# How have profits been shaping domestic price pressures in Austria?

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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.
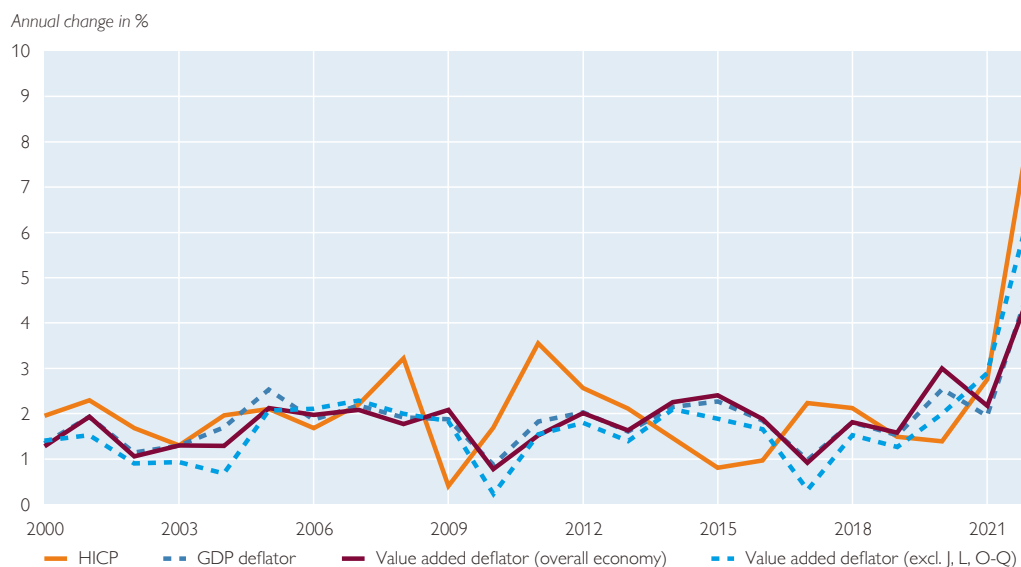
Energy imports were the main driver of the high inflation rates measured in 2022. With enterprises and their employees seeking to sustain their real income levels by charging higher prices and demanding higher wages, respectively, inflation has since spread to other product groups. Given the cause-and-effect 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.

Chart 1

**Inflation according to different measures**

*Annual change in %*



HICP ■ ■ GDP deflator ■ Value added deflator (overall economy) ■ ■ Value added deflator (excl. J, L, O-Q)

*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

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[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.

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

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.

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

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[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).

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## 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

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[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:

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

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**

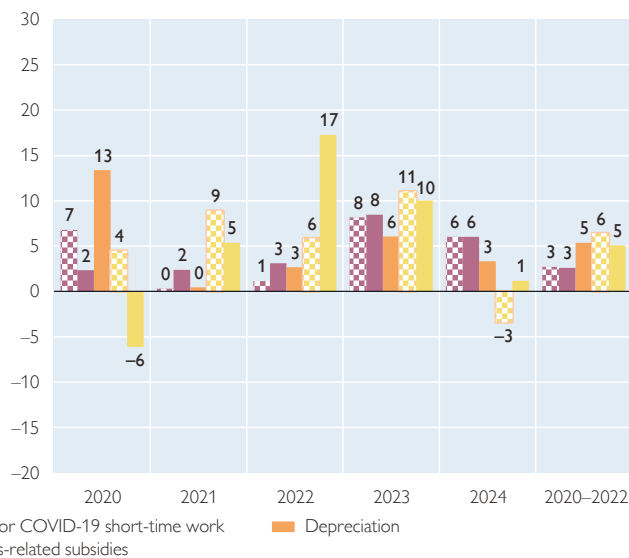**Value added growth by component (nominal)**

*Annual change (from 2019) in %*



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

*Annual change (from 2019) in %*



Legend:
- Compensation of employees
- Compensation of employees adjusted for COVID-19 short-time work
- Depreciation
- Net operating surplus
- Net operating surplus adjusted for crisis-related subsidies

*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

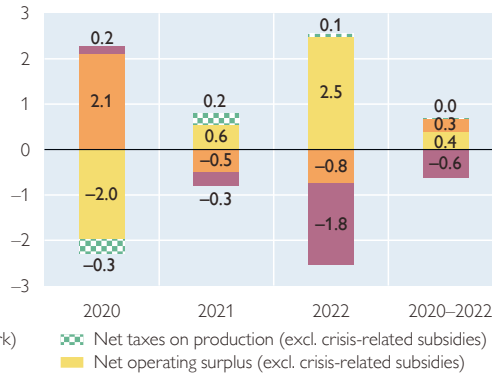## Overall economy (without NACE J, L and O-Q)

**Contribution to change in value added deflator**

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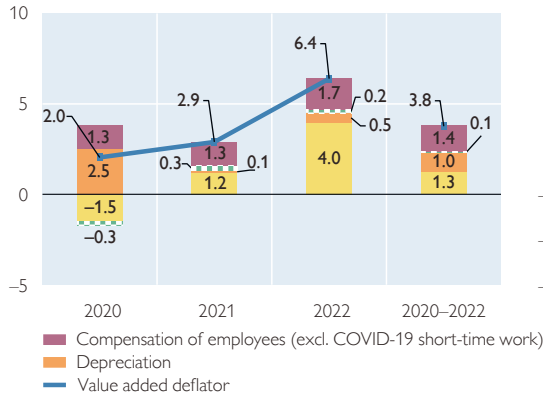


**Gap to distribution-neutral scenario with equal growth of all components**

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



Legend:
- 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.*

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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:*

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

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

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

*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.*

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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.

### 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*
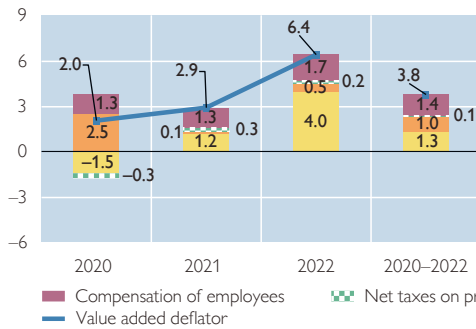
**Contribution to change in value added deflator (unadjusted contributions)**

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



Compensation of employees — Net taxes on production — Depreciation — Net operating surplus — Value added deflator
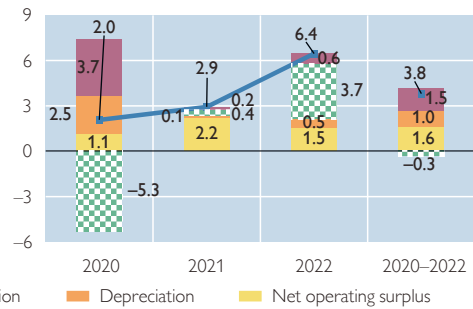
*Source: Statistics Austria, authors' calculations.*

*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.*

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[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

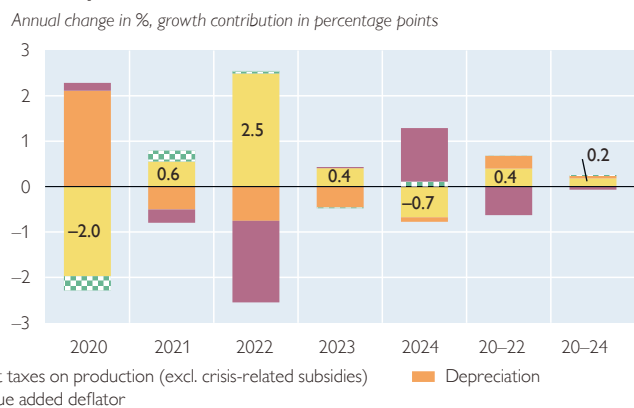**Overall economy until 2024 (without NACE J, L and O-Q)**

**Value added growth by component (excl. net taxes on production)**
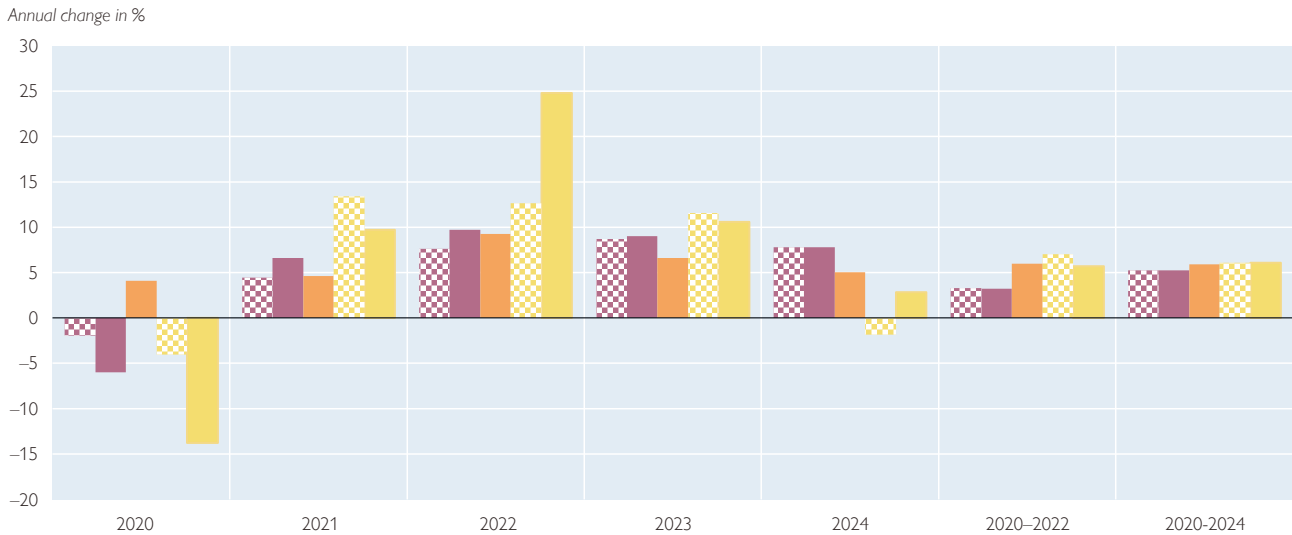
*Annual change in %*



**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 taxes on production (excl. crisis-related subsidies)  ■ Depreciation
Net operating surplus (excl. crisis-related subsidies)  — Value added deflator
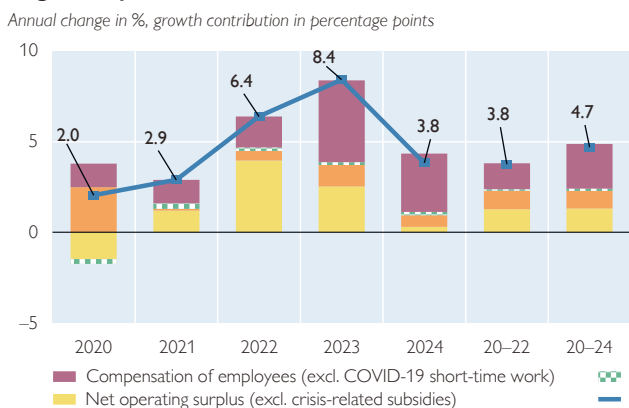
*Source: Statistics Austria, authors' calculations.*

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.
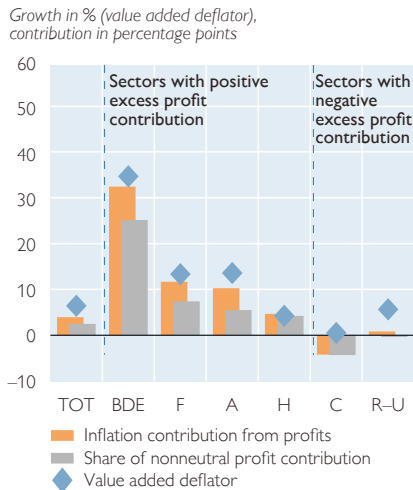
## Overview of sectoral results

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.
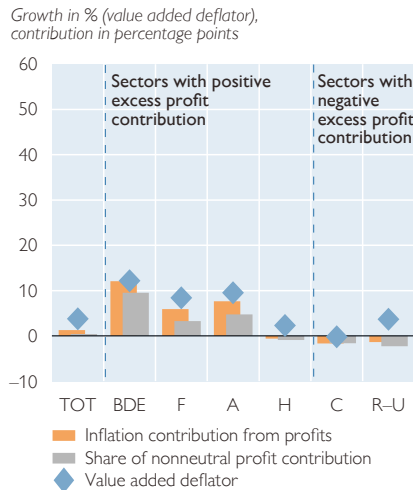
Chart 5

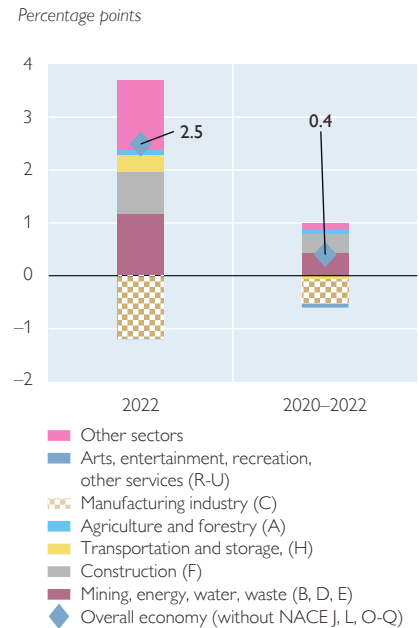### Inflation contribution from profits by sector



**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

Legend (left and middle panels):
- ■ Inflation contribution from profits
- ■ Share of nonneutral profit contribution
- ◆ Value added deflator

Legend (right panel):
- ■ Other sectors
- ■ Arts, entertainment, recreation, other services (R–U)
- ▨ Manufacturing industry (C)
- ■ Agriculture and forestry (A)
- ■ Transportation and storage, (H)
- ■ Construction (F)
- ■ Mining, energy, water, waste (B, D, E)
- ◆ Overall economy (without NACE J, L, O-Q)

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

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[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.*

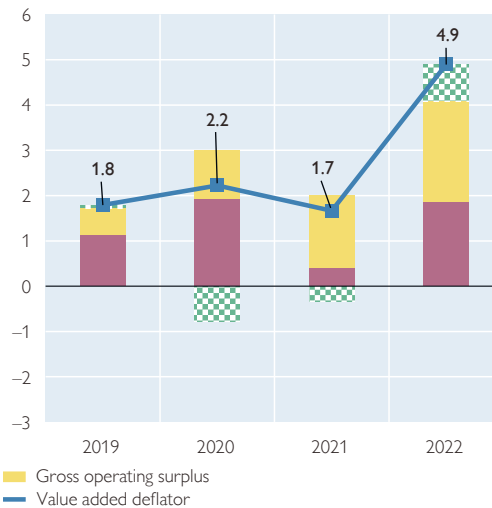Chart 6

**Comparison of value added deflators**

**Value added deflator for Austria**

*Annual change in %, contribution in percentage points*
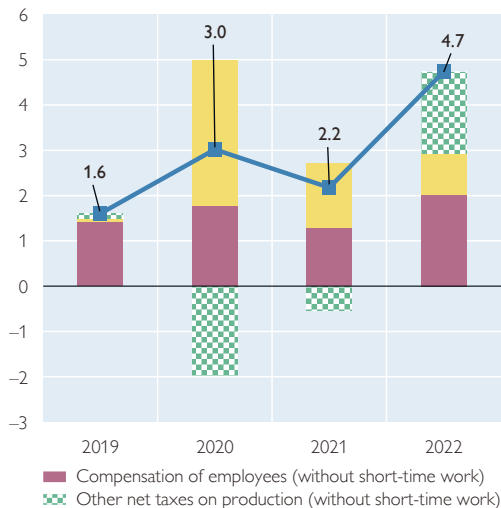
**Value added deflator for the euro area-20**

*Annual change in %, contribution in percentage points*



Compensation of employees (without short-time work)
Other net taxes on production (without short-time work)
Gross operating surplus
Value added deflator

*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 $\Delta$ 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.

$$K_{i,t} = K_{i,t-1} + I_t - D_t = K_{i,t-1} * (1 - r_i) + I_t * (1 - 0.5 * r_i)$$

(Real) depreciation and amortization results from

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

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.

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[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).*
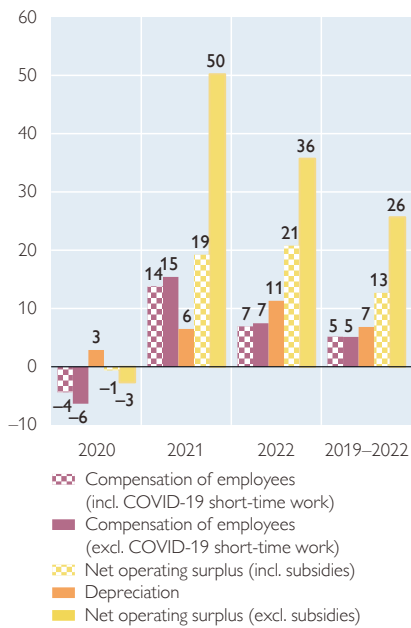
## Annex 3

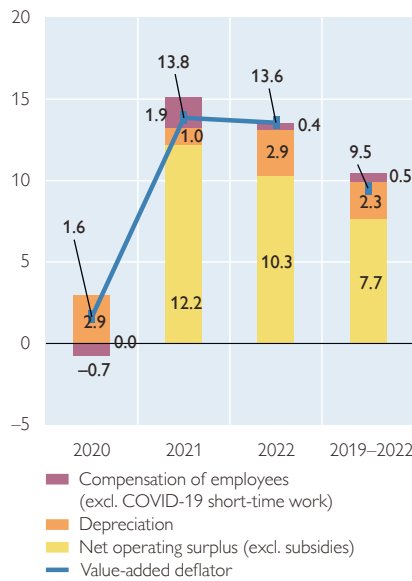## Results of the sectoral decomposition

### Agriculture and forestry (NACE A)

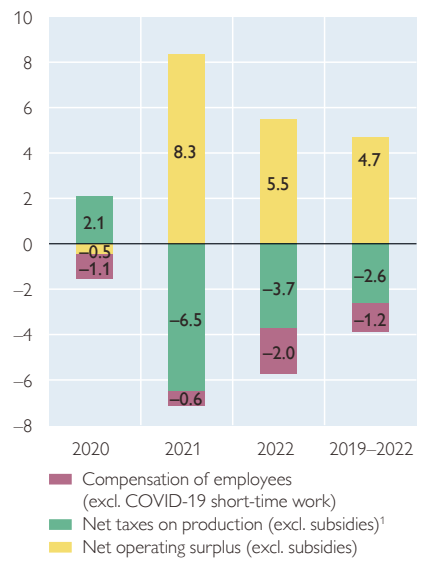**Value added growth by component (excl. net taxes on production)**

*Annual change in %*



- Compensation of employees (incl. COVID-19 short-time work)
- Compensation of employees (excl. COVID-19 short-time work)
- Net operating surplus (incl. subsidies)
- Depreciation
- 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)
- 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)
- Net taxes on production (excl. subsidies)[1]
- Net operating surplus (excl. subsidies)
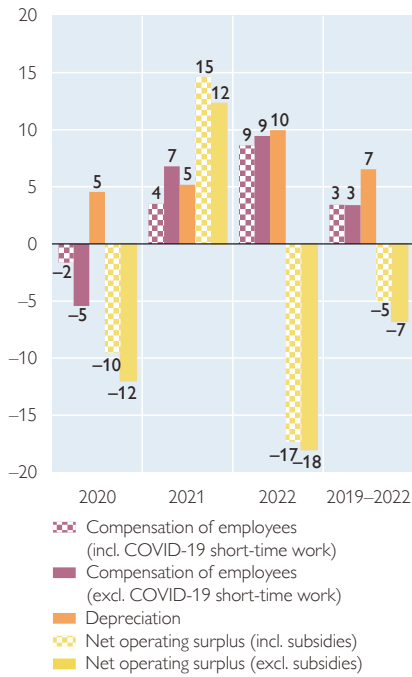
Source: Statistics Austria, authors' calculations.

[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.
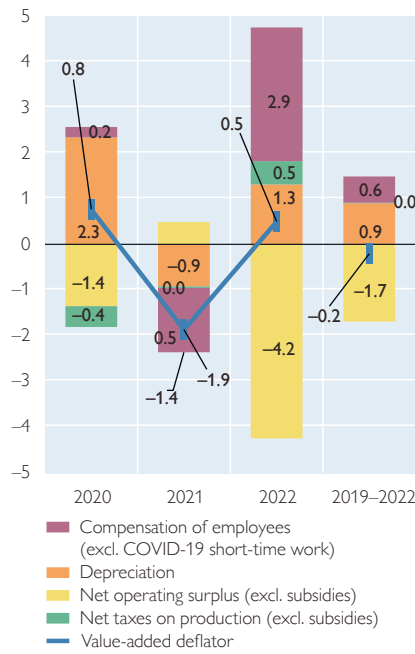
## Manufacturing industry (NACE C)

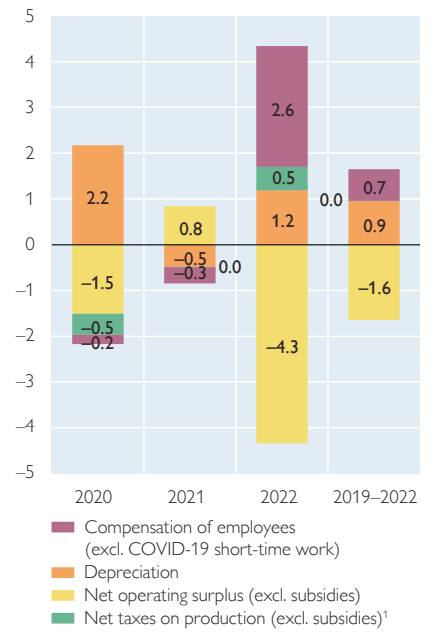**Value added growth by component (excl. net taxes on production)**

*Annual change in %*



Legend:
- 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*



Legend:
- 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*



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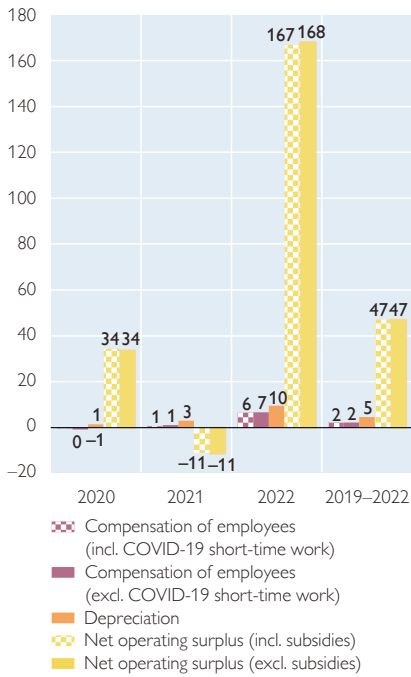- Net taxes on production (excl. subsidies)[1]

*Source: Statistics Austria, authors' calculations.*
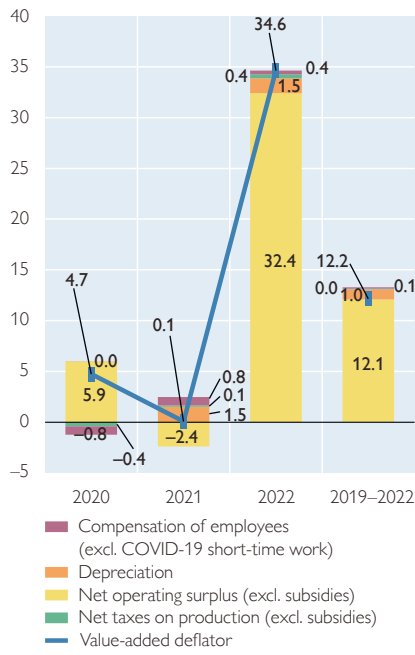
# Mining, energy, water and waste (NACE B, D-E)

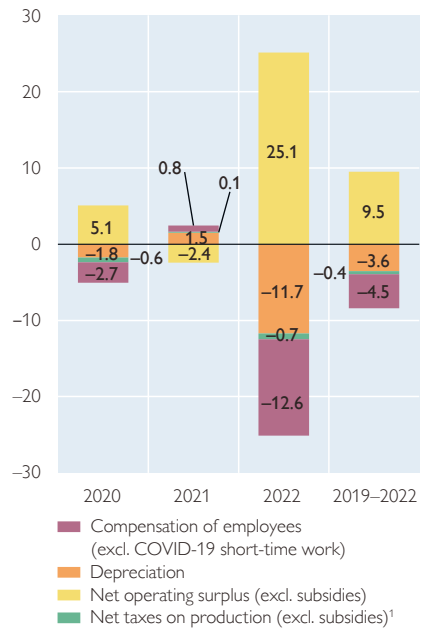**Value added growth by component (excl. net taxes on production)**

*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**

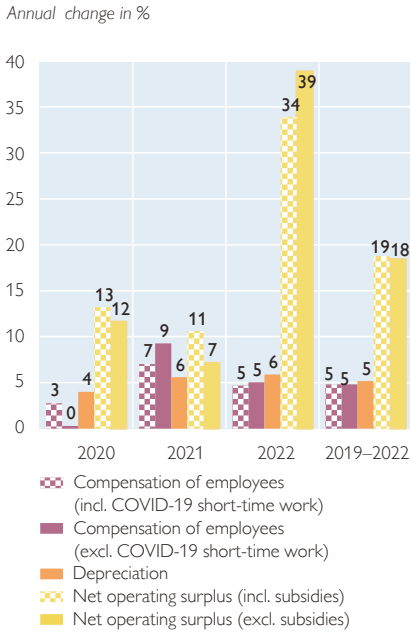*Annual change in %, growth contribution in percentage points*



Left chart legend:
- 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)

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

Right chart legend:
- 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.*

## Construction (NACE F)

**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.

## Wholesale trade and motor vehicles (NACE G)

**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)
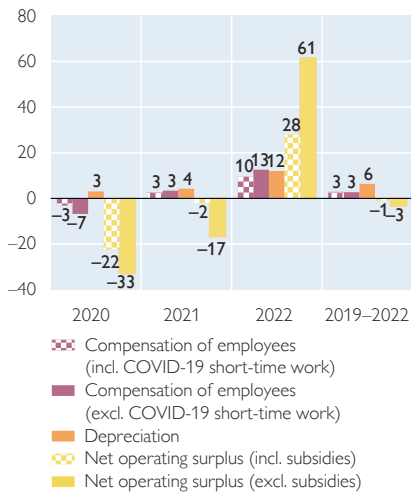Net taxes on production (excl. subsidies)[1]

Source: Statistics Austria, authors' calculations.
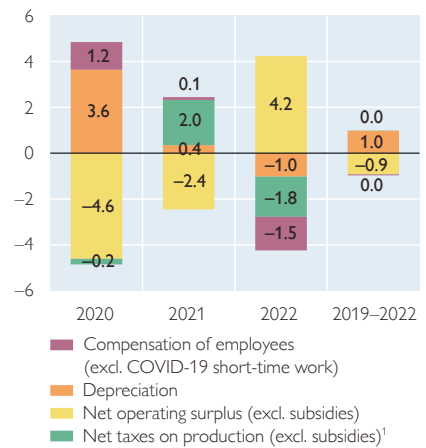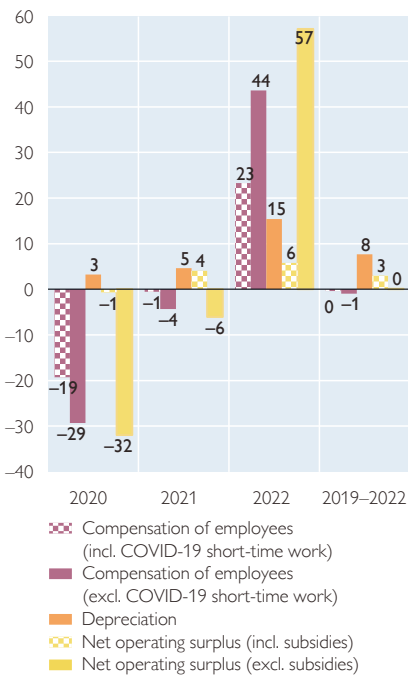
Chart A6

## Transportation and storage (NACE H)

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

*Annual change in %*



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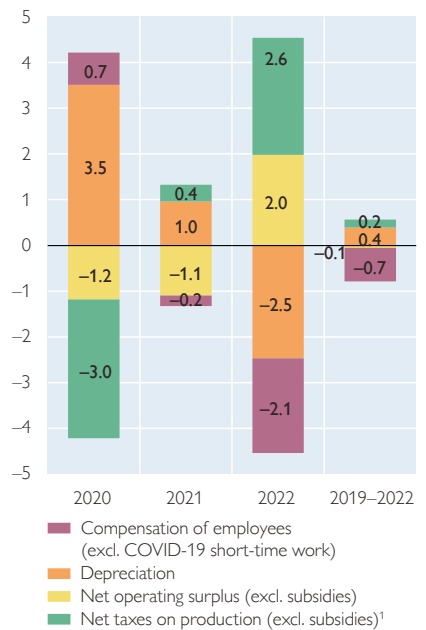- Net operating surplus (excl. subsidies)

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

*Annual change in %, growth contribution in percentage points*



Legend:
- 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*



Legend:
- Compensation of employees (excl. COVID-19 short-time work)
- Depreciation
- Net operating surplus (excl. subsidies)
- Net taxes on production (excl. subsidies)[1]
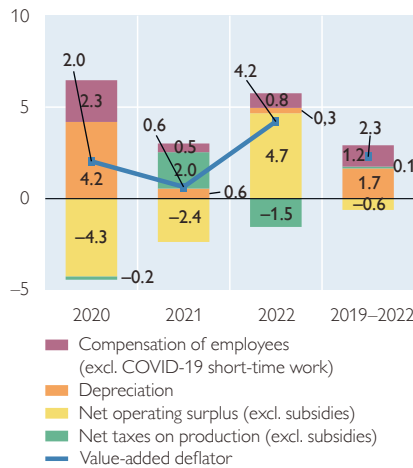
*Source: Statistics Austria, authors' calculations.*

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Chart A7

## Accommodation and food services (NACE I)

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

*Annual change in %*



Legend:
- 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*



Legend:
- 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*



Legend:
- Compensation of employees (excl. COVID-19 short-time work)
- Depreciation
- Net operating surplus (excl. subsidies)
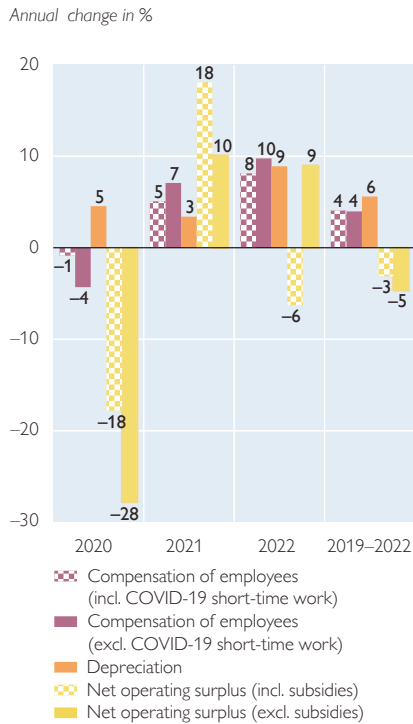- Net taxes on production (excl. subsidies)[1]
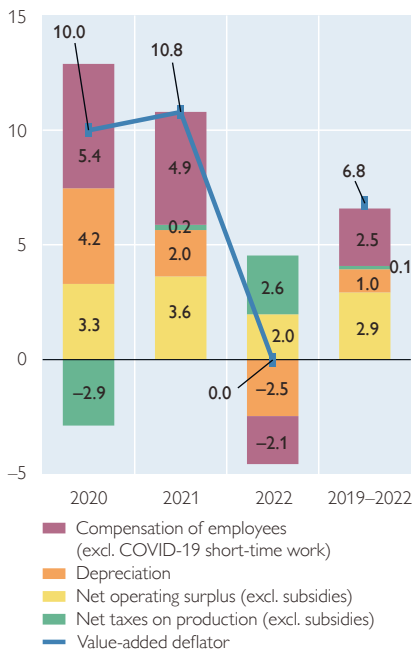
*Source: Statistics Austria, authors' calculations.*
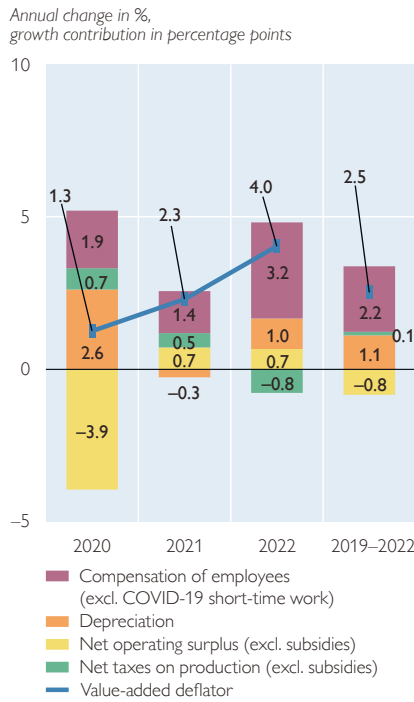
Chart A8
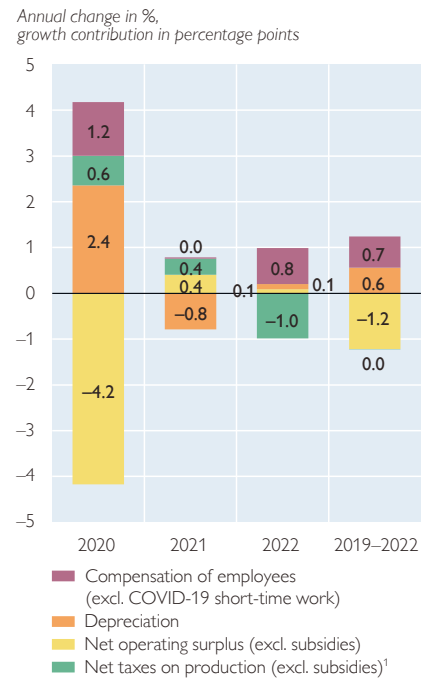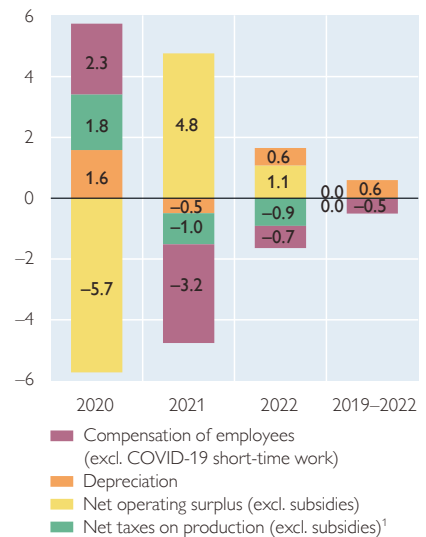
## Other private sector services (NACE K, M-N, R, T-U)

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

*Annual change in %*



Legend:
- 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*



Legend:
- 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**

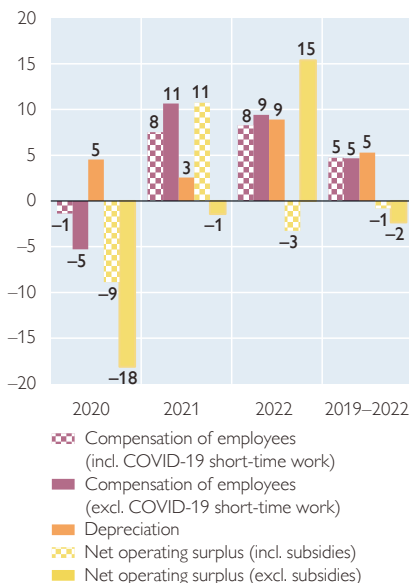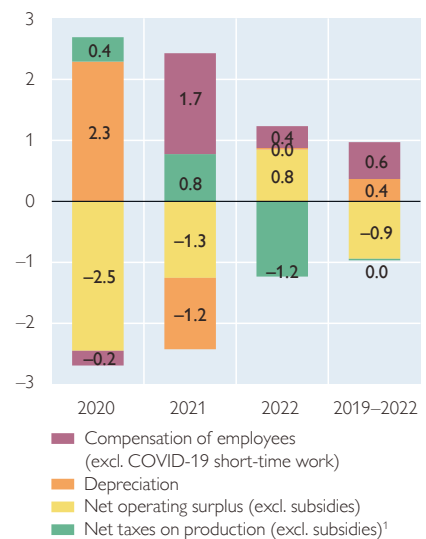*Annual change in %,*
*growth contribution in percentage points*



Legend:
- 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.*

# Financial and insurance services (NACE K)

**Value added growth by component (excl. net taxes on production)**
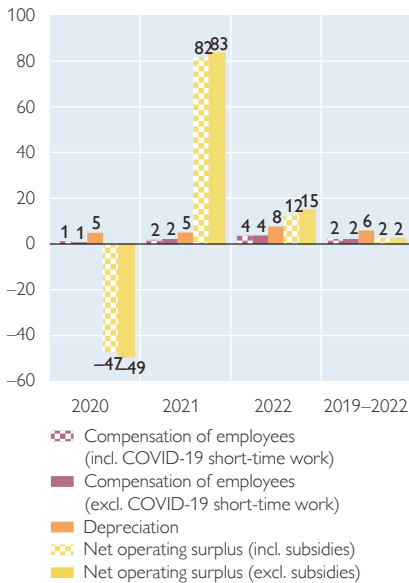
*Annual change in %*



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]
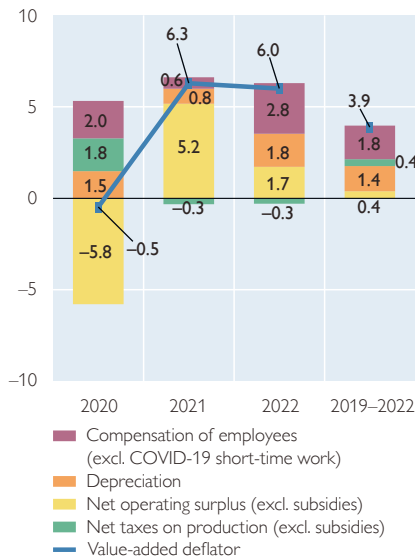
*Source: Statistics Austria, authors' calculations.*

# 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)
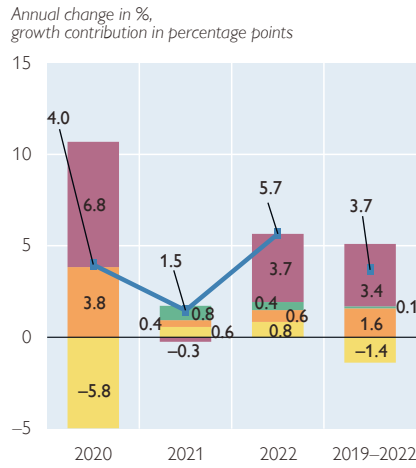Net taxes on production (excl. subsidies)[1]
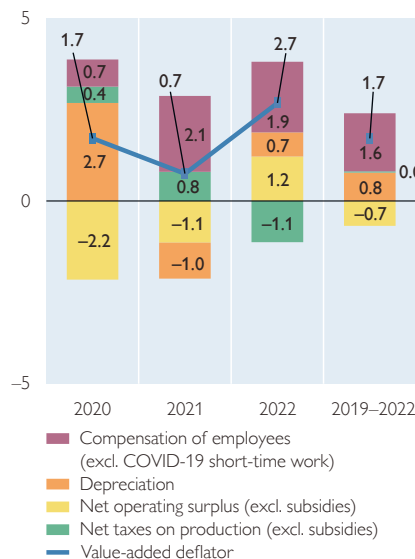
*Source: Statistics Austria, authors' calculations.*

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

**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.*

## Components of net taxes on production

**Overall economy (without NACE J, L, O-Q)**
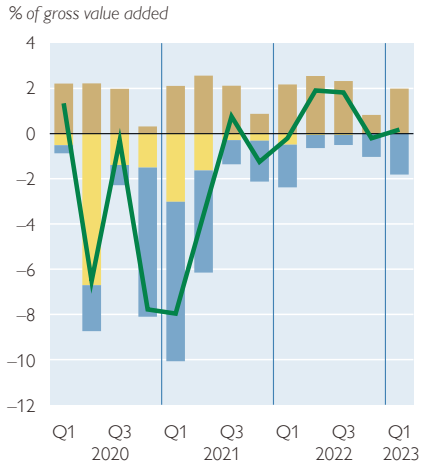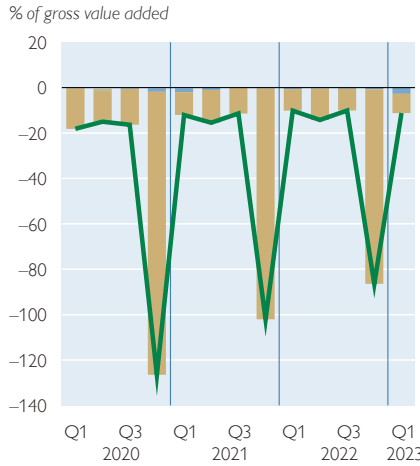
% of gross value added

**Agriculture and forestry (NACE A)**

% of gross value added

**Manufacturing industry (NACE C)**

% of gross value added

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

% of gross value added

**Construction (NACE F)**

% of gross value added

**Wholesale (NACE G)**

% of gross value added

**Transportation and storage (NACE H)**

% of gross value added
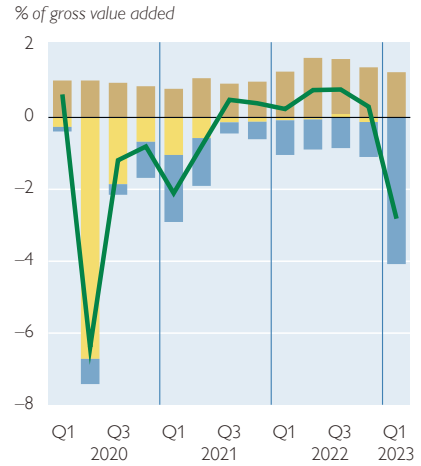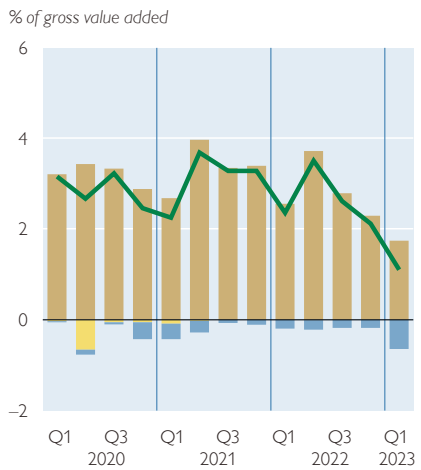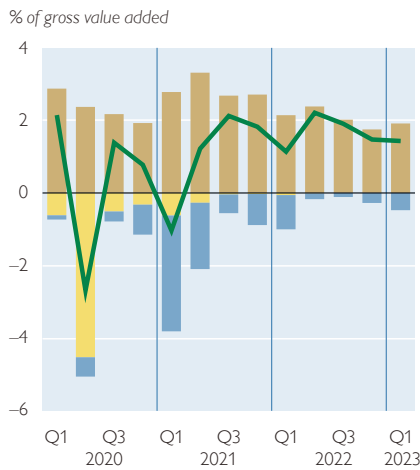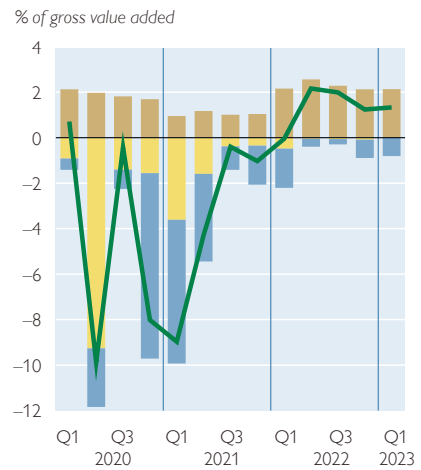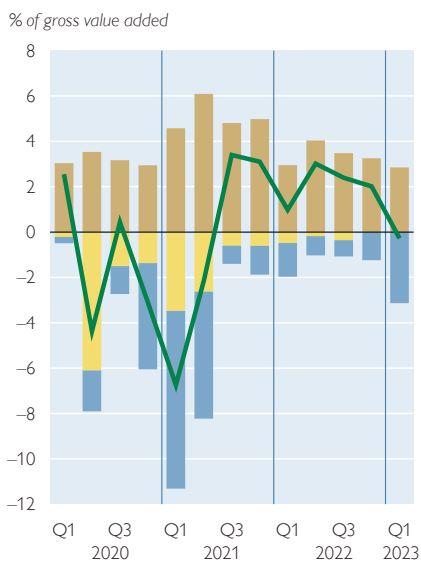
**Accommodation and food services (NACE I)**

% of gross value added
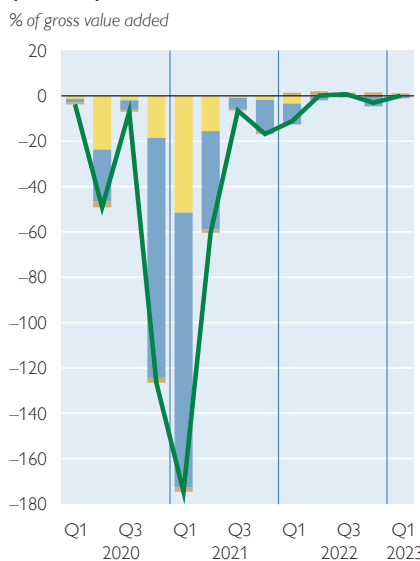
**Other private sector services (NACE J-K, M-N, R, T-U)**

% of gross value added
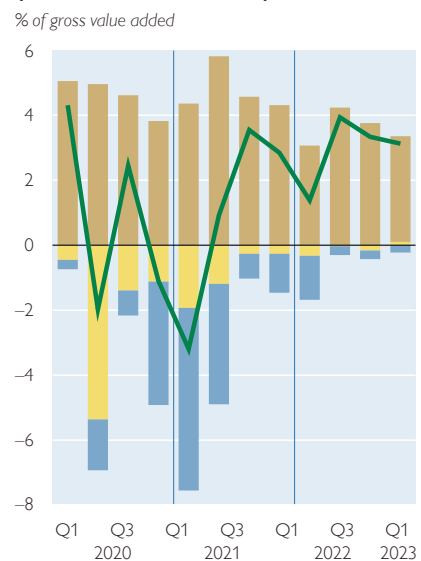
■ Net taxes on production (without COVID-19 subsidies)    ■ Other COVID-19 subsidies    ■ Short-time work subsidies    — Total

*Source: Statistics Austria, authors' calculations.*

How have profits been shaping domestic price pressures in Austria?

Chart A13

# Contributions to value added deflator growth (quarterly data)
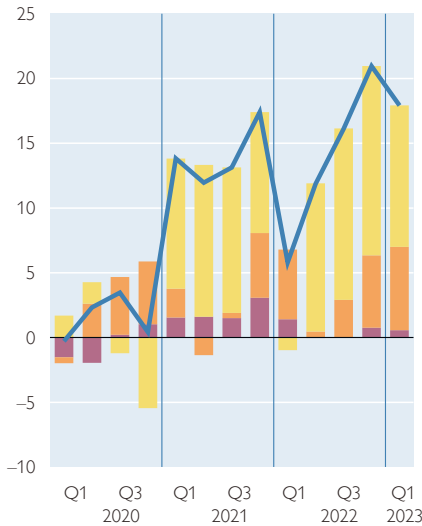
## Overall economy (without NACE J, L, O-Q)

*Annual change in %,*
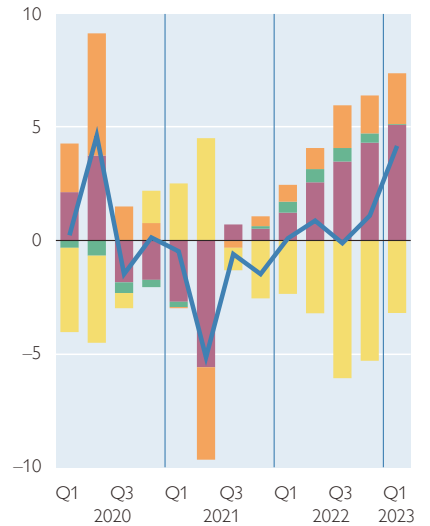*growth contribution in percentage points*
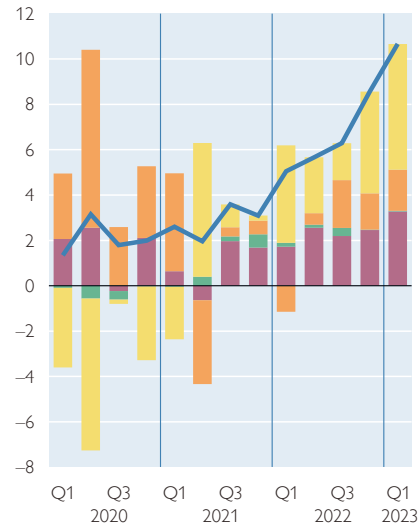


## Agriculture and forestry (NACE A)

*Annual change in %,*
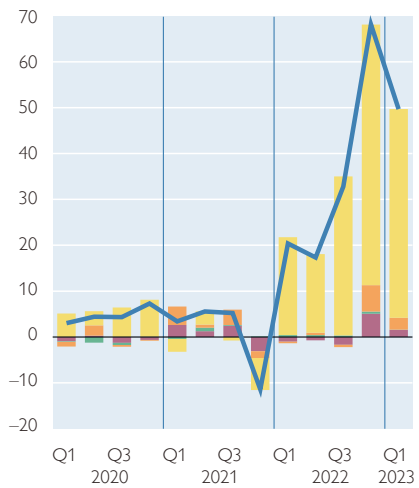*growth contribution in percentage points*



## Manufacturing industry (NACE C)

*Annual change in %,*
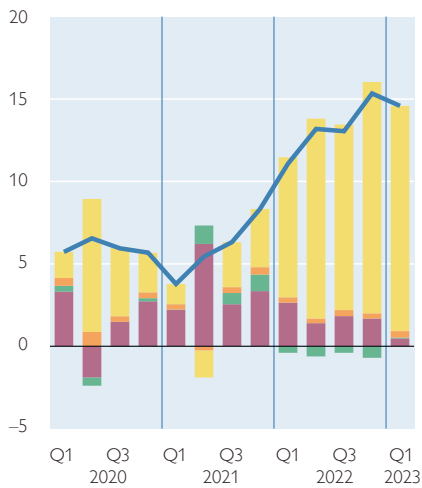*growth contribution in percentage points*



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

*Annual change in %,*
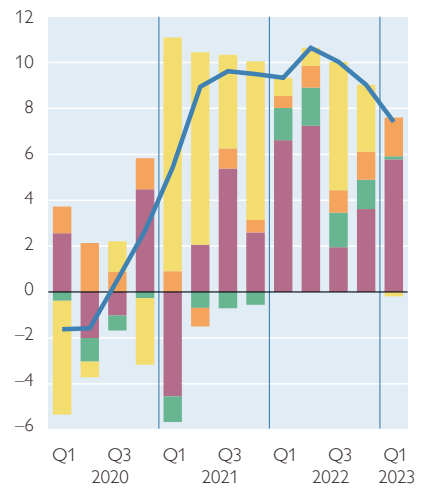*growth contribution in percentage points*



## Construction (NACE F)

*Annual change in %,*
*growth contribution in percentage points*



## Wholesale trade and motor vehicles (NACE G)

*Annual change in %,*
*growth contribution in percentage points*
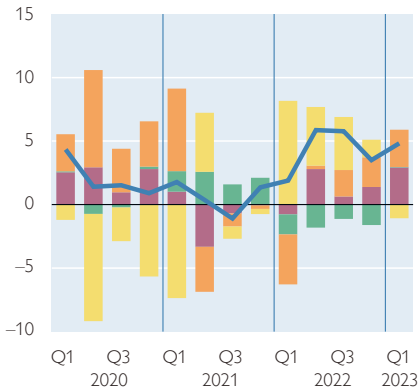


■ Compensation of employees   ■ Net taxes on production   ■ Depreciation   ■ Net operating surplus   —— Total

*Source: Statistics Austria, authors' calculations.*

## 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 %,*
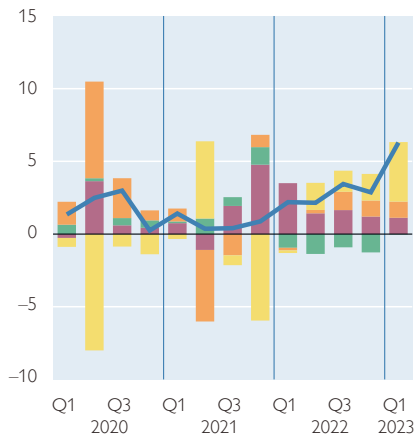*growth contribution in percentage points*



**Manufacturing industry (NACE C)**

*Annual change in %,*
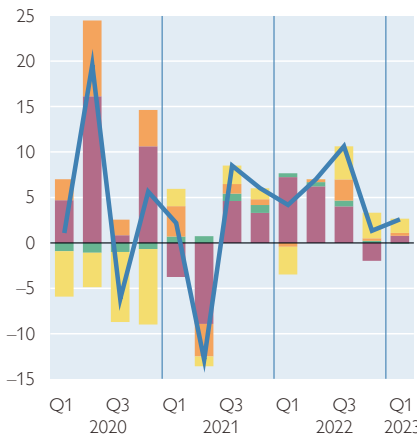*growth contribution in percentage points*



**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*



■ Compensation of employees  ■ Net taxes on production  ■ Depreciation  ■ Net operating surplus  ▬ Total

*Source: Statistics Austria, authors' calculations.*

## 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.*