudential framework for small domestic firms with international financial exposure. Borio emphasized the need for fiscal policy to work in tandem with monetary policy to address both price stability and financial stability concerns. Adrian pointed out the significance of the interaction between monetary and fiscal policies in combating inflation and addressing weak bank performance. Finally, Lane stressed the importance of having a comprehensive toolkit that includes resolution regimes but cautioned against over-reliance on them. He suggested focusing on credit conditions and their impact on monetary transmission channels to better understand the strength of the transmission mechanism.

In conclusion, the panelists acknowledged the challenges posed by volatile times and discussed the appropriate policy reactions and measures. They reiterated the application of the separation principle between monetary policy and financial stability, while recognizing the resilience of the banking system. However, concerns were raised regarding nonbank financial institutions, and the need for monetary and fiscal policies to cooperate was emphasized. The panelists also discussed the development and effective implementation of resolution regimes, as well as the importance of monitoring credit conditions.

4 Fiscal and monetary policy interactions: side effects, trade-offs, and complementarities – need for coordination?

The shocks that the global economy and in particular the euro area have faced in recent years have required very strong fiscal and monetary policy responses. This has raised the issue of side effects, trade-offs and spillovers between these two policy areas. In a session moderated by *Maria T. Valderrama* (Head of the OeNB's Monetary Policy Section), experts on the interaction between monetary and fiscal policy attempted to answer three main questions: 1) How can monetary and fiscal policies interact optimally to achieve complementarities and synergies? 2) How does fiscal policy affect the effectiveness of monetary policy? 3) What useful role can fiscal rules play? Four speakers offered complementary perspectives on the matter: *Aaron Mehrotra* (Principal Economist, Bank for International Settlements) presented the global and long-term view, while *Dennis Bonam* (Principal Economist, De Nederlandsche Bank) zoomed in on the euro area perspective and offered theoretical underpinnings of the interaction of monetary and fiscal policies. *Sven Langedijk* (Advisor, Directorate-General for Economic and Financial Affairs at the European Commission) gave the institutional and fiscal policy perspective about the policy mix. Finally, *Francesco Papadia* (Senior Fellow at Bruegel) offered a broader perspective, building on his knowledge of central banks from inside and out.

Looking at data for the past five decades, Mehrotra and his co-authors showed in greater detail that the policy regime matters for the strength of the relationship between fiscal deficits and inflation. They look at two combinations of policy regimes: First, a "monetary-led" regime, where fiscal policy stabilizes debt over time and monetary policy enjoys a high degree of independence. The second regime

is the "fiscal-led" regime, where fiscal policy does not stabilize debt, and monetary policy is only weakly independent. Fiscal-led regimes were common in the 1980s and 1990s, but since the year 2000, monetary-led regimes have been predominant. They also show, after controlling for other cofounding variables within a Phillips curve framework, that there is a strong effect from fiscal deficits on inflation in the fiscal-led regime, compared to smaller effects in the monetary-led regime. Moreover, they look at the entire inflation forecast distribution and find that, when fiscal deficits increase, the probability of higher and more volatile inflation outcomes is higher in the fiscal-led regime. Thus, when inflation is high, like it is at the time of writing, monetary policy accompanied by fiscal tightening has larger effects on aggregate demand and there are fewer risks to financial stability because interest rates must rise by less. On the question whether fiscal rules have helped historically, their analysis shows that fiscal rules have been stabilizing factors, in the sense that there are more primary surpluses during periods of monetary tightening, which coincides with today's situation and monetary-led regimes.

Bonam zoomed in on the euro area experience and showed that the euro area has gone through cycles where monetary and fiscal policy have moved sometimes in tandem and sometimes in opposite directions. Bonam and his co-authors analyze whether this matters for the effectiveness of monetary policy. Their model shows that, indeed, the effectiveness of monetary policy depends very much on whether fiscal policy is supportive (i.e. moves in the same direction). Moreover, they show that this difference is driven by different responses of private consumption to a monetary policy shock, depending on the given fiscal policy regime. The innovation of their analysis is that they model a wealth effect (on consumption) that is influenced both by monetary and fiscal policies. Moreover, they show that the net effects of both shocks depend on whether consumers/households expect Ricardian effects or not. This implies that a contractionary monetary policy shock is less effective if consumers expect fiscal policy to react procyclically and/or if they believe there are risks of fiscal dominance. To prove their hypothesis, they look at a sample of euro area member states with high debt. They find that consumers do not fear fiscal dominance. Thus, their analysis clearly calls for fiscal rules that would reduce the risk of fiscal dominance or procyclical fiscal policy, which would undermine the effects of monetary policy.

To complete the theoretical view from the last paper, Langedijk offered the policy perspective. He presented a detailed account of the European Commission's proposal to reform the European Union's Stability and Growth Pact (SGP) dated April 26, 2023, as well as the motivation for reform. The European Commission's review of the SGP yielded that the SGP had not been effective in reducing debt levels, or in guaranteeing countercyclical fiscal policies. Moreover, governments tended to reduce investment, which had negative effects on potential growth. Hence, the current reform of the SGP is aimed at strengthening debt sustainability while at the same time promoting inclusive and sustainable growth in the European Union. The reform proposal attempts to make governments commit to a binding reform path, while at the same time giving them more discretion about how to achieve these goals. For example, governments can extend the time to reach their goals to 4 or 7 years, but they will not be able to backload reform efforts. More importantly, the European Commission acknowledges the importance of keeping escape clauses in place for periods of crisis such as the COVID-19 pandemic. On

the other hand, fiscal policy should be countercyclical to support monetary policy and reduce the risk of fiscal dominance.

Finally, Papadia delved into the consequences of the ongoing review of the SGP for the ECB as a backstop to fiscal policy. He asked two questions: 1) Will the new SGP reduce the risk that the ECB must act again as a backstop for fiscal policy and 2) If the ECB must take this role again, will the SGP help the ECB? Papadia reviewed the experience of the ECB and concluded that, while it was undesirable for the ECB to act as a fiscal backstop, doing so was inevitable. Despite this, there is no risk of fiscal dominance in the euro area and thus no threat to price stability from the side of fiscal policies. This is so because in the past, the ECB's action helped bringing back the economy from a bad to a good equilibrium, by sparking a change in expectations. Looking ahead, Papadia listed some elements which are in his view crucial for the new SGP. First, he recommended that the SGP differentiates across countries and allows for an intertemporal approach. In general, there should be more room for discretion and the rules should be linked to growth and investment as well as to macroeconomic imbalances. He considered the European Commission's proposal dated April 2023 to be in line with his recommendations. However, he thought that the main obstacle is to agree on a debt sustainability analysis framework given the lack of trust among member states. Finally, what does this mean for the ECB? He thought that the proposal was a good basis to build the conditionality required for the ECB to act as a backstop, but the SGP will need to be respected and there should be enough incentives for governments to comply. He concluded that the SGP proposed by the European Commission has the potential to mitigate the risk that the ECB will again be forced to act as fiscal backstop and can also help manage the ECB backstop when needed again.

In conclusion, the discussion highlighted the importance of fiscal policy for central banks, but at the same time showed how complicated this interaction is, and how difficult it is for these areas to act optimally without coordination. Coordination, on the other hand, would risk weakening central bank independence. Thus, a new SGP that can achieve its objectives is much needed to increase the effectiveness of monetary policy.

5 Central banks as risk managers: long-term side effects, risks, and limitations

The second keynote lecture was delivered by *Jon Danielsson* (Director of the Systemic Risk Centre, London School of Economics and Political Science). Drawing from his recent book "The illusion of control," Danielsson challenges the common assumption that risks to the financial system originate from outside the system. Instead, he argued that critical risks originate from within the system through individual interactions, making them difficult to accurately measure or manage.

If central banks were to assume the role of risk managers, it would entail enhancing positive outcomes and increasing their likelihood, while minimizing the probability and severity of negative outcomes. The focus lies on the extremes of the distribution, while the available data reside in the center. Traditional risk models assume that risk is exogenous and therefore relatively easy to measure. However, Danielsson asserted that financial risk is generated through the interactions of market participants and is thus endogenous. This endogenous risk emerges due to

the prolonged time span between decisions and crises, and any efforts to stabilize the financial system inadvertently incentivize agents to misbehave.

In the decade after the financial crisis of 2008, the three key objectives of economic growth, low and stable inflation and financial stability, were achieved. It took monetary policy accommodation to accomplish these objectives, but as monetary policy remained accommodative for an extended period, systemic financial risks increased. This was not considered problematic, as regulations were expected to contain systemic risk. Yet, this perceived control is illusionary. The complexity of the financial system makes it impossible to identify and manage all risks. The fundamental question now is whether the focus should be on building robustness through buffers or on fostering resilience with shock absorption capabilities. Buffers are costly and fail to protect against large shocks. Hence, it is more effective to leverage the inherent shock absorption capacity of the system. Diversifying the portfolio of financial institutions enhances resilience and reduces regulatory costs. To achieve this diversification, regulations should be tailored to different types of institutions. Furthermore, barriers to entry should be eliminated (embracing fintech, decentralized finance, and possibly central bank digital currencies), and shadow banking should be acknowledged. However, the adoption of these measures is hindered by a combination of conservatism, risk aversion, local optimization and lobbying, which leads to new initiatives being perceived as potential threats that must be prohibited.

If central banks were to act as risk managers, they would need to aggregate all private risks into a measure which can be directly controlled by the central bank and give it more say in political decision-making. Considering the limitations of such an approach, Danielsson concluded his presentation by quoting Friedrich August von Hayek, who wrote, *"If we possess all the relevant information, if we can start out from a given system of preferences, and if we command complete knowledge of available means, the problem which remains is purely one of logic... This, however, is emphatically not the economic problem our society faces."* Therefore, central bankers cannot function as risk managers, and diversity is the best approach to safeguard our financial system.

6 Monetary policy communication in uncertain times

A panel discussion on monetary policy communication in uncertain times moderated by *Birgit Niessner* (Director of the OeNB's Economic Analysis and Research Department) marked the last session of the conference. In her opening remarks, Niessner stressed that the effectiveness of monetary policy measures relies to an important extent on clear communication by policymakers. While this statement necessarily applies to both tranquil and challenging times, Niessner emphasized that the current high inflation environment requires particular efforts to explain how exactly central banks address inflation above target and when their measures will bear fruits.

In her opening statement, *Klodiana Istrefi* (Senior Economist, ECB) emphasized that, while clear communication of monetary policy decisions is essential, it is crucial to consider the trade-off between accuracy and simplicity. She argued that simplification intended to avoid an in-depth discussion of uncertainties faced by policymakers in the decision-making process may convey a false sense of certainty and understanding of central banks' power to the public. Istrefi made a plea for

central bankers to remain transparent about the complexity they face in their day-to-day decisions. She also highlighted the progress monetary policy has made in fighting inflation since the 1970s when its credibility still largely hinged on the personality of single policymakers. Today, Istrefi opined, clear central bank communication about monetary policy objectives and the reaction function can substitute for the persuasiveness and credibility formerly conveyed by individual policymakers like Paul Volcker.

The second panelist, *Michael McMahon* (Professor of Economics, Oxford University), started his introductory remarks by paraphrasing former Federal Reserve chairman Alan Greenspan, who had stated that uncertainty was not just one feature of the monetary policy landscape, but in fact its very defining feature. In this sense, while monetary policy would always have to operate in a context of high uncertainty, policymakers cannot use this fact as an excuse for not being clear in their communication efforts. McMahon also stressed that academics, while advancing our understanding of the effects of complex future-oriented policies such as forward guidance, may have partly overlooked an important aspect of central bank communication, i.e. how to clearly communicate the central bank's assessment of the current economic situation. In his view, a substantial part of monetary policy surprises simply derives from a divergence of market participants' and central bankers' interpretations of current economic conditions, rather than from what academics like to describe as random variation in policy measures.

Emanuel Mönch (Professor of Financial and Monetary Economics, Frankfurt School of Finance & Management) addressed three key issues by way of introduction. First, he underlined the key importance of anchoring long-term inflation expectations for effective monetary policy via nominal interest rate setting. Mönch highlighted that learning models can provide valuable insights about how central bank communication can contribute to strengthening the anchoring process. Second, he argued that the reason why central banks remained behind the curve during the recent rise in inflation may be explained by the communication of, and commitment to, asymmetric reactions functions as in recently revised monetary policy strategies (e.g. the adoption of average inflation targeting by the Federal Reserve). Third, drawing on recent research based on survey experiments, Mönch emphasized that central banks should stick to the "KISS" principle (Keep it short and simple) whenever engaging in monetary policy communication, in particular when inflation expectations are already drifting away from the target.

The fourth panelist, *Kilian Rieder* (Principal Economist, Monetary Policy Section, OeNB), pointed out that an analysis of formal central bank communication alone (e.g. official policy announcements and attributable speeches by policymakers) may be too narrow when it comes to devising approaches to stabilize and anchor inflation expectations. Based on recent research on the effects of anonymous monetary policy leaks from the Eurosystem, he argued that informal communication channels targeting the financial market and the public can represent powerful tools to shape public expectations that often counteract the effect of official central bank communication. He suggested that, even if central bankers were able to craft perfectly clear and simple policy announcements, and even if they succeeded in reinforcing these announcements with attributable statements and concrete measures, informal central bank communication may still be able to create enough noise to undo their efforts at least partly.

After the introductory round, the panelists engaged in a discussion about the promises and pitfalls of central bank communication with the general public, including the role of the so-called three "E's" (explanation, engagement and education) in this respect. Subsequent questions from the audience circled around the empirical evidence on the effect of central bank communication on people's behavior, the extent to which central bank communication may have been overburdened and the impact of humility in monetary policy communication in terms of acknowledging past mistakes. Niessner closed the discussion by asking the panelists whether they thought a particular central bank had done an especially good job in communicating during the recent challenging times of high inflation. In response, panelists highlighted the difficulty of coming up with objective criteria for evaluating the quality of central bank communication given central banks' very different communication strategies. Moreover, the consensus on the panel was that there was substantial room for improvement across all institutions. Second, Niessner asked panelists to name a specific policymaker who could serve as a role model for clear central bank communication. The panel mentioned the rhetorical talents and wit of Andy Haldane's speeches and noted Isabel Schnabel's outstanding ability to discuss complicated and controversial monetary policy topics in an accessible way.

7 Academic session A: prices, wages, and expectations

In the first academic session on day two of the conference, chaired by *Fabio Rumler* (Head of the OeNB's International Economics Section), cutting-edge empirical evidence was presented on the question whether the price-wage nexus, i.e. the slope of the Phillips curve, had been changing, and if and how inflation expectations and labor market institutions may affect the transmission of monetary policy.

The first paper presented by *José-Elías Gallegos* (Banco de España) explained the fall in inflation persistence observed in recent decades in a New Keynesian setting with noisy information on the state of the economy. The resulting Phillips curve including these information frictions can successfully explain the evolution of US inflation dynamics of the past three decades and indicates only a modest decline in the slope of the Phillips curve. Furthermore, the paper finds that the Phillips curve has become considerably more forward-looking than backward-looking over this time.

A paper presented by *Alex Grimaud* (Vienna University of Economics and Business) introduced endogenous price-setting frequency in a New Keynesian model and derives a nonlinear Phillips curve that is consistent with micro data on price setting and at the same time generates a time-varying slope coefficient that can explain inflation dynamics in the US without relying on assumptions of very large cost-push shocks. This Phillips curve also generates asymmetric transmission of shocks with comparatively stronger inflation effects in the case of demand-driven expansions versus demand-driven recessions.

Aleš Maršál (National Bank of Slovakia) also investigated the effect of a nonlinear Phillips curve on the conduct of monetary policy. Assuming Calvo price-setting and applying nonlinear solution methods, the Taylor principle (i.e. the central bank reacting by more than one for one to the inflation gap) is no longer found sufficient for achieving macroeconomic stability. Instead, a so-called stability region is formulated that replaces the determinacy region in the nonlinear case to avoid self-reinforcing inflationary spirals. The setup implies that monetary policy should

be even more reactive to deviations of inflation from its target to avoid such a spiral.

Matija Lozej (Central Bank of Ireland) investigated the role of labor market institutions and regulation for the transmission of a common monetary policy shock in a monetary union. The theoretical model used in this paper includes search and matching frictions and heterogeneity in labor market institutions within a monetary union. Given this heterogeneity, a central bank responding more strongly to the unemployment gap in case of a negative demand or cost-push shock leads to smaller output losses but higher inflation and reduces the cross-country differences in consumption in a monetary union.

The last paper, presented by *Roshni Tara* (University of Surrey), finds that agents' expectations of house prices, despite not being part of the consumption basket, are an important determinant of overall inflation expectations. The authors set up a two-sector New Keynesian model where one sector's prices are overweighted in agents' inflation expectations and derive optimal monetary policy from the model. In this environment, the central bank should be especially attentive to the overweighted sector and react more actively to developments in this sector even if this implies reacting to asset prices.

8 Academic session B: monetary policy transmission and implementation

Academic session B, chaired by Claudia Kwapil (Senior Principal Economist, Monetary Policy Section, OeNB), featured four research papers revolving around the topic of monetary policy transmission and implementation. Two of these papers specifically focused on nonbank financial intermediaries.

Denis Gorea (European Investment Bank) presented the work of Cucic and Gorea (2022), who examine the question of whether nonbanks transmit monetary policy shocks in the same way as banks. Their findings reveal that nonbanks increase their credit supply following a contractionary monetary policy shock. After such a shock, banks experience a reduction in long-term debt funding, while nonbanks witness an inflow of funds that enables them to lend more. Consequently, nonbanks mitigate the actual impact of the traditional bank lending channel on the economy: nonbank credit safeguards corporate investment and household consumption against the adverse consequences of monetary contractions. Consequently, an expanding nonbank sector may diminish the effectiveness of monetary policy to restrain credit growth. At the same time, the borrowers who receive credit from nonbanks (and would not have received credit from banks) are not riskier. In this sense, nonbanks contribute to financial stability.

The topics of financial stability and nonbanks are also addressed in the paper by Haas and Kanngiesser (2023), presented by *Alexander Haas* (University of Oxford). According to the authors, the rise of nonbank financial intermediation in recent years has two contrasting effects. On one hand, nonbanks contribute to the deepening of capital markets, resulting in efficiency gains. On the other hand, nonbanks are susceptible to runs, posing a risk to financial stability. The authors demonstrate that during times of crisis, central bank liquidity provision can prevent runs on nonbanks. However, this action creates an ex ante moral hazard because nonbanks anticipate the central bank's intervention and increase their leverage, thereby increasing the risk of future financial panics. Nevertheless, the preliminary results

of the model indicate that the higher leverage of nonbanks does not lead to a higher frequency of runs. Additionally, asset prices remain consistently higher and overall welfare increases. Consequently, central bank intervention can support efficiency gains that finally outweigh the concerns regarding financial stability.

A paper presented by *Ander Perez-Orive* (Federal Reserve Board) investigated whether monetary policy shocks affect the economy asymmetrically, and the reasons behind it. Perez-Orive and Timmer (2022) observe that in the current US tightening cycle, there is a high proportion of financially distressed firms compared to previous tightening episodes. They discover that these financially distressed firms drive the asymmetric impact of monetary policy on investment and employment. When faced with contractionary monetary policy shocks, financially constrained firms exhibit a greater responsiveness in their borrowing and investment decisions compared to healthy firms. Furthermore, they are also more responsive to contractionary shocks than to expansionary shocks. These findings provide evidence of a financial mechanism contributing to the asymmetry of monetary policy. During the ensuing discussion, the question arose as to whether these financially constrained companies differ from healthy companies also in terms of their price-setting behavior. Preliminary evidence suggests that financially distressed firms indeed tend to increase their prices (or are more reluctant to decrease them) to address their liquidity issues. Consequently, they may contribute to a more inflationary environment.

Lastly, *Ryan Rholes* (University of Oxford) addressed the question, "Do central banks influence inflation expectations through their publicized forecasts, and what role does the accuracy of these forecasts play?" Managing inflation expectations is crucial for central banks that have adopted inflation-targeting frameworks. Furthermore, many of these banks rely on communication strategies to shape and manage these expectations. Specifically, they publish inflation forecasts and provide additional information related to these forecasts. Therefore, the question arises as to whether the credibility of central banks' forecasts is important for effective monetary policy. McMahon and Rholes (2022) demonstrate that forecasts and their performance do indeed matter. Specifically, individuals assign greater importance to central bank forecasts that have exhibited better accuracy in the recent past. Additionally, they find that effective communication can mitigate the impact of poor forecast performance.

The conference program, presentations and video replays can be found on the websites of SUERF and the OeNB.