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Austrian economy to slow down after strong first half

Friedrich Fritzer, Martin Schneider, Richard Sellner, Alfred Stiglbauer, Klaus Vondra[1]

In the second half of 2022, the war in Ukraine and ensuing high inflation are set to deal a major blow to Austria's economy. In the first half, robust economic growth was still carried by consumers' pent-up demand and strong exports. As a result, economic growth will still come to about 5% in 2022 as a whole. Yet, in the summer, first signs of a trend reversal became evident in the Austrian labor market. Unemployment rates are already edging up, starting from lower levels than before the COVID-19 pandemic, and the number of people in employment and vacancies are edging down. HICP inflation had increased sharply since the beginning of the year, but in August lower fuel prices caused it to move sideways. For the rest of the year, inflation is, however, expected to remain high.

1 After strong first half, economic growth to weaken notably in second half

Austria's economic performance in 2022 reflects two very different developments. In the first half, the economy grew strongly due to catching-up effects both on the demand side – in private consumption and foreign trade – and on the supply side, namely in industry, wholesale and retail trade as well as food services. In the second half, we expect economic growth to weaken considerably amid high uncertainty related to the war in Ukraine and a spurt in inflation.

According to the quarterly national accounts data released by Statistics Austria, the Austrian economy grew by 1.5% in the second quarter of 2022 (quarter on quarter; in real terms, seasonally and working-day adjusted). Economic growth had thus been revised upward considerably against the end-July national accounts flash estimate (+0.5%) published by the Austrian Institute of Economic Research (WIFO) on July 29, 2022. In addition, growth figures were also revised upward for the third quarter of 2021 (+0.3 percentage points) and the first quarter of 2022 (+0.4 percentage points). As a result, the GDP forecast for 2022 overall was mechanically revised upward by 1.6 percentage points from +3.8% (OeNB's economic assessment of June 2022) to +5.4%. In the same vein, quarter-on-quarter growth rates were also revised upward, some even considerably, in Germany (Q1 22), Italy (Q1 and Q2 22), Spain (Q2 22) and the Netherlands (Q1 and Q2 22). As a consequence, the euro area as a whole is set to record an annual growth rate that exceeds expectations before the summer.

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Table 1

National accounts data for Austria (Q2 data published on September 1, 2022)

	GDP	Private consumption	Government consumption	Gross fixed captial formation	Exports	Imports	Domestic demand (without inventories)	Net exports	Changes in inventories	Statistical discrepancy	Inventories and statistical discrepancy
	Change on previous period in %						*Contribution to GDP growth in percentage points*				
Q3 21	+3.7	+9.0	+1.9	–4.4	+1.3	+0.6	3.6	0.4	–1.0	0.7	–0.3
Q4 21	–0.9	–3.6	+4.0	+1.7	+2.0	+1.9	–0.6	0.1	–0.2	–0.3	–0.4
Q1 22	+1.9	+1.6	–3.2	+0.1	+6.8	+5.2	0.1	1.0	0.6	0.1	0.7
Q2 22	+1.5	+0.8	+0.9	–1.0	+2.4	–0.3	0.3	1.7	0.1	–0.6	–0.5
2020	–6.9	–8.4	–0.4	–5.0	–11.5	–9.5	–5.6	–1.6	0.1	0.3	0.4
2021	+4.8	+3.6	+8.5	+8.7	+9.7	+13.3	5.8	–1.6	0.5	0.1	0.6
Revisions compared to flash Q2 national accounts data (published on July 29, 2022)											
	Percentage points						*Percentage points*				
Q3 21	+0.3	–1.2	+0.1	–1.7	+0.4	–0.7	–1.0	+0.6	-	-	–1.1
Q4 21	–0.1	+0.2	–0.4	+1.7	+0.1	–0.9	+0.4	+0.5	-	-	–1.4
Q1 22	+0.4	+0.8	–0.2	–1.5	+4.6	+1.6	+0.0	+1.8	-	-	–0.3
Q2 22	+1.0	+2.7	+0.9	–2.2	–0.3	–0.8	+1.0	+0.3	-	-	0.0
2021	–0.1	+0.3	+0.2	+4.5	–4.8	–3.1	+1.3	–1.0	-	-	0.0

Source: Statistics Austria, WIFO.

The revisions of the national accounts data point to a much more favorable economic development than the flash estimate of July 29. At +0.8%, private consumption now posts a positive growth rate, as opposed to the strong decline (–1.9%) in the flash estimate. Government consumption was likewise revised upward, while investments were revised downward to –1.0%.

From a production-side perspective, both the industry sector (+1.3%) and the services sector (+1.6%) expanded significantly. At +19%, the strongest recovery was recorded for accommodation and food service activities (NACE I; not shown separately in table 2). In the second quarter of 2022, the value added of this sector amounted to 81% of the pre-crisis level (2019). It had already stood at 89% in the third quarter of 2021, before dropping again to 63% because of the lockdown in the fourth quarter of 2021.

Table 2

National accounts data for Austria (production-side data published on September 1, 2022)

	GDP	Gross value added	Agriculture (NACE A)	Industry (NACE B–E)	Manu-facturing (NACE C)	Construc-tion (NACE F)	Services, total (NACE G–U)	Services, private (NACE G–N)
	Change on previous period in %							
Q3 21	+3.7	+3.6	–1.0	+0.8	+0.7	–2.0	+5.1	+6.2
Q4 21	–0.9	–1.1	–2.4	+1.4	+0.5	–1.0	–1.8	–2.5
Q1 22	+1.9	+2.3	+2.1	+1.8	+2.1	+2.8	+2.3	+3.4
Q2 22	+1.5	+1.4	–2.0	+1.3	+1.3	–0.7	+1.6	+1.6
2020	–6.9	–6.9	–2.8	–6.5	–7.0	–2.9	–7.5	–8.1
2021	+4.8	+4.2	+7.9	+7.7	+9.1	+3.2	+3.2	+2.7
Revisions compared to national accounts data (Q2 flash data published on July 29, 2022)								
	Percentage points							
Q1 21	–0.3	–	–	–1.1	–0.2	–1.1	–0.6	–1.4
Q2 21	+0.0	–	–	+0.2	+0.9	–0.2	+0.2	+0.1
Q3 21	+0.3	–	–	–1.0	–0.8	–1.0	+0.6	+0.7
Q4 21	–0.1	–	–	+0.8	+0.1	–0.7	–0.5	–0.9
Q1 22	+0.4	–	–	+0.6	+0.7	+1.2	+0.2	+0.7
Q2 22	+1.0	–	–	+0.6	+1.1	–0.8	+1.3	+1.3
2020	–0.0	–	–	–0.0	+0.0	+0.0	–0.0	–0.0
2021	–0.1	–	–	–1.4	+0.5	–1.7	–0.3	–1.4

Source: Statistics Austria, WIFO.

Table 2 continued

National accounts data for Austria (production-side data published on September 1, 2022)

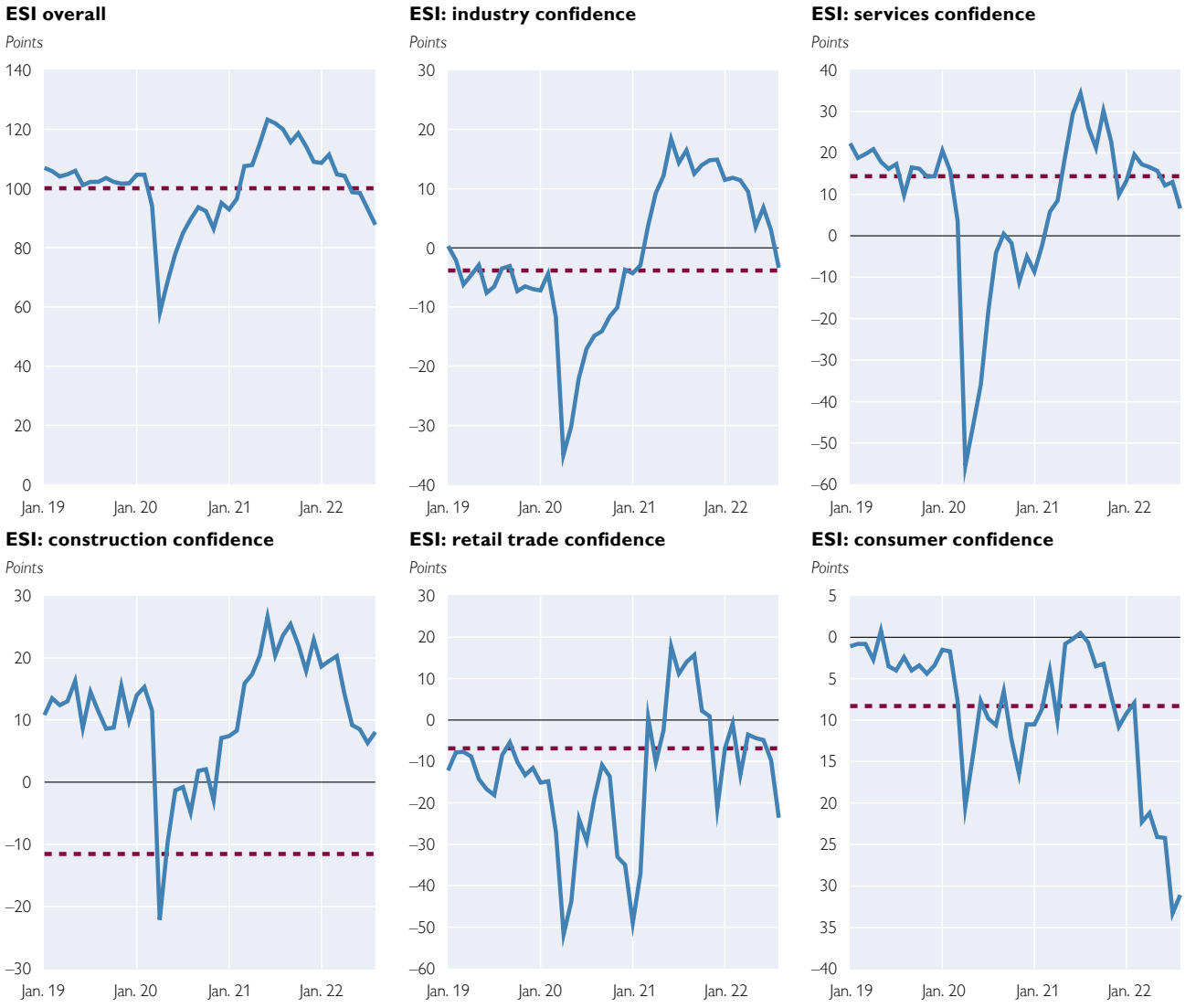
	Trade, transport/ storage, hospitality (NACE G–I)	Information and com-munication (NACE J)	Financial and insurance services (NACE K)	Real estate activities (NACE L)	Scientific and technical activities (NACE M–N)	Public services (NACE O–U)	Public adminis-tration (NACE O–Q)	Other services (NACE R–U)
	Change on previous period in %							
Q3 21	+15.0	+1.2	+0.2	+0.5	–0.1	+2.5	+1.7	+8.9
Q4 21	–6.2	+1.2	+1.6	+0.5	–0.8	–0.1	+0.9	–7.2
Q1 22	+5.6	+0.8	–1.6	+1.0	+4.8	–0.4	–1.0	+4.6
Q2 22	+3.8	+0.1	–1.5	+0.4	+0.3	+1.6	+1.6	+1.6
2020	–15.5	–1.7	+4.7	+0.3	–8.0	–5.8	–3.6	–19.5
2021	+1.2	+3.5	+2.4	+1.1	+7.0	+4.5	+4.8	+2.3
Revisions compared to national accounts data (Q2 flash data published on July 29, 2022)								
	Percentage points							
Q1 21	–2.8	+0.0	–0.6	–0.1	–1.1	+1.4	+1.5	+0.7
Q2 21	+0.1	+0.4	+0.3	–0.4	+0.7	+0.5	+0.6	+0.0
Q3 21	+2.1	–0.1	–1.3	–0.8	+1.2	+0.5	+0.6	+0.3
Q4 21	–0.6	–0.2	–1.4	–0.2	–2.1	+0.4	+0.3	+0.4
Q1 22	+2.2	–0.9	–1.7	–0.1	+0.4	–1.1	–1.1	–1.3
Q2 22	+3.7	+0.3	–2.3	+0.1	–0.8	+1.2	+1.6	–1.2
2020	–0.0	–0.0	–0.1	–0.0	–0.0	+0.0	+0.0	+0.0
2021	–2.5	–0.0	–1.8	–0.8	–0.2	+2.3	+2.5	+1.2

Source: Statistics Austria, WIFO.

In the second half of 2022, this brisk growth will level off markedly, however. Among others, the EU economic sentiment indicator (ESI) produced by the European Commission, the WIFO business climate index and the purchasing managers' index recorded significant declines in July and August, indicating an economic slowdown in Austria in the coming months. While the situation in summer was still predominantly deemed stable in most areas, firms' expectations for the future are deteriorating. Especially order volumes, also from abroad, started downtrending. Consumer confidence even hit a historic low in July 2022, and retail trade confidence likewise dropped considerably, namely from –9.7 in July to –23.6 in August. In the construction sector, confidence, while at a high level, had already been shaken in the second quarter. The expected rise in interest rates and stricter housing

Chart 1

EU economic sentiment indicator (ESI)

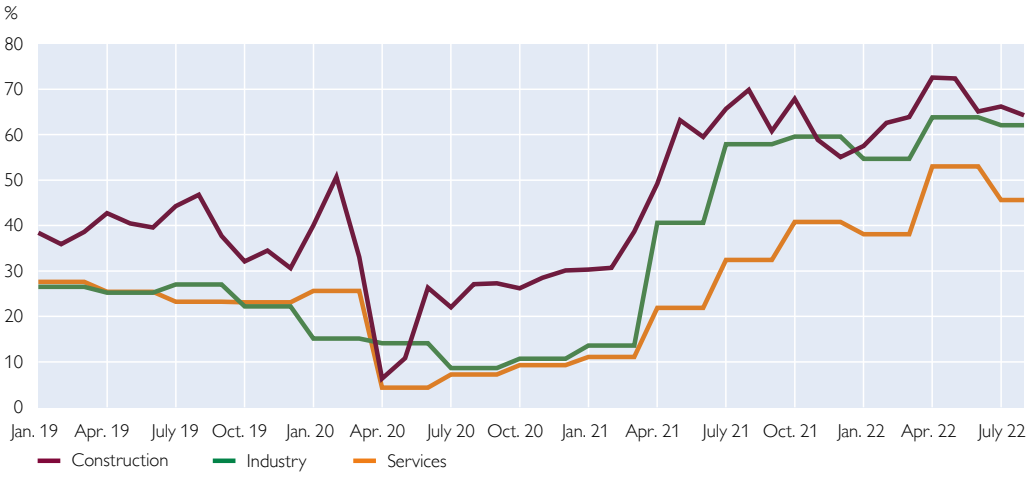


Source: European Commission (DG ECFIN).

Note: Includes data for August 2022. Dotted lines reflect long-run averages (1999 to 2019).

Chart 2

Share of Austrian firms reporting labor or material/capacity shortages



Source: European Commission (DG ECFIN).

loan criteria may continue to drive the slowdown in construction activity. In the services sector, confidence dropped below its long-term average in August, suggesting that catching-up effects due to the reopening of restaurants and tourism services are petering out.

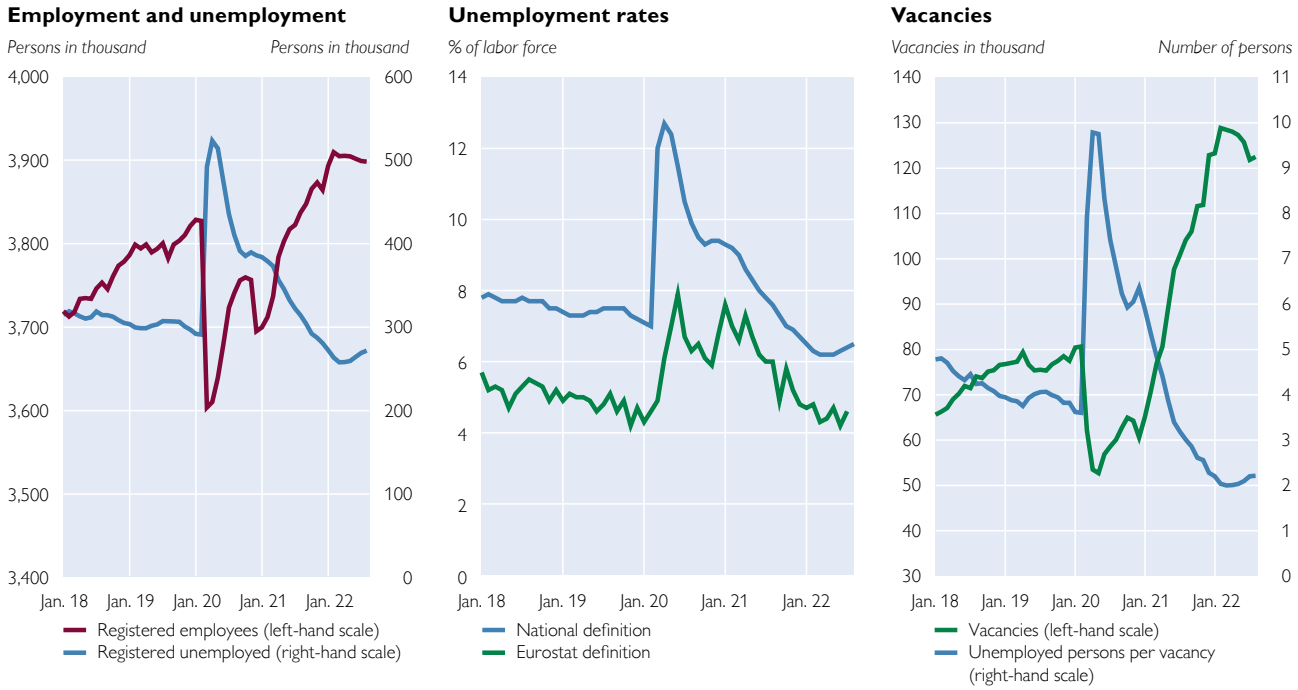
On the demand side, persistently high inflation keeps slowing income growth and, by extension, consumption. Given a worldwide tightening of monetary policy that goes hand in hand with rapidly rising interest rates, refinancing costs are going up. This in turn puts a damper on the willingness to invest, which has already been diminishing due to the currently high uncertainty. Production expectations are being revised downward considerably, especially in Germany and some countries in Central, Eastern and Southeastern Europe (CESEE), as the war in Ukraine is expected to continue and uncertainty about Russia's gas supplies to Europe remains high. The chance of a recession is rising not only in the USA but also in Germany, and thus in the entire euro area. The slowing economy is mirrored in the decline of global supply chain pressures as measured by the Federal Reserve Bank New York. Although many firms still report labor/material shortages or capacity constraints, we expect economic tensions to ease in the second half of 2022.

2 Labor market remains tight due to labor shortages; wage pressure rises

The Austrian labor market remained tight during summer. Seasonally adjusted employment well exceeded its pre-pandemic level but had not increased further since February 2022. The national unemployment rate provided by the Public Employment Service Austria (AMS) rose from its low of 6.1% in March 2022 to 6.5% in August, still remaining below its pre-crisis level of 7.0% in February 2020. The Eurostat unemployment rate stood at 4.3% in July 2022 (February 2020: 4.6%). Having hit a record high of almost 130,000 in February 2022, immediate vacancies sank to about 122,000 in August. Yet, the recent rise in unemployment and decrease in vacancies have increased the number of job seekers per

Chart 3

Labor market developments in Austria since 2018



Source: AMS (Public Employment Service Austria), OeNB.

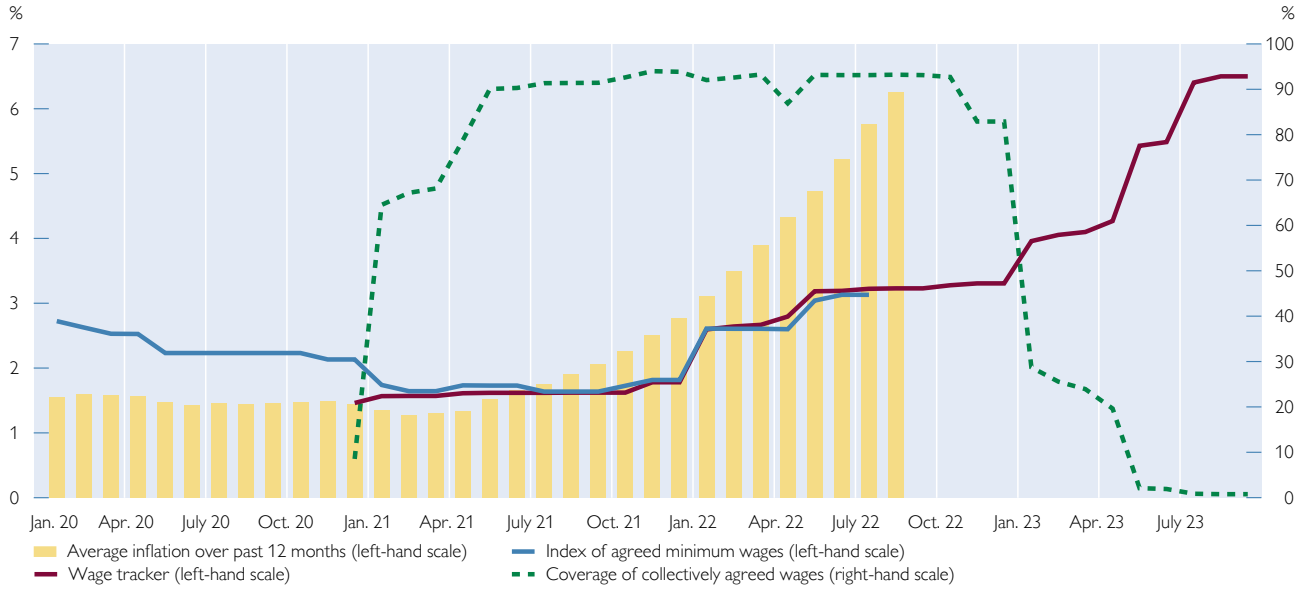
Note: Seasonally adjusted data until end-July 2022.

vacancy only slightly. On average, the number of job seekers per job opening amounts to only 2.2; before the pandemic, this number was twice as high. In other words, labor shortages remain high. In July, labor shortages were cited as the main reason for limited production by 24% of companies in the industrial sector (long-term average: 7%), 35% in the construction sector (12%) and almost 37% in the services sector (11%).

Collective wage agreements in the last months show an upward trend. Still, the index of agreed minimum wages is rising only slowly, given the lesser weight in the index of recent agreements. To better capture the current uptrend in collective wage agreements, the OeNB developed an alternative indicator, the so-called wage tracker. Currently, it is based on 336 collective wage agreements that have been concluded since September 2020. The index is calculated as a monthly average of collectively agreed wage increases weighted by employment. Chart 4 shows that, in recent months, the wage tracker (red line) was closely in sync with the increasing index of agreed minimum wages (blue line). For the near future, the wage tracker shows wage increases of over 6% owing to certain favorable agreements recently concluded, which extend to mid-2023 (e.g. meat industry: +5.7%, clothing industry: +5.4%, mill industry: +5.5%, animal feed industry: +6.0%, bakery trade: +6.5%). Collective wage agreements in Austria are, as a rule, concluded for a period of 12 months. Rising wages depicted by the wage tracker are roughly in line with the inflation measure usually used in collective bargaining (average inflation over past 12 months; yellow columns in chart 4). Though only a small number of

Chart 4

OeNB wage tracker: current and future collectively agreed wages in Austria



Source: Statistics Austria, Austrian Trade Union Federation, Austrian Ministry of Labour, OeNB.

Note: Latest data point: September 2023.

employed persons has experienced high wage increases (see dashed green line reflecting the coverage of collective wages in chart 4), we expect wage increases to remain high overall in fall 2022, provided no major macroeconomic changes will occur.

3 Inflation continues to rise unabated in the third quarter of 2022[2]

Inflation as measured by the Harmonised Index of Consumer Prices (HICP) continued to rise sharply in Austria in recent months, reaching 9.4% in July 2022. Such a high level was last seen in Austria in the mid-1970s, when oil prices had soared in the wake of the first crude oil price crisis. In its flash estimate for August, Statistics Austria expected HICP inflation to inch down to 9.2%.[3] August is, however, unlikely to have brought a trend reversal as major energy providers (EVN and Wien Energie, the utility providers serving Austria's largest province and Vienna) had announced substantial electricity price increases for September 2022. From December onward, we expect the electricity price cap adopted by the Austrian government in early September to bring down inflation. The price cap is set to ensure that households will pay no more than 10 cent per kilowatt hour (kWh) for electricity up to a volume of about 2,900 kWh; beyond that, market prices will kick in.

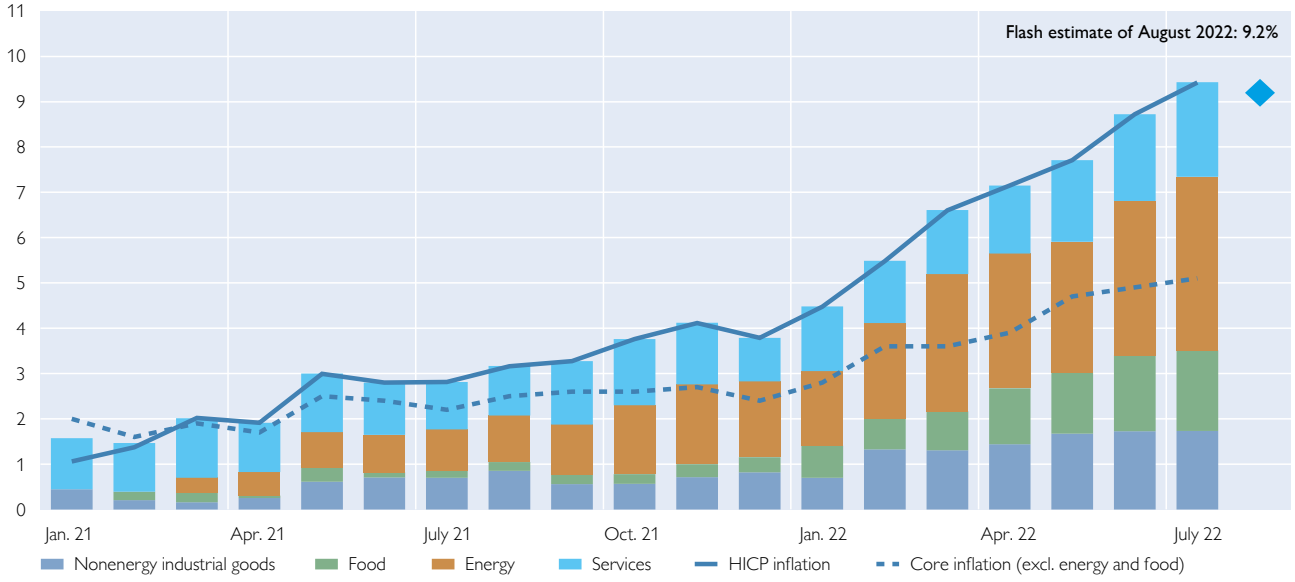
[2] *For the OeNB's latest inflation forecast see: https://www.oenb.at/Publikationen/Volkswirtschaft/inflation-aktuell.html. The next forecast update will be released on Oktober 14, 2022.*

[3] *Detailed results became available only after the cutoff date for data; according to Statistics Austria, the decline in inflation in August was primarily driven by fuel prices.*

Chart 5

Contributions to Austrian HICP inflation

Inflation in %; inflation contributions in percentage points



Source: Statistics Austria.

Since April 2022, the rise in inflation has mainly been driven by energy prices given surging crude oil and wholesale gas prices. Energy consumer prices account for close to 40% of the inflation spurt that occurred between April and July 2022, but the prices of all other HICP components have gone up as well. Services and food (including alcohol and tobacco) explain about one-quarter each of the increase observed from April to July, and nonenergy industrial goods slightly more than 10%. Core inflation, which excludes energy and food prices, totaled 5.1% in July 2022, having mounted by 1.2 percentage points from April 2022. The rise in core inflation is mainly attributable to ongoing price increases for durable consumer goods such as vehicles and furniture, but prices have been going up in the tourism industry as well.

Following a rate of 3.4% in April 2022, the pace of inflation in the services industry peaked at 4.8% in July 2022, the highest level since the euro area was created in 1999. Within the services sector, prices have soared above all for hospitality services. The increases in restaurant and café prices likewise reached a record high (9.3%) in July 2022, while the inflation rate for accommodation services (9.8%) fell just slightly short of the historical high (11.9%) recorded in May 2022. Last but not least, the prices for flight tickets and package tours have also seen exceptional price spikes of late. With demand remaining strong, many service providers appear to have been able to pass through higher costs resulting from rising energy and food prices to consumers.

Nonenergy industrial goods prices have also been going up considerably. With an inflation rate of 5.8% in July 2022, they well exceeded the long-term average (1% since 2001). These developments have been primarily driven by the prices for durable consumer goods, such as furniture and furnishings as well as vehicles. As

a case in point, in July 2022, used car prices exceeded the prices charged a year earlier by 25%. Demand for used cars is likely to have been pushed up by the global chip shortage and ensuing supply-chain bottlenecks in car manufacturing. Producers continued to face high input costs as commodity prices in both the energy and nonenergy segments were spiraling and supplies tightened further in the wake of Russia's war on Ukraine. While it had not been speeding up further in recent months, producer price inflation remained at elevated levels in June 2022 (27.7%) and just slightly below the peak observed in April 2022 (28.6%).

Energy price inflation, in contrast, accelerated to 46.9% in July (April 2022: 37.6%). Crude oil prices as well as gas and electricity wholesale prices spiked further recently, not least in anticipation of gas supply shortages. As a result, motor fuel prices have been surging: in July 2022, prices were 63% above the price level of July 2021. Heating oil prices even climbed 108% beyond the July 2021 level. Initially, the rise in energy prices was cushioned somewhat in May 2022, when taxes on electricity and natural gas were lowered considerably. However, gas and electricity prices are set to surge again in September 2022, given sharp price increases by the utility providers serving Lower Austria and Vienna.

Finally, food prices (including alcohol and tobacco) were up 10.2% in July 2022 compared with July 2021 (April 2022: 7.1%). Since April 2022, we have seen a sizable increase in prices in particular for meat, milk, eggs, cheese and oils and fats. To some extent, these developments reflect the rise in prices for agricultural commodities. After all, Russia's war on Ukraine has not only been driving up energy prices but has also been a major push factor in the global rise of food prices. In June 2022, agricultural commodity prices exceeded the year-earlier level by about 35%. At the same time, the high energy prices have been driving up the cost of agricultural production through higher transportation and input costs, given a year-on-year increase in fuel and fertilizer prices of 63% and 68% in July 2022.

Nontechnical summaries in English and German

Nontechnical summaries in English

What is the impact of carbon pricing on inflation in Austria?

Andreas Breitenfellner, Friedrich Fritzer, Doris Prammer, Fabio Rumler, Mirjam Salish

Coping with the climate crisis is among the key policy challenges of our times. After all, global warming and climate action are both having an impact on prices and inflation, directly and/or indirectly through demand-side or supply-side effects. The resulting inflation impact is difficult to quantify, however. This is why our focus is on assessing the direct inflationary impact of policy measures that have been adopted to limit and discourage greenhouse gas emissions by setting a price for carbon. For Austria, we identified but a limited impact on inflation from both the scheme for carbon emissions trading introduced by the EU in 2005 and the national carbon pricing/taxation scheme to be rolled out in Austria in 2022.

EU-wide emissions trading, while not being overly effective right from the start, served to lower carbon emissions by some 30% across the EU and by roughly 20% in Austria until 2020.[1] Unlike other EU countries, Austria has not observed significant inflationary effects from the gradual rise of emission allowance prices. This can, above all, be attributed to the fact that more than 80% of Austria's electric power supply stem from renewable energy sources. Next, we assess Austria's new national carbon pricing scheme and its impact on consumer price inflation. The "carbon pricing" label notwithstanding, the new scheme is ultimately a tax levied on all sectors not covered by EU emissions trading. Much like Germany, Austria is going to gradually raise this carbon tax from EUR 30 per ton of carbon dioxide in 2022 to EUR 55 in 2025, pending migration to a full-fledged emissions trading system. In terms of direct implications of this regime, we estimate headline inflation to grow by just 0.1 or 0.2 percentage points per year. On top of this, indirect effects may drive up consumer prices further, depending on the rate at which production costs are passed through to consumer prices, and depending on the extent to which rising wage settlements may trigger second-round effects. In turn, the impact on inflation may decrease over time as carbon emissions go down.

At the same time, increased efforts to protect the climate are going to raise the risks to price stability, thus making monetary policymaking more challenging. Fulfilling its obligations from the Paris agreement, the EU pursues the ambitious target of cutting net greenhouse gas emissions to zero by 2050. Austria even aims for 2040. In this respect, carbon pricing is a cost-effective and technology-neutral means of climate action to counteract the market failure that private sector prices for goods and services do not cover the social costs of carbon emissions. Ideally, carbon pricing would only change relative prices, such as the price of fossil fuels versus the price of renewable energy sources, thus nudging businesses and consumers to changing their energy consumption behavior as needed. In practice, however, climate policies will also have an impact on the overall price level, given nominal rigidities in goods and factor markets, the low price elasticity of energy demand and the potential unanchoring of price expectations. Although economies of scale of green technologies can also have a disinflationary effect, one should expect net effects to be inflationary for some time.

While inflation rates have recently been driven to record highs by largely non-climate-related causes, including pandemic and war conditions, calls have been emerging to suspend carbon pricing. Yet, suspension would be counter-productive because this would remove the incentive to consume less energy and could eventually thwart the price effect if applied widely. Instead, the measure of choice would be direct transfers as a means to protect lower-income households from the impact of energy price inflation.

Climate change and climate action are going to drive up inflation and make it more volatile, thus creating a challenge for monetary policy. Here, a predictable transition path with corresponding (shadow) prices for carbon dioxide will give economic agents the planning security needed and central banks better conditions to fulfill their mandate. Monetary policymakers can support climate action indirectly by stabilizing long-term expectations at low levels and preventing second-round effects, without counteracting the relative price changes. However, if carbon pricing were to drive up inflation over the medium term, raising interest rates would be appropriate to safeguard price stability.

[1] *In an emissions trading system, an overall limit is set on the absolute amount of greenhouse gases that may be emitted. Regulated companies are allocated emission allowances and may sell spare allowances to companies that are short of allowances.*

Where have all the insolvencies gone?

Helmut Elsinger, Pirmin Fessler, Stefan Kerbl, Anita Schneider, Martin Schürz, Stefan Wiesinger, Michael Wuggenig

The COVID-19 pandemic and related measures have had a major impact on the Austrian economy. Against this backdrop the authors of this paper address three issues regarding firm-level developments and the effects of government support measures during the pandemic period.

1. How have insolvency numbers changed from the pre-pandemic period to the pandemic period, and do we see catch-up effects once government support broadly ceased?
2. Have the lower insolvency rates during the pandemic period been offset by higher rates of firms exiting the market without insolvency and/or changing numbers of firm entries?
3. What impact did pandemic-related support have on corporate balance sheets?

Analysis of the data yielded the following results: 1. Insolvency rates remained well below pre-pandemic levels in 2020, 2021 and in the first half of 2022. 2. The number of firm exits without insolvency went down as well, while the number of firm entries remained stable in 2020 and even rose markedly in 2021. 3. On the assumption that the pandemic support payments were designed to keep vulnerable firms in business, our corporate balance sheet data suggest that the support was lavish and probably not targeted enough.

To further substantiate our findings based on corporate balance sheet data, we cross-check our database with the European Commission's state aid transparency database, which covers grants and guarantees exceeding EUR 100,000. The evidence at hand suggests that a rather large share of the public support payments ultimately appears to have increased firms' deposits, respectively their liquidity buffers, in a highly uncertain environment. Furthermore, firms receiving the transfer payments were also found to have increased their equity levels. In other words, the support appears to have gone well beyond the levels required to keep firms in existence.

Nontechnical summaries in German

Wie wirkt sich die CO_2-Bepreisung auf die Inflation in Österreich aus?

Andreas Breitenfellner, Friedrich Fritzer, Doris Prammer, Fabio Rumler, Mirjam Salish

Die Bewältigung der Klimakrise ist eine der größten Herausforderungen unserer Zeit. Sowohl die Erderwärmung als auch der Klimaschutz zeigen Auswirkungen auf Preise und Inflation, entweder direkt oder indirekt über Effekte auf Angebot und Nachfrage. Diese kombinierten Inflationseffekte sind allerdings schwer zu quantifizieren. Deshalb konzentriert sich diese Studie auf die direkten Auswirkungen der Bepreisung von Treibhausgasemissionen auf die Verbraucherpreisinflation. Gemäß unseren Berechnungen erhöhen sowohl der europäische Emissionshandel als auch die geplante CO_2-Bepreisung in Österreich die österreichische Inflation maximal um wenige Zehntel-Prozentpunkte. Das 2005 in der EU eingeführte Emissionshandelssystem zeigte nach Anlaufschwierigkeiten die gewünschte klimapolitische Wirkung.[2] Bis 2020 wurden etwa 30 % der EU-weiten und grob 20 % der österreichischen Emissionen gesenkt. Auf die Inflation hatten die steigenden Preise von Emissionszertifikaten in Österreich anders als in anderen EU-Ländern keinen nennenswerten Einfluss. Dies ist vor allem darauf zurückzuführen, dass hier mehr als 80 % der Stromerzeugung aus erneuerbaren Energiequellen stammt. Weiters analysieren wir die Auswirkungen der in Österreich bevorstehenden CO_2-Bepreisung auf die Verbraucherpreisinflation. Wenn auch anders genannt, handelt es sich effektiv um eine Steuer, die auf nicht vom EU-Emissionshandel erfasste Sektoren erhoben wird. Ähnlich wie in Deutschland soll diese schrittweise, zwischen 2022 und 2025 von 30 auf 55 EUR erhöht werden, bevor sie in ein Emissionshandelssystem überführt wird. Was die direkten Auswirkungen betrifft, so schätzen wir, dass die Gesamtinflation zwischen 2022 und 2025 jährlich um lediglich 0,1 bis 0,2 Prozentpunkte steigen wird. Hinzu kommen indirekte Effekte je nach Ausmaß und Tempo der Umwälzung der Produktionskosten auf die Verbraucherpreise sowie eventuelle Zweitrundeneffekte durch höhere Lohnabschlüsse. Andererseits könnte der Inflationseffekt mit fortschreitender Dekarbonisierung allmählich nachlassen.

Zunehmende Klimaschutzanstrengungen werden jedoch das Risiko für die Preisstabilität verstärken und damit die Geldpolitik herausfordern. Das Pariser Abkommen vollziehend hat sich die EU das ehrgeizige Ziel gesetzt, bis 2050 die Netto-Treibhausgasemissionen auf null zu reduzieren; Österreich will sogar schon 2040 klimaneutral werden. Die Bepreisung von Kohlenstoff ist eine kosteneffiziente und technologieneutrale Klimaschutzmaßnahme, die einem Marktversagen entgegenwirkt; denn die gesellschaftlichen Kosten von Treibhausgasemissionen sind in den privatwirtschaftlichen Preisen für Güter und Dienstleistungen nicht abgebildet. Im Idealfall ändert die Bepreisung nur die relativen Preise, beispielsweise zwischen fossilen und erneuerbaren Energieträgern, was Anreize für die notwendige Verhaltensänderungen von Unternehmen und Haushalten schafft. In der Realität ändert die Klimapolitik jedoch auch das allgemeine Preisniveau. Begünstigt wird dies durch nominelle Rigiditäten auf Güter- und Faktormärkten, die geringe Preiselastizität der Energienachfrage und eine mögliche Entankerung der Inflationserwartungen. Zwar wirken durch Skaleneffekte immer kostengünstiger werdende erneuerbare Energieträger desinflationär, jedoch ist damit zu rechnen, dass auf absehbare Zeit die inflationären Effekte überwiegen.

Obwohl die derzeitigen Rekordinflationsraten kaum klimapolitische Ursachen haben (Stichwort: Pandemie, Krieg), werden Forderungen laut, die CO_2-Bepreisung auszusetzen. Diese Vorgangsweise ist jedoch kontraproduktiv, da sie den Anreiz nimmt, weniger fossile Energie zu verbrauchen, was den gewünschten Preiseffekt bei einer flächendeckenden Anwendung letztendlich sogar konterkarieren könnte. Besser geeignet sind direkte Transfers um einkommensschwache Haushalte vor den Auswirkungen der Energiepreisinflation zu schützen.

In Zukunft werden Klimawandel und Klimawende erhöhte und volatile Inflation mit sich bringen und daher die Geldpolitik herausfordern. Ein vorhersehbarer Transformationspfad mit entsprechenden (Schatten-)Preisen für CO_2 gibt den Wirtschaftsakteuren die nötige Planungssicherheit und hilft den Zentralbanken ihr Mandat zu erfüllen. Die Geldpolitik kann die Klimapolitik indirekt unterstützen, indem sie die langfristigen Inflationserwartungen auf niedrigem Niveau stabilisiert und Zweitrundeneffekte verhindert, ohne jedoch relativen Preisänderungen entgegenzuwirken. Wenn aber die CO_2-Bepreisung die Inflation mittelfristig in die Höhe treibt, ist eine geldpolitische Straffung im Sinne des Preisstabilitätsziels gerechtfertigt.

[2] *Ein Emissionshandelssystem begrenzt (laufend) die absolute Menge auszustoßender Treibhausgase und teilt diese in Emissionsrechte auf, die auf Firmen zugeteilt und auf einem Markt gehandelt werden.*

Wie entwickeln sich die Insolvenzen in Österreich in Zeiten von COVID-19?

Helmut Elsinger, Pirmin Fessler, Stefan Kerbl, Anita Schneider, Martin Schürz, Stefan Wiesinger, Michael Wuggenig

Die COVID-19 Pandemie und die damit verbundenen Maßnahmen hatten starke Auswirkungen auf die österreichische Wirtschaft. In diesem Zusammenhang geht das Autorenteam dieser Studie drei zentralen Fragen in Bezug auf die Entwicklung von privaten Unternehmen und die Auswirkungen von Unterstützungsmaßnahmen des Staates während der Pandemie in Österreich nach:

1. Wie haben sich Insolvenzen während der Pandemie entwickelt und gibt es einen Aufholeffekt in Bezug auf das Insolvenzgeschehen nach dem Auslaufen von staatlichen Maßnahmen?
2. Wurden die beobachteten niedrigeren Insolvenzraten während der Pandemie durch höhere Marktaustritts- bzw. niedrigere Markteintrittszahlen kompensiert?
3. Wie haben sich die Unterstützungsmaßnahmen des Staates auf die Bilanzen der Unternehmen ausgewirkt?

Folgende Antworten ergeben sich aus der Analyse der Daten: 1. Die Insolvenzen blieben in den Jahren 2020, 2021 und auch im ersten Halbjahr 2022 deutlich unter dem Vorkrisenniveau. 2. Auch die Zahl der Firmenaustritte ohne Insolvenz ging zurück, während die Firmeneintritte im Jahr 2020 stabil blieben und im Jahr 2021 sogar deutlich gestiegen sind. 3. Unter der Annahme, dass die staatlichen Unterstützungszahlungen dazu dienten, konkursgefährdete Unternehmen zu retten, deuten unsere Unternehmensbilanzdaten darauf hin, dass die Unterstützung zu hoch und wohl nicht zielgerichtet genug war.

Um diese Erkenntnisse aus den Firmenbilanzen zu untermauern, verknüpfen wir unsere Daten mit der Transparenzdatenbank der Europäischen Kommission und beziehen die staatlichen Beihilfen über EUR 100.000 in unsere Analyse mit ein. Die vorliegenden Ergebnisse deuten darauf hin, dass ein großer Teil der öffentlichen Unterstützungszahlungen zu erhöhten Unternehmenseinlagen bzw. Liquiditätspuffern geführt hat. Außerdem wurden die Gewinne und damit das Eigenkapital in einem unsicheren Umfeld gestärkt. Die Subventionen stärkten nicht nur die Liquidität und Solvenz der geförderten Unternehmen, sondern gingen darüber hinaus.

Analyses

What is the impact of carbon pricing on inflation in Austria?

Andreas Breitenfellner, Friedrich Fritzer, Doris Prammer, Fabio Rumler, Mirjam Salish[1]
Refereed by: Friderike Kuik, European Central Bank

Tackling the climate crisis is one of the biggest challenges of our times with major repercussions for the macroeconomy. This study focuses on the impact of setting a price for carbon on consumer price inflation. Carbon pricing is a cost-effective means to reduce greenhouse gas emissions and incentivize sustainable behavior by increasing the prices of fossil fuels. To assess the related inflationary risk, we elaborate on two complementary (explicit) pricing approaches – carbon taxation and emissions trading – in the EU and in Austria. After teething problems, the emissions trading system launched by the EU in 2005 turned into an effective tool of decarbonization, with roughly 30% of EU-wide emissions cut by 2020 as emission allowance prices were raised over time. In Austria, rising allowance prices did not have a significant impact on inflation given the high share of renewable sources in power generation. With regard to the carbon tax that Austria will apply in the course of 2022 to sectors not covered by emissions trading, we estimate HICP inflation to go up by 0.1 to 0.2 percentage points annually until 2025, excluding indirect and second-round effects. Looking forward, trends in climate change and low-carbon transition may further impact inflation, its volatility and its distributional consequence and pose a challenge for monetary and other policies alike. This, however, should not detract from necessary climate protection in view of the consequences of unmitigated climate change on inflation and human activity at large.

JEL classification: E31, H23, Q54
Keywords: climate change, carbon pricing, inflation, monetary policy

It stands to reason that climate change and climate mitigation policies should have an impact on prices and inflation. After all, rising average temperature levels imply an increased frequency and intensity of extreme weather events creating adverse economic and social effects (Dafermos et al., 2021). Plus, by creating incentives for the necessary changes in the behavior of companies and consumers, the political drive for renewable energy sources alters not just relative prices. Climate policies may also raise the overall price level given nominal rigidities in goods and factor markets, the low price elasticity of energy demand and the potential unanchoring of inflation expectations if agents misinterpret past (relative) price changes. While economies of scale of green technologies can also have a disinflationary effect, one should expect net effects to be inflationary for some time, until a higher share of energy demand is covered by large scale and low-cost renewables in a more efficient way.

Indeed, mechanical analysis of the inflationary effects of carbon pricing, abstracting from behavior adjustment to changes in relative prices, suggests strong upward inflationary pressure in the short run (see e.g. Nöh et al., 2020). For the medium run, however, empirical studies show very small or even negative effects of carbon pricing on the overall price level (see e.g. Moessner, 2022, and Konradt and Weder di Mauro, 2021).

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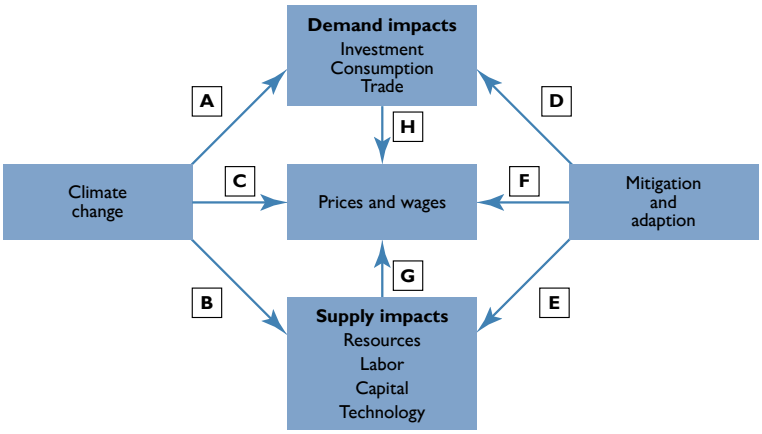
Unlike some other countries, we have not observed significant inflationary effects from the rise in carbon allowance prices in the EU emissions trading system (ETS) in Austria (see below; Pacce et al., 2021). This can be ascribed to the fact that renewable sources account for more than 80% of Austria's electricity mix. Against this backdrop, we analyze the effect planned carbon taxation is likely to have on consumer price inflation in Austria.[2] Regarding the direct impact alone, we project this policy to increase headline inflation between 0.1 and 0.2 percentage points annually from 2022 to 2025, reflecting staged implementation. This may be accompanied by indirect and second-round effects, depending on the pass-through of production costs to consumer prices and successively higher wage claims. Otherwise, the inflationary effect could gradually decrease with progressing decarbonization.

Given political uncertainty, it remains unclear whether prices will continue to be driven up in the medium to long run by ambitious climate policies and/or increasing climate damage. Yet, a predictable low carbon transition path with corresponding (shadow) prices will give economic agents the planning security needed and central banks better conditions to fulfill their mandate. The latter implies that the ECB's monetary policy should react to climate-related energy price increases only if they pose a risk to price stability in the medium term. Ensuring affordable energy costs for vulnerable households is, after all, a matter of fiscal policy.

The remainder of this paper is structured as follows: Section 1 discusses the theoretical literature on the impact of climate change and climate action on inflation. In sections 2 and 3, we elaborate on (fiscal) policies setting a price on carbon emissions, specifically carbon emissions trading and carbon taxation, with a special focus on Austria. Section 4 presents model calculations of the impact of carbon pricing on consumer bills and the affectedness of households in Austria. Section 5 concludes.

Figure 1

Broad linkages between climate change, climate policy and inflation



Source: Andersson et al. (2020).

1 How do climate change and climate policy affect inflation?

The impact of climate change on inflation can be analyzed along different dichotomies: (i) the effects of climate change itself vs. the effects of the mitigation policies to curb climate change; (ii) the direct effects on energy and food prices vs. possible indirect effects on other prices by climate-induced changes in economic activity and productivity; (iii) the effects on the supply side (through productivity, migration) vs. the demand side (through income) of the economy. In any case, most empirical studies on the inflationary effects of climate change are only partial in that

[2] *Our analysis is based on data up to the end of 2021. We use the term "carbon taxation," whereas the Austrian authorities adopted the wording "carbon pricing" because the new tax will metamorphose into an emission trading system as of 2026 (Bundesministerium für Digitalisierung und Wirtschaftsstandort, 2022).*

they assess the effects of one or some aspects but not the overall impact of climate change on inflation.

In this section, we adopt the first perspective, discussing the effects of a rise in the global temperature on the inflation process in the long run (on a qualitative level) before turning to the more specific mitigation effects. Figure 1 gives an overview of the channels through which climate change and climate mitigation policies can affect prices and inflation.

1.1 Effects of climate change on inflation

The currently projected increase in the global temperature would imply an increased frequency and intensity of extreme weather events and natural disasters like floods, storms, wildfires and droughts which will have direct and indirect effects on inflation (see e.g. box 9 in Koester et al., 2021). Resulting disruptions in agricultural production can affect food prices directly while reduced labor productivity due to heat stress, in particular in the Global South, will affect prices rather indirectly. Through possible damages to the infrastructure and production capacities, more frequent extreme weather events may disrupt global supply chains, thus affecting worldwide production and putting upward pressures on prices (negative supply shock; B in figure 1) – see McKibbin et al. (2017). These disruptions may be temporary and local in case of single events but could also have more persistent and global economic consequences in case of correlated or compound events. For example, McKibbin et al. (2017) argue that rising sea levels could lead to abrupt repricing of real estate prices in exposed areas around the world.[3] These effects will be more pronounced the stronger the rise in the average temperature. At the same time, uncertainty about the pace and extent of global warming and the ability of governments to counteract is going to add to macroeconomic uncertainty, which is likely to increase the volatility of macroeconomic variables, including inflation (Andersson et al., 2020).

The most direct and immediate impact of rising mean temperatures is expected for food and agricultural commodity prices (G in figure 1). Faccia et al. (2021) find that during hot summers in the Northern hemisphere global food prices increase by an average of about 0.4 percentage points, which is more than the standard deviation of the quarterly food price series. In the first instance, this constitutes a change in relative prices but depending on the extent of the event and given the low price elasticity of food consumption, headline inflation can be affected as well. More generally, empirical evidence (summarized in Parker, 2018) suggests that impacts of natural disasters triggered by global warming on prices are heterogeneous, depending on the type and extent of the extreme event and the subindex considered. For instance, prices for insurances against natural disasters could increase.

The expected income losses for consumers and firms resulting from lower economic activity due to more intense and frequent natural disasters and extreme weather events will have dampening effects on demand and exert downward pressures on prices (negative demand shock; A in figure 1) – see Andersson et al. (2020). However, the global demand and supply effects of climate change on inflation are difficult to assess as rising temperatures affect different countries and world regions

[3] *For properties potentially affected by floods and rising sea levels, housing prices – according to Parker (2018) – are expected to decline, whereas in safe areas they could even increase.*

differently and as adaptation strategies might dampen or even overturn the effects locally. Specifically, production in countries most exposed to global warming in the Global South might shift to less affected countries in the North, and costly adaptation strategies to the rising temperature level such as infrastructure investments, government support for technological transition or income compensation schemes may also benefit richer countries in the North (see IMF, 2017; IPCC, 2021). Thus, climate change will also have global distributional effects as emerging countries will feel the physical and economic consequences – among them also the price effects – of climate change much more than advanced economies (see IPCC, 2021 and 2022; Faccia et al. 2021; Stern, 2006, chapters 4 and 5).

Concerning the long-run consequences of global warming on real activity, Kikstra et al. (2021) estimate that by the end of the century, global GDP could be up to 51% lower than without warming depending on the persistence of damages. Previous studies such as OECD (2015), based on less sophisticated integrated assessment models, came to more moderate results (up to 10% lower GDP by 2100). IPCC (2022) ascribes the large span of global estimates to nonlinearities and different methodologies. The wide range of possible outcomes reflects uncertainties regarding the size, type and timing of the impacts of climate change and potential nonlinearities stemming from difficulties in assessing sectoral and regional adjustments to climate change.[4] A significant share of these macroeconomic impacts results from the adverse effects of climate change on labor and crop productivity and the capital stock due to heat stress and physical damage. This loss in output and capital stocks will weigh on the net wealth of households and firms, in turn affecting their investment and consumption decisions. While the supply effects described above will exert upward pressures on prices, the demand effects are expected to affect prices and inflation negatively, the difference being that the former occurs in a more erratic and temporary form while the latter materializes rather as a long-run trend.

1.2 Effects of mitigation policies on inflation

The second dimension of the impact of climate change on inflation we want to discuss are the effects of fiscal and other government measures to mitigate climate change (F in figure 1). These effects will be concentrated in the energy and energy-intensive sectors such as (emission-intensive) manufacturing and the automotive and transport industries. Depending on the ambition of climate protection, these effects tend to materialize sooner than the macroeconomic effects described above. Clearly, they depend on the exact design of the policy measures (regulations, cap and trade policies or taxation) but also on the use of the ensuing revenues. If revenues are used to offset the income loss by cutting other indirect taxes, the overall effect could be mitigated, whereas the use of revenues for cutting direct taxes or for subsidies fostering energy efficiency in heating or transport could even increase the effect on inflation in the short run by raising the disposable income of consumers.

A cost-efficient and technologically neutral way of incentivizing decarbonization of the economy is putting a price on carbon to counteract the market failure

[4] *As mentioned before, sectors and regions around the world will be affected differently by climate change. While most sectors and regions will be affected negatively by increasing temperatures, productivity and agriculture at higher latitudes (e.g. in Northern Canada, Russia and Scandinavia) may even benefit initially. This could lead to relocations of production and population that might benefit some countries at the expense of others (IPCC, 2021).*

that prices do not cover the social costs of carbon emissions. Carbon pricing may be implemented through taxes or an emissions trading system.[5] Carbon taxes may be levied directly on the carbon content of fossil fuels, or indirectly via environmental taxes (for a further discussion see section 3). This will affect energy and transport prices directly and, indirectly, the prices of other energy-intensive products, such as steel or cement. An EU-wide emissions trading system (EU ETS) was launched in 2005 as a key element of incentivizing decarbonization in Europe (EU and EEA-EFTA states). While up to 2021, low and variable carbon prices under this regime have not impacted inflation substantially, the drastic price hike in 2021 had considerable inflationary effects in some EU member states (see section 2).

Besides carbon pricing, governments can support the reduction of emissions and the transition to a carbon-neutral economy via command-and-control regulation (e.g. by setting emissions standards[6]), subsidies to increase energy efficiency (e.g. for installing new heating systems and insulating houses) and direct investment in green infrastructure (such as energy and transport systems). Theoretically, these industrial policy measures can be translated into shadow prices of carbon emissions. Yet, these prices and their inflationary impact are ambiguous and therefore difficult to quantify.

Looking ahead, headline inflation has been estimated to increase due to the implementation of ambitious mitigation policies in Europe (including emissions trading, carbon taxation and other measures) by 1 percentage point up to 2030, decreasing over time (NGFS, 2021). However, this inflationary impact of implicit and explicit carbon (shadow) pricing may turn negative close to 2050 when carbon neutrality will be reached due to falling prices of renewable energy and increased energy efficiency, which would in turn reduce the weight of energy in the consumption basket of households (see Andersson et al., 2020).

As discussed above, there are several policies to fight CO_2 emissions having direct and indirect price effects, respectively. In the next chapters we want to discuss two schemes that have a direct impact on prices, namely the ETS system and explicit and implicit CO_2 prices and taxes.

2 EU-wide climate mitigation with a direct price effect: emissions trading

The European Union's key tool for reducing greenhouse gas emissions is the emissions trading system (EU ETS) launched in 2005. It regulates emissions created in the energy, manufacturing and construction, and aviation sectors, across the EU and in Iceland, Norway, Liechtenstein and the UK. The installations[7] covered by emissions trading are responsible for almost half of the EU's human-induced carbon emissions and around 40% of the EU's total greenhouse gas emissions.[8] Between

[5] *Carbon taxes put a price on emissions and let the market determine the amount of emission reduction. Trading schemes define the scope of emission cuts and allow the market to determine the price. While working in opposite directions, the two methods are principally interchangeable.*

[6] *An example for such a change in regulations are stricter emission limits for cars and vans adopted by the European Commission in 2019, aiming at a reduction of CO_2 emissions by more than 30% from 2030 on.*

[7] *According to Article 3(e) of the EU ETS Directive, an installation is a stationary technical unit where one or more activities under the scope of the European Union Emissions Trading Scheme (EU ETS) and any other directly associated activities which have a technical connection with the activities carried out on that site and which could have an effect on emissions and pollution.*

[8] *EU Emissions Trading System (EU ETS) (europa.eu).*

2005 and 2020, verified emissions from installations covered by EU ETS fell by more than 30%, exceeding the 20% reduction target set for 2020.[9]

2.1 How does emissions trading work?

Emissions by energy-intensive industries and energy providers (excluding heating and transport) are covered by EU ETS allowances.[10] The total amount of allowances, which are tradable among the participants ("cap and trade"), are set for each trading period at increasingly lower levels. National caps were replaced by an EU-wide cap in the third trading phase (2013-2020). Currently, roughly 57% of allowances are allocated through auctions. The rest is allocated for free, taking into consideration benchmark values and the risk of carbon leakage.[11] The allocation of free allowances has been reduced over time, while the types of greenhouse gases and sectors covered have been widened. In respect of emissions made during a given year, allowances have to be handed in until April 30 of the following year.[12] One allowance permits the emission of one CO_2-equivalent ton.[13] For each ton of CO_2 emissions not covered by an allowance, participants must pay a penalty of EUR 100. This framework is to ensure cost-efficient investment in carbon-reducing measures and efficient emission reductions in accordance with national climate goals. Allowances that have been neither used nor traded can be carried forward.

For the fourth trading period starting in 2021, the cap for 2021 (excluding aviation) was fixed at 1.57 billion allowances, with an initial annual reduction factor of 2.2%. To reach the more ambitious emissions reduction target of the European Green Deal (–61% by 2030 compared to 2005), the European Commission proposed a one-off reduction of the emissions cap by 117 million allowances as well as an increased annual reduction factor of 4.2%.[14]

[9] *Note that this time period includes the initial COVID-19 pandemic period, which was associated with a considerable reduction in emissions and therefore partly explains the overachievement in 2020. In 2021, verified emissions in the sectors covered by EU ETS decreased further on average over all countries, but in some countries (e.g. Austria) we also see a rebound. Across all economic sectors, European emissions rebounded strongly but not completely (IEA, 2022). For detailed information on progress made, see the EU Emissions Trading System (ETS) data viewer (EEA, 2021) or European Parliament (2020).*

[10] *The legal framework is the EU ETS Directive (Directive 2003/87/EC).*

[11] *Sectors facing competition from industries outside the EU without comparable climate policies receive more free allowances (risk of carbon leakage). The free allocation is calculated using greenhouse gas emission benchmarks for each product. This product benchmark is based on the average emissions of the best-performing 10% of the installations covered. Installations that do not reach the benchmarks receive fewer allowances than needed.*

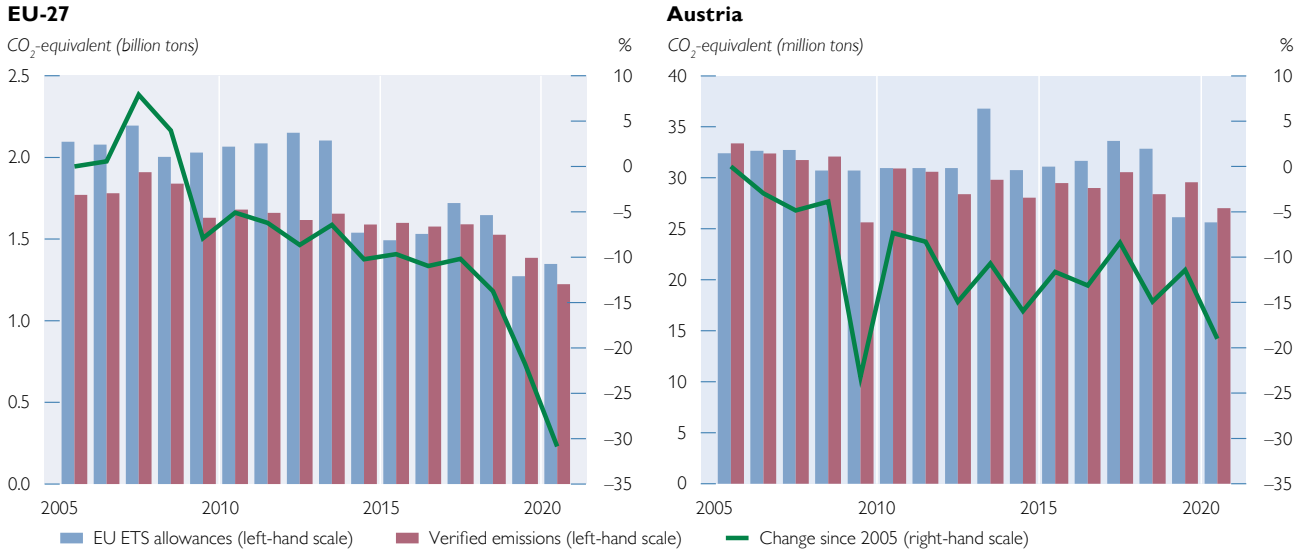
[12] *Apart from the allowances, firms can also use emission reduction units from Joint Implementation or Clean Development Mechanism projects.*

[13] *One allowance permits the emission of one ton of CO_2 or the equivalent of any other relevant greenhouse gas, such as methane, nitrous oxide or perfluorinated carbon. For instance, the emission of one ton of methane is equivalent to the emission of around 25 tons of CO_2.*

[14] *European Green Deal: Increasing the ambition of EU emissions trading (europa.eu).*

Chart 1

Emissions allowances and verified emissions excluding aviation (2005–2020)



Source: European Environment Agency.

Note: EU ETS = EU emissions trading system.

2.2 Emissions trading in Austria

Verified emissions in Austria account for roughly 2% of total verified emissions in the EU plus the UK.[15] Chart 1 shows allowances and verified emissions for the first three trading phases as well as the reduction in verified emissions compared to 2005 in percent for all stationary installations (i.e., excluding aviation). In Austria, verified emissions in 2020 were approximately 19% lower than in 2005. Austria was one of the few member states which by 2019 had not significantly decreased greenhouse gas emissions compared to 1990 and was about to miss the reduction target for 2020. Ultimately, it met the target only because emissions dropped substantially amid the COVID-19 pandemic in 2020.[16]

2.3 Evolution of emission allowance prices

The price of carbon – similar to that of energy prices – is comparatively volatile and depends on factors such as temperature, economic activity, the amount of renewable energy and investments in green technologies. In phase 1 of the EU's emissions trading system, the number of allowances issued (which were allocated for free) exceeded emissions, causing the price to fall to zero. During the second trading phase, the financial crisis of 2008/2009 caused an unexpectedly large reduction in emissions, which led to a surplus of allowances and kept carbon prices low. Nevertheless, Ahamada and Kirat (2012) find that compared to the pilot phase, the impact of the carbon constraint on German and French electricity wholesale prices increased considerably in phase 2. Following the implementation

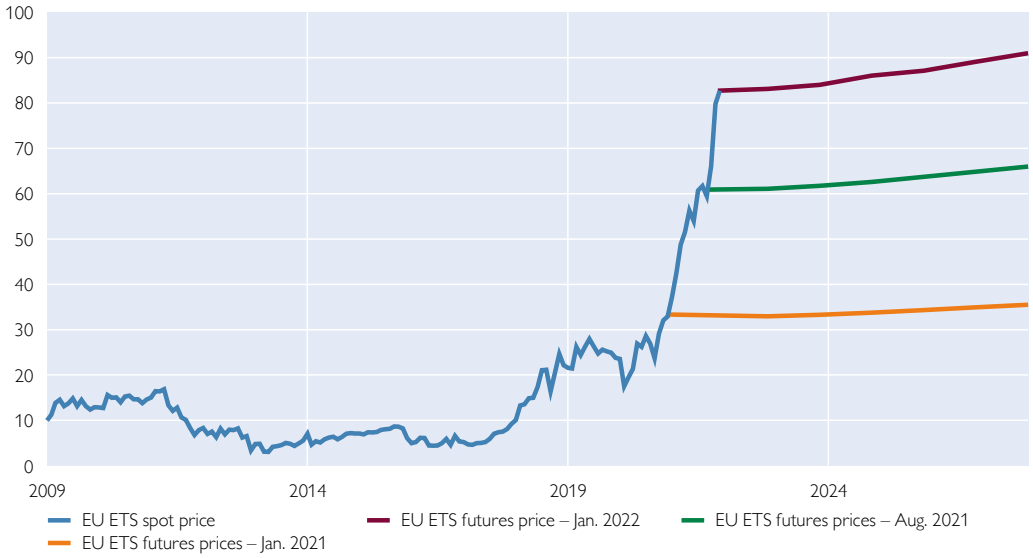
[15] *EU Emissions Trading System (ETS) data viewer — European Environment Agency (europa.eu).*

[16] *Rechnungshof Österreich (2021). Data for final greenhouse gas emissions for 2021 has been released after publication of the report in May 2022.*

Chart 2

Emissions allowances: spot prices (2009–2021) and futures prices (2022–2027)

EUR per ton of CO_2 equivalent



Source: Macrobond.

of a market stability reserve mechanism in 2019 to address the surplus of allowances,[17] EU ETS allowance prices increased from around EUR 8 per CO_2-equivalent ton at the beginning of 2018 to EUR 83 in January 2022 (see chart 2). The growing importance of climate policies and the ambitious reduction objectives of the European Green Deal may have contributed to this price increase. As allowances can be banked to cover future needs, there is a tight link between spot and futures prices, which results in EU ETS futures prices being comparatively flat (see chart 2).

2.4 Impact of emissions trading on inflation in Austria

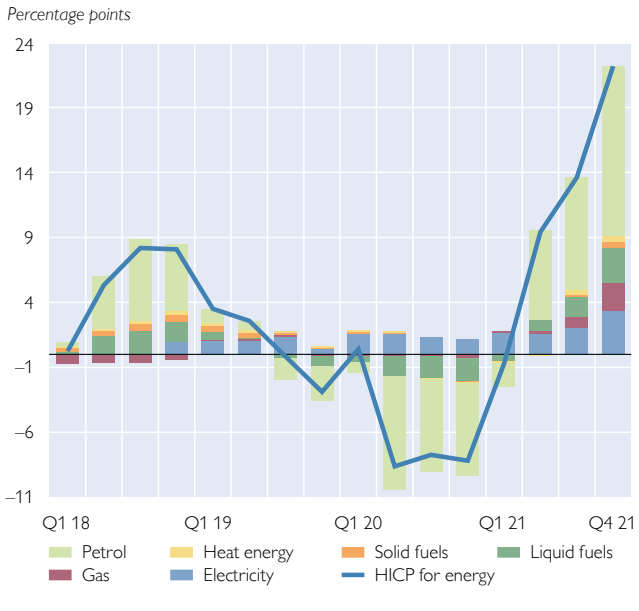
The ECB (2021a) argues that in the euro area up to summer 2021, EU ETS allowance prices most likely only affected the energy component of the HICP and here particularly electricity prices. This is owed to the limited coverage of emissions trading (which covers aviation but no other forms of transport, excludes housing and agriculture, etc.) and free allocations. In the course of 2021, energy prices increased markedly not only due to soaring oil prices, but also because of a surge in European gas and electricity prices. Gas and electricity inflation developments varied considerably across Europe due to differences in the pass-through of wholesale prices. While for fuels the pass-through from wholesale to consumer prices is (almost) complete, the pass-through of electricity prices is determined by the electricity mix as well as the price-setting mechanism.

[17] *Market Stability Reserve (europa.eu).*

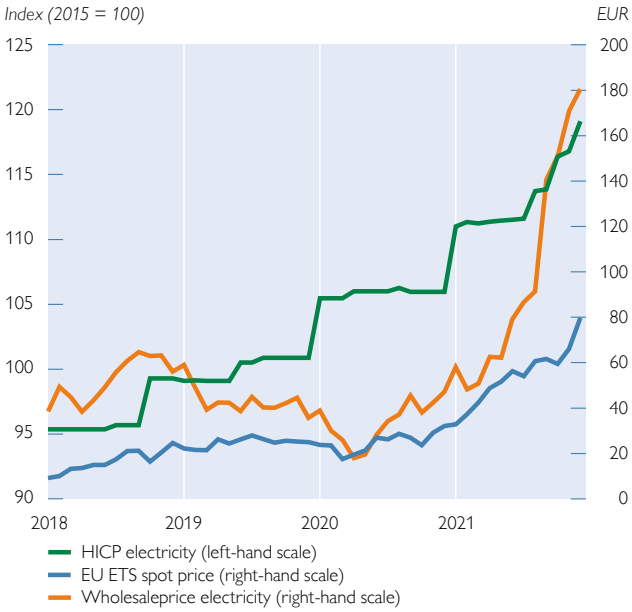
Chart 3

Energy price developments in Austria (2018–2021)

Contribution to energy inflation



Electricity prices and EU ETS spot price



Source: Eurostat.

Wholesale electricity prices are mainly driven by changes in gas prices, given that a larger demand for electricity results in increased (marginal) gas demand for gas-fired power plants.[18] The sharp increase in EU ETS allowance prices played a secondary role in the rise of wholesale electricity prices. European wholesale electricity prices roughly tripled from January to December 2021 (see chart 3). In Austria, electricity consumer prices have typically gone up at the beginning of the year. Most recently, in 2021, we had mid-year rises too, yet still falling short of the sharp surge in wholesale electricity prices or EU ETS allowance prices witnessed in other EU countries (as e.g. Spain or the Netherlands). Apart from a lower share of contracts with flexible tariffs, the share of low-carbon electricity generation is comparatively high in Austria with more than 80% of renewable electricity and hydropower in 2020. In the euro area, however, roughly 38% of electricity came from renewable sources, 36% from fossil fuels and 26% from nuclear power plants in 2020, with large differences across countries.[19] In countries with a high share of renewable or nuclear energy, the impact of changes in wholesale prices or EU ETS allowance prices on consumer prices is more limited. Pacce et al. (2021) estimate that the rise in EU ETS allowance prices was responsible for approximately 20% of the increase in wholesale electricity prices in Spain in the first half of 2021. This increase, in turn, contributed around one-third to the rise in Spain's HICP inflation during the same time period. However, in Spain almost half of the EU ETS emissions stem from fossil fuel electricity generation, which is considerably more than in Austria. While the direct inflationary impact of higher EU ETS allowance

[18] *See ACER (2022) for details on the price setting mechanism for wholesale electricity prices.*

[19] *International Energy Agency and Eurostat data for 2020.*

prices on energy inflation in Austria so far seems limited, potential (future) effects on other components cannot be ruled out.[20] Higher energy prices not only affect energy inflation but, indirectly, also other HICP components and producer prices, and might hence be passed on to consumer prices of other HICP components with some delay.

3 National climate mitigation with a direct price effect: carbon taxation

To reduce emissions from sectors not covered by emissions trading such as transport (excluding aviation), housing, agriculture and waste management, EU member states set national emission reduction targets (Effort Sharing Decision). In 2020, the Austrian government adopted the goal of achieving carbon neutrality by 2040, ten years ahead of the EU.[21] Taxation is an efficient instrument at hand to achieve the necessary decarbonization as it sets a price on environmentally harmful activities. The most recent tax reform based on ecological and social principles, which was passed in December 2021, includes an explicit price for carbon emissions in sectors currently not covered by EU-wide emissions trading (see sections 3.3 and 4).

3.1 Implicit taxes on carbon emissions

Environmental taxes have been at the core of the EU's environmental policy since the early 1990s, when the Mineral Oils Directive (Directive 92/82/EEC) set minimum tax rates on mineral oils for transport and heating and natural gas used for heating. The 2003 Energy Taxation Directive (ETD) introduced minimum tax rates for all energy products and all uses, thus widening the scope to coal, gas and electricity.[22] Above these minimum rates, member states have been free to set their national rates as they consider appropriate. Thus, the ETD framework provides cost-effective incentives for consumers/producers to adjust their behavior toward increased sustainability. Yet, the framework does not target carbon emissions directly and is also guided by competitiveness and social considerations. This is why we have lower ETD minimum tax rates for gasoil (diesel and heating oils) than for petrol, despite gasoil emitting more CO_2. Unsurprisingly, actual tax rates for motor diesel are lower than for petrol in almost all member states except for Belgium and Slovenia.

Energy taxes (covered by the ETD) are the largest part of environmental taxes, which additionally cover transport taxes (directly linked to use/ownership of motor vehicles such as registration taxes) as well as the taxation of pollution and resources (see chart 4). Despite the widespread interest in environmental taxes, they only amounted to 5.4% of EU tax revenues (2.2% of GDP) in 2020, of which energy taxes accounted for around three quarters. While Austria's energy tax revenues are below EU average at 1.2 % of GDP (EU average: 1.7% of GDP), its transport tax revenues are among the highest in the EU (see chart 4). This is due to the fact that Austria levies a vehicle registration tax that is CO_2-dependent and an annual vehicle insurance tax, which are both recorded as transport taxes.

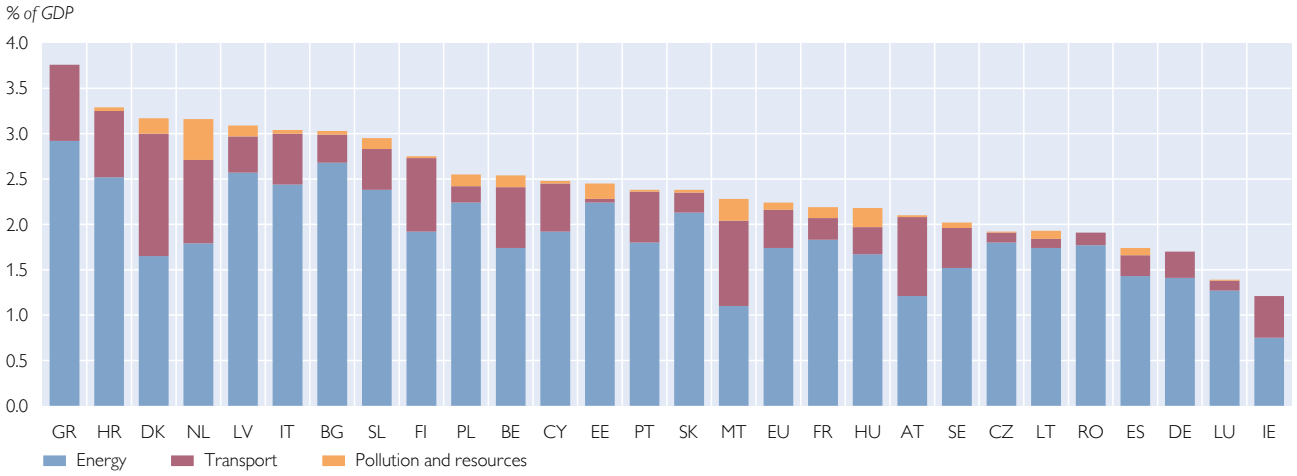
[20] *In Austria, roughly 40% of verified emissions during the third trading period came from the production of pig iron or steel, followed by the combustion of fuels with around 25%, the production of cement clinker (9%) and aviation (less than 5%).*

[21] *See IEA (2020). Austria's emission targets outside the EU ETS: –16% in 2020 and –36% by 2030 compared to 2005 levels.*

[22] *Energy Tax Directive 2003/96/EC.*

Chart 4

Environmental taxes (2020)



Source: Eurostat.

A more granular view of energy taxes in the EU shows that comparatively high tax revenues are not necessarily the result of high tax rates but might indicate high energy intensity (energy consumption/GDP).[23] In particular, countries that joined the EU more recently have a high energy intensity while showing low implicit tax rates on energy, which measure the tax revenue raised per unit of energy consumed (see e.g. Avgousti et al., 2022).[24] Indeed, Bulgaria, Hungary, Poland and Romania apply tax rates for motor fuels that are not significantly above the minimum tax rates. In contrast, the Netherlands and Italy levy tax rates twice as high as the minimum tax rates for unleaded petrol (EUR 359 per 1,000 liters), and Italy, Belgium and France levy diesel tax rates for cars which are almost twice as high as their minimum of EUR 330 per 1,000 liters.[25] Austria's tax rates for motor fuels are in the middle range (maximum diesel rate of EUR 425 per 1,000 liters, minimum tax rate for petrol of EUR 482 per 1,000 liters) and in the lower third for heating fuels – also reflected by the sixth-lowest implicit tax rate on energy – despite having one of the highest purchasing powers in the EU. At the same time, Austria's energy intensity is already among the lowest in the EU.

3.2 Explicit taxes on carbon emissions

Given that carbon emissions are a direct driver of climate change, the literature has advocated carbon taxes as an effective incentive-based fiscal policy measure to mitigate climate change. Unlike energy taxes, for which minimum rates apply across the EU with room for upward flexibility only, carbon taxes are entirely subject to national jurisdiction. Moreover, carbon taxes apply per unit of carbon emission, while minimum energy tax rates are based on the volume of energy products consumed – neither reflecting the energy content nor the carbon emissions of the energy products.

[23] *The EEA (2021) defines energy intensity as "the ratio between gross inland energy consumption (GIEC) and gross domestic product (GDP), calculated for a calendar year."*

[24] *A low implicit tax rate not only mirrors low rates on harmful energy sources, but might also result from an environmentally friendly energy mix relying on sources which are usually taxed at lower rates (e.g. hydroelectric power).*

[25] *Information based on European Commission (2021a).*

Table 1

Overview of carbon tax regimes

	Carbon tax rate (per ton of CO_2 equivalent, April 2021)	Share of jurisdiction's greenhouse gas emissions covered	Year of implementation
	EUR	%	
Denmark	23.78	35	1992
Estonia	2.00	6	2000
Finland	62.00	36	1990
France	45.00	35	2014
Germany	25.00	40	2021
Ireland	33.50	49	2010
Latvia	12.00	3	2004
Luxembourg	20.00	65	2021
Netherlands	30.00	12	2021
Poland	0.07	4	1990
Portugal	24.00	29	2015
Slovenia	17.30	50	1996
Spain	15.00	3	2014
Sweden	116.33	40	1991
United Kingdom	21.23	23	2013

Source: World Bank (data updated in April 2021), OeNB.

EU member states have started to levy national prices on carbon on sectors and products not covered by EU emissions trading but largely already covered by the ETD, primarily on mineral oils and gas. Currently, Sweden, Finland, France, Germany, Ireland, Denmark, Portugal, Latvia, Estonia, Poland and Spain levy some kind of carbon tax. The rates range from 7 cent in Poland to about EUR 116 per ton of CO_2 in Sweden (see table 1). Like price levels, the types of greenhouse gas emissions covered differ widely: while some member states, such as Luxembourg, aim for broad coverage to complement EU ETS, others like Spain limit carbon taxes to very specific products such as fluorinated gases.

3.3 Carbon pricing in Austria

Austria planned to levy a carbon tax from mid-2022 on fossil fuels and gas, in particular on motor and heating fuels, liquified petroleum gas as well as natural gas and coal, which are the very products already covered by the ETD but not covered by EU ETS.[26] Technically, Austria's carbon tax was set up on the basis of a national ETS system with staggered fixed prices until 2025.[27] Until 2025, the price will go up to EUR 55/ton CO_2, from a starting rate of EUR 30/ton CO_2.[28] From 2026 onward, the system will operate with market prices, unless the EU-wide ETS system is extended to cover these products. This system basically replicates the German carbon pricing system introduced in 2021 with a starting price of EUR 25/ton CO_2 (see table 2). Like the German system, it covers about 40% of domestic greenhouse gas emissions. By 2025, the Austrian and German systems will be

[26] *While the carbon tax covers all sectors and uses of fossil fuels (heating and motor fuels), certain energy-intensive industries are entitled to a discount if the CO_2 costs exceed a certain threshold. In June 2022, the rollout of carbon pricing was postponed from July to October 2022 in view of the surge in inflation driven by energy prices (Bundesministerium für Digitalisierung und Wirtschaftsstandort, 2022).*

[27] *Unused permits can be returned to the authorities for the purchase price which is fixed by the authorities according to table 2.*

[28] *Federal Law Gazette. Part I No. 10/2022.*

aligned, and as other countries also intend to raise carbon prices stepwise, Austria's carbon price will be well in line with those of other member states.[29]

To compensate for the volatility of energy prices, carbon pricing in Austria is aligned with energy price fluctuations under a price stability mechanism: An increase in energy prices of more than 12.5% in the first three quarters of the current year halves the carbon price increase in the next year (i.e., the price increase would be EUR 2.5 instead of EUR 5). Vice versa, a fall in energy prices by more than 12.5% would lead to a carbon price increase of EUR 7.5 per ton in the following year.

Table 2

Price per ton of CO_2 equivalent

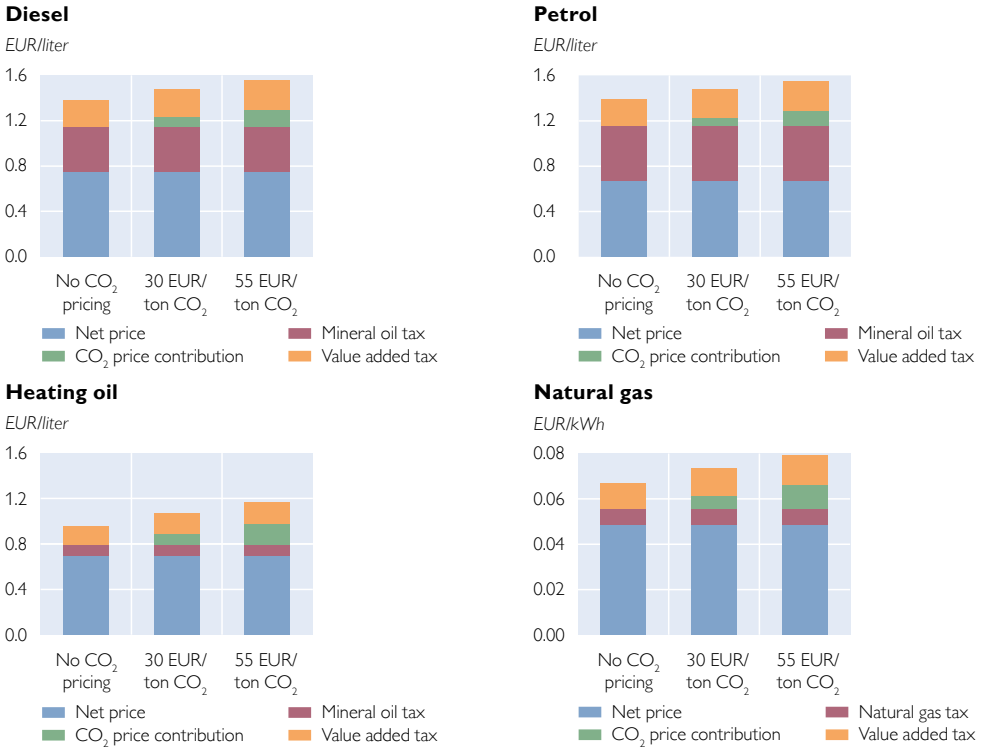
Year	Austria	Germany
	EUR	*EUR*
2021		25
2022	30	30
2023	35	35
2024	45	45
2025	55	55
2026	Trading system	Trading system: 55–65

Source: Germany: Federal Ministry for the Environment, Austria: Eco-social tax reform act 2022, part 1.

The carbon tax is aligned with emission content. In other words, as different energy sources release different amounts of CO_2 during combustion, the resulting carbon price per volume or energy unit differs for each energy source (as displayed in chart 5 for diesel, petrol, heating oil and natural gas).[30]

Chart 5

Price decomposition of different energy sources (December 2021)



Source: OeNB.

[29] *The current energy price hike induced some member states to temporarily cut carbon taxes, energy taxes or the VAT on energy products.*

[30] *In the Austrian case, the emission intensities are 2.38 kg/liter for petrol, 2.67 kg/liter for diesel, 3.24 kg/liter for liquid fuel and 2.04 kg/m3 for gas.*

As described above and indicated in chart 5, energy sources are already subject to a considerable amount of taxation under the ETD and VAT regime. While explicit carbon pricing only accounts for a minor part of the mineral oil price paid by consumers, energy taxes – which can be considered implicit carbon taxes – and the VAT– which is also levied on the taxes – account for about half of the consumer price of petrol and diesel. Until 2025, the carbon pricing system would drive up energy prices by up to EUR 0.18 (carbon price and VAT) per liter, indicating a price increase of 19% at constant energy taxes and net prices.

4 Impact of Austria's carbon pricing system on inflation and distribution

Macroeconomic and inflation impacts of a carbon price are not constant over time. The price elasticity of transport energy and heating demand is very low in the short run, which leads to a high pass-through of taxes to consumer prices in these sectors. Over time, however, consumer behavior may adjust to the change in prices. Therefore, long-run impacts on inflation might be lower compared to what we observe initially. In the following, we quantitatively estimate the short-run impacts on prices in Austria and provide a gauge for medium- to long-term effects with an overview of recent empirical estimates for euro area countries.

4.1 Inflation impact of the Austrian carbon pricing system

Technically, the price on carbon is a mark-up on the prices for transport fuels and heating energy, levied at the producer stage. Consumers have the option of switching to alternative products or services or simply consuming less in many instances. However, passenger transport or heating are somewhat different in this respect. In the case of transport, producers are likely to pass on their mark-up costs to consumers in the short run as the latter are unlikely to substitute quickly. In the case of housing energy, substitution is much easier rather in the medium to long run than in the short run but probably not complete. A case in point for the full pass-through to consumer prices is the mineral oil tax increase made in Austria in 2011 (by 5 cent for diesel and 4 cent for petrol). One month after the tax increase, fuel prices (net of VAT) were raised by about the same amount.

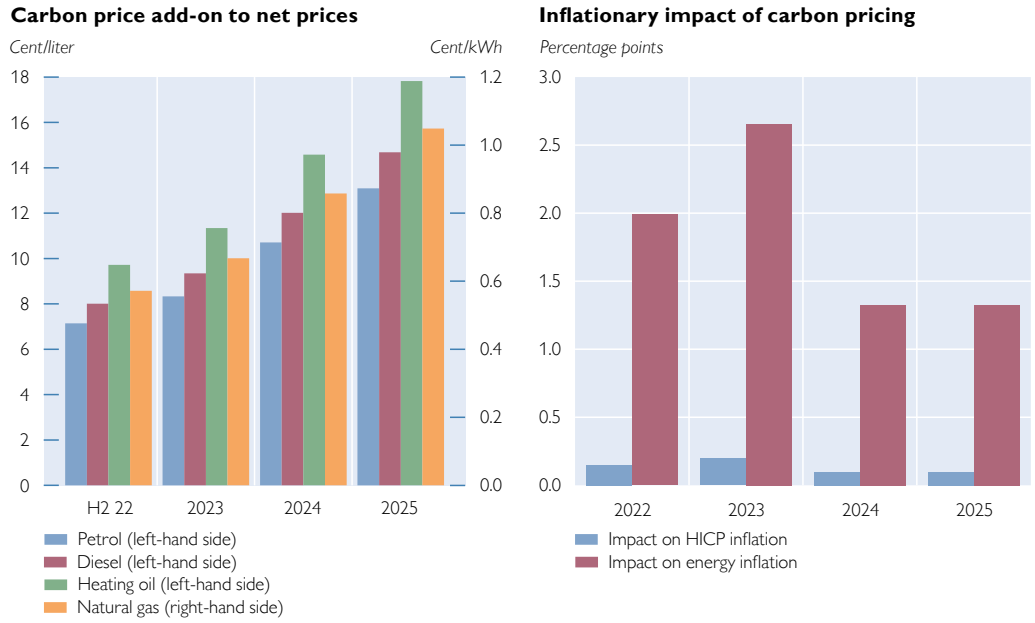
Assuming full and immediate transmission, carbon pricing starting in mid-2022 would raise energy price inflation directly by about 2 percentage points and HICP inflation by about 0.15 percentage points in 2022 (see chart 6, right-hand panel). In 2023, the effect of carbon pricing will be 2.7 percentage points on energy price inflation and 0.2 percentage points on HICP inflation, given the originally planned mid-year start date in 2022 and the mark-up applicable from 2023 (EUR 5 per ton of CO_2).[31] In 2024 and 2025, the inflationary effect of the carbon price will still be 0.1 percentage point for overall HICP inflation and 1.3 percentage points for energy inflation. It should be noted that these impacts are based on the assumption that the price stability mechanism built into Austria's carbon pricing system will not kick in (see section 3.3 above).[32]

[31] *Since the introduction of carbon pricing in Austria was postponed from July to October 2022, the inflationary impact is somewhat lower in 2022 and slightly higher in 2023 than specified in our calculation above.*

[32] *Currently (July 2022), it is likely that the price stability mechanism will apply in 2023. The price impacts are minor as this implies an increase of just EUR 2.5/ton CO_2 instead of EUR 5/ton CO_2 emission.*

Chart 6

Impact of carbon pricing (2022–2025)



Source: OeNB.

With regard to the carbon pricing system that Germany started to phase in in 2021, the Bundesbank estimates the direct and indirect impacts of carbon taxation on inflation to reach up to 0.3 percentage points in the short run (2021 and 2022).[33] Following full rollout, Nöh et al. (2020) estimate the direct and indirect effects on German consumer price inflation to range from 0.2 to 1.0 percentage points in the period from 2021 to 2026.

However, what happens beyond the short run? In case of substantial carbon taxation, there might also be negative indirect effects on consumer spending and competitiveness. As consumer prices rise, real income and hence consumption opportunities could decrease, and wage claims might go up. Furthermore, production costs could also rise via wage increases and transport costs, potentially hitting the competitiveness of the domestic economy. At the same time, incentives for firms to invest in carbon-neutral production capital could stimulate aggregate demand. While no estimates for the long-term inflationary impact are available for Austria, some recent empirical estimates suggest that no inflationary effects might follow in the medium to long run. McKibbin et al. (2021) estimate the impact of a EUR 40 carbon tax (with 30% emission coverage) to increase headline inflation by 0.26 percentage points contemporaneously and by about 1.0 percentage point in the second and third year. Beyond this horizon, the impact is still positive, yet statistically insignificant. For core inflation, the authors find that carbon taxation has a negative, yet not always significant impact over the whole horizon investigated (up to six years ahead). The authors take this as an indication that relative prices change (energy inflation goes up while nonenergy inflation goes down). Konradt and Weder di Mauro (2021) arrive at similar overall results. They empirically show

[33] *The Bundesbank simulations refer to a preliminary pricing scheme which was augmented in the final release.*

that in the medium to long run, carbon taxes in Europe were not inflationary but only changed relative prices.

4.2 Distributional impact of the Austrian carbon pricing system

The reported impacts on headline inflation are a measure for the "average consumer" but vary across households depending on their spending pattern. Low-income households will spend a higher share of their income on housing energy than high-income households. In Austria, households in the lowest expenditure quintile spend 7.5% of their budget on household energy while those in the highest expenditure quintile spend 2.7% on household energy.[34] Hence, the burden of carbon taxation is also comparatively larger for poorer households than for richer households. It is estimated that about 210,000 Austrian households (5.4% of the population) are "energy poor," i.e. not able to keep their home adequately warm (see Statistics Austria, 2021). As Känzig (2022) argues, the negative economic consequences of direct inflationary effects are hence amplified via reduced income for households in the lower income deciles. These distributional consequences could be mitigated by means-tested transfers to vulnerable groups or by reducing the income tax burden (or social security charges) for low-income households.

In the case of transport fuel, the absolute cost burden is higher for richer households as the expenditure share of transport fuels increases with income. According to Budgetdienst (2019) estimates, the absolute burden arising from the carbon price for transport fuels roughly doubles from the lowest quintile to the highest income quartile. As a share of income, however, the tax burden is again higher for low-income households. Carbon tax impacts differ also across regions. Households living in urban areas are likely to be less negatively affected than those in rural areas. City inhabitants spend less on transport and heating fuels (Budgetdienst, 2019). Moreover, they can switch to public transport while inhabitants in less urbanized regions are often compelled to use private transport to commute to work or satisfy basic needs. The "climate bonus" implemented in 2022 was initially designed to smooth such regional differences.

5 Concluding remarks

Fulfilling its obligations from the Paris Agreement, the EU has set ambitious targets to contain climate change, reduce human-made CO_2 emissions and eventually achieve carbon neutrality by 2050. To reach this target, both EU and national administrations have introduced a wide range of climate protection measures. These measures as well as climate change itself might have a nonnegligible impact on energy prices and headline inflation. In general, this impact is difficult to quantify, which is why we restrict our analysis to assessing the direct inflationary effects of two approaches to imposing a price on greenhouse gas emissions, namely emissions trading and carbon taxation.

We estimate the direct impact on consumer price inflation of the forthcoming Austrian carbon tax to range between 0.1 and 0.2 percentage points annually from 2022 to 2025. This direct impact, however, could be exacerbated by possible indirect effects due to the pass-through of higher production costs and possibly higher wage claims. In the medium to long run, the energy mix as well as energy efficiency

[34] *According to the Consumer Expenditure Survey 2014/2015.*

will change during the green transition as a consequence of changes in relative prices for different energy sources. Firms will find it increasingly important to invest in and develop green technologies to obtain an advantage over competitors pressed to pass on production costs driven up by rising carbon prices or competitors operating at lower profit margins. During the transition phase, prices for fossil fuels as well as EU allowance prices are expected to rise in any policy scenario.[35] Moreover, prices are likely to remain highly volatile until renewable energies can largely meet energy demand, and fossil fuels are substituted substantially.

With record inflation rates today, isolating the individual causes is a challenge. The release of pent-up demand during the recovery from the pandemic, associated supply bottlenecks and not least the war in Ukraine are currently more significant inflation drivers than ambitious climate policy measures. All these causes affect energy price inflation in particular. To compensate for the inflation hike to some degree, a number of EU member countries have considered and recently gone ahead with lowering taxes for motor and heating fuels, including the suspension of carbon pricing. This strategy is counterproductive, however, because it removes the incentive to consume less energy and could eventually thwart the price effect if applied everywhere. If policymakers want to protect low-income households from the effects of energy price inflation, direct (means-tested) transfers might be better suited.

Prices play a key role to ensure that in the medium to long term consumer behavior changes and households switch to public transport, e-mobility or more energy-efficient housing. Changes in consumption patterns and demand will result in changes of the weights of the different energy components in the HICP basket and impact inflation. Carbon pricing (and other climate change policy measures) ideally change relative prices without overall inflationary consequences. Apart from unrealistically perfect market conditions, the ideal case relies on two additional aspects. First, the carbon tax revenues need to be redistributed to households and firms in an appropriate way. Second, monetary policy might need to indirectly support the climate change policies by preventing long-term inflation expectations from moving upward and second-round effects from unfolding. To do so, central banks should not counteract the relative price changes and clearly communicate their strategy to the public. However, if carbon pricing were to drive up inflation over the medium term, a monetary policy response to meet the price stability target would be warranted (Schnabel, 2022).

References

ACER – European Union Agency for the Cooperation of Energy Regulators. 2022. ACER's Final Assessment of the EU Wholesale Electricity Market Design.

Ahamada, I. and D. Kirat. 2012. The impact of phase II of the EU ETS on the electricity-generation sector. Revue d'économie politique Vol. 125, No. 6. 887–908.

Andersson, M., C. Baccianti and J. Morgan. 2020. Climate change and the macro economy, ECB Occasional Paper 243. June.

[35] *The Network for Greening the Financial System (NGFS) considers three scenarios: The "current policy scenario" with no additional climate policies, the "net zero 2050 scenario" with a substantial reduction in the use of gas and oil, and a disorderly transition scenario.*

Avgousti, A., F. Caprioli, G. Caracciolo, M. Cochard, P. Dallari, M. Delgado Téllez, J. Domingues, M. Ferdinandusse, D. Filip, C. Nerlich, D. Prammer, K. Schmidt and A. Theofilakou. 2022. Fiscal Policy and Climate Change. ESCB occasional paper (mimeo).

Avgousti A., F. Caprioli, P. Dallari, M. Delgado Téllez, M. Ferdinandusse, C. Nerlich, D. Prammer, K. Schmidt and A. Theofilakou. 2022. Climate change challenge, fiscal instruments, and other policies in the EA. ECB Occasional Paper (forthcoming).

Budgetdienst. 2019. Verteilungswirkungen einer CO_2-Steuer auf Haushaltsebene. Anfragebeantwortung des Budgetdienstes.

Bundesministerium für Digitalisierung und Wirtschaftsstandort. 2022. Bundesgesetz über einen nationalen Zertifikatehandel für Treibhausgasemissionen (Nationales Emissionszertifikatehandelsgesetz 2022 – NEHG 2022). Fassung vom 11.07.

Dafermos, Y., A. Kriwoluzky, M. Vargas, U. Volz and J. Wittich. 2021. The Price of Hesitation: How the Climate Crisis Threatens Price Stability and What the ECB Must Do about It. Hamburg, Berlin and London: Greenpeace Germany; German Institute for Economic Research; and SOAS, University of London.

Deutsche Bundesbank. 2019. Outlook for the German economy – macroeconomic projections for 2020 and 2021 and an outlook for 2022. In: Monthly Report. December.

ECB. 2021a. EU emissions allowance prices in the context of the ECB's climate change action plan.

ECB. 2021b. Developments in energy commodity prices and their implications for HICP energy price projections. Box 1 of: Eurosystem staff macroeconomic projections for the euro area (December).

Ecofys, Fraunhofer-ISI and GW. 2015. Electricity Costs of Energy Intensive Industries: An International Comparison.

EU Council. 2003. Energy tax directive. 2003/96/EC of 27 October 2003 restructuring the Community framework for the taxation of energy products and electricity.

European Commission. 2021a. Excise duty tables. Part II: Energy products and Electricity.

European Commission. 2021b. EU Emissions Trading System (EU ETS), Published online at europa.eu

European Commission. 2019. A European Green Deal, Published online at europa.eu.

EEA – European Environment Agency. 2021. Energy Intensity in Europe. https://www.eea.europa.eu/data-and-maps/indicators/total-primary-energy-intensity-4.

EEA – European Environment Agency. 2022. EU Emissions Trading System (ETS) data viewer. https://www.eea.europa.eu/data-and-maps/dashboards/emissions-trading-viewer-1.

European Parliament. 2020. EU progress towards its climate change goals (infographic).

Faccia, D., M. Parker and L. Stracca. 2021. Feeling the heat: extreme temperatures and price stability, ECB Working Paper 2626.

Federal Law Gazette. 2022. Nationales Emissionszertifikatehandelsgesetz 2022. Part I, No. 10/2022.

IEA – International Energy Agency. 2022. Global Energy Review. International Energy Agency. March.

IEA – International Energy Agency. 2020. Austria 2020, International Energy Agency. May.

IMF. 2017. The Effects of Weather Shocks on Economic Activity: How Can Low-Income Countries Cope? World Economic Outlook (October). Chapter 3.

IPCC – Intergovernmental Panel on Climate Change. 2022. Climate Change 2022 – Impacts, Adaptation, and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. Summary for Policymakers. In: Cambridge University Press (in press).

IPCC – Intergovernmental Panel on Climate Change. 2021. Climate Change 2021 – The Physical Science Basis, Working Group contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change.

Känzig, D. 2022. The unequal economic consequences of carbon pricing. Unpublished paper. January.

Kikstra, J., P. Waidelich, J. Rising, D. Yumashev, C. Hope and C. Brierley. 2021. The social cost of carbon dioxide under climate-economy feedbacks and temperature variability. Environmental Research Letters 16(9).

Kletzan-Slamanig D. and Köppl A. 2016. Umweltschädliche Subventionen in den Bereichen Energie und Verkehr. WIFO Monatsberichte 89(8). 605–615.

Konradt, M., B. Weder di Mauro. 2021. Carbon Taxation and Inflation: Evidence from the European and Canadian Experience. CEPR Discussion Paper 16396. July.

Köppl A. and M. Schratzenstaller. 2021. Aspects of Environmentally Beneficial Tax Incentives. WIFO Working Papers. 621/2021.

Koester, G., E. Lis, C. Nickel, C. Osbat and F. Smets. 2021. Understanding low inflation in the euro area from 2013 to 2019: cyclical and structural drivers, ECB Occasional Paper Series 280.

McKibbin, W.J., M. Konradt and B. Weder di Mauro. 2021. Climate Policies and Monetary Policies in the Euro Area. Paper for ECB Sintra Forum 2021. Forum draft.

McKibbin, W.J., A.J. Morris, P.J. Wilcoxen and A.J. Panton. 2017. Climate change and monetary policy: Dealing with disruption. Climate and Energy Economics Discussion Paper. November 30.

Moessner, R. 2022. Effects of Carbon Pricing on Inflation. CESifo Working Paper Series 9563.

NGFS – Network for Greening the Financial System. 2021. Climate scenarios for central banks and supervisors. Technical document. June 2021.

Nöh, L., F. Rutkowski and M. Schwarz. 2020. Auswirkungen einer CO_2-Bepreisung auf die Verbraucherpreisinflation. Arbeitspapier 03/2020 (Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung). May.

OECD. 2015. The Economic consequences of climate change, Paris.

Pacce, M., Sánchez, I. and M. Suárez-Varela. 2021. Recent developments in Spanish retail electricity prices: the role played by the cost of CO_2 emission allowances and higher gas prices. Banco de España Documentos Ocasionales 2120.

Parker, M. 2018. The impact of disasters on inflation, Economics of Disasters and Climate Change 2(1). 21–48.

Rechnungshof Österreich. 2021. Bericht des Rechnungshofes: Klimaschutz in Österreich – Maßnahmen und Zielerreichung 2020.

Schnabel, I. 2022. Looking through higher energy prices? Monetary policy and the green transition. Remarks at a panel on Climate and the Financial System at the American Finance Association 2022 Virtual Annual Meeting. Frankfurt am Main. January 8.

Statistics Austria. 2021. Erweiterte Betrachtung der Energiearmut in Österreich. Studie im Auftrag von E-Control.

Stern, N. 2006. The Economics of Climate Change: The Stern Review. Cambridge, UK. Cambridge University Press.

UNFCCC – United Nations Framework Convention on Climate Change. 2015. Paris agreement.

Valsecchi C., P. ten Brink, S. Bassi, S. Withana, M. Lewis, A. Best, F. Oosterhuis, C. Dias Soares, H. Rogers-Ganter and T. Kaphengst. 2009. Environmentally Harmful Subsidies: Identification and Assessment. Final report for the European Commission's DG Environment. November.

Where have all the insolvencies gone?

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Like in many other industrialized countries, government support programs kept corporate insolvency rates below pre-crisis levels in Austria in 2020 and 2021, and continued to do so in 2022 in all months for which data were available at the time of writing (up to July 2022). From information available to the OeNB, we built a firm-level database to examine whether the lower rates of insolvencies were offset by higher rates of firms exiting the market without insolvency and/or lower rates of firms entering the market. We find the number of firm exits without insolvency to have gone down as well, whereas firm entries remained rather stable in 2020 and increased markedly in 2021.

On the assumption that the pandemic support payments were designed to keep vulnerable firms in business, our corporate balance sheet data suggest that the support was lavish and probably not targeted enough. To further substantiate our findings, we cross-check our database with the European Commission's state aid transparency database. The evidence at hand suggests that a rather large share of the public support payments ultimately appears to have increased firms' deposits, respectively their liquidity buffers, in a highly uncertain environment, and even equity, rather than having to be spent to keep businesses afloat. With the benefit of hindsight, government support provided in 2020 can, therefore, to a large extent be interpreted as compensation for losses due to state-imposed lockdowns or public transfers to equity holders for the build-up of risk buffers. Put differently, the full extent of government support does not seem to have been crucial for keeping firms in existence.

Looking ahead, more transparency with regard to firm-level pandemic support payments is a necessary precondition for gaining a deeper understanding of the impact of public support on the structure of the business sector and corporate balance sheets, competition, innovation and financial stability. These insights could help in improving measures for current and future crises.

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Given the severe impact the COVID-19 pandemic has had on the economy, economic theory would suggest a strong increase in insolvencies. After all, supply and demand contracted as infected workers were absent from work, consumers were shopping less frequently to avoid exposure to the virus and governments repeatedly imposed lockdowns to contain the spread of the virus. However, far-reaching government rescue programs have so far kept the number of insolvencies considerably below pre-pandemic levels (Elsinger et al., 2021).

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In this study we try to answer three questions.

1. How have insolvency numbers changed from the pre-pandemic period to the pandemic period, and do we see catch-up effects once government support broadly ceased?
2. Have the lower insolvency rates during the pandemic period been offset by higher rates of firms exiting the market without insolvency and/or changing numbers of firm entries?
3. What impact did pandemic-related support have on corporate balance sheets? Was this support needed to keep firms in business? And what did businesses do with funds provided in excess of what they needed to keep going?

To deliver answers to these questions we employ a range of data sources available to the OeNB. Specifically, we built an experimental dataset mapping data from Austria's published notices website to master data and balance sheet data collected by the OeNB and structural business statistics compiled by Statistics Austria. We further augment the data with the European Commission's state aid transparency database.

Note that in one important respect our data differ from comparable figures provided by Kreditschutzverband von 1870 (KSV 1870) or Österreichischer Verband Creditreform (Creditreform). We explicitly exclude sole proprietors and work with a well-defined set of firms, namely all entities included in the Austrian business register other than registered sole proprietors in Austria. Our database therefore consists mostly of limited liability companies, limited partnerships, general partnerships and stock corporations[2]. (See box 1.)

There are some major caveats to our analysis as our data allow us to answer the questions we pose with decreasing robustness. While we can answer the question regarding insolvencies (question 1) rather precisely and in detail up to the most recent months, the remaining two questions are more difficult to tackle based on the information we have access to. These data limitations unfortunately relate to both data quality and timeliness. While information on firm entries is rather straightforward to retrieve, we rely on year-end data for firm exits (question 2). That is why we cannot analyze the second question beyond the end of 2021. Regarding government measures and their impact on corporate balance sheets (question 3) we face several data limitations: First and foremost, we still have only very limited access to comprehensive firm-level data on government support measures. The European Commission's transparency database covers only grants and guarantees exceeding EUR 100,000 (EUR 10,000 for agricultural firms) and excludes compensation payments for short-time work. Second, balance sheet data come with a severe time lag and have some missing data items that we describe in our analysis. That is why we can use the balance sheet data only up to the end of 2020 and for a limited share of firms. Nevertheless, when combined, the available aggregates and the balance sheet microdata allow us to create some suggestive evidence and give a preliminary answer to our research questions. Our findings are, moreover, supported by regulatory bank data, as available until the end of 2021.

[2] *Note however, that also data including sole proprietors show a similar pattern since the beginning of the pandemic, namely fewer insolvencies in 2020 and 2021, which did not see a return to pre-crisis levels until recently.*

Our results, which exclude sole proprietorships as mentioned above, can be distilled down to three answers:

First, insolvencies among firms excluding sole proprietorships are still below pre-pandemic levels, even based on the most recent (July 2022) absolute figures. We do not observe any catch-up effect so far. However, this is a phenomenon witnessed in many industrialized countries.

Second, we also observe lower exits without insolvency. Thus, such exits are far from compensating for lower insolvencies. Firm entries on the other hand were somewhat below trend growth in 2020 but increased above the long-term trend levels in 2021.

Third, the aggregates suggest that firms' deposit balances (i.e. cash and cash equivalents including bank deposits), respectively their liquidity buffers, increased during 2020 roughly by the amount of government support businesses received during that time. An analysis of individual balance sheets shows that this was not due to a few particularly large firms. *If the pandemic-related support measures were solely aimed at keeping vulnerable firms in business, which we presume, our findings suggest – with the benefits of hindsight – that the measures were lavish and probably not targeted enough.*[3]

A notable case in point is the fact that – to a large degree – the financial support increased liquidity and equity beyond pre-pandemic levels and in comparison to firms not receiving support, rather than being needed to cover costs. We call for further in-depth analyses to evaluate the impact of these measures on the structure of the business sector and on corporate balance sheets, competition, innovation and financial stability. It takes comprehensive firm-level data on all government measures to conduct this analysis. Such data are needed.

Box 1

Data and precursor studies

Insolvencies

To track insolvencies during the pandemic, OeNB staff experts put together an experimental dataset from data sources available internally. Most importantly, we linked up data from Austria's public notices website with master data, granular credit data and balance sheet data that the OeNB collects on an ongoing basis.

The database thus built was tailored to monitor developments relevant to financial stability. That is why our data differ in one important respect from other data sources on insolvencies, such as figures provided by Kreditschutzverband von 1870 (KSV 1870), Österreichischer Verband Creditreform (Creditreform), or recently Statistics Austria. We take a sectoral approach to be able to work with a well-defined set of firms, namely all entities registered in the Austrian business register other than registered sole proprietorships. This also excludes nonregistered entities, such as NGOs and public companies. Our reasoning is that the bulk of the loan volume is held by registered firms in the nonfinancial corporate sector rather than sole proprietorships. Only for these registered entities can we identify a meaningful population of firms, which in turn allows us to define meaningful insolvency ratios, considering that with sole proprietorships and self-employed persons, it is practically and legally difficult to distinguish between business and private. While sole proprietorships and the self-employed might

[3] *Note that support is claimed back if considered inappropriate or unjustified by the Ministry of Finance: Corona-hilfen: „Gehen konsequent gegen schwarze Schafe vor" (bmf.gv.at); Korrekturmeldung | COFAG | COVID-19-Finanzierungsagentur des Bundes GmbH.*

be hit hardest by the crisis, thus likely showing the largest increase in insolvencies once the impact of policy support recedes, they are typically those with the lowest loan volumes, which are additionally secured by private assets.

An insolvency case in our data is defined by the occurrence of at least one of three events, namely

1. *bankruptcy proceedings have been initiated and/or*
2. *reorganization proceedings have been initiated and/or*
3. *insolvency proceedings were not initiated due to a lack of sufficient assets to cover the costs.*

For a detailed description of our approach see Elsinger et al. (2021).

Exits and entries

To track entries and exits, we document founding dates and make year-end comparisons of the firm population within our database. Preliminary results were already published in Fessler and Wuggenig (2021). Note that the definitions in the current study differ slightly as we are now also able to filter out firms which merely changed their corporate form (e.g., from a limited partnership to a limited liability company) or firms whose identifiers have changed (e.g., following a takeover or a merger). Such instances are no longer counted as exits or entries. However, these differences – as expected – turn out to have a rather marginal impact on the results. More important is the question of how to deal with entities for which the information of legal form is missing. While this question does not influence insolvency or entry numbers, it matters for exits and the overall number of firms (entities). We argue below why we do not count such instances and show results based on counting them in the appendix.

Balance sheets

While our aggregate data come directly from the financial accounts, the micro-based statistics are dependent on the availability and quality of corporate balance sheet data. The latest available balance sheet data are for 2020, but for reasons of comparison we also use the 2019 and 2018 data. While data coverage is rather good for limited liability companies and stock companies (we have balance sheet data for all three years for about 80% of limited liability companies and 70% of stock corporations[4]), data coverage is often much worse for other legal forms. However, as limited liability companies and stock corporations are most relevant, especially in terms of balance sheet size, we are still confident that our micro analyses on balance sheets represent macro developments rather well.

The remainder of this study provides the empirical evidence and elaborates the context as well as potential caveats in greater detail. Section 1 deals with insolvencies during the pandemic. Section 2 covers firm exits other than through insolvency and firm entries. Section 3 deals with firm balance sheets. Section 4 presents the data from the European Commission's transparency database and section 5 concludes.

1 Insolvencies remain well below pre-pandemic levels

Historically, insolvencies rise during crises (Claeys et al., 2021). However, this is not the pattern we have seen during the coronavirus pandemic in Europe.[5]

One example is Germany. As noted by the Deutsche Bundesbank in its December 2021 report, the number of corporate insolvencies dropped substantially in

[4] *Within our dataset. However, with regard to limited liability companies as well as stock corporations the data should include almost all such entities existing in Austria.*

[5] *Note on monitoring the financial stability implications of COVID-19 support measures. Report of the ESRB. September 8, 2021. Monitoring the financial stability implications of COVID-19 support measures (europa.eu).*

2020 despite the pandemic. Bundesbank staff experts conclude that the insolvency figures reflect the impact of government support. Under pandemic regulations, Germany temporarily suspended obligations for businesses to file for insolvency if they became insolvent or overindebted in 2020. As a result, the number of insolvencies dropped sharply, above all in the services sector, despite a sizable decrease in sales (Deutsche Bundesbank, 2021). At the same time, government support measures drove enterprises' liquidity levels significantly upward. On balance, enterprises absorbed the shock from the coronavirus pandemic better than anticipated by many economic experts. The Deutsche Institut für Wirtschaft[6] arrived at the very same reasons for the low insolvency rates in Germany: fiscal policymakers rolled out extensive financial assistance packages and public authorities temporarily removed insolvency filing requirements.

The magnitude of the effect is evident from figures compiled by the ifo Institute for the German finance ministry:

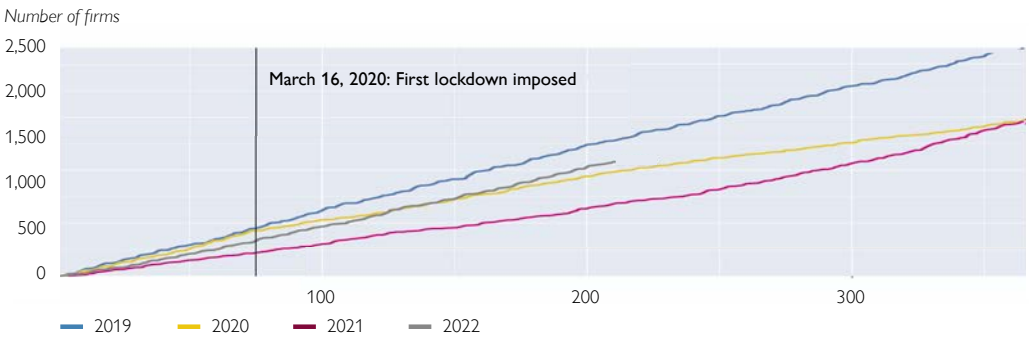
"Taking the historical relationship between business activity and insolvency developments into account, our estimates indicated that the likely claims arising from applications for insolvency proceedings should have risen to somewhere between EUR 60 and 100 billion. Instead, they rose to just EUR 48 billion in 2020, up from EUR 34 billion in 2019."

For Austria, chart 1 shows the yearly cumulative incidence of firm-level insolvencies as recorded on a day-by-day basis from the beginning of 2019 to the end of July 2022. As is well known, insolvencies decreased right from the start of the first lockdown despite the large economic shock due to the pandemic. Since then, many experts and institutions (including the OeNB) have forecast and warned of a wave of upcoming insolvencies exceeding pre-crisis levels for several reasons: the economic shock itself, rising uncertainty and a catch-up process compensating for the lower number of insolvencies in the early days of the pandemic. As the pandemic went on, lockdowns were legislated and suspended, and a plethora of government measures were taken to help firms to survive. However, so far the data suggest neither a wave of insolvencies nor any form of catch-up process with regard to insolvencies. Thus, the answer to our question (1) is rather straightforward: the absolute numbers of insolvencies remain below the pre-crisis levels.

Chart 1

Cumulative insolvencies in Austria

Clear downward trend since first lockdown



Source: Austria's published notices website (Ediktsdatei). Days since 1st January.

[6] *DIW Berlin: Insolvenzgeschehen in Deutschland: Corona-Pandemie hinterlässt erste Spuren.*

On the one hand, it could be argued that this shows the success of state intervention to support Austrian firms in a difficult time of government-imposed lockdowns. On the other hand, there are several reasons why one should be cautious about calling for maximal firm survival – especially in times of crisis. We would like to mention three reasons here.

First, saving firms is costly. Reallocating taxpayers' money to the business sector may be justifiable if it is indeed needed to keep firms in existence that are relevant to society because they serve essential consumer needs (directly or within a production chain), if they would most likely not survive without the subsidy and if they were to leave a gap that cannot be filled by competitors or newcomers.

Second, there are unseen consequences to (potential) competitors. After all, subsidies provided to some firms put unsubsidized (potential) competitors at a disadvantage and prevent new competitors from entering markets. In particular, such subsidies rob firms that were well prepared for a crisis and not eligible for public support of their deserved advantage in the market, thus prohibiting the development toward a more resilient economy.

Third, a classical prediction of public choice theory is that large subsidy programs, especially when designed and implemented quickly and in a rather nontransparent way, tend to create a poor incentive structure in terms of efficiency. This happens through a distortion in competition usually for the benefit of firms with direct or indirect ties to relevant political decision makers or access to special interest networks or insider information.

All three issues tend to foster a less dynamic, less innovative business sector and come with a price tag, not only because of the direct monetary cost of the subsidies but mostly because of the long-term effects on innovation and competition. Market economies cannot function if markets are welcomed as long as profits are high but are canceled when crisis hits, and profits are low. Rational firms anticipate government intervention and will crowd out firms with more resilient forward-looking business models. Generally speaking, privatizing profits but socializing losses is not supporting the market economy but makes it less successful in satisfying people's needs and more vulnerable to crisis in the future.[7]

2 Lower insolvencies were not offset by exits and entries

In this section we answer the question if the lower insolvency rates were offset by higher rates of firms exiting the market without insolvency and/or changing numbers of firm entries during the pandemic period.

Table 1 shows a short summary of exits, entries and insolvencies for 2019, 2020 and 2021 as well as the insolvency-to-exit ratio and the overall number of firms. Note that for table 1 we excluded all entities for which data on the legal form were missing. For alternative numbers including those entities see table A1 in the annex. The absolute numbers of exits and the overall numbers of firms are different, but this is not relevant for our main results, namely that the development of exits shows no compensation for fewer insolvencies.

[7] *See also "The wealth effect of Bailouts" for a broader discussion right at the beginning of the pandemic: The Wealth Effects of Bailouts: A Quantitative Assessment | Institute for New Economic Thinking (ineteconomics.org).*

In total, firm entries exceeded exits and insolvencies combined in both 2020 and 2021. Insolvencies accounted for about 24% to 32% of exits, implying that the number of non-insolvency-related exits was about 2–3 times larger than the number of insolvencies. However, while the number of firm entries was only marginally larger in 2020 than in 2019 but increased markedly in 2021, the number of both insolvencies and exits was substantially lower in 2020 than in 2019 and increased only slightly in 2021. While the 2020-to-2019 decrease in insolvencies was about 32%, the decrease in exits was about 12%.

Table 1

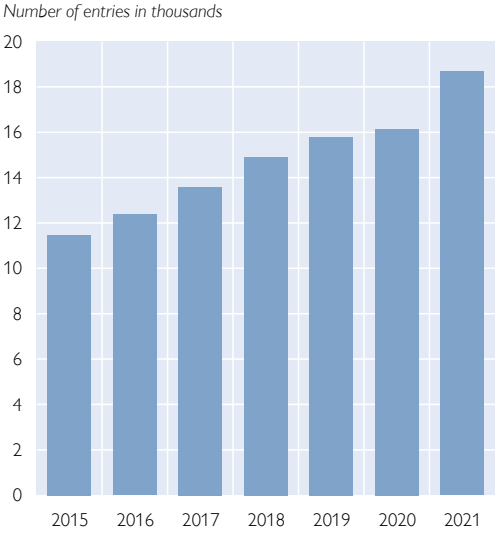
Firm entries, exits and insolvencies

Year	Entries	Exits	Insolvencies	Begin-of-year levels	End-of-year levels	Insolvency-to-exit ratio
	Thousands					%
2019	15.8	6.8	2.2	227.2	233.8	31.9
2020	16.1	6.0	1.5	233.8	240.7	24.7
2021	18.7	6.1	1.5	240.7	251.7	24.0

Source: OeNB (database of master data).

Chart 2

Firm entries per year



Source: OeNB (database of master data).

These results already point to a clear answer to question (2) whether more exits compensated for fewer insolvencies. They did not. On the contrary, the number of firm exits even decreased. Due to the combination of lower numbers of exits and insolvencies with the almost stable (2020) and then strongly positive development (2021) of entry numbers, the number of firms (according to our definition) ultimately increased by about 8% (6% if one uses definitions from table A1) from before the pandemic (end of 2019) until the end of 2021.

As a next step we look closer at the annual development of firm entries (chart 2). While there were fewer entries in 2020 than one would have assumed extrapolating from the pre-crisis trend, rising firm entry numbers in 2021 more than compensated for this effect. Overall, the positive long-term trend with regard to firm entries continued – if not accelerated – during the pandemic.

If exits without insolvencies cannot explain the drop in insolvencies, what can? In the following we look into balance sheet data (section 3) and then add data on pandemic-related support measures (section 4) to find that these measures were lavish and are likely the main reason for the few insolvencies observed in Austria in 2020 and 2021.

3 Markedly higher increases in deposit and equity levels observed for firms that received pandemic support in 2020

From aggregate statistics we know that, on the aggregate, corporate deposits (i.e. cash and cash equivalents including bank deposits) increased in tandem with the substantial increase of state subsidies during the pandemic. On first sight it might

seem odd that deposit balances should have increased in times of crisis. However, the reasons for such an increase at the aggregate level are manifold. If you think of it simply in accounting terms: The supply of money and funds increased by central banks and governments in response to the pandemic will end up somewhere in the economy. Even if measures are targeted perfectly toward companies in serious trouble, companies will use the subsidies to pay their bills to stay in business, sending the funds mostly to the accounts of other companies. Other explanations include temporary bans on dividend payments, businesses investing less due to uncertainty, sale and leaseback activities and many more. At the micro level, however, troubled firms are unlikely to see their deposits increase. Definitely not beyond the levels of their sound firm-peer counterparts. That is why our investigation needs to look at the micro level underlying the aggregate statistics.

In this section we will analyze balance sheet dynamics in 2018, 2019 and 2020. All in all, our sample consists of 159,590 firms for which total assets are available for at least one year. For 122,715 of those firms, we know total assets across all three years. Compared to the number of firms given in table 1 this number seems small. Yet, these figures include more than 70% of all stock corporations and more than 80% of all limited liability companies. These two most important legal forms of companies represent 70% of all companies in the full sample and are thus well accounted for. The results below are with respect to the subsample of firms for which we know total assets for all three years, i.e., firms that neither entered nor exited the market during this period.

Table 2 summarizes aggregates of key balance sheet items for 2019 and 2020. Our dataset does not include each and every item for each firm. The "coverage" column exhibits the scope of assets or liabilities covered compared with the corresponding totals for all 122,715 firms. The "number of firms" column shows the number of firms for which we have information on the respective item in each of the three years.

Aggregate total assets increased by 3.7% from 2018 to 2019 and by 4.4% from 2019 to 2020. The median growth rate was 2.6% in 2020 and 1.9% in 2019. The strong growth in current assets was not driven by inventories, which declined by 2% in 2020 after a 1.8% increase in 2019. Cash and cash equivalents including bank deposits – deposits for short in the following – increased by as much as 17.5%

Table 2

Balance sheet developments

	Aggregate change 2020	Aggregate change 2019	Firm-level median change 2020	Firm-level median change 2019	Coverage	Number of firms
	%					*Thousands*
Total assets	4.4	3.7	2.6	1.9	100.0	122.7
Fixed assets	2.2	4.1	–1.7	–1.3	96.8	101.0
Current assets	7.8	0.3	6.4	4.2	99.1	121.3
Inventories	–2.0	1.9	0.0	0.0	44.4	53.1
Deposits	17.5	2.4	8.7	0.0	85.5	96.9
Accounts receivable	7.1	–1.0	4.5	2.3	92.9	111.8
Liabilities	1.1	1.1	0.0	0.0	95.9	113.9
Equity	7.5	3.3	5.1	4.9	92.5	121.6

Source: OeNB (database of master data), European Commission (state aid transparency database).

in 2020, and accounts receivable by 7.1%. On the liability side of the balance sheet, equity increased by 7.5% in 2020 compared to 3.3% in 2019 whereas liabilities[8] remained broadly unchanged. Was the increase in deposits driven by a few outliers or was it a broader phenomenon? When we group the data by provinces, by NACE codes, and by firm size, we find that

1. The growth of deposits was extraordinary in all provinces except for Salzburg and Tyrol, which both have an important tourism industry (table 3).
2. The growth of deposits was below average with regard to accommodation and food service activities. The same applies for the arts, entertainment and recreation sector, whose average growth rate in 2020 (+9.2%) still marks a strong increase from 2019 (–11.8%). At the other end of the spectrum, manufacturing and transportation and storage show a substantial increase in deposits (table 4).
3. Larger firms (deciles 7 to 10) increased their deposits more than smaller firms (table 5). The lowest two deciles sharply reduced their deposits or kept them stable.

Table 3

Change in corporate deposits by province

	Aggregate change 2020	Aggregate change 2019	Firm-level median change 2020	Firm-level median change 2019	Number of firms
	%				*Thousands*
Burgenland	30.1	16.1	14.6	0.0	2.3
Carinthia	22.1	4.4	12.4	0.0	5.5
Lower Austria	34.4	3.7	12.7	0.0	14.5
Upper Austria	19.9	10.9	11.7	0.0	13.7
Salzburg	4.6	7.8	6.2	0.2	7.9
Styria	34.2	5.1	12.5	0.0	11.5
Tyrol	5.9	5.1	8.4	3.0	8.1
Vorarlberg	24.4	-0.6	7.1	2.3	4.7
Vienna	12.0	-3.2	3.6	0.0	28.8

Source: OeNB (database of master data).

[8] *Note that liabilities include all bank loans. However, for many firms only the aggregated category liabilities is available, which is the reason why we do not show more disaggregated subcategories such as bank loans.*

Table 4

Change in corporate deposits by NACE code

		Aggregate change 2020	Aggregate change 2019	Firm-level median change 2020	Firm-level median change 2019	Number of firms
		%				*Thousands*
C	Manufacturing	41.8	9.0	14.9	0.3	8.1
D	Electricity, gas, etc.	1.1	–18.5	2.1	1.8	1.0
E	Water supply; sewerage, waste management	14.1	0.5	9.6	2.1	0.4
F	Construction	13.3	11.7	10.4	0.5	10.1
G	Wholesale and retail trade; repair of vehicles	19.5	10.0	16.5	0.0	18.6
H	Transportation and storage	33.5	–2.9	12.5	0.0	3.2
I	Accommodation and food service activities	6.7	9.2	3.8	0.5	6.2
J	Information and communication	28.4	8.0	14.9	3.5	5.5
K	Financial and insurance activities	4.2	1.5	7.7	0.0	1.7
L	Real estate activities	10.8	–1.6	1.3	0.0	14.0
M	Professional, scientific and technical activities	10.7	–2.2	2.9	0.0	19.9
N	Administrative and support service activities	12.7	3.0	5.8	0.7	3.9
P	Education	15.3	3.6	15.6	3.7	0.7
Q	Human health and social work activities	8.4	12.6	14.5	7.2	1.2
R	Arts, entertainment and recreation	9.2	–11.8	7.9	0.0	1.6
S	Other service activities	20.0	16.8	19.6	0.0	0.7

Source: OeNB (database of master data).

Table 5

Change in corporate deposits by balance sheet decile

	Aggregate change 2020	Aggregate change 2019	Firm-level median change 2020	Firm-level median change 2019	Number of firms
	%				*Thousands*
1	–39.1	–25.9	–9.4	–12.1	12.1
2	–13.4	–24.1	0.0	0.0	12.4
3	2.2	–0.1	8.2	0.0	12.2
4	6.4	8.3	12.2	3.8	12.3
5	11.6	5.9	15.3	2.4	12.2
6	7.4	16.2	16.3	4.2	12.3
7	15.6	7.1	15.8	4.7	12.3
8	15.1	8.4	15.3	4.5	12.3
9	14.9	7.9	13.9	3.6	12.3
10	19.3	0.8	10.4	2.6	12.3

Source: OeNB (database of master data).

The data suggest that the increase of deposits was a broad phenomenon across provinces, sectors, and firm size. Even in the accommodation and food service activities sector, which was heavily affected by the pandemic, deposits grew by more than 6%.

To additionally validate our findings that large firms saw a more pronounced increase in deposits (even relative to their size), we also draw on regulatory data reported by banks. Cash positions of households and firms are found on the liability side of banks and the data allow for a breakdown into "micro and SME," "corporates" (i.e., firms that do not fall under the former) and households. In 2020, banks recorded a large inflow of deposits from all three groups. The outstanding deposits of corporates rose by as much as 22.9%, followed by household deposits (+9.4%) and SME deposits (+7.9%). The robust increase in corporate deposits continued in 2021 (+13.5%). Household deposits increased at an even stronger rate (+14.6%) while SME deposits stagnated (–0.4% growth).

Our finding is even more surprising as sales revenues for the firms in our sample decreased by 6.6% in 2020 compared to an increase of 2.5% in 2019. Hence, the increase in highly liquid assets might well have been driven by government subsidies, a hypothesis we further investigate with micro data on pandemic-related support below.

4 Transparency data on pandemic support measures confirm balance sheet dynamics

In this section we merge the balance sheet data described in section 3 with firm-specific data on pandemic-related support,[9] as downloaded on July 14, 2022. All in all, we retrieved 21,531 data points relating to 21 different pandemic-related support measures, which can be grouped into grants and guarantees. Note that the data do not include short-term work compensations and VAT reductions and that the database covers only amounts exceeding EUR 100,000. Furthermore, we use only 2020 data. The data include government-issued guarantees for 5,845 different firms totaling EUR 2.9 billion and grants of EUR 1.4 billion to 4,720 different firms (table 6). We find firm-level matches in our balance sheet data for more than 80% of the grants and guarantees in terms of value and more than 70% in terms of the number of firms.

How do firms that received help and those who did not compare in terms of various balance sheet items? We classify all firms for which we do not have observations in the pandemic support database as firms that did not receive any government help. This is certainly not correct. Given the threshold of EUR 100,000 underlying the transparency database, there are many (smaller) firms that received lower amounts of support, yet we do not have access to such information up to now. A second issue that must be kept in mind is that the subsample of firms that received support is tilted toward larger firms because of the threshold. Table 7 summarizes the results for those firms that received grants. Total assets, current assets, deposits and accounts receivable increased more than in the full sample. On the liability side, both liabilities and equity increased. The median increase in liabilities was moderate. Table 8 shows the corresponding results for firms that were granted guarantees. Here, the picture is similar, with the difference that the median increase in liabilities was quite pronounced.

Aggregate deposits increased by about 62% for firms that received grants and 121% for those who received guarantees (tables 7 and 8) compared to 18% (table 2) in the full sample. This seems not to be due to larger firm size only. Even in the highest balance sheet decile, deposits only increased by 19% (table 5). The same pattern holds for firm-level median changes.

And the pattern is not different for equity. Firms receiving grants increased their equity levels on average by 18.1% in 2020 (table 7), which is well above the rate for 2019 and more than twice as much as the full sample rate (7.5%, table 2). Again, the same pattern holds for firm-level median changes.

Table 6

Descriptive statistics of firm-level data merged mith state aid transparency data

	Euro amounts	Number of firms	Euro amounts (merged)	Number of firms (merged)	Coverage in euro	Coverage in counts
	Thousands				%	
Guarantees	2,919,616	5.8	2,428,171	4.1	83.2	70.9
Grants	1,436,302	4.7	1,171,324	3.5	81.6	74.0

Source: European Commission (state aid transparency database) and OeNB calculations.

[9] *The data are publicly available from the EU COM website: Öffentliche Suche in der Beihilfentransparenzdatenbank (europa.eu). For a further description of the data, see Barmeier and Haller (2022).*

Table 7

Balance sheet dynamics measured for firms receiving grants

	Aggregate change 2020	Aggregate change 2019	Firm-level median change 2020	Firm-level median change 2019	Number of firms
	%				*Thousands*
Total assets	12.1	4.4	7.2	2.3	3.1
Fixed assets	0.7	8.3	–4.7	–2.7	3.1
Current assets	28.3	–1.0	22.7	6.8	3.1
Inventories	–6.3	4.5	–6.9	2.1	2.7
Deposits	61.6	–3.7	19.1	6.7	3.0
Accounts receivable	40.0	–5.1	41.6	4.7	3.1
Liabilities	12.4	3.4	1.4	–1.4	3.1
Equity	18.1	5.6	12.8	9.3	2.4

Source: OeNB (database of master data), European Commission (state aid transparency database).

Table 8

Balance sheet dynamics measured for firms receiving guarantees

	Aggregate change 2020	Aggregate change 2019	Firm-level median change 2020	Firm-level median change 2019	Number of firms
	%				*Thousands*
Total assets	8.2	4.6	10.2	3.2	3.7
Fixed assets	1.0	4.8	–3.3	–0.8	3.6
Current assets	14.8	4.1	20.4	5.1	3.7
Inventories	1.4	6.1	–1.2	3.5	3.0
Deposits	120.7	–5.8	71.1	0.0	3.2
Accounts receivable	4.3	4.2	18.0	5.8	3.6
Liabilities	15.9	3.5	15.1	1.1	3.7
Equity	5.9	7.6	7.6	9.5	2.9

Source: OeNB (database of master data), European Commission (state aid transparency database).

For firms in urgent need of funding support, one would expect low levels of deposits and stable or decreasing equity levels following the receipt and use of subsidies to "help them pay outstanding bills." These firms, however, show even larger increases in deposits than their counterparts who did not receive such support, which is suggestive evidence that the support received exceeded actual needs as considerable sums went unspent.

This ties in with results from a survey[10] among about 1,100 companies which was administered by KSV 1870 in August 2021 and published in October 2021. Of the 54% of companies which stated that they received state support, only 61% answered that they actually relied on this support. 34% stated that they did not need the support and 5% refused to answer the question.

[10] *Zahlungsmoral trotz Corona-Krise weiter verbessert | KSV1870.*

5 Conclusion

In this study we posed three questions and used firm-level and aggregate data to answer them.

1. Question (Q): How have insolvency numbers changed from the pre-pandemic period to the pandemic period, and do we see catch-up effects once government support broadly ceased?
   Answer (A): Insolvency rates among Austrian firms excluding sole proprietorships have been lower since the onset of the pandemic, as is the case in many other industrialized countries. So far, we see neither a rise above pre-pandemic levels nor a catch-up effect compensating for the much lower initial rates.
2. Q: Have the lower insolvency rates during the pandemic period been offset by higher rates of firms exiting the market without insolvency and/or changing numbers of firm entries?
   A: No, lower insolvency rates have not been offset by more exits. On the contrary, we observe lower firm exits since the beginning of the pandemic. Entries on the other hand were rather stable – below trend – in 2020 but increased strongly – above trend – in 2021. Overall, the number of firms increased by about 8% from end-2019 to end-2021.
3. Q: What impact did pandemic-related support have on corporate balance sheets? Was this support – with the benefit of hindsight – strictly needed to keep firms in business? And what did businesses do with funds provided in excess of what they needed to keep going?
   A: Firms substantially increased their cash/deposit holdings as well as their equity levels in 2020. This effect is stronger for larger firms and does not hold for the lowest two deciles of firms by size, whose deposits decreased or stagnated. On average (and for the median), the increases were stronger for firms which received pandemic-related support. For the smaller firms, data on such support are yet too thin to draw this conclusion for this subsample as only government subsidies above EUR 100,000 are available in the European Commission's state aid transparency database.

Even in branches hit most by the crisis (tourism, restaurants), firms' cash/deposit holdings increased on average. Austria had the largest pandemic-related help measures in percent of GDP among EU countries (Köppl-Turyna et al., 2021) and also one of the strongest reductions in insolvency levels.[11] Our findings suggest that these support programs are the main cause for Austria's persistently low insolvency rates. Our insights from micro-level data point to the conclusion that the public support was not sufficiently targeted and, to a large extent, probably beyond the levels required to keep firms in existence – given that the aim of these measures was to help firms to survive the external shock from the pandemic.

[11] *We also conducted an international comparison relating the volume of support measures to the reduction in insolvencies. Due to cross-country data consistency issues with regard to both insolvencies and support measures, we consider the related findings tentative: There seems to be a strong (negative) relation across EU countries, with Austria ranked first in spending, second in insolvency reduction, but "below the line," i.e. a relatively low reduction in insolvencies in comparison to the volume of pandemic-related grants.*

In July 2022, the Austrian government announced an initiative[12] for more transparency about firm-level pandemic support measures.[13] Such data are a necessary precondition for gaining a better understanding of the impact of policy measures on the structure of the business sector and corporate balance sheets, competition, innovation, and financial stability. And finally, such analyses are crucial to refine policy measures for future crisis to avoid a potential misallocation of public resources.

References

Barmeier, M. and M. Haller. 2022. Changes in banks' rating assignments in response to the COVID-19 pandemic. Financial Stability Report 43. OeNB. 61–71.

Claeys, G., M. Hoffmann and G. Wolff 2021. Corporate insolvencies during COVID-19: keeping calm before the storm. Bruegel Blog. January 7.

Elsinger, H., P. Fessler, S. Kerbl, A. Schneider, M. Schürz and S. Wiesinger. 2021. Calm before the storm? Insolvencies during the Covid-19 Pandemic. Financial Stability Report 41. OeNB. 57–76.

Fessler, P. and M. Wuggenig. 2021. Exits and entries of Austrian firms during the pandemic – preliminary results. Konjunktur Aktuell December 2021. OeNB. 48–52. OeNB.

Deutsche Bundesbank. 2021. Ertragslage und Finanzierungsverhältnisse deutscher Unternehmen im Jahr 2020. December 2021. 45–63.

Ifo Institut. 2020. Ein Fünftel der deutschen Firmen hält sich für gefährdet. Press release. https://www.ifo. de/node/56536.

Ifo Institute. 2021. Fewer insolvencies than expected in 2020. Press release.

IWH – Leibnitz Institute für Wirtschaftsforschung Halle. 2022. IWH-Insolvenztrend: Erneut viele Industriejobs von Insolvenz betroffen.

Köppl-Turyna, M., J. Berger, N. Graf, P. Koch, W. Schwarzbauer, L. Strohner and M. Wolf 2021. COVID-19 Maßnahmen Stand der Maßnahmenauszahlung und internationaler Vergleich von COVID-19 Stützungsmaßnahmen vor dem Hintergrund der unterschiedlichen Bedeutung automatischer Stabilisatoren. Eco Austria: Institut für Wirtschaftsforschung.

[12] *Transparenzoffensive bei Corona-Hilfen (bmf.gv.at).*

[13] *Since the end of October 2022 the Federal Ministry of Finance publishes the beneficiaries of grants exceeding 10,000 EUR per year excluding short-term work compensations (https://transparenzportal.gv.at). These data suffer from two weak spots. They can not be easily downloaded. The data covers only name, year, legal form, zip and OENACE code. Merging these data with our database seems complicated and error-prone.*

Annex

Table A1

Entries, exits and insolvencies including entities with missing legal form

Year	Entries	Exits	Insolvencies	Beginning-of-year levels	End-of-year levels	Insolvency-to-exit ratio
	Thousands					%
2019	15.8	11.8	2.2	373.3	380.9	18.3
2020	16.1	9.4	1.5	380.9	390.2	15.7
2021	18.7	10.2	1.5	390.2	403.8	14.3

Source: OeNB (database of master data).

Table A2

Pandemic-related upport measures included in the analysis

Specifications	Number of entries	Amount in EUR millions
COVID-19: Austrian liquidity assistance scheme	12,123	39,24.3
COVID-19: Third amendment to aid scheme SA.56981 (2020/N): Austrian guarantee scheme for bridge loans under the Temporary Framework for pandemic-related state aid for businesses	5,046	1,578.4
COVID-19: Austrian guarantee scheme for bridge loans	1,580	492.3
COVID-19: Compensation scheme: directive on fixed cost subsidies	906	232.6
COVID-19: Austrian liquidity assistance scheme (SA.56840): fixed cost compensation under chapter 3.12 of the Temporary Framework for pandemic-related state aid for businesses (SA.58661)	899	18.4
COVID-19: Fourth amendment to aid scheme SA.56981 under the Temporary Framework for pandemic-related state aid for businesses	306	448.2
COVID-19: Fifth Amendment to aid scheme SA.56981	234	70.0
COVID-19: Regional support measures (Carinthia, Styria, Tyrol, Upper Austria and Vienna)	142	8.9
COVID-19: Regional support measures (Carinthia, Upper Austria, Styria, Tyrol and Vienna)	79	2.7
COVID-19: SA.60321(2020/N) compensation scheme: directive on fixed cost subsidies for economic activities of nonprofit organizations (SA.57928 (2020/N))	58	13.6
COVID-19: Sixth amendment to aid scheme SA.56981	40	12.3
COVID-19: Compensation scheme: directive on fixed cost subsidies for economic activities of nonprofit organizations	37	12.9
COVID-19: Startup aid fund	26	17.4
COVID-19: Prolongation of SA.58360 aid scheme: grants and guarantees from the Lower Austrian Economic and Tourism Fund	14	8.5
COVID-19: Fixed cost compensation under chapter 3.12 of the Temporary Framework for pandemic-related state aid for businesses	13	3.3
COVID-19: Modification of SA.57148 (2020/N): regional support measures (Carinthia, Upper Austria, Styria, Tyrol and Vienna) under the Temporary Framework for pandemic-related state aid	9	0.4
COVID-19: Compensation scheme: directive on fixed cost subsidies for economic activities of nonprofit organizations	8	1.8
COVID-19: Funding from the Lower Austrian Economic and Tourism Fund (SA.58360)	6	5.5
COVID-19: Prolongation of SA.57928 (2020/N): compensation scheme: directive on fixed cost subsidies for economic activities of nonprofit organizations	3	0.4
COVID-19: Aid for Austrian Airlines	1	150.0
COVID-19: Grants from the Lower Austrian Economic and Tourism Fund (SA.100853)	1	0.3
Total	21,531	7,002.1

Source: OeNB (database of master data).

The return of inflation

Key findings from the 49th OeNB Economics Conference and the 35th SUERF Colloquium (May 23/24, 2022)[1]

Ernest Gnan, Kilian Rieder (OeNB and SUERF); Teresa Messner, Fabio Rumler, Mirjam Salish (OeNB)[2]

After several years of persistently below-target inflation rates, global inflation has been increasing sharply since 2021. Several driving factors have been identified: (i) the vigorous post-pandemic economic recovery; (ii) disruptions in global value chains for intermediate and final goods, due in part to short-term pandemic-related factors and in part to a possible reversal of globalization; (iii) cycles in commodity and energy production and prices, some of which may also be related to actual or anticipated climate protection measures; and (iv) labor market shortages resulting from pandemic-induced structural changes in labor demand and supply. Whether the rising inflation rates are temporary or more permanent has been subject of lively debates. Among other things, the answer hinges on the reaction of expectations and wages to the rise in headline inflation. Central banks worldwide have come under pressure to tighten their policy rates. The risk of missing a timely response and of inflation becoming entrenched, as a result, contrasts with concerns of strangling the post-pandemic economic recovery amid the fallout from the war in Ukraine and Western sanctions against Russia. At a political economy level, the interplay between monetary policy, fiscal policies and financial stability has become more complicated, with high debt, high asset market valuations and climate challenges potentially hampering central banks' perceived anti-inflationary resolve.

Against this background, on May 23 and 24, 2022, some *750 participants* attended – either in person at the premises of the OeNB in Vienna or online – the 49th OeNB Economics Conference and the 35th SUERF Colloquium to discuss the underlying drivers of inflation, short- to medium-term prospects for price developments, policy implications and the latest findings from economic research to shed light on these issues. The conference brought together *37 top expert speakers and decision makers* from central banking, the finance industry and academia.

Instead of following the sequence of presentations outlined in the conference program, this report aims to extract key insights by grouping the topics under *three overarching themes*: first, *longer-term trends and drivers of* (global) inflation (i.e., demographics, (de-)globalization, climate change and protection); second, the role of *inflation perceptions and expectations and the use of granular price data* to improve our understanding and forecasting of inflation; and third, *lessons for policy*.

[1] *The conference program, presentations and video replays can be found on the websites of SUERF – The European Money and Finance Forum and the Oesterreichische Nationalbank (OeNB).*

[2] *Oesterreichische Nationalbank, Monetary Policy Section, ernest.gnan@oenb.at, kilian.rieder@oenb.at, teresa.messner@oenb.at, fabio.rumler@oenb.at and mirjam.salish@oenb.at. This conference summary reflects the authors' understanding of the conference findings, presentations and interventions. It does not necessarily reflect the official viewpoint of any of the institutions with which the authors or any of the reported speakers are affiliated. For further details on the presentations and records of the conference, please see the video replays.*

1 Long-term drivers of (global) inflation: aging, (de-)globalization and climate change

In the longer term, inflation will be driven by structural forces, including aging…

In his keynote lecture, *Manoj Pradhan*, Chief Economist and Founder of Talking Heads Macro Ltd, analyzed *secular inflation trends in the 2020s*. Before sharing some of the main insights of his 2020 book The Great Demographic Reversal, co-authored by Charles Goodhart, Pradhan stressed that inflation is going to be with us for a long time. We are currently seeing three inflation cycles affecting us simultaneously: (i) inflation related to COVID-19 (supply bottlenecks, pent-up demand); (ii) cyclical inflation; and (iii) demographic inflation. In the last three decades, demographic shocks have kept inflation low. In China, for instance, internal migration from rural to urban sectors and the increasing participation rate of women have contributed to an upward labor supply shock and exercised downward pressure on wages. As the marginal product of labor usually exceeds wages and workers additionally save a share of their income, a positive labor supply shock has a deflationary effect. Yet, the working age population continues to increase only in Africa and India, while in China and Eastern Europe it has already started to decrease. The non-working population only consumes (and consumption does not decline with age); hence, as the labor force shrinks and the share of the elderly grows, inflationary pressures rise. As a consequence of these demographic developments, the debt-to-GDP ratio will increase and productivity and economic growth will not be sufficient to deal with the rising burden of debt. As a solution, apart from taxation and aggressive rate hikes, Pradhan suggested expanding central banks' balance sheets. This can serve to turn bonds into variable coupon consols, thereby forgiving debt over a long horizon.

Pradhan then analyzed the current inflation surge considering the arguments previously presented. The response to this surge depends on how large the disturbances are. Expectations, wages and prices react to what is happening right now, which means that it is important to act holistically here and now, instead of solely focusing on future inflation expectations. Bringing inflation back to its target will be a demanding task for central banks, as curbing inflation might result in high unemployment. Stagflation may pose a challenge to central bank independence, result in a possible fragmentation within the EU and have adverse effects on politics in general (e.g., high food inflation can easily derail governments and the World Bank argues that food prices will rise until 2024).

…(de-)globalization…

In the SUERF Marjolin Lecture, Professor *Harold James* from Princeton University offered a *long-term perspective on the relationship between inflation and (de-)globalization* in the form of a short preview of his book on inflation and globalization that will be published in 2023. He started out by looking at the year 1975 in the UK, when James himself was a student in Cambridge and consumer price index inflation in the UK had reached 25%. Back then, a combination of unfortunate events, lack of political will and insufficient understanding of the economy led to a backward movement in globalization. Globalization was by many perceived as a potential

threat to price stability. Similarly to today, this resulted in deglobalization being actively discussed and domestic production taking center stage.

According to James, higher inflation in times of supply shocks does not necessarily suggest that globalization is on the retreat. It rather indicates that more globalization is needed. Historically, inflation has been pushed by three factors: (i) fiscal dominance and (ii) financial dominance, which both imply that central banks must keep interest rates low if they want to avoid a financial crisis or sovereign default; and (iii) social dominance, which results in inflation being used to "buy" social peace. Given the widespread consensus that high inflation is traumatic and undesirable, as it is a strain on federal systems and leads to distributional conflicts, central banks should guarantee price stability. Historically, episodes of high inflation were followed by a return to monetary policy keeping prices and expectations under control (as was the case with the gold standard or the inflation targeting regime of the 20th century). The demand for stability, including social stability, cannot be met by the private sector.

Globalization has a big impact on inflation. It has reduced the long-run level of inflation and it has altered the relationship between economic slack and inflation. According to James, economists that claim otherwise err on the question of when globalization began. Many assume that it was at the beginning of this century, when China was admitted to the World Trade Organization, but, in fact, globalization began much earlier. We can identify two phases when globalization took off – after the 1970s and after the 1840s. In light of supply shocks caused by crop failures across Europe in the 1840s, the view emerged that Europe needed more trade to gain wider access to resources. In the 1970s, the initial reaction to supply shocks was protectionism. Only gradually did the idea that an open world would be better for everyone develop. As the world is facing major challenges, including the COVID-19 pandemic and the war in Ukraine, low inflation again is under threat. Shifts in labor and energy markets pose a challenge to the provision of fiscal relief packages; shifts in relative prices following technology and supply shocks pose a challenge to inflation targeting; and finally, costs of government borrowing are much more uncertain. When asked about the factors that will push globalization this time, James pointed to the fact that each globalization period is different. This time, it will be future artificial intelligence, electronic communication and the globalization of services that will characterize the new period of globalization. In James' view, more globalization is needed and will materialize in the future.

…and climate change and protection

In a session moderated by OeNB Director *Birgit Niessner* and dedicated to the *effects of climate change and climate mitigation on inflation*, it was shown that climate change-related shocks constitute a major risk factor for economic and price stability. After all, these shocks alter supply (e.g., bad harvests and resulting food shortages) and demand factors (e.g., higher demand for green technologies and skills), and may affect the transmission of monetary policy. Not only climate change itself but also its mitigation can affect relative prices and inflation. As was highlighted by *Blandine Barreau*, Coordinator at the International Energy Agency, governments' decarbonization efforts and respective investments still need to be scaled up drastically around the globe, and in emerging market economies in particular, to meet the net zero emission goals within the next decade. But it is not only governments

and parliaments that need to address climate change; central banks also need to take climate change and its mitigation into account. *Christiane Nickel*, Head of the Prices and Costs Division at the ECB, demonstrated that the green transition is most likely going to put pressures on energy prices and inflation in the short to medium run. According to her, only a well-managed energy transition can safeguard, in the long run, the economy against high and volatile prices, which economies around the globe are experiencing at the moment. In addition, *Luiz de Mello*, Director of the Policy Studies Branch at the OECD, noted that the green transition affects the economic performance of companies to quite varying degrees across sectors and hinges on the substitutability of brown technologies with green technologies (investments) and the progress achieved in upskilling the labor force for green jobs. *Elga Bartsch*, Managing Director at the Blackrock Investment Institute moreover pointed out that in the new higher inflation regime, which is characterized by persistently higher inflation, stronger supply side constraints and likely higher output volatility, central banks might need to critically rethink their inflation targeting frameworks and include climate change-related costs in their policy decisions.

2 What role do inflation perceptions and expectations play, and how can granular price data improve inflation analyses and forecasts?

Inflation expectations are heterogeneous across agents and driven by psychological and sociodemographic factors

The evolution of inflation expectations is key for the further course of inflation and the appropriate monetary policy response. As long as inflation expectations are well-anchored to the inflation target of central banks, the latter can pursue a gradual path of steering inflation. If, however, inflation expectations were to become deanchored, central banks would need to take far more decisive action, which might include triggering a sharp recession to break with inflation expectations. It is therefore essential for central banks to understand how to measure inflation expectations in real time. Recent research has particularly focused on inflation expectations of different types of agents (e.g., households, firms, professional forecasters, market participants) and their differences. Researchers have also investigated how inflation expectations are formed and what causes possible non-linear, abrupt changes in inflation expectations once certain thresholds are exceeded.

A panel of top economists from the ECB, Amundi Asset Management and the University of Chicago, moderated by *Ernest Gnan*, Head of the OeNB's Monetary Policy Section, discussed what role inflation expectations play for the path of inflation, what drives inflation expectations and whose inflation expectations should be monitored. *Pascal Blanqué*, Chairman of the Amundi Institute, emphasized the role of psychology as a driver of inflation expectations of financial market participants. He argued that financial markets are going through a regime shift from financial capital to physical assets, which has the potential of driving up inflation in the future. Blanqué furthermore argued that, despite their hawkish tone, central banks are behind the curve of the tightening cycle, which leads to a repricing of portfolios and risk on financial markets. *Geoff Kenny*, Head of Section of the ECB's Monetary Policy Research Division, presented new results on inflation

expectations in the euro area, obtained from the Consumer Expectations Survey conducted by the ECB. Medium-term inflation expectations (three years ahead) have remained broadly stable at 2% since April 2020, and have only recently, i.e. in March 2022, increased to 3%. Making use of a randomized controlled trial study designed to analyze the effect of communication on inflation expectations and central bank credibility, ECB researchers found that communication on the symmetric 2% price stability target, including broader explanations of the target's role and of monetary policy in general, significantly increases the credibility of central banks and has a dampening impact on inflation expectations. *Michael Weber*, Associate Professor at the University of Chicago, reviewed inflation expectations of households and firms, drawing on different data sources used in his research. He emphasized the large heterogeneity in individual inflation expectations: These were found to be higher for the main grocery shoppers in the household (mostly women), for respondents with lower IQ scores and for those exposed to higher actual inflation (poorer households). Weber also showed that inflation expectations of firms are not very different from those of households.

Inflation perceptions and expectations of households and firms are similar and driven by the same forces

Inflation expectations again took center stage in an academic session moderated by *Fabio Rumler*, principal economist in the OeNB's Monetary Policy Section, in which key findings in cutting-edge academic research from around the world were presented, pinning down the *determinants of inflation perceptions and expectations of households and firms*. *Angelo Gutiérrez-Daza* from the Universitat Pompeu Fabra and Barcelona School of Economics presented his paper which incorporates learning by shopping into the benchmark New Keynesian model. He finds that the learning mechanisms support central banks' efforts to stabilize inflation, as they help anchor inflation expectations. As a result, monetary policy shocks have stronger effects on real activity, i.e. the slope of the Phillips curve flattens. *Daria Minina* from the University of Amsterdam investigated the close link between inflation perceptions and expectations and showed that the pass-through from perceptions to expectations is affected by sociodemographic factors, the source of information on inflation news and individual uncertainty about inflation perceptions/expectations. *James Moberly* from the University of Oxford analyzed the parameters of individual laws of motion for households' inflation expectations, based on data stemming from a Bundesbank survey on consumers' inflation perceptions and expectations. He showed that, given the heterogeneity in the formation of individuals' inflation perceptions and expectations, the response of aggregate consumption to an inflation shock is stronger and more persistent than in a representative agent model. Based on a new Banque the France survey on firms' inflation expectations, *Frédérique Savignac* from the Banque de France showed that expectations of firms are substantially less biased and also less dispersed than those of households. She furthermore showed that expectations of firms differ depending on the position the respondent holds at the firm, i.e. on whether the CEO/CFO or a lower-level manager/employee participates in the survey. *Xuguang Simon Sheng* from the American University argued – based on data from a representative firm survey in the US – that firms' aggregated expectations of unit costs are highly correlated with aggregate inflation, as unit costs are an important determinant of firms'

pricing decisions. Thus, unit cost expectations can serve as an alternative measure of inflation expectations if the latter are not directly observable. Last but not least, *Pierre Siklos* from the Wilfrid Laurier University introduced a novel indicator measuring disagreement in inflation expectations, derived from firm-level data collected in South Africa. He showed that disagreement in inflation expectations is highly correlated with disagreement in other macroeconomic variables such as wage growth, interest rates or capacity utilization.

New advances in inflation forecasting and inflation (expectations) modeling

The second academic session of the conference, chaired by *Kilian Rieder*, principal economist in the OeNB's Monetary Policy Section, was dedicated to new advances in inflation forecasting and inflation (expectations) modeling. The common theme of all academic contributions in this session was a clear strive to improve the standard New Keynesian framework currently used in inflation forecasting and modeling. *Roland Meeks* from the International Monetary Fund, demonstrated the importance of incorporating more information on the entire distribution of heterogeneous inflation expectations in forecasting models, instead of merely relying on simple aggregate measures of survey expectations. *Philippe Goulet Coulombe* from the Université du Québec noted the problematic, yet important role of unobservables in the estimate of Phillips curves and proposed an innovative way of overcoming the weaknesses of traditional proxy variables by drawing on a hemisphere neural network model. *Alistair Macaulay* from the University of Oxford, and winner of this year's SUERF Marjolin Prize, investigated the consequences of departing from the full-information rational expectation assumption in models in which rational inattention and subjective beliefs about the economy are endogenous. Macaulay's model captures key empirical facts about the interaction between information and subjective beliefs about (the impact of) inflation, drawing on the Bank of England's Inflation Attitudes Survey. The contribution by *Sebastian Rast* from the European University Institute drew on panel data from the US Survey of Professional Forecasters to show that news about long-term inflation have a stronger bearing on forecasters' long-term expectations than incoming data on current inflation. These findings imply that the coordination of beliefs through effective central bank communication may be a more (cost-)effective tool to keep inflation at target than monetary tightening. *Fabio Verona* from the Bank of Finland closed the session by highlighting the insights that can be reaped from using a frequency-domain decomposition of inflation data and its components in the New Keynesian Phillips curve (NKPC) framework for inflation forecasting. Verona showed in particular that low-frequency versions of the NKPC can significantly outperform benchmark models.

Micro, scanner and webscraped price data enhance inflation analyses

The use and analyses of micro price data, such as those underlying consumer price indices, or of scanner or webscraped price data has gained importance in inflation research in the past decade. In the final session of the conference, moderated by *Martin Summer*, Head of the OeNB's Research Section, acclaimed academics presented and discussed their recent research, making use of such data sources. *Oleksiy Kryvtsov*, Senior Research Officer at the Bank of Canada, presented his work on how webscraped data, i.e. price data from web shops of supermarkets and

other types of retailers, can inform about consumer product shortages and their impact on inflation. With this type of data, it is possible to construct high-frequency measures of product shortages for different sectors and several countries. He identifies temporary and permanent stockouts and finds that a higher share of stockouts significantly increases prices within one to three months. This inflation response is particularly pronounced for imported goods. Furthermore, based on prices and stockouts, the costs of replenishing goods can be estimated. The co-movement of prices and stockouts suggests that higher costs of replenishing inventories were an important driver of inflation during the pandemic. A respective cost shock has a sizable but less persistent effect on inflation, driven again by imported goods. *Chiara Osbat*, Adviser at the ECB, presented the webscraping projects conducted by the Price-Setting Microdata Analysis (PRISMA) research network within the European System of Central Banks (ESCB). First, she presented the advantages and disadvantages of using webscraped data and the challenges associated with building a respective database, i.e. with validating, storing and classifying those data. Subsequently, she elaborated on the use of webscraped data, particularly for nowcasting (which can help reduce forecast errors), inflation measurement (applying and experimenting with different price index methodologies) and inflation monitoring (real time analyses). One implication from the research projects is that webscraped data are particularly useful when they are complemented with other data sources such as scanner data. These data are available at a lower frequency, but they are richer in information, as they also contain information on quantities purchased. *Fabio Rumler*, principal economist in the OeNB's Monetary Policy Section, complemented the previous presentation by discussing research projects conducted by the PRISMA network using scanner data. There are two main types of scanner data, namely supermarket scanner data (i.e., data on all items scanned at the cashier's desk of a retailer) and household scanner data (i.e., data on all items purchased by a household). With the former type of data, it is, for example, possible to study price elasticities, the pass-through of costs to prices (such as VAT changes) and price-setting behavior. Analyzing the latter type of data helps understand the heterogeneity in experienced inflation across different demographics and countries. Households experience inflation rates in multiple heterogeneous ways. This heterogeneity results from different products being bought and their differences in prices; yet, it cannot be fully explained by household characteristics, such as household income and size. In his presentation, *Raphael Schoenle*, Associate Professor at Brandeis University, took up a general criticism of inflation measures, namely that aggregate measures often hide underlying or changing price dynamics. In particular, the cross-sectional distribution of disaggregated inflation rates has systematically changed over the last decades. It has therefore become important to look at different measures and statistics of inflation and account for such changes in economic models and central banks' policy frameworks.

3 Lessons for policy

Inflation is a major concern for citizens and policymakers alike

In his opening remarks, OeNB Governor *Robert Holzmann* emphasized that the recent surge in inflation rates in Europe had been a core concern of Europeans already in early 2022, i.e. already before the start of the war in Ukraine. Governor

Holzmann raised the question of why so many policymakers and academics alike were surprised by the speed with which, and the extent to which, inflation had returned. He argued that there was only a fine line between unexpected events on the one hand and missing creativity in interpreting relevant data, limited foresight and too narrow forecasting scenarios on the other. In this context, Governor Holzmann drew the audience's attention to large global trends, geopolitics and Europe's dependency on fossil energy sources as factors that may have been partly overlooked in the recent past. At the same time, he also emphasized that the current synchronization of inflation due to global shocks and the spillovers of large idiosyncratic or regional shocks was not a new phenomenon. Looking beyond purely macroeconomic and econometric explanations for the return of inflation, the OeNB Governor highlighted the important role behavioral factors play in shaping inflation and inflation expectations. To illustrate this point, he put the spotlight on recent research showing that the reaction of individuals to unexpected inflation developments largely depends on the inflation experiences they have accumulated throughout their lifetime. Governor Holzmann also argued that the concerns and ideas of younger generations should be taken into account by policymakers when setting out to address the present challenges. The best contribution to social peace that monetary policymakers could make would be to abide by their price stability mandate.

SUERF President *Jakob de Haan* offered a more academic perspective on the recent return of inflation. When it comes to tightening monetary policy conditions, the ECB may lag behind compared, in particular, to the US Federal Reserve and the Bank of England; yet, de Haan also acknowledged that underlying second-round price pressures may still be weaker in Europe. As a case in point, euro area wages have not picked up at the same pace as elsewhere recently. He closed with a plea for more discussions on current cross-country differences in inflation levels and recalled the weaknesses of the standard New Keynesian framework for modeling and forecasting inflation.

Why did central banks fail to see inflation coming?

In a high-level panel moderated by OeNB Governor Holzmann, top decision makers discussed timely questions related to monetary policy, policy interaction and inflation in a post-pandemic world faced with severe geopolitical tensions. Governor Holzmann first asked *why we did not see inflation coming*. Were we too focused on a low-inflation environment? For instance, he specifically raised the question of whether the discussions revolving around forward guidance were neglecting the possibility that inflation targets might also be approached from above rather than from below. By referring to the current large economic shocks (notably energy and food price shocks), *Andrew Bailey*, Governor of the Bank of England, emphasized that it was the rapid succession of adverse events that would pose major challenges. The resulting price rises would hurt the poor the most. What can and should monetary policy do in this case? When pandemics and wars happen, monetary policy must still take the necessary measures to bring inflation back as fast as possible. *Joachim Nagel*, President of the Deutsche Bundesbank, recalled that the Bundesbank had never been a proponent of extraordinarily expansionary monetary policies in the first place. Central banks should be self-critical. It would be too easy to simply say that the surge in inflation was due to supply shocks.

Since monetary policies have been very accommodative for over a decade, it was no surprise that inflation started to rise after such a long period of monetary expansion.

According to *Claudio Borio*, Head of the Monetary and Economic Department at the Bank for International Settlements (BIS) and SUERF Fellow, the BIS – like most observers – had also been surprised by the strength and persistence of inflation. In his view, we need to be very humble when trying to understand ex post what we did wrong. The current surge in inflation is due to many post-pandemic factors. We underestimated pent-up demand; the shift from demand for goods to demand for services was more persistent than thought; and global supply bottlenecks were stronger and more persistent than anticipated. The war in Ukraine – which resulted in a huge negative supply shock – had not been expected either. Furthermore, what may appear as a supply shock from individual countries' perspectives, may in fact be a demand shock at the global level. The way expectations are modeled by the Phillips curve implies that bygones are bygones. In negative terms-of-trade shocks, however, one might try to recover purchasing power losses, and this can create a self-propelling inflation process. Finally, there are no non-linearities in the Phillips curve in the sense that inflation itself may propel inflation. Once inflation moves out of the realm of rational inattention and moves into focus, the inflation process can become more entrenched. What is important now is that we do not repeat past mistakes going forward. Monetary policy was constantly trying to push up inflation in pre-COVID-19 times, which was very hard to achieve. But with the current shocks, monetary policy may or may not accommodate the rise in prices. In many countries, demand is below what it would have been in the absence of the COVID-19 shock. In other countries, output is higher than in pre-pandemic times. It is not only the level but also the speed of output growth that matters, however. If supply does not respond at the same speed, inflation will rise.

According to *Tobias Adrian*, Financial Counsellor and Director of the IMF's Monetary and Capital Markets Department, the shift in central banks' monetary policy strategies toward make-up strategies was motivated by the proximity to the zero lower bound on interest rates. Pre-pandemic inflation expectations had been on a downward trend; the Phillips curve had gradually flattened. Developments in the US have been different from other countries in this respect, however. While output is back to the pre-pandemic level in the UK, it is clearly above that level in the US. The link between money supply and inflation is far from clear. These days, supply shocks are the key drivers of inflation. Central banks have been facing a sequence of severe shocks. The risk of recession is quite high in a number of European countries. China's economy is seriously slowing down. All of this explains why central banks do not act as fast as some might expect them to do. Labor markets have largely recovered in many countries (albeit to different degrees), creating potential for upward wage pressures. Central bank credibility is key now, and at very high levels in advanced economies (AEs), which is why the central banks in these countries can look through supply shocks. In emerging market economies (EMEs), central bank credibility is lower, which is why the central banks there should not look through supply shocks. Therefore, EMEs tightened their monetary policy stance earlier and more aggressively to react to surging inflation; as a result, inflation is coming down rapidly again. In AEs by contrast,

due to higher credibility, central banks can react more moderately, all the while being careful to avoid second-round effects.

Do central banks need to fundamentally review their inflation forecasting models?

With respect to inflation forecasting, the question was raised of whether central banks' forecasting models that have not managed to forecast inflation well over the past two years should be subject to external reviews. *Claudio Borio* argued that the Phillips curve can be a useful tool, but that central banks would also need to think more broadly, notably when transitioning from low to high inflation regimes, as these regimes differ widely. When inflation is high, the common component of inflation is much bigger – there is a self-reinforcing nature of inflation. This is not included in standard models. Borio moreover argued that an external review of central banks' models would not be very helpful, since all institutions rely on the same models. Forward guidance should not be the preferred go-to tool, as flexibility is key in the current context. *Joachim Nagel* emphasized the need for checks and balances in all tools used. Whether this would require an external auditor is unclear; in any case, central banks would need sufficient resources to evaluate forecasting performance internally. Regarding wages, it seems to be clear that the German wage moderation of the last years is over. In the second half of 2022, we will see high wage settlements. According to *Andrew Bailey*, the question is what forecasting models are being used for. Unlike a clockwork, these models may not guarantee internal consistency in every instance, but they allow expert judgment to be incorporated in instances where modelling economic relationships becomes difficult. According to *Tobias Adrian*, the baseline typically behaves in a linear way, whereas specific scenarios can be identified through non-linearities. Inflation may be higher and more persistent than thought, however. On financial markets, there are already concerns about a de-anchoring of inflation expectations. On the real economic side, there are huge downside risks at this point, i.a. due to the recent economic developments in China and the war in Ukraine. In addition, probability distributions are unfortunately characterized by very fat tails at the moment, thus pointing to extreme events.

Why have central banks not reacted as forcefully to inflation as one would have expected?

OeNB Governor Holzmann moreover raised the question of *why central banks have not reacted quite so forcefully to the rise in inflation* as one would have thought. Was this due to their high credibility that allowed them to adopt a wait-and-see attitude or due to uncertainties over what caused the current shocks? Are there deep-rooted historical drivers or can differences in the speed of reactions be explained by the composition of central bank decision-making committees? Or is a very cautious and gradual response appropriate anyway? *Tobias Adrian* explained that what central banks are trying to achieve is a soft landing. Central banks always have to balance trade-offs. In EMEs, negative output gaps were much larger when inflation surged; they nevertheless responded more aggressively to the marked rise in inflation, since their central banks lacked credibility. Asset markets have corrected heavily, but these corrections have so far been orderly. Financial conditions have to become tighter, but in an orderly manner.

Claudio Borio pointed to different circumstances in different countries. In Latin America, for instance, a sharp rise in inflation required a strong monetary policy reaction. At turning points, central banks usually wait a bit – there is what is referred to as "reversal aversion." While this is not a good reason, it may partly explain central banks' behavior. Gradual responses are not mistakes; when circumstances change, this needs to be recognized (which takes time) and communication needs to be adjusted gradually. In fact, the size and speed of the surge in inflation surprised the entire economic field and all policymakers alike. Debt levels and financial vulnerability are very high worldwide; financial markets have taken on a lot of risk. Under the current circumstances, a given extent of monetary tightening may have a stronger effect now than in the past. *Joachim Nagel* recalled that there were some institutions, like the BIS, that highlighted inflation dangers early on. Central banks' inflation forecasting models failed to adequately deal with structural and serial shocks, however. *Andrew Bailey* pointed out that shocks have become bigger over time. The current aim must be to bring inflation back to target without undue damage to output. What role should forward guidance play in this context? It will likely be used also in the future, but it should be seriously reconsidered. Turning to financial stability, households' balance sheets are now more robust to shocks than in the past, due to action taken in the aftermath of the global financial crisis aimed at reinforcing financial stability.

How to deal with financial stability risks arising from monetary tightening in an already fragile situation?

When asked about potential risks to financial stability resulting from monetary policy, *Joachim Nagel* responded that when inflation rates are this high, the central bank mandate is clear on the required course of action. To reduce the risk of financial market turmoil, it is paramount to give markets clear guidance in order to reduce uncertainty and support financial stability. *Claudio Borio* emphasized that central banks have a clear mandate that they need to fulfill, while taking financial stability into account. Whenever central banks exercise this judgment, they must not fall into the trap of financial dominance. This might happen in cases where the financial system as a whole is regulated properly. Since the global financial crisis, a lot of progress has been achieved in banking systems. By contrast, in nonbank financial firms, progress is lacking. Central banks and securities markets regulators have different views on this, however. Finally, *Andrew Bailey* warned that central banks would possibly lose credibility if they tightened monetary policy too fast in a crisis and would then have to reverse course if the economy were to fall into a recession.

Improving models and paying closer attention to tail risks to avoid inflation crises in the future

In her concluding remarks, OeNB Vice President *Barbara Kolm* thanked the organizers and all the participants for a truly inspiring conference. She then offered her thoughts about what could be done to be better prepared for future inflation surges, proposing, i.a., to incorporate non-linearities into (forecasting) models, pay closer attention to tail risks, closely monitor the anchoring of inflation expectations and try to counteract adverse effects of high inflation on vulnerable households in a timely manner. She concluded by expressing her hopes that, at the next

conference hosted by the OeNB and SUERF, we will be in a position to discuss the current surge in inflation in retrospect.

Box 1

(Geo-)politics play a central role for economic and price developments

The development of inflation needs to be considered in the broader context of global and longer-term (geo-)political, societal and economic developments. In his dinner speech, Martin Selmayr, Head of Representation of the European Commission to Austria and Professor at the University of Saarbrücken, raised the question of whether we are witnessing a "Zeitenwende." While Russia's war against Ukraine indeed implies a tectonic shift in global affairs, several other events – which of course cannot and should not serve to relativize Russia's aggression – have also fundamentally changed our world over the past decades (e.g., the events of 9/11, the global financial crisis, Russia's annexation of Crimea in 2014, the election of Donald Trump as US President or the COVID-19 pandemic).

Where does this "Zeitenwende" lead us to? There are five views: First, some claim that it marks the start of the age of strong leaders who shape our future, since democracies have failed. In Selmayr's view, the contrary is true: Western democracies have shown that they are capable of coping very well with the crises we have seen over the past decades and that they are likely to fare better than totalitarian regimes. A second view claims that we are now in an era of deglobalization. Again, Selmayr disagreed: The EU benefits tremendously from globalization, and a halt to trade with Russia, with its modest 3% of world GDP, does not imply a halt to globalization. On the contrary, the EU would instead even further intensify its links with other parts of the world. A third claim is that this highly disruptive period, marked by a pandemic, high inflation, economic uncertainty and – most depressingly – war, is the end of peace. In Selmayr's view, after 30 years of relying on the US, it is high time for the EU to build its own defense capacities. Of course, this does not mean that Europe now wants war. A fourth concern is that the energy crisis triggered by the war in Ukraine will put a stop to climate protection policies. In Selmayr's opinion, the EU's efforts to substitute oil and gas from Russia with other sources of oil and gas are needed to ensure energy supply in the short term. Overall, the energy crisis will boost Europe's greening and decarbonization efforts. Fifth and last, many claim that Russia's invasion of Ukraine marks the end of the rules-based international order. Selmayr, by contrast, pointed out that the international court of justice has clearly declared Russia's actions illegal. Now, not only the Western Balkans but also Ukraine and Moldova seek to join the EU. The war has undoubtedly shown that the EU is a model for the future, not of the past. To conclude, instead of living in a dystopia, we should recognize how successful our route of democracy – underpinned by a rules-based global system, openness and European integration – has been.