

Bančni vestnik

SPECIAL ISSUE
SLOVENIA ONE YEAR
AFTER THE OUTBREAK OF
THE ENERGY CRISIS AND
DEVELOPMENT PRIORITIES



EDITORIAL

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Coping with inflationary pressures in a challenging geopolitical and financial environment

*Boštjan Vasle**

Our economies have once again proved more resilient than was generally expected last year. In Slovenia and the euro area, economic growth has slowed markedly over the past year, yet we avoided a decline in the level of activity. In addition to the Russian military aggression and its aftermath, growth slowdown also reflects the high level of economic activity achieved after rapid rebound following the pandemic crisis. The mild winter and diversification of energy sources helped us weather the shortage of energy supply from Russia. While high wholesale prices of energy and raw materials combined with weaker demand for goods brought about a moderation in manufacturing, growth in the services sector remains robust. This activity in the service sector is underpinned by new record-high employment levels and historically low unemployment, which have contributed to the acceleration of wage growth. Although part of the business sector may be able to absorb certain increases in labour and financing costs, not least due to generally higher profit margins in the recent period, some of the burden may be passed on to consumer prices, thereby adding to inflationary pressures if demand remains strong. The confluence of adverse circumstances has had a somewhat more visible impact on global financial markets, where prices have fallen from their late 2021 peaks and remained volatile, as well as on the US and Swiss banking sectors.

* Boštjan Vasle, Governor, Banka Slovenije

Inflation remains a major concern and bringing it under control is a key policy priority. While the euro area headline inflation receded in recent months due to falling energy prices, the underlying inflation has remained uncomfortably high. Past increases in input costs have probably not yet fully shown in final prices and still motivate upward price pressure. However, with global supply chains largely normalised and energy prices declining to more moderate levels, the price pressure is gradually shifting from external to domestic factors. This increases the need for fiscal policy to help us fight against inflation.

The Eurosystem's response to persistently high inflation has been decisive.

Since July, we have raised our key interest rates by a total of 3.75 percentage points at the fastest pace since the euro introduction. After completing net asset purchases in the first half of last year, we initiated a gradual disinvestment in March of this year. Together with the banks' repayment of our longer-term loans, this will gradually reduce surplus liquidity in the economy and decrease our footprints on financial markets. Looking ahead, a few more rate hikes might be needed, given the excessively high core inflation and the tight labour market. We will accelerate the shrinking of our balance sheets soon, albeit with caution and preparedness to address unwarranted reactions from financial markets.

Rising interest rates have so far had a largely positive effect on the overall profitability of banks in Slovenia and elsewhere in Europe. The resulting losses on securities valuations have been manageable, banks' capital and liquidity positions have remained largely sound, and the share of non-performing loans has been historically low at the system level. The US banking sector's turmoil has globally increased depositors and investors' attentiveness to bank health, but the impact on the European banking sector has been limited.

The resilience of our banking systems to recent shocks and interest rate rises reflects, among others, the strengthening of EU banking regulation and supervision over the last decade. It argues in favour of a more conservative European approach in the application of the Basel standards to banks of all sizes. Macroprudential policies have also contributed to limiting risks in banks. Nonetheless, recent developments can serve as a reminder that the challenges of a rapidly changing macro-financial environment should not be neglected and that we all, namely banks, supervisors, regulators and external auditors, must remain vigilant. Banks need to continue working on sound governance and internal controls; this is where the recently troubled banks have failed. As a supervisor, we are increasingly tailoring our oversight processes to bank-specific characteristics and macro-financial circumstances. In the last two years, we have been paying extra attention to

banks' exposure to the hospitality and energy-intensive industries, (unrealised) securities losses, a significant gap in the maturity of assets and liabilities, and banks' liquidity profiles. We also strive not to lose sight of longer-term challenges related to banks' prospects in the evolving financial landscape.

Equally important is to avoid any further delays in transposing the final set of Basel III reforms into EU law and to maintain momentum in strengthening of the bank crisis management framework. Extending the scope of depositor protection and the resolution framework to smaller banks will serve as steps in the right direction. In this regard, the right balance between the stability of the banking system and the costs of resolution is needed, and this can be achieved through various resolution tools. Another important outstanding EU issue is the provision of liquidity in the bank resolution process.

Let me conclude with a longer-term challenge: it is true that unprecedented policy support helped us weather the shocks. But to restore the stability and proper functioning of our economies, we should avoid the misleading impression that monetary and fiscal policy can or should step in to address every challenge. It is important that policy support is and will remain available for major shocks and critical periods. However, market participants should strengthen their resilience for major shocks and prepare themselves for unwanted developments as well.

Macroeconomic Outlook for 2023 and 2024

*Dan Bucsa and Mauro Giorgio Marrano**

- We expect the economies in EU-CEE¹ to grow by around 0.9% in 2023 and 3.6% in 2024, with most countries avoiding a technical recession this year. The Western Balkans could grow slightly faster than EU-CEE in 2023 and slower in 2024.
- Stronger global trade, fewer supply-chain bottlenecks, resilient consumers and more public and private investment will support economic growth. Tight financial conditions at home and abroad and destocking will weigh on economic growth this year, with negative fiscal impulses slowing the recovery next year.
- In Russia, we forecast an economic contraction of 2.5% in 2023, followed by a small rebound of around 1.7% in 2024, provided exports do not fall sharply, import substitution improves and public spending does not tighten too much.
- Inflation has peaked throughout CEE but is likely to miss targets in 2023-24 as disinflation could be slowed by rising energy prices and taxes, the gradual removal of price caps, FX pass-through and backward-looking wage indexation supporting consumer demand.
- Regarding monetary policy, in 2023 we expect rates to be cut to 12% in Hungary while the probability of a cut in Czechia has diminished. In 2024, we expect rates to be cut to 4.50% in Czechia, 5% in Romania, 5.50% in Poland and Serbia, and 7% in Russia.
- CEE banks are well capitalised and profitable, but central banks need to manage any episode of risk aversion proactively. The Polish banking system would benefit from a blanket solution to end the lawsuits related to CHF mortgage loans.
- The risk of funding higher budget deficits in 2023 has been mitigated by bumper issuance in 1Q23. Private and public borrowing from abroad will cover the C/A deficit not financed through FDI and EU funds.
- Gradual European integration for Serbia, following an agreement with Kosovo, could be used as a blueprint for Ukraine. The EU would benefit from investing in the energy infrastructure of the Western Balkans.
- In our view, the main risks are: **1.** Europe's lack of a common vision on how to end the war in Ukraine, which we expect to continue in 2024 without escalating to other countries or non-conventional weapons; **2.** war fatigue in CEE; **3.** the European Commission's more flexible approach to observing whether EU countries respect the rule of law; **4.** the growing popularity of Euroskepticism in EU-CEE; **5.** Poland and Hungary's missing EU funds; **6.** political uncertainty if the opposition wins the elections in Poland; and **7.** Europe's lack of a common natural-gas strategy.

JEL E66

CEE weathered the first winter of the Russia-Ukraine war better than expected. Mild weather and timely planning helped Europe avoid blackouts and gas shortages. Most CEE countries purchased less natural gas from Russia while finding other import sources. At the beginning of April, natural gas in storage was at its highest level this decade. In addition, CEE countries used 4-17% less electricity in 2022 than in 2021, with Slovakia and Romania leading the way. Savings explained a large part of the decline, but factory closures were also a reason. The risk of scarring remains high in the production of metals (especially nonferrous ones), chemicals (especially fertilisers), glass and food. Imports rose for all these products, but stronger-than-ex-

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¹ EU-CEE refers to CEE countries that are members of the EU: Bulgaria, Croatia, Czechia, Hungary, Poland, Romania, Slovakia and Slovenia.

pected demand from Europe prevented net exports from extracting too much from growth in both 4Q22 and 1Q23. CEE consumers started 2023 in a better mood than had been feared half a year ago. Surveys show that households have become more optimistic since October-November 2022. They are now expecting lower inflation and unemployment ahead and are planning to make larger high-value purchases than they thought possible only a few months ago.

Slowdown more often and likely than a technical recession

In our view, the risk of other countries experiencing a technical recession in 2023 has declined. Stronger global trade² leaves the small, open economies of CEE in a good position to benefit from more robust external demand. This is enhanced by faster growth in China further alleviating supply-chain blockages, with most CEE countries now as able to source inputs as they were before the pandemic. The automotive sector continues to lag, as evidenced by Hungary's underperformance.

We expect consumers to further support non-tradable sectors. Post-pandemic precautionary savings offer a cushion of at least 1% of GDP in all countries but Russia, Slovakia and Poland. In addition, we expect wages to outpace inflation starting this summer, with an impact on services (especially travel and tourism) and on purchases of durable goods. Solid household finances are a reason why we do not expect a sharp correction in housing prices, although the situation varies across countries.

The European Commission's decision from February 2023 to allot RRF funds pro-rata³, according to what reforms have been implemented⁴ means that some money will be lost (especially when linked to difficult judicial reforms), but also that more money is likely to flow to EU-CEE countries to boost public investment in 2023 than in 2022. This more flexible approach could finally unlock flows of recovery funds to Czechia and Slovenia, which, together with Hungary and Poland, saw no disbursements in 2022. The latter two countries are unlikely to see any RRF transfers in 2023⁵, but might receive the first large payments from structural funds allotted in the 2021-27 EU budget. If foreign demand picks up in 2H23, we expect capex to follow through with a very short delay because many exporting sectors are running out of spare capacity or need to in-

vest in machinery to offset the shortage of workers that has persisted since 2019, in spite of the pandemic and the war. Despite this positive outlook, we expect GDP growth to slow in 2023 compared to 2022 in all CEE countries. We forecast EU-CEE will grow by 0.9% in 2023, compared to 4.2% in 2022, accelerating to 3.6% in 2024. We expect the Western Balkans to grow slightly faster this year and around 0.5pp slower in 2024. Besides the carryover, we see several reasons for growth to slow this year compared to 2022, as detailed below:

- 1. Negative credit impulses in 2023 and fiscal impulses in 2024:** In most countries where fiscal policy will be expansionary, its impact will only offset diminishing credit to the economy.
- 2. Destocking:** Lower inventories are explained by supply chains running more smoothly and smaller purchases of energy products, as natural-gas storages and coal reserves need less replenishing this year.
- 3. Weaker consumption in 1H23:** This is likely to occur in countries where precautionary savings have been exhausted (Poland, Slovakia) or where inflation continues to outpace wages by a large margin (Czechia, Serbia, Hungary). In addition, we expect debt repayments to peak this year, as we detail in the special topics section.
- 4. Tighter financial conditions globally:** We do not expect domestic funding conditions to worsen this year, but intercompany lending might become more expensive and scarcer if interest rates continue to rise in developed markets.

In Russia, we expect the economy to shrink by 2.5% this year and to grow by 1.7% in 2024. The government ramped up public spending and investment in 2022 to cushion the blow from sanctions and mobilisation, but the fiscal stimulus seems to have come to an end. We expect private consumption to recover gradually in 2023, with base effects providing for a full-year decline. Meanwhile, military spending is likely to further crowd out other industrial sectors due to incomplete import substitution, especially for electronic components.

In Slovenia, we have revised up our GDP growth forecast for 2023, from 0.5% to 1.5%, due to more resilient economic performance at the turn of the year. GDP returned to growth in 4Q22, implying that Slovenia has avoided a technical recession and that there was no negative carryover into 2023, as opposed to what we previously assumed. In addition, growth in 1H23 will probably be slightly better than previously envisaged, although we expect it to remain modest as the impact of high commodity

² See our Economics Flash - Global Leading Indicator by UniCredit: More green shoots of recovery, 8 March 2023.

³ COM_2023_99_1_EN.pdf (europa.eu)

⁴ Rather than wait for all the reforms associated with one semiannual disbursement to be fulfilled before releasing the money.

⁵ See country sections for details.

Chart 1: 2023 growth forecasts

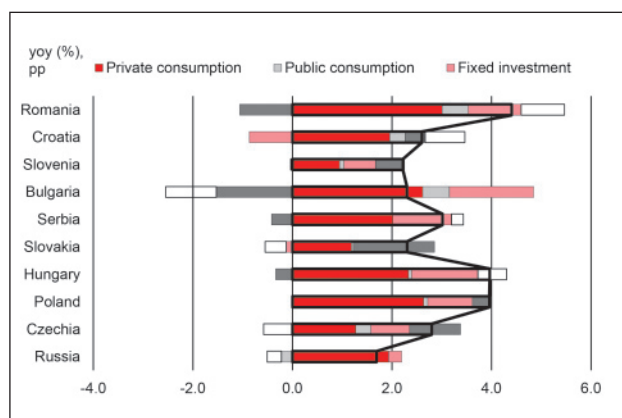
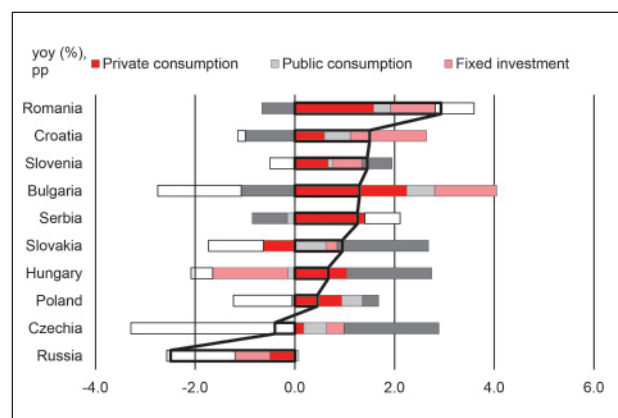


Chart 2: 2024 growth forecasts



Sources: Eurostat, national statistical offices, UniCredit Research

prices, a squeeze on real income and weak growth among Slovenia's main trading partners will likely continue to weigh on the economy. In 2H23, we expect growth to start to gradually recover as headwinds to growth begin to ease. In 2024, we expect growth to pick up to 2.2%, driven by a recovery in consumption, private investment, and a larger contribution from net exports.

Spring disinflation based solely on base effects

We believe that inflation has peaked in EU-CEE. As war-related base effects in energy and food prices start kicking in, headline inflation is likely to fall quickly towards 10%, where we expect disinflation to slow down.

However, strong domestic demand in most countries could slow disinflation in 2023. In most countries, service prices seem to be under greater pressure than those of goods, suggesting that consumer demand remained strong. The assessment of strong consumer demand is reinforced by the increased share of operating surpluses in 2022 GDP in all CEE countries but Slovakia, mostly at the expense of labour. Besides strong domestic demand, there are other shocks that could slow disinflation in 2023-24, which we list below:

1. Energy prices will have to rise further, even if international prices remain low. Natural-gas prices paid by households would have to increase in five countries if they were to align to current Title Transfer Facility (TTF) forwards, which are at their lowest since the summer of 2021. Since many CEE companies benefit from regulated prices, a similar liberalisation would add to headline inflation.
2. Tax rates will have to return to pre-pandemic levels. This is mostly the case for food and energy, with Hungary and Poland standing out.
3. Price caps will have to be removed.

4. The pass-through of currency depreciation to inflation remains asymmetrical and is largest Hungary, Serbia, Romania and Poland (in declining order). We believe that the recent appreciation is temporary and that the correction brought about by the turmoil in global financial markets may just be the first episode of depreciation.

5. Backward-looking wage bargaining will remain an issue for CEE companies until at least 2025. We forecast nominal wage growth will outpace inflation in 2H23 and exceed inflation and productivity in 2024. This would further support demand and cost-push inflationary factors.

As a result, we do not expect inflation to return inside target ranges in 2024, in contrast to most CEE central banks. The exception is Russia, where we and the CBR expect the target to be met next year. The outlook is better for 2025, provided that monetary policy does not ease too soon.

In Slovenia, inflation is likely to have peaked in 1Q23 and we expect it slow thereafter. Government measures aimed at mitigating the impact of high global energy prices should contain inflationary pressure, particularly in the first half of the year. These include a VAT reduction on certain energy products, from 22% to 9.5%, from September 2022 to May 2023, and caps on electricity and natural-gas prices for households and small and medium-sized enterprises for one year. Starting in 2Q23, base effects in energy and food prices and a moderation of core inflation could result in inflation slowing further, to 5.5% by year-end. Risks to the inflation outlook are related to commodity prices and stronger-than-expected wage growth

Monetary policy: no need to rush

Large portfolio flows in 1Q23 helped ease financial conditions in CEE and supported exchange rates, with some

central banks having to buy FX to prevent excess appreciation. In the absence of large market jitters, carry was king this past winter. This situation changed due to tightening financial conditions in developed markets.

Considering the recent banking problems in the US and Switzerland, we believe that CEE central banks should be cautious. Credit is yet to adjust to tighter monetary and financial conditions in most CEE countries. This poses a lingering inflationary risk. Since financial wealth outside bank deposits is limited in CEE (or tied up in pension funds), higher interest rates have a negative wealth effect only through debt repayments and a potential decline in house prices. Both channels will be relevant in 2023 but positive real wage growth in 2H23 might fuel inflation again before inflationary expectations have adjusted. Therefore, we believe patience is paramount to a successful and timely return of inflation to target.

In Hungary, we expect rates to be cut from 13.00% to 12% in 2023 and further to 6.00% in 2024. In Czechia, the probability of a rate cut this year is diminished and there is the risk of further tightening if the government fails to implement credible and significant fiscal tightening. In 2024, we expect the central bank to reduce its policy rate to 4.50%. We also expect FX interventions to subside and EUR-CZK to return above 24 in 2023-24.

We do not expect the NBP and NBR to cut rates until next year, while a temporary tightening of liquidity may be needed if pressure on currencies returns. We expect the NBP to cut to 5.5% in 2024 and the NBR to 5%. We see the RON depreciating gradually, with EUR-RON rising to 5.00-10 this year and 5.10-20 in 2024. EUR-PLN could return close to or above 4.80 during episodes of market stress. We expect the NBS to cut to 5.5% and the CBR to 7% in 2024. If the opposition wins the elections held in May, we

see the CBRT taking the policy rate to 40% before year-end, with cuts to 25% next year if inflation falls. We expect the TRY to depreciate regardless of the election outcome. That said, an orderly depreciation would be preferable to one brought about by too low a carry and a scramble for external financing.

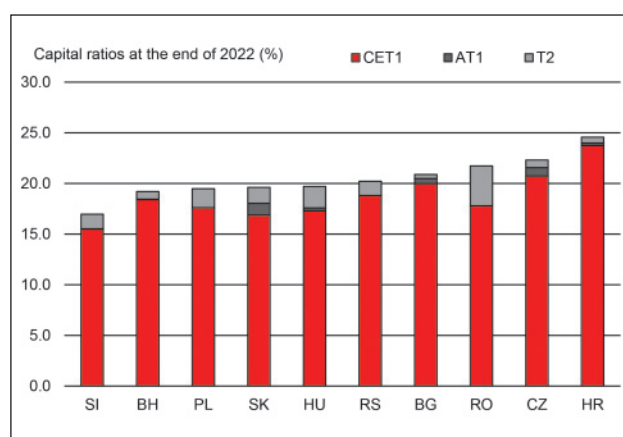
The troubles affecting US and Swiss banks brought back memories of the banking crisis that affected CEE in the aftermath of the global financial crisis. This time things are truly different. Chart 3 shows that CEE banks have high capital ratios and that profitability improved in the aftermath of the COVID-19 pandemic (Chart 4). Exposure to single sectors is limited by prudential regulation. While banks are losing money from higher bond yields, in most CEE countries longer-term bonds are held to maturity and are often hedged against interest-rate risk.

That said, there are several lessons that need to be learned from past experiences, namely:

1. No CEE economy or financial system is fully insulated if investors lose appetite for EM assets. This illusion led to capital controls and massive interventions in 2008-09 in several CEE countries that. Central-bank actions affected financial conditions for years. This time around, external imbalances are smaller and so is the reliance on foreign funding in the private sector.
2. Since this is first and foremost a question of trust, CEE central banks must be proactive in managing any worries arising among retail and/or institutional investors.

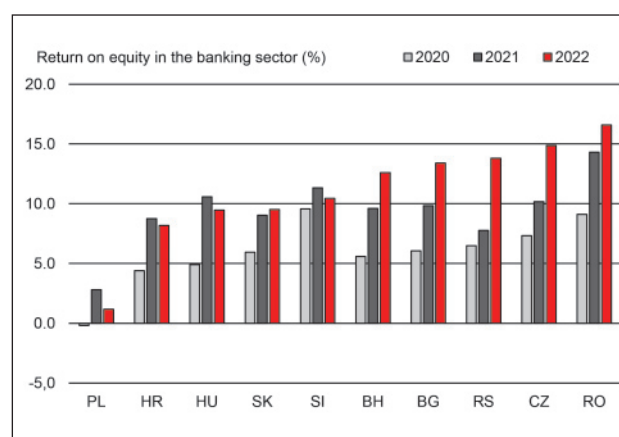
It is paramount that the Polish authorities work together to achieve rapid resolution of the CHF mortgage problem. An imminent ruling by the CJEU, whose legal counsel advised the court to side with borrowers, might affect confidence in

Chart 3: High capital ratios across CEE



Sources: central banks, UniCredit Research

Chart 4: Bank profitability improved after the COVID-19 pandemic



the Polish banking sector because loan-loss provisions would have to double. Thousands of ongoing lawsuits muddy the outlook at a time when banks need to keep access to short-term liquidity and longer-term funding. If the courts are left to deal with separate lawsuits for years to come, financial conditions could remain tighter in Poland than in neighbouring countries, ultimately affecting economic growth.

A strong start to 2023 lowers funding risks

CEE governments are trying to fight the downturn by transferring money to households and/or offering substantial subsidies to reduce energy costs. This is particularly true in countries that face elections this year (Slovakia, Bulgaria, and Poland) and next (Romania). We expect budget deficits to tighten this year only in Romania and Serbia, while only Croatia, Bosnia-Herzegovina and Serbia are likely to cap fiscal shortfalls below 3% of GDP. In 2024, we expect budget deficits to fall below 3% of GDP also in Slovenia and Bulgaria.

With fiscal tightening in limbo, we forecast negative fiscal impulses only in Hungary, Romania, Serbia and Croatia in 2023, with fiscal policy turning contractionary throughout CEE in 2024.

Higher funding needs have been met with unprecedented bond issuance in 1Q23, one of the most successful quarters of issuance EU-CEE ever had.

In Slovenia, the government deficit will likely widen from 3.0% of GDP in 2022 to 3.4% of GDP in 2023. This is lower than the figure envisaged in the government's budget for 2023 and our previous forecast (5.0% of GDP), reflecting the lower cost of the measures to mitigate high energy prices (now estimated at EUR 1 billion, or 1.5% of GDP), a somewhat better macroeconomic environment, and lower assumed capital expenditure.

Larger-than-planned public-sector wage increases represent an upside risk. In 2024, the deficit could narrow to 2.7% of GDP as a result of the expiration of the aforementioned mitigation measures and a decline in investment. Slovenia's debt-to-GDP ratio will remain high but likely edge down from 70% in 2022 to 67% by 2024, driven by high nominal GDP growth.

C/A deficits increased in 2022 due to higher energy bills and weak exports, especially to the eurozone. With global trade currently growing at a double-digit rate⁶ and natural-gas prices close to two-year lows, trade deficits are expected to narrow faster from 2Q23 onwards, with a further improvement in 2H23. If equity FDI flows resume, they

would slow the narrowing of the trade deficit, especially in Hungary and Slovakia. In 2023, most C/A deficits will not be fully funded by FDI and EU funds. However, debt flows will cover the remaining shortfall in most CEE countries.

Unusual opportunities and usual risks

Our outlook envisages opportunities and risks. In terms of opportunities, Serbia's agreement with Kosovo opens the door for the former to speed up its EU-accession negotiations. Under the step approach favoured by French President Emmanuel Macron, Serbia can hope to benefit from a tighter relationship with the EU, for example by joining the European customs union in the near future. This would boost inward FDI, productivity and exports, while reducing the risk of economic emigration. While Serbian authorities will not recognise Kosovo's independence, they may allow the latter to join international organisations. Serbian President Alexander Vucic, the author of this unprecedented step, will walk a tightrope at home in trying to communicate unpopular changes to an electorate that remains Euroskeptic and opposed to NATO in its majority.

Another opportunity was highlighted by the Greek government, which asked the EU to fund the energy infrastructure of the Western Balkans in order to fully integrate it with that of the EU and allow a more seamless transfer of oil and gas to landlocked Central Europe. In our view, this would be an extremely important project that would further reduce dependency on Russian energy for both the EU and the Western Balkans. This would probably weaken Russia's influence in the Western Balkans, eventually helping these countries to move closer to the EU. The road ahead is still bumpy, since reform appetite remains restrained at best. In our view the main risks are: 1. Europe's lack of a common vision on how to end the war in Ukraine, which we expect to continue in 2024 without escalating to other countries or non-conventional weapons; 2. war fatigue in CEE; 3. the European Commission's more flexible approach to observing whether EU countries respect the rule of law; 4. the growing popularity of Euroskepticism in EU-CEE; 5. Poland's and Hungary's missing EU funds; 6. political uncertainty if the opposition wins the elections in Poland; and 7. Europe's lack of a common natural-gas strategy.

⁶ See Economics Flash – Global Leading Indicator by UniCredit: More green shoots of recovery, 8 March 2023.

Headline inflation is declining, but core inflation remains stubborn¹

*Maja Bednaš**

In 2022, inflation intensified, and price growth has become more broad-based. As growth in food prices is expected to ease gradually and the contribution of energy prices to be smaller this year (in the absence of external shocks), core inflation is expected to ease at a slower pace, not only in Slovenia, but also elsewhere in the euro area. In March 2023, the European Central Bank noted a lack of clear evidence that underlying price growth is slowing.

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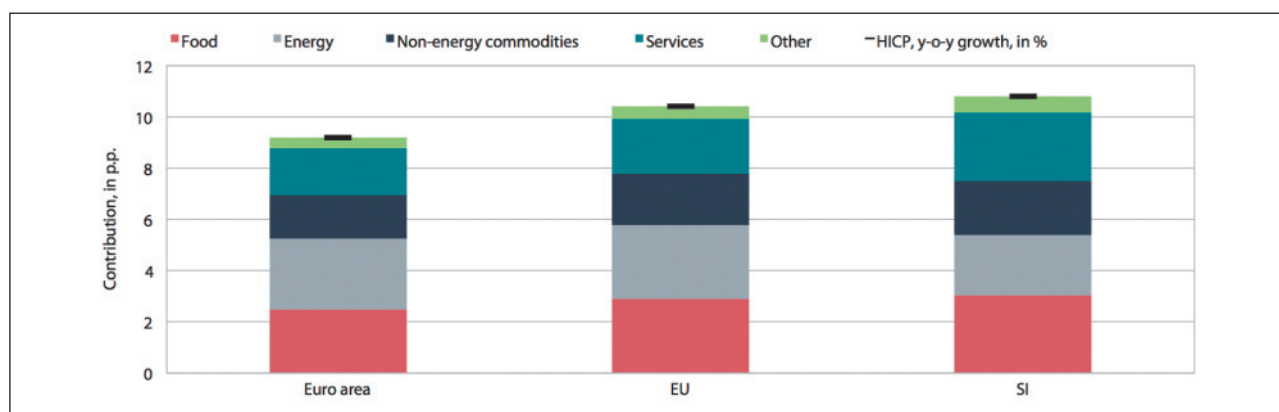
Inflation in Slovenia and the EU started to grow in 2021 and strengthened significantly in 2022, which required response from central bank authorities. Whilst over the past decade consumer prices rose by an average of just over 1% on an annual basis, at the end of 2021 year-on-year growth reached around 5%, the highest since 2007. The most important reasons for the increase were significantly higher fuel prices, economic recovery after the outbreak of the coronavirus pandemic and the impact of supply chain disruption. In addition to the surging fuel prices, which contributed the most to the high inflation, the contribution of the non-energy industrial goods prices also increased significantly: with the bottlenecks in supply chains and pressures from higher commodity prices, the supply of some semi-durable and durable products did not follow the increased demand and consumption of households. While in the period 2011–2020, consumer prices fell on average by around 0.5% each year, in 2021 growth of the prices of these goods averaged around 4.5%. Furthermore, higher prices of fuel, input materials and raw materials, as well as a poor harvest, affected food prices, and both processed and unprocessed food became more expensive. The overall growth in prices of service was still relatively subdued in 2021 (1.5%) with the hospitality service contributing the most to the rise, due both to higher demand (including the redeeming of tourist vouchers) and to labour shortages in this segment of services. However,

the impact of the labour market situation on overall inflation remained modest. In 2021, the Harmonised Index of Consumer Prices (HICP) growth in Slovenia was similar to the EU average, with only slightly larger differences in the components of inflation. In Slovenia, the contribution of growth in the prices of non-energy industrial goods was above average, while the rise of prices of services was about half lower than the EU average.

At the beginning of 2022, price growth intensified and has become more broad-based. The war in Ukraine has led to great uncertainties in the market for fuel, non-energy commodities and food and additional problems in supply chains, which maintains high pressures on further price growth. Thus, inflation increased considerably in 2022 and reached its highest level in almost 30 years in mid-2022, before declining slightly but still exceeding 10% at the end of 2022 (4.9% at the end of 2021). In 2022 as a whole, inflation averaged 8.8% (1.9% in 2021). The largest upward impact on inflation came from higher prices of food and non-alcoholic beverages (3.1 p.p.), and energy prices were also significantly higher (2 p.p.). In addition to goods prices, the growth of services prices has also strengthened, which – apart from a probable partial spill-over of energy prices – was mainly related to a post-COVID19 recovery in demand and wage increases in activities facing labour shortages. The contribution of service prices to inflation thus increased especially towards the end of 2022, as did that of food prices. On the other hand, energy price growth slowed (amid a high base effect, weakening economic activity and government measures to mitigate rising energy

¹ Based on Development Report 2022 and Spring Forecast of Economic Trends 2023, IMAD

* Maja Bednaš, Director, Institute of Macroeconomic Analysis and Development of the Republic of Slovenia

Figure 1: In 2022, rising food prices contributed significantly to inflation in Slovenia and the EU

Source: Spring Forecast of Economic Trends 2023, IMAD, 2023.

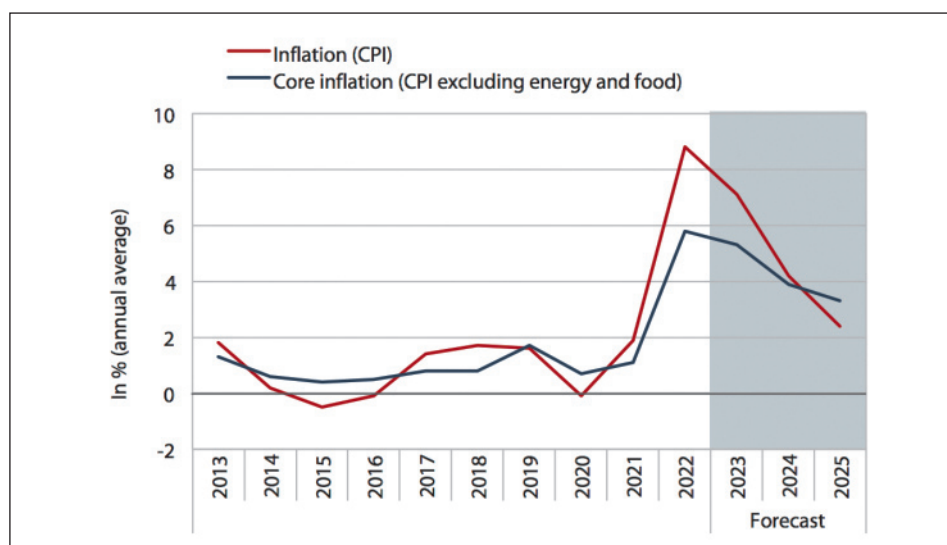
prices) but remained strong. Price growth in non-energy industrial goods also slowed slightly towards the end of 2022 as supply chain problems eased and the commodity market situation stabilised. In line with these developments, core inflation (excluding food and energy prices) was significantly higher at the end of 2022 (7.4%) than at the end of 2021 (3.1%). The rising inflation in 2022 marked the beginning of an accelerated monetary policy normalisation, which has been tightening credit conditions by raising interest rates and phasing out non-standard measures, thereby dampening demand, upward pressure on prices and inflation expectations. While the latter have been elevated in the short term, they remain anchored near the inflation target in the longer term.

In IMAD's Spring Forecast, released at the beginning of March 2023, we expect inflation to ease off gradually this year, but to remain relatively high on average, mostly due to still high year-on-year inflation in the first half of the year, mostly related to strong base effects. The latest statistical data confirm these expectations. In March 2023, consumer prices remained the same as in the previous month, while year-on-year growth increased as expected and amounted to 10.5%. Much of the year-on-year increase was due to the lower base from last year when the government significantly reduced electricity prices by abolishing certain levies and charges. Consequently, these prices increased by almost 50% year-on-year in March this year. As mentioned above, the largest upward impact on inflation in 2022 and at the beginning of 2023 came from higher prices of food and non-alcoholic beverages; in March they rose by 19% year-on-year. However, we expect that the growth of these prices will gradually slow down as the increase in agricultural input prices has already slowed significantly, which will gradually lead to an easing of price pressures along the entire price/cost chain. These expectations are based on the estimation of the pass-

through of a commodity price shock along the food price chain in the internal EU market on consumer food prices in Slovenia, following the analysis of Ferrucci et al. (2012)². We estimated the pass-through of a commodity price shock along the food price chain in the internal EU market on consumer food prices in Slovenia by means of a vector autoregression model (VAR). The analysis considers that a longer period of tight conditions in the energy and food commodity markets, exacerbated by the war in Ukraine, and adverse weather conditions contributed to a sharp rise in food prices, especially in 2022. Prices for agricultural inputs began to rise in 2021, with the increase accelerating in the first half of 2022. Price increases were exceptionally high in the mineral fertiliser group (which follow fossil fuel prices) and in the animal feed group (which largely follow grain prices). Agricultural producer prices followed input prices. Food import prices and producer prices also rose significantly in 2022. Strong increase of energy prices also significantly affected food prices. In addition to higher fertiliser and energy prices, food production was also affected by adverse weather conditions (drought) in the summer of 2022. To some extent, the higher costs of food production were passed on along the entire chain from production to retail food prices. Together with energy prices, these contributed most to the acceleration of inflation in 2022 in Slovenia, the euro area and the EU. The highest price increases were recorded for oils and fats and dairy products at all levels, while higher prices for dairy products, cereals and meat accounted for almost two-thirds of the increase in food prices. In all euro area countries and EU Member States, food prices in 2022 outpaced the general price increase, with significant differences between countries. The model estimates suggest that the pass-through of the commodity shock to consumer food prices in Slovenia is

² For more technical details, see Spring Forecast of Economic Trends 2023, IMAD.

Figure 2: Year-on-year headline inflation in Slovenia will gradually decline in 2023 but remain relatively high on average; core inflation will ease at a slower pace



Source: Spring Forecast of Economic Trends 2023, IMAD, 2023.

quite protracted and lasts a little more than a year, after which the response becomes statistically insignificant. These estimates suggest that the shocks that occurred at the end of 2021 and in March and April last year were almost completely passed through.

In Spring Forecast 2023, we estimate that inflation will only gradually towards 2%, not before 2025. In 2023, higher service prices will still contribute significantly to inflation, and the contribution of food prices will also remain relatively high, although growth in food prices is expected to ease gradually. The contribution of energy prices is expected to be smaller this year in the absence of external shocks. As price increases are gradually slowing, inflation is expected to be 5.1% at the end of 2023 and average 7.1% in the year as a whole, mainly due to its high level at the beginning of the year. For next year, we expect inflation to weaken further in the absence of external shocks, falling below 3% by the end of the year, supported by

monetary policy measures. However, core inflation is expected to ease at a slower pace, not only in Slovenia, but also elsewhere in the euro zone as the data for March show that while headline inflation on average dropped, the core price growth accelerated. In the euro zone, it has been above 7% since January 2023 (2.4% in January 2022), while in Slovenia it exceeded 9% in December 2022 and has remained above (3.9% in January 2022). In March 2023, President of the ECB spoke about the absence of clear evidence of underlying inflation trending down.

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Why is inflation so high and so different in euro area countries

*Madis Müller**

The article discusses what caused the recent sudden inflation surge both globally and in Europe and why current inflation rates differ so widely across the EU member countries using the euro. It examines how high inflation impacts people and state finances and discusses how monetary, fiscal and structural policies interact with each other. It concludes by underlying that restoring price stability is currently the highest priority for central bankers.

JEL E31 E6

After staying too low for more than a decade, inflation suddenly surged both globally and in Europe. This article discusses what caused this surge and why current inflation rates differ so widely across the member states of the euro area. It examines how high inflation has impacted people and state finances and discusses how monetary, fiscal and structural policies interact with each other.

It is clear that restoring price stability is currently a matter of the highest priority for central bankers, and while the article does not focus on monetary policy tools, central banks undoubtedly need to do their part to get inflation sustainably under control by both raising interest rates and gradually reducing the size of their balance sheet.

The global and European roots of high inflation

The search for the causes of the current high inflation starts in the aftermath of the Covid-19 pandemic. The global economy recovered fast once the pandemic ended and the restrictions on consumption and travel were lifted. Aggregate demand in our economies bounced back, and it was also boosted by the wide-ranging support measures that governments and central banks offered to help companies and households cope with the crisis. It turned out that not all companies could respond quickly enough to this increase in demand, as some restrictions lingered and supply chains remained fractured. This put pressure on input prices that was then passed on to consumers.

Then Russia attacked Ukraine, and this caused energy and

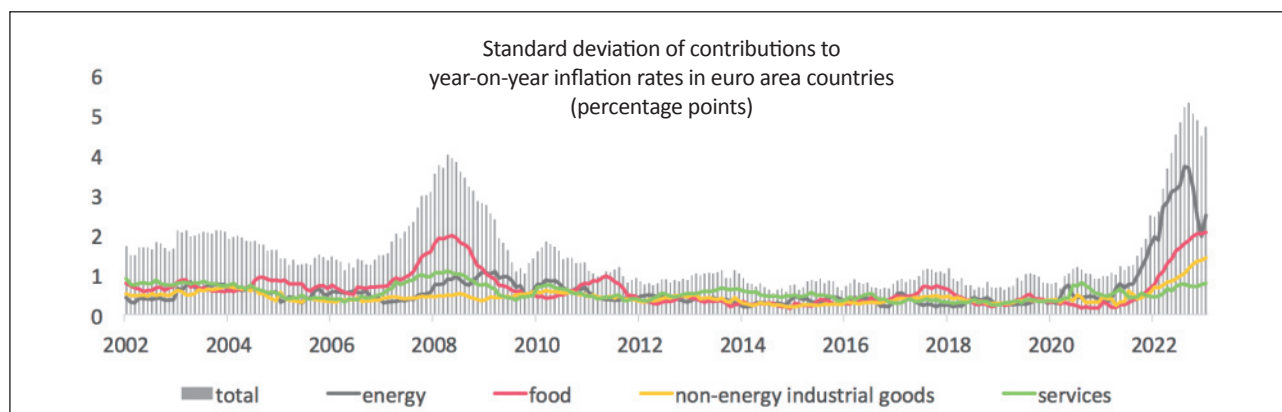
commodity prices, including food prices, to increase sharply. The energy crisis hit Europe especially hard as the European Union as a whole and many member states were heavily dependent on Russian oil and gas. Russia weaponising energy pushed inflation up to levels not seen since the last great oil shock in the 1970s and 1980s. By October last year, the euro area annual inflation rate passed through 10% mark, although the inflation rates were very different across the member countries, ranging from 7% in France to above 20% in the Baltics in that month. Inflation in Slovenia was just below the euro area average at 10.3%.

The differences between the inflation rates in the various countries of the euro area first started to widen in 2020 when the Covid-19 pandemic caused stronger disinflation in countries that have large tourism sectors. As the pandemic faded, inflation picked up most in countries where the economy had declined less and where labour shortages were starting to put pressure on wages. The Baltics were hit even harder by supply chain disruptions when the war and sanctions cut off imports from Russia and prices rose. Before the war started, gas and electricity were relatively cheaper in the Baltic states than they were on average in the euro area. This relatively low starting point made the subsequent price increases larger in percentage terms.

After Russia invaded Ukraine, energy became the biggest cause of the divergence between the headline rates of inflation in the countries of the euro area. A range of factors have caused this divergence, including the extent to which

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Figure 1. Inflation divergence has never been higher in the euro area



Sources: Eurostat, Eesti Pank calculations

energy prices were regulated, and what support measures governments chose to alleviate the energy price shock for households and companies. Differences in the energy generation mix have also contributed to the divergence, as have the terms of household utilities contracts. In countries where the prices for electricity or gas are fixed for longer, it also took longer for the increase in prices to pass on to consumers.

Inflation was particularly high in Estonia, reaching close to 20% last year. The main reasons behind that also apply to Latvia and Lithuania, the other two Baltic countries with very high inflation.

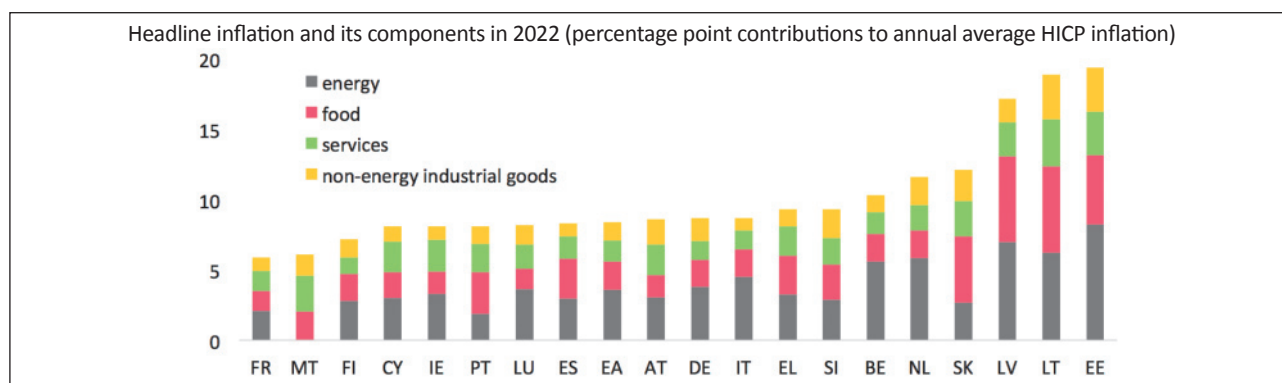
To start with, the share of energy and food in the consumer basket is still somewhat higher in our countries than the average in the euro area. This meant that rapid rises in the prices of energy and food in particular consequently had a bigger impact on our inflation readings.

Compounding this, price setting has traditionally been more flexible in the Baltic region than in other euro area countries, meaning that both rises and falls in commodity prices are translated more swiftly to consumer prices. Administered prices are also flexible and governments have

allowed higher global energy prices to pass through quickly to regulated prices, while governments in some other euro area countries have been more cautious. High energy prices have also passed through to consumer prices in Estonia particularly fast because Estonian households have generally preferred to have flexible prices in their utility contracts. This had been a smart choice in most previous years, but it cost us dearly in 2022. It meant that any price increases in the wholesale markets for electricity in particular were immediately reflected in the prices paid by households. The increases in the prices of electricity that Estonian households experienced in the first half of last year were indeed dramatic.

A third and more general reason why inflation has been high in the Baltic countries is that the economic impact of the pandemic was more limited in our region and the pandemic was followed by a very strong and swift recovery. Expansionary fiscal and monetary policies combined with strong domestic demand pressures thus contributed to an increase in inflation. On top of this was a controversial change in the Estonian pension system in the autumn of 2021 that allowed individuals to start withdrawing their

Figure 2. Sources of inflation divergence vary across countries while energy and food prices have been the main drivers



Sources: Eurostat, Eesti Pank calculations

pension savings before they reached retirement age. Some of this money was used to fund private consumption, which further increased inflationary pressures.

The substantial dispersion of inflation rates between the countries of the euro area countries poses the question of how harmful these differences are in a monetary union. Obviously there will always be differences between the structures of our economies, and so there will always be some differences between the inflation rates in different countries. Such differences have been around since the euro was first introduced, though for most of the time they have been minor.

Large differences in inflation rates could however lead to problems with the smooth functioning of a single currency area. An obvious problem is that a common monetary policy allowing nominal interest rates to be similar in all of the euro area countries will lead to differences in real interest rates if there are differences in inflation. The real interest rates in countries with higher inflation might be too low, while the real rates may be too high for countries with lower inflation. The common monetary policy then becomes too lax for some countries and too tight for others. There may also be possible concerns about the price competitiveness of individual countries in a monetary union if they experience persistently higher inflation at the country level. Finally, not every country in a monetary union will have identical economic and financial cycles, and this can then in turn cause differences between national inflation rates. These are well-known challenges faced by monetary unions and the solution can only lie in the prudent use of other economic policies by the government – namely their structural and fiscal policies.

Inflation and consumers

When we talk about inflation, we usually mean how prices change for the average consumer. However, the actual

impact that inflation has on individual households can vary quite a lot depending on their consumption patterns and the dynamics of the prices of different goods and services. Households that spend a larger portion of their money on food are more exposed to changes in the price of food, while households that have higher spending on housing feel inflation bite harder when energy prices rise.

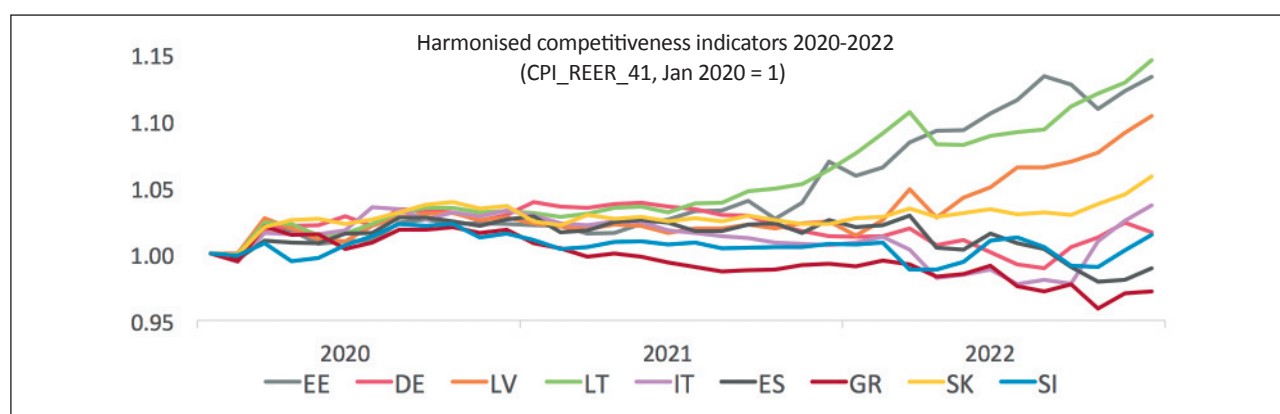
Studies show that households on lower incomes are generally more exposed to the problems caused by high inflation than those with higher incomes.

The difference between the levels of inflation experienced by different groups in society was not that large when inflation was low, amounting to about one quarter of a percentage point as shown by the ECB's researchⁱ. The gap between the inflation rates for households on higher and lower incomes had widened in the euro area though to 1.9 percentage points by September 2022. Calculations for January 2023 by the Bruegelⁱⁱ think tank indicate that it had reached two or three percentage points in many European countries, and as much as five or even seven in countries where inflation was 20%. Such differences can aggravate inequality and have substantial distributional effects. It is low-income households that face higher rates of inflation, but they typically have smaller financial buffers and hold their savings on bank accounts with low interest rates, which are less protected against inflation. This makes it vital that governments target their support measures as accurately as possible.

The consequences of high inflation for public finances

High inflation also affects the public finances, as the relationship works through numerous channels and in both directionsⁱⁱⁱ. Some of those channels are direct consequences of policy measures to alleviate the impact of high inflation, especially higher energy prices. Bruegel estimates^{iv} that countries in the European Union allocated a

Figure 3. Large and persistent divergences in inflation may impact the relative competitiveness of countries within the union



Source: European Central Bank

total of 657 billion euros to cutting energy taxes and supporting households and firms between September 2021 and January 2023. This amounts to 4.5 per cent of GDP for 2021, a sizeable amount of extraordinary spending indeed. Some countries have raised additional revenues to cover this by introducing windfall taxes on energy companies^v. One positive side effect of higher inflation is that it reduces the ratio of government debt to GDP because nominal GDP grows fast. This good news has been offset though by the sharp rise in interest rates over the past year, and the most likely net effect is that interest payments on government debt will be higher in the years to come^{vi}. Inflation affects the fiscal balance through both revenues and spending and there are both positive and negative effects. Higher inflation may bring in more tax revenue relative to GDP if the brackets in the income tax system are left unchanged, but less revenue relative to GDP for excise taxes that are fixed in nominal terms. Spending may decline in relation to GDP if pensions and public sector wages adjust slowly, while discretionary support measures of the type we have seen applied in all the EU countries over the past year increase public spending. It is worth noting how high inflation can affect public finances in surprising and contradictory ways. During the first year of rising prices, the budget balance very often improves. The higher prices first make the tax base larger and there are higher revenues from consumption taxes, while at the same time there can be a long lag before many costs adjust. This means there is a fiscal honeymoon in the first year of higher prices that creates the illusion for policy-makers that there is additional room in the budget to spend. It is only during the next year or two as costs adjust and indexation mechanisms start to work that the painful reckoning comes due. Caution is therefore needed when any additional fiscal support measures are designed.

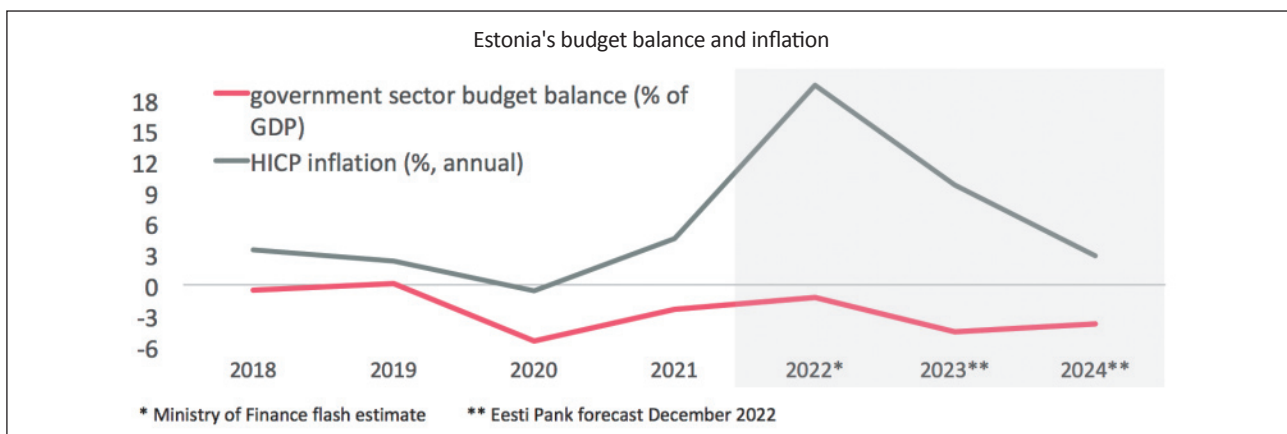
Ongoing research at Eesti Pank has attempted to estimate the extent to which an unexpected rise in inflation would affect fiscal balances in the euro area using data from the mid-1990s to 2021, and has found that inflation has a sizeable positive effect on the fiscal balance as a percentage of GDP^{vii}. The positive effect comes both from the expenditure side of the budget and from the revenue side. This is particularly true when there is a significant positive inflation surprise, meaning when actual inflation turns out to be higher than expected.

Governments in Europe increased their spending in 2022 so they could fund energy subsidies, invest in their defence forces and provide the help needed by Ukraine. Despite this extra spending, the fiscal situation has remained relatively benign in most countries and in the euro area overall. This also applies to Estonia, where the fiscal deficit for 2022 was one per cent of GDP. This benign outcome can in large part be attributed to the high inflation that we saw last year. Looking ahead, this boost to public finances is likely to be reversed when inflation comes down, at which point deficits will creep up again. This is something that politicians should keep in mind as they plan their government's spending and taxes for the years ahead.

The interaction of monetary, fiscal and structural policies

High inflation is clearly a challenge not only for people, companies and central banks, but also for governments. Europe witnessed significant turmoil in energy markets last year and governments have tried to find ways to provide relief to households and companies either by direct subsidies or through new regulations in the energy markets. But even before the Russian invasion of Ukraine, it was expected that the green transition would push energy prices up. The signal given by that rise in energy prices was intended to have an important role in encouraging the green

Figure 4. Inflation and its impact on public finances



Sources: Statistics Estonia, Estonian Ministry of Finance, Eesti Pank

transition. The problem now is that not only are energy prices being steered by the green transition, but they have also moved much more sharply because of the extreme tension in geopolitics.

We should distinguish between two features of the current problem. The first is that higher prices have undermined purchasing power, increased inequality and made energy intensive industries less competitive. The second is that energy prices have become increasingly volatile, and this in itself is a problem that policymakers need to tackle. That the price of electricity for consumers can range between minus one cent and 400 cents per kWh, as we have experienced in Estonia, is a concern from the perspective of price stability. Governments are therefore facing important choices when designing appropriate policies for the energy sector.

Looking beyond monetary policy, fiscal policy can have both a direct and an indirect impact on inflation.

As I mentioned above, one of the reasons why inflation rates vary so widely between the countries of the euro area is that countries may at any moment be at a somewhat different point of the economic cycle. The Baltic countries for instance felt a more limited impact from Covid-19, and their subsequent recovery was strong. The strong cyclical position of the Baltic countries was also one of the key causes of the acceleration in inflation. As common monetary policy cannot solve cross-country differences in cyclical positions, fiscal policy must play a role. In countries where strong domestic demand is causing high inflation, a tighter fiscal policy can help reduce the pressure.

Governments also use price controls and subsidies for energy prices directly to keep prices under control, but do so in different ways. Price controls are usually applied when market mechanisms fail. If prices are high because markets are malfunctioning, then price controls let the authorities buy time to fix the mechanisms that set market prices. But price controls cannot solve the issue of scarcity, which is often the main cause of high prices. The main disadvantage of capping prices is that price ceilings do not guide consumers to reduce their consumption of the scarce product. This has been the problem with price caps for energy, as it does not encourage consumers to use energy more efficiently, and nor do caps offer producers any incentive to increase supply.

The alternative is targeted income support measures, which allow the burden of higher energy costs to be shared within a society. Unlike price controls, these measures preserve price signals and help to steer both demand and supply towards a new equilibrium. The main concern with income support is that it is more difficult to manage. How target

groups are selected is a highly political issue and any such measures are an additional fiscal cost, so they need to be temporary and well targeted.

In summary

Headline inflation is falling in the euro area, but it still remains too far above the ECB's target of two per cent. That measures of underlying inflation are still very high is even more worrisome, as this indicates the presence of more persistent inflationary forces that can be difficult to break. The differences in inflation rates between the member states of the euro area have largely been driven by energy prices and the policy measures taken by governments, and they remain wide. This may become a problem for the euro area, if such differences become persistent and hamper the transmission of monetary policy and the smooth functioning of the currency union. The ECB can only make monetary policy for the euro area as a whole, without tailoring it to the needs of any particular country. This makes it vital that such divergences in national inflation and real interest rates are kept in check by national structural and fiscal policies. Government support measures that are taken to shield the economy from the impact of high and volatile energy prices must be temporary and well targeted so that they preserve the right incentives for consumers and energy producers, and do not overburden government finances. These are evidently challenging times for central banks, but in setting monetary policy we must not hesitate to fight high and persistent inflation. Keeping prices stable is the best contribution central banks can make to the economy, and doing so is essential if we want to see purchasing power recover and businesses regain the confidence to invest and create jobs. If we hesitate, we may later have to raise interest rates much higher, and keep them high for much longer, in order to get inflation down to its target of two per cent and to keep it there.

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The unfolding of global shocks, policy response and implications¹

*Gonzalo Capriolo and Jože Markič**

This article provides an overview of the impact of massive shocks that EU Member States are still experiencing with particular focus on Slovenia. To assess the impact of the shocks over the medium term, it is important to understand the background against which these shocks have been unfolding and the interaction with the policy response. This fundamentally relates to the EU's energy dependency and energy market and to geoeconomic fragmentation gaining momentum in the aftermath of the coronavirus pandemic and the war in Ukraine. Prior to the pandemic, there were ongoing structural changes in the energy market and trade tensions. In the energy market, there was a growing decoupling of price of gas from that of oil and gas becoming an important determinant of electricity prices as marginal energy source in electricity generation.

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The combination of various demand and supply shocks on energy prices, has resulted in the deterioration of the terms of trade for energy-importing countries, which is the main channel affecting external balances, inflation, disposable income, economic activity, competitiveness of the economies and well-being. While prices of energy sources have receded recently from the peak in 2022, the underlying structural changes in natural gas markets, low-to-no Russian gas imports and the European Union's reliance on the world's liquefied natural gas (LNG), suggest that prices are likely to stay above the pre-pandemic levels over the medium-term and the EU will be more vulnerable to global LNG dynamics where China is an important consumer. Higher energy prices in the EU than in other parts of the world might affect its competitiveness and indirectly that of Slovenia. Looking forward, the necessary energy transition is also likely to affect prices of energy as it will discourage demand for fossil fuels and push up the cost of renewable energies over the medium-term. Furthermore, the relocation of supply chains and deglobalisation, can influence the overall EU performance including that of Slovenia. In this context, reducing energy dependence is of critical importance, as well as preserving global trade.

Introduction

Slovenia as other EU member states is faced with the impact of the unprecedented supply-side shocks. The coronavirus pandemic led to the collapse of global aggregate demand, subsequently followed by its strong rebound against the backdrop of a sluggish response of aggregate supply including severe global supply chain disruptions. The war in Ukraine has heightened the tensions arising from the opening up of the economy after the pandemic. The reduction of gas supply to the EU and uncertainty of future supply shortages has triggered a massive deterioration in terms of trade for energy importing countries including Slovenia. The surge of energy prices has fed through to consumer prices which is adversely affecting disposable income of individuals, external account balances and profit margins in energy intensive industries. The impact on energy prices has receded. However, to the extent that the energy supply shocks including the risks of supply shortages, would be more persistent on prices, it might hinder competitiveness of energy intensive industries, influence the strength of economic activity, affect export composition and ultimately dent potential growth. The policy response has included government support to households, corporates, wage increases and synchronised aggressive tightening of monetary policy whose adverse effects on economic activity are likely to materialise with a lag. The effects of monetary tightening aiming at aligning demand with constrained and

¹ The views expressed in this article are those solely of the authors.

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volatile supply are already visible in the movements of stock indices and stress in the financial markets. This article first reviews the conditions in the energy market to understand the implications of the shocks. Then it analyses the shocks and implications on various indicators and policy responses, and in conclusion, it provides policy recommendations.

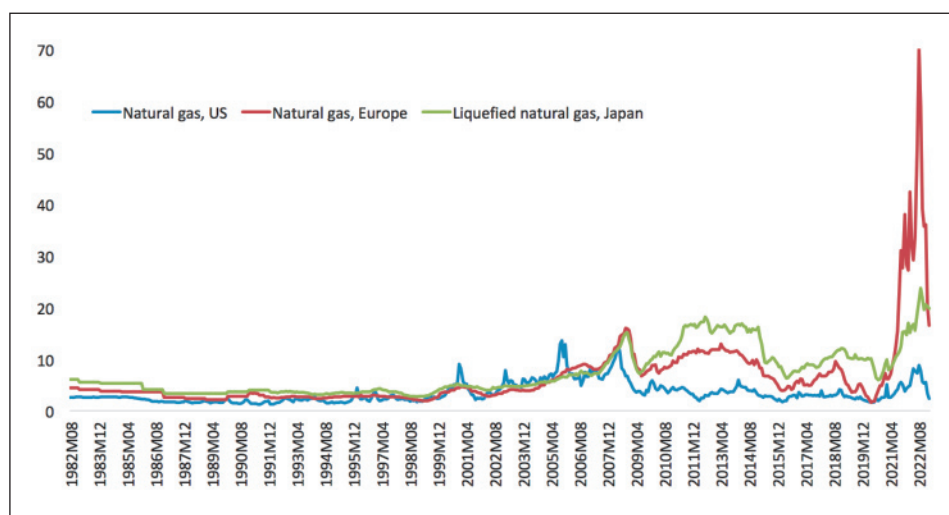
Energy dependency and structural change

The European economy depends on imports of fossil fuels while it generates only one quarter of total energy consumed (Panetta 2023). It imports 98% of petroleum products and 92% of natural gas. The latter is the second most important energy resource and the main source of energy in the manufacturing sector (Gunnella et.al., 2022). Slovenia depends on oil and gas imports. In 2021, domestic energy production in Slovenia covered 53% of total energy used and the rest were imports. From the total energy produced, nuclear energy accounted for 44%, followed by renewable resources (35%) and coal (21%) (SURS 2022). At the EU level the dependency on imports of oil and gas also affects electricity production and prices since about 70% of the energy mix used in the generation of energy comes from fossil fuels. The EU's wholesale electricity market is organized based on a marginal pricing method, where the most expensive technology used to meet demand sets the wholesale price. In addition, prices are affected by the price of carbon emission under the EU' Energy trading system. The ultimate price depends on energy used as input in the electricity generation which in most recent years has been gas (ACER 2021). Under normal conditions and over the past years until 2021, the market delivered stable prices at the EU level around EUR 0.08 per Kilowatt-hour. However, with the shocks in 2021 and particularly the war in Ukraine the price doubled in the

first semester of 2022. This dynamic reflects the underlying structural vulnerabilities of the electricity market and dependency of fossil fuels.

Prior to the coronavirus pandemic and energy crisis, the gas market was and still is undergoing structural changes that help to understand the propagation of the shocks that should be taken into account when assessing for example developments in terms of trade developments, prices and competitiveness. This includes subdued investments in oil and gas production caused by low energy prices after a price drop in 2014 and uncertainty about the future mix of energy due to energy transition (Adolfson et.al., 2022). There was also a gradual ongoing decoupling of oil and gas prices that the crisis highlighted. This responds to the emergence of a globalized market for gas and the change in indexation of gas contracts in Europe from oil prices to mostly spot and future prices since 2015, where the Dutch European Title Transfer Facility is the main price reference (Adolfson et.al., 2023). The most recent change in the structure of market happened due to the war in Ukraine and consists of the EU diversification of gas providers away from Russia and EU integration into LNG global markets. This implies lower market power from Russia but at the same time growing vulnerability to global LNG dynamics where China is a major player and because over 70 percent of EU purchases are based on spot prices (McWilliams et. al., 2023). The change in market structure might also imply that the EU relative competitive advantage in terms of gas prices with respect to Asian countries will disappear and at the same time the EU relative disadvantage with respect to the US will widen (Figure 1). To the extent that gas will still play an important role in electricity generation, this implies that the structural change in supply provision will be reflected in the level of price of electricity which

Figure 1. Monthly prices in nominal US dollars (mmbtu)



Source: World Bank
Commodity Price Data

is likely to remain over the medium-to long term above the pre pandemic and pre-war in Ukraine levels. In the short-term the uncertainty of gas supply for the current whole year is significant as the winter may not be as mild as the last one, and stronger demand from other countries could question the sufficient availability of LNG supplies.

Pandemic-related shocks

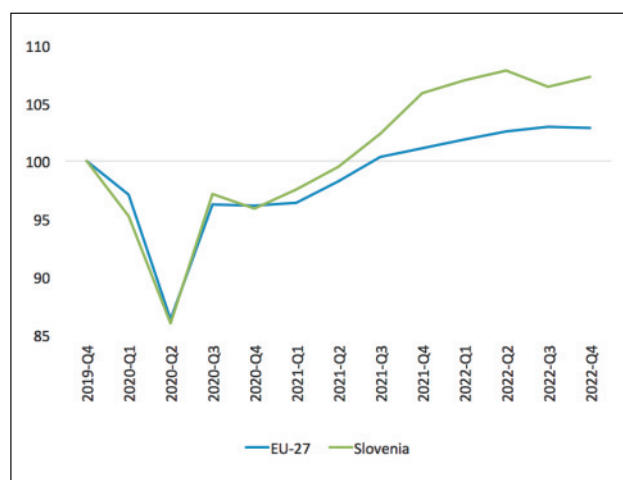
In the aftermath the pandemic lockdowns in 2020, two important shocks unfolded at global level. The rebound of demand with bias on goods and at the same time the occurrence of severe supply chain disruptions. The global dynamics are mirrored in the case of Slovenia. After the sharp slump in 2020Q2, the EU's and Slovenia's GDP were in 2021Q3 already at higher levels than those prior to the pre-pandemic (2019Q4) (Figure 2). In the aftermath of the global financial crisis, it took to the EU economy about 6 years to reach the pre-crisis level while to Slovenia 9 and a half years. In the EU and Slovenia real private consumption strongly rebounded in 2021Q3 (Figure 3) and in Slovenia real household expenditure growth recorded a high rate in 2022 (9.1%). In the EU and Slovenia, the contribution of household expenditure to GDP recovered in 2021 and remained sizable in 2022. In the case of Slovenia real government consumption remained at high level during the pandemic as well as in its aftermath in (2022). However, it only partially offset the fall in activity in 2020 when the pandemic was at its peak (Figure 4). The magnitude of the demand shocks experienced in the past three years can be appreciated by the size of huge increase in household savings during the pandemic (Figure 5) and its decrease in its aftermath. In 2020, household savings in Slovenia amounted to 6.2% of 2019 GDP. The increase in household consumption in the years 2021

and 2022, as well as the following reduction of savings was also massive from recent historic perspective (Figure 6). The observed behaviour by no means can be interpreted as a cyclical fluctuation but as result to an unprecedented shocks in which the global economy practically stopped and then rebounded.

The other important shock triggered by the global lockdown has been the severe supply chain disruptions whose consequences are still unfolding in economic terms, concerns about their reliability and economic security. This happened due to disruption of few key inputs¹. These disruptions were without precedents in the last 40 years, and their implications seems to be long lasting beyond the ongoing normalisation in terms of their global reconfiguration. The supply chain disruptions amplified the shock of readjustment of demand which it seems to have been taken place when inventories were low (Alessandria et al., 2023). While supply chain disruptions are fading away (Figure 7), due to security reasons and risk of lack of supply, a reconfiguration of global value chains seem to be undergoing. Also, because of the war in Ukraine, a realignment of geopolitical alliances is ongoing, which is likely to undermine globalisation. To the extent that Slovenia's main trading partners are European countries such a global repositioning might not significantly affect trade and to some extent can provide business opportunities. However, to the extent EU partners trade volume and cost competitiveness is affected by the relocation of supply chains this can have indirect adverse economic impact on Slovenia's economy.

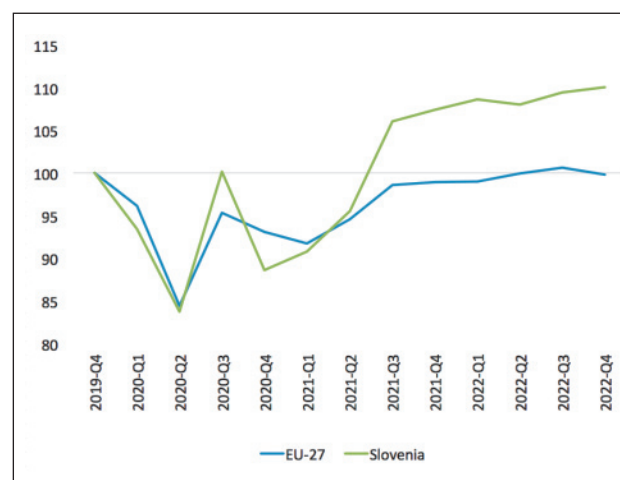
¹ The problems in supply chains and limited production capacity were faced with higher intensity in the EU and Slovenia in 2021. The automotive industry was the most affected by the shortage of semiconductors due to increased demand with limited production capacity in Europe. With the rapid rebound in demand for cars and limited supply, the automotive industry faced severe shortages. Other industries that have experienced the disruption in supply chain include the metal industry, the electrical equipment industry, the other machinery and equipment industry, and the rubber and plastics industry.

Figure 2. Real gross domestic product (2019Q4=100)



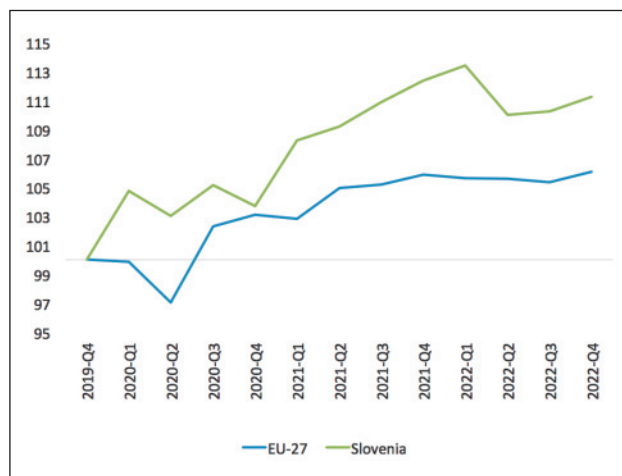
Source: Eurostat. Own calculation

Figure 3. Real private consumption (2019Q4=100)



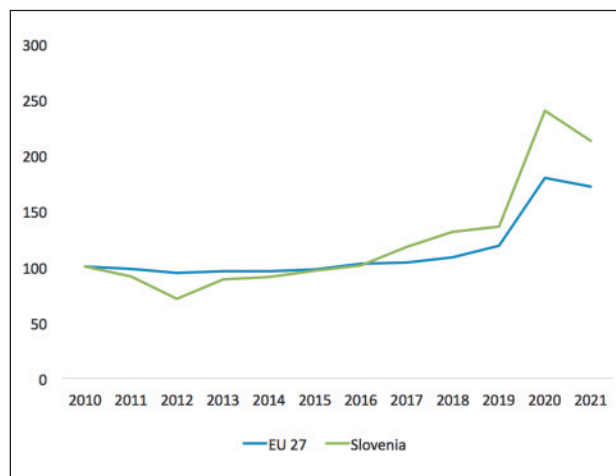
Source: Eurostat. Own calculation

Figure 4. Real final consumption expenditure of general government (2019Q4=100)



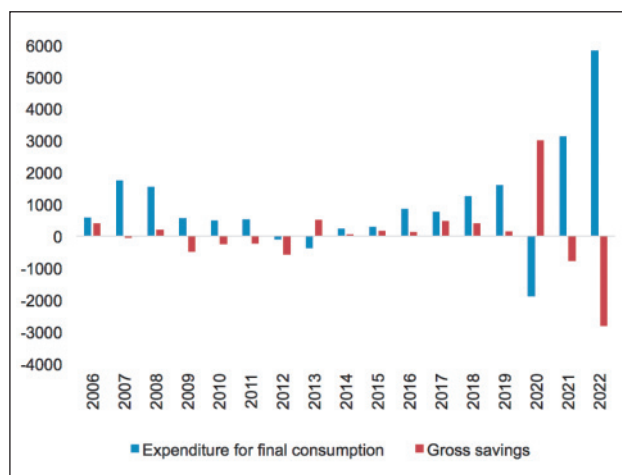
Source: Eurostat. Own calculation

Figure 5. Gross savings. Households; non-profit institutions serving households (2010=100)



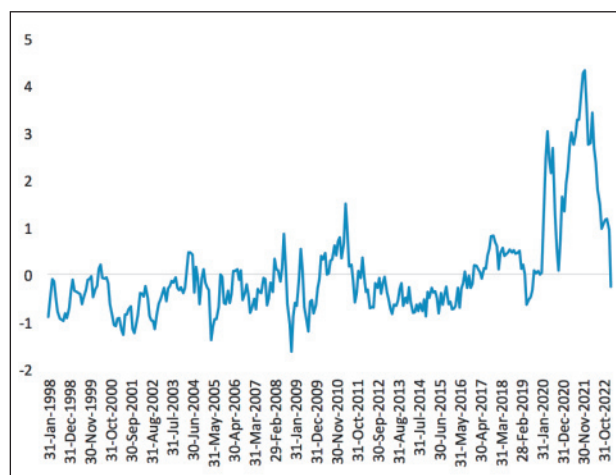
Source: Eurostat. Own calculation

Figure 6. Household's consumption and savings (change with respect to previous year (EUR million))



Source: SORS. Own calculation

Figure 7. Global Supply Chain Pressure Index



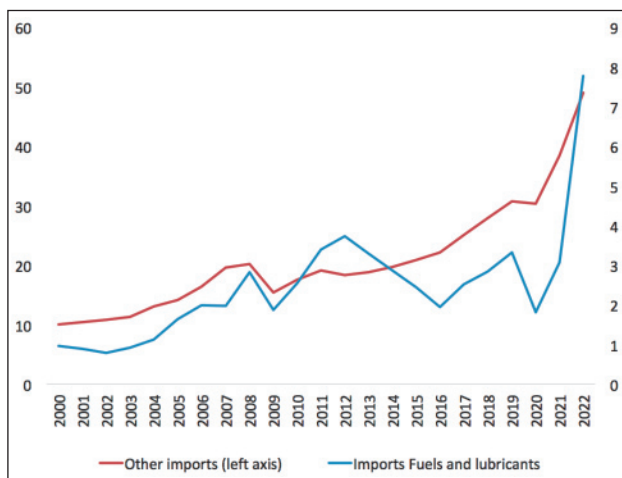
Source: New York. FED

Deterioration of terms of trade of goods: Permanent or temporary

At the EU level and in Slovenia, the pandemic resulted in a decline of demand for export and import of goods in general and in particular of import of energy goods (Figure 8). As a consequence, the price of imports fell more than those of exports of goods resulting in the improvement in the terms of trade in 2020 (Figure 9). The fall in demand for energy goods importantly contributed to the improvement in terms of trade given the relative sizable share of energy in total imports of the EU and Slovenia (Figure 10). The fall in energy prices in 2020 in Europe was significant when compared with their pre-pandemic levels (Figure 11) and is reflected in the drop of Slovenia's energy import prices (Figure 12). With the reopening of the economy, supply side problems and euro depreciation against the dollar, the price of energy increased in the second half of 2021.

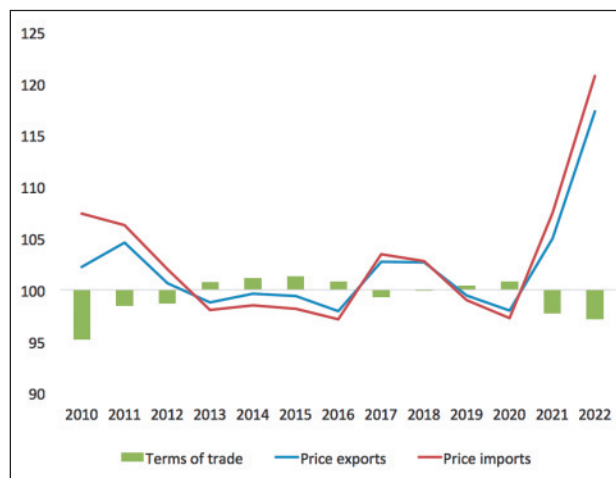
In 2021Q3 the Slovenia's energy import prices measured by the combined index was already at the pre-pandemic level (2019Q4) and continued increasing towards the end of that year (figures 13 and 14). Among supply factors affecting energy prices in 2021 were weather conditions, maintenance work delayed by the pandemic and earlier decisions of oil and gas companies to reduce investment (IEA 2023). These factors and depleted gas inventories kept price of gas and oil at elevated levels. What is particularly notorious is the significant increase in price of gas in 2021 compared to that in the previous year (66%). Also, it is striking the fast increase in the price of imports of energy in 2021 (75% YoY) that contrasts with the fall in those prices in the previous year (20% YoY). While the deterioration of terms of trade in 2021 was smaller for example to that in 2010, the significant difference between these two years is the unprecedented sharp increase in the price of

Figure 8. Slovenia Import of goods (EUR billion)



Source: SORS. Own calculation

Figure 9. Terms of trade of goods

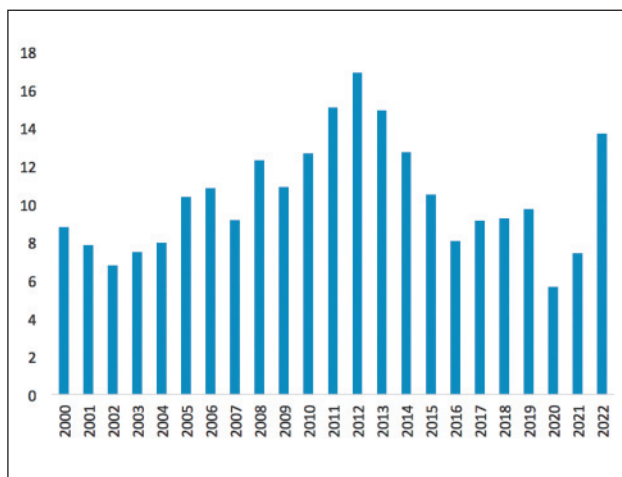


Source: SORS. Own calculation

import of energy in only one year in 2021 (75%). In 2010 the price of energy imports increased by 19% and in the three-year period 2010-2012 the accumulated price increase was 41% which clearly are smaller than that that took place in only one year in 2021. In 2022, because of the war in Ukraine, prices of gas (41%) and energy further and sharply increased. Consequently, the Slovenia's price of energy imports increased massively in 2022 (117 %YoY). What it is also relevant is that the increase in price of natural gas also affected that of electricity (Figure 16). The price of gas and electricity increased by 600% between the year 2020 and 2022. In the same period the Slovenian's import prices of crude petroleum and natural gas increased by 840% and electricity by 565%. The adverse impact of the increase in import prices on Slovenia's terms of trade of goods was offset by the in-

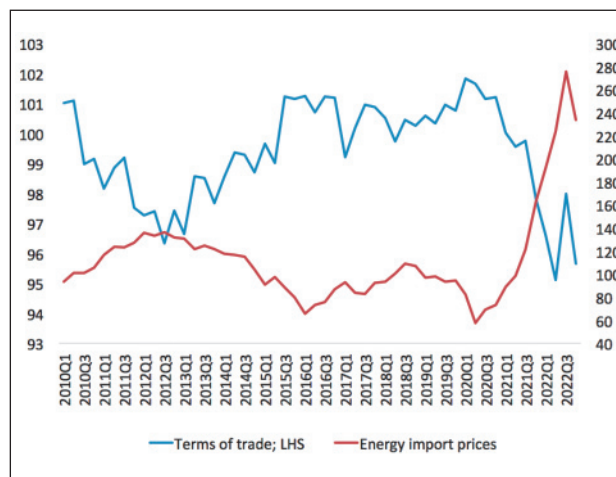
crease in prices of exports. This was also the case in EU partners. In Slovenia, the two-year (2021-2022) accumulated increase in exports prices of goods was 19% which partly compensate the increase in import prices of 23%. The large passthrough of import prices on those of exports in the past two years, when the terms of trade deteriorated, contrast to that experienced in 2010 when trade of terms deteriorated the most. In that year the increase in price of exports was significantly smaller than that of import prices by 9.7 p.p. The fact that the increase in import of energy and that of total imports was passed on to export prices suggests that Slovenia's EU main trading partners also managed to partially compensate, in the same way such a shock including increased labour costs, to their respective terms of trade. While it seems feasible to increase export prices

Figure 10. Slovenia: Share import of fuels and lubricants in total imports



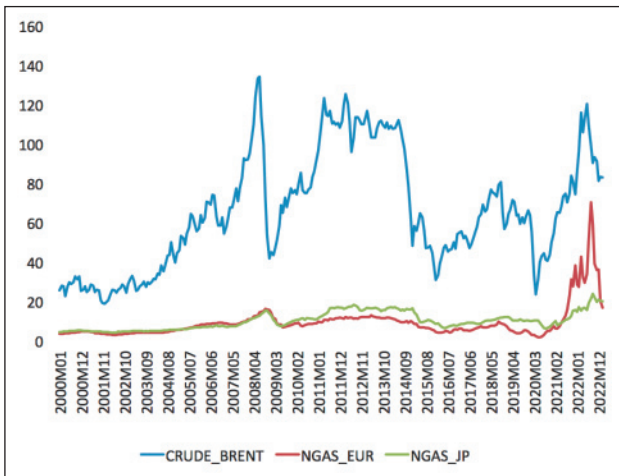
Source: SORS. Own calculation

Figure 11. Terms of trade (ToT) of goods and energy import prices (2010=100)



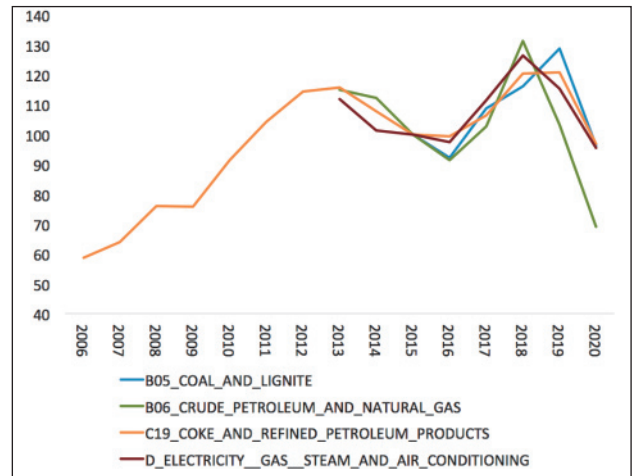
Source: SORS. Own calculation

Figure 12. Monthly prices in nominal US dollars



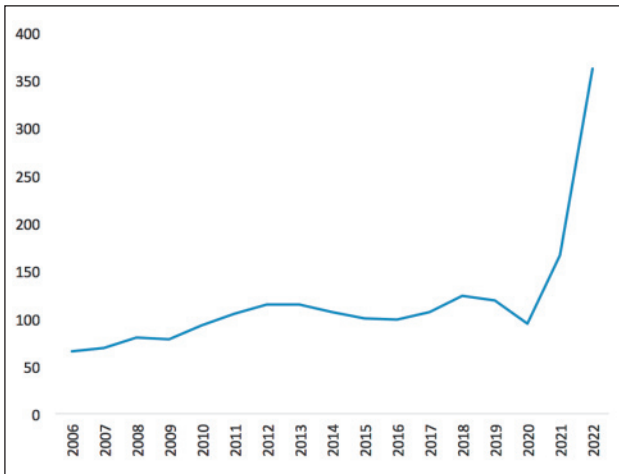
Source: World Bank Commodity Price Data

Figure 13. Import price indices (2015=100)



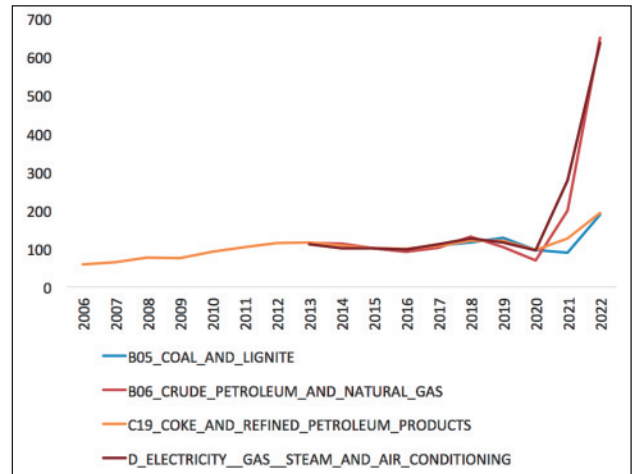
Source: SORS

Figure 14. Energy imports' prices (2015=100)



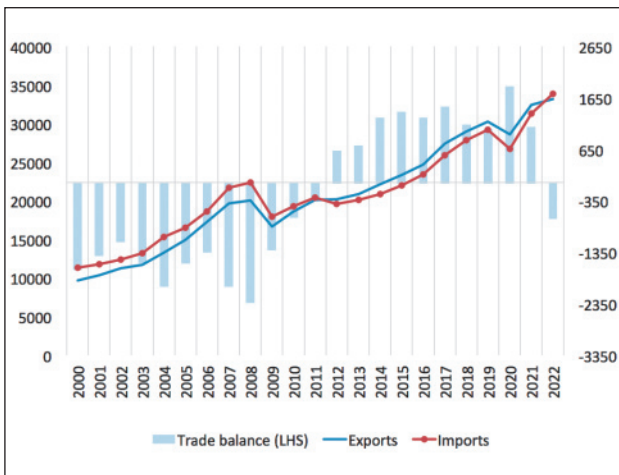
Source: SORS

Figure 15. Import price indices (2015=100)



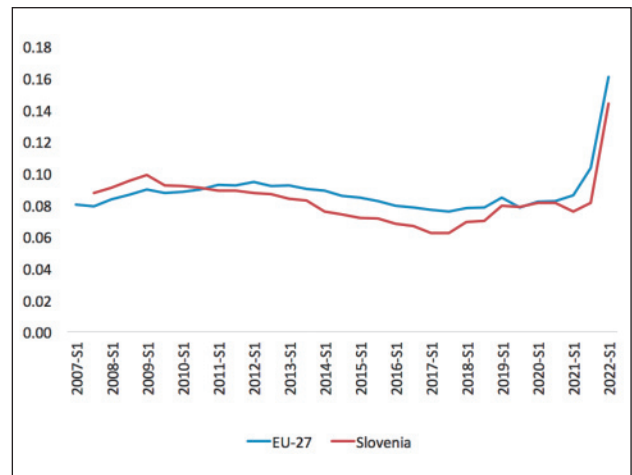
Source: SORS

Figure 16. Trade balance and exports and imports, (EUR million)



Source: SORS

Figure 17. Electricity prices for non-household consumers - bi-annual data (Kilowatt-hour)



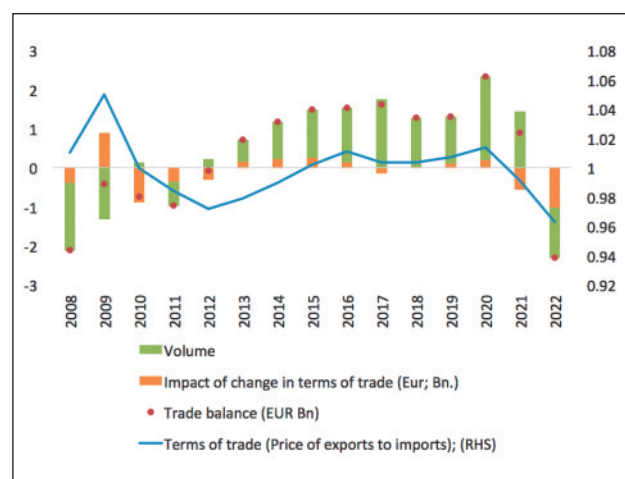
Source: Eurostat

to offset the increase in price of energy imports, the question is whether the relative increase of energy prices vis-a-vis competitors is more long lasting as well as its impact on competitiveness of EU economy and with that of Slovenia. This is particularly relevant for energy intensive industries. Also, the relocation of global supply chains driven by the pursuance of low cost can undermine competitiveness if not offset by attracting FDI into the Slovenian economy.

Impact on trade balance and current account

While private demand rebounded towards the end of 2021, the strong rise in the value of energy imports in the second half of 2021, which accelerated in 2022, was the major driver of the current account deterioration in the EU and in Slovenia. In 2022, the trade in goods balance of the EU was in deficit by EUR 432 billion, reaching its lowest level since 2002 (Eurostat 2023). In the case of Slovenia, the current account underwent large swings over the past three years. In 2020, the current account surplus was the highest so far, at EUR 3.6 billion (7.6% of estimated GDP). The large surplus derived mainly from a higher trade surplus in goods, as the fall in real imports was larger than in exports due to lower spending and investment (Figure 15). In 2021, the surplus declined due to the deteriorating terms of trade triggered by the increase in import of energy goods and the recovery of domestic demand. In 2022, due to further deterioration in terms of trade and stronger increase in domestic demand, the current account surplus for the first time turned into a deficit (0.8% of GDP). The main contributor to the significant decline in the current account balance was the deficit in goods trade balance.

Figure 18. Terms of trade, and its impact on trade balance (EUR Billion)

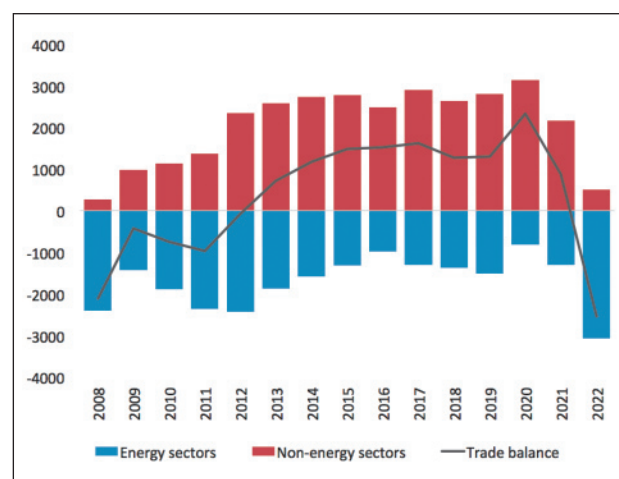


Source: SORS. Own calculations

The movements of the terms of trade importantly affect the trade balance, this is particularly notorious when shocks take place such as those experienced in 2010 and 2021-2022 (Figure 17). Those shocks were primarily caused by the increase in energy prices due to the high share of energy imports which spilled over onto prices of raw materials and food. The latter also affected by the war in Ukraine. Because of the energy price shocks, the negative trade balance in energy sectors widened affecting the overall trade balance in 2022 as it happened in 2010-2012 (Figure 18). From a historical perspective, the most adverse impact of terms of trade shock on the trade and current account balances took place in 2022. This is also reflected in the decomposition of the change in trade balance (Figure 19).

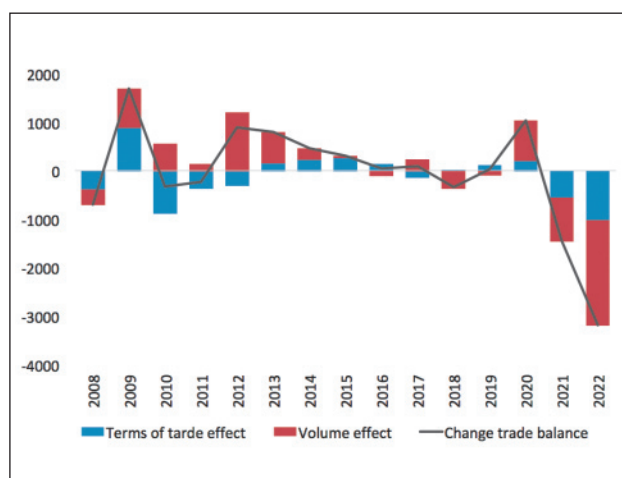
Going forward, a critical issue to address is whether the terms of trade deterioration can be regarded as permanent and how it would affect the trade and current account balances. According to an error correction model, we set out to assess the impact of external demand for exports, domestic demand and terms of trade on the current account, the impact of change in terms of trade on the current account balance is sizable, it reaches its higher effect in four quarters after the shock. What it is also important it that the impact tends to be permanent regardless of the temporary nature of the shock. Thus, from this perspective, the adverse deterioration of terms could have long lasting impact on the current account balance as the price of energy is likely to remain above that observed in the past. The issue is the extent to which the current account will be affected once the ongoing demand and supply shocks fade away. While prices of energy and food have fallen in recent months, it is very likely that the price of gas and indirectly the price

Figure 19. Trade balance by sectors, in EUR mill.



Source: SORS. Own calculations

Figure 20. Decomposition of change in trade balance (EUR million)



Source: SORS. Own calculations

of energy would remain above the pre-pandemic levels. As discussed above, the structural changes undergoing the energy market are likely to result in a permanent higher price of gas for EU countries than those prior to the war in Ukraine. Thus, the EU comparative competitive advantage in terms of prices of energy against Asian countries or comparative disadvantage against US will remain and thus affect adversely the size of balances of trade and current account and competitiveness of energy intensive industries of EU countries including Slovenia.

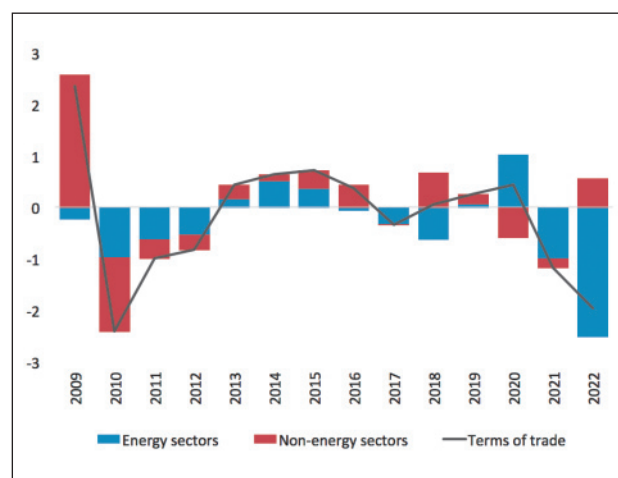
Income effect of deterioration of terms of trade

The terms of trade, which began deteriorating since 2021Q1, has resulted in a negative income effect. With a relatively rigid price elasticity of demand for energy, the purchase of volumes at rising prices lead to transfer of purchasing power from the EU and Slovenia abroad. In the case of Slovenia, the negative income effect due to the deterioration in the terms of trade on a year-on-year basis amounted to 2 p.p. of GDP in 2022. The main contributor was the energy sector, which accounted for 2.5 p.p. of GDP. The loss of income due to imports of high-priced energy products was partly offset by higher export prices from the non-energy sector (Figure 20). Notice also that the contribution of energy sectors to the negative income effect in 2022 was one and a half bigger than that in 2010.

Impact on price dynamics

As a result of the pandemic the inflation rate in Slovenia from an average close to 2% per year turned negative in 2020 (Figure 21). The fall in the inflation rate in 2020 is primarily explained by the drop in energy prices of fuels

Figure 21. Income effects of terms of trade, percentage points of GDP

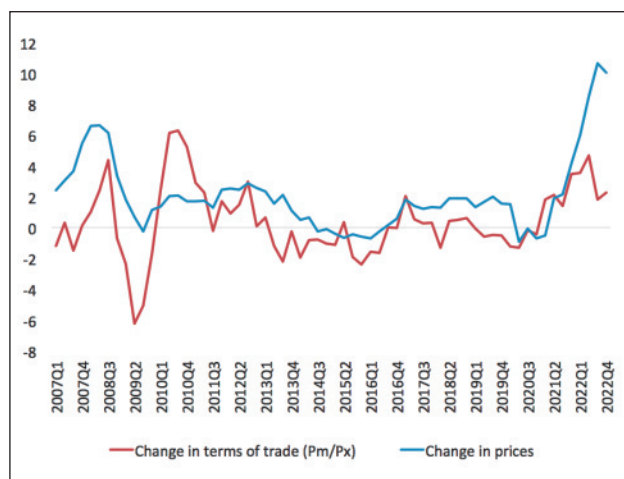


Source: SORS. Own calculations

(20%) and electricity in Slovenia. The subsequent sharp increase in energy and commodity prices in 2021 lead to raise in food prices and ultimately in those of services. Core inflation in Slovenia and the EU was already above 2.5 % (YoY) in December 2021. The war in Ukraine triggered a massive supply shock on energy prices that aggravated the readjustment of global demand and supply resulting from the reopening in the economies. The impact of the shock, first on the terms of trade of the EU energy dependent economies and then on inflation is clear. The historical strong correlation between terms of trade and inflation in Slovenia in the post euro area integration period close to 50% rose to 67% in the last four years. In a broader comparative perspective, the contribution of energy prices to inflation in the US was smaller than that in the euro area by 1 p.p. in 2022. In the US it was close to 3 p.p. and 4 p.p. in the euro area (Panetta 2023). This reflects the difference in energy markets in the two economies and the relative advantage of the US. This is also the case in the food market. Similarly, private consumption in the US and the euro area exhibit different dynamics (Schanabel 2023). While in the US private consumption, and particularly private consumption of goods were in June 2021 well above 2019 levels, in the euro area it only reached the pre-pandemic levels by December 2022. The different way demand and supply shocks interact are reflected in the different policy stances of respective monetary authorities. In the case of the US the contribution of prices of goods and services to headline inflation was more than half (i.e. broader base) reflecting probably stronger impact of demand. In the euro area energy and food prices contributed two thirds to headline inflation reflecting predominantly the impact of supply shocks.

The dynamics of key prices in a comparative manner between Slovenia and EU-27 provides insights on how the energy shocks were transmitted. Prices show similar trends but also the impact of policy intervention. Reflecting different policy response in Slovenia the price index (2015=100) of electricity, gas and other fuels for housing was (140) lower than that in the EU-27 (170). For non-households' consumers, the half-yearly price of electricity (kilowatt-hour) in the first half of 2022 was slightly lower in Slovenia (0.19 EUR) than in the EU-27 (0.22 EUR). However, between the first semester of 2002 and the last in 2019 the increase in electricity price for non-households' consumers in Slovenia (66%) was higher than that in the EU-27 (53%), which might have a bearing on relative competitiveness. The price index (2015=100) for fuels and lubricants for personal use, which reflects policy intervention, was higher in the EU-27 (139) than in Slovenia (119) in February 2023. The average yearly inflation in both cases in the last six months until February 2023 was 12%. The price index for food (2015=100) in February 2023 was similar in the EU-27 and Slovenia (138 and 139 respectively), and the average annual inflation of food prices in the past 6 months including February 2023 was 17.5 and 18% respectively. The price index excluding energy, food, alcohol and tobacco was equal in both EU-27 and Slovenia (116) in February 2023, and the average annual inflation in the past 6 months including February 2023 was slightly higher in Slovenia (6.9% compared to 6.1% in EU-27 (Figure 22). The inflation rate in Slovenia reached its peak in July 2022 (11.7%) and in the euro area in October 2022 (10.6%). With energy and commodity prices falling since November 2022 headlines rates have shown decline. In the case of Slovenia, inflation begun declining in August 2022, but the

Figure 22. Change in terms of trade and price index (YoY %)



Source: SORS. Own calculations

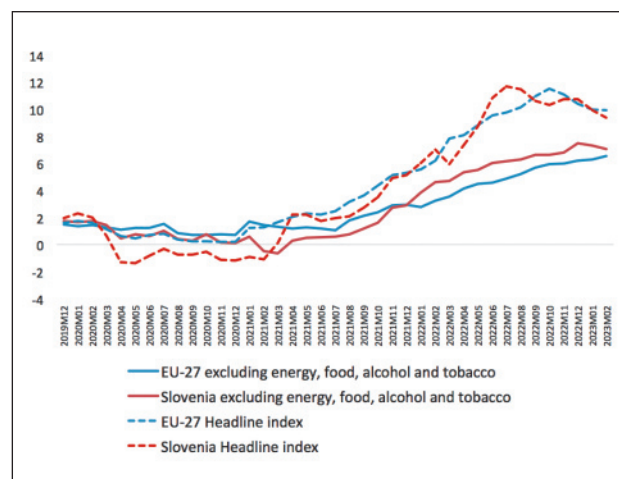
pace slowed towards the end of the year and then continued again in 2023. What remains a challenge is the still growing trend in core inflation in the euro area and in Slovenia. Slovenia's core inflation (excluding energy prices) in March 2023 was 5.4% slightly lower than that in the euro area 5.7%.

Impact on real household disposable income

The pandemic and policy response in terms of lockdowns in 2020 by reducing economic activity also adversely affected real disposable income. The strong policy response in Slovenia prevented a real drop in real disposable income in 2020 and particularly in 2020Q2. This was not the case of the euro area in 2020 (Figures 21 and 22). The policy response in Slovenia included support to households, job retention schemes and temporary pandemic associated wage bonuses. The sizable policy response can be appreciated by the strong deterioration of the Slovenia's government fiscal position measured by the structural balance deterioration in 2020 (5 p.p. of GDP), that was larger than that in the euro area, and which has remained expansionary thereafter (Figure 23).

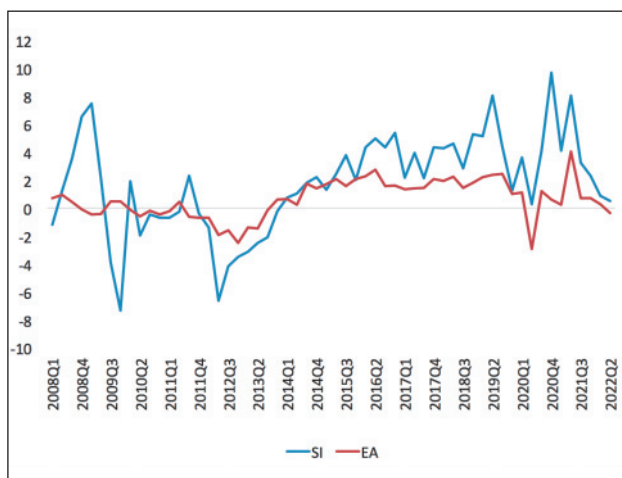
Real disposable income in Slovenia continued increasing in 2021 on the back of wage bonuses (first half of the year) and the economy strong rebounding towards the first half of the year including the normalisation of business activity for the self-employed. In 2022, because of the surge of energy prices and inflation, the financial situation of households in the euro area and Slovenia deteriorated. In 2022Q2 real growth of household's disposable income in the euro area already turned negative while in Slovenia was slightly positive. Nevertheless, the real growth rate for the whole year 2022 in Slovenia was

Figure 23. Change in prices (YoY %)



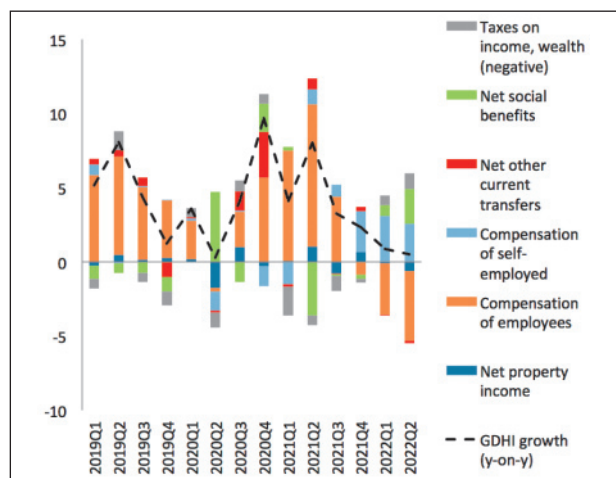
Source: Eurostat. Own calculations

Figure 24. Real gross household disposable income YoY %



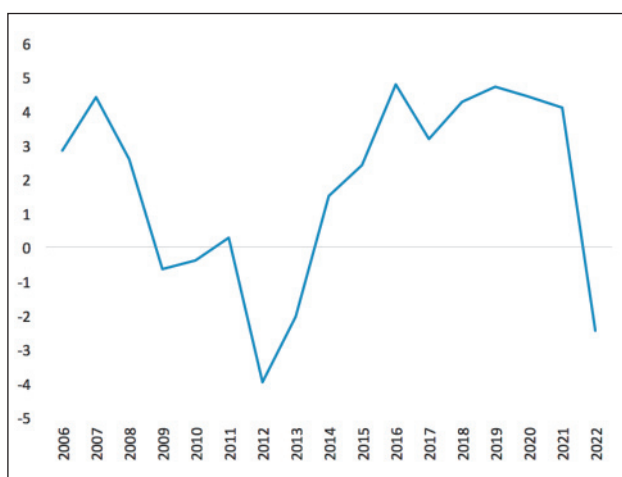
Source: Eurostat. Own calculations

Figure 25. Real household disposable income, contribution to yearly change



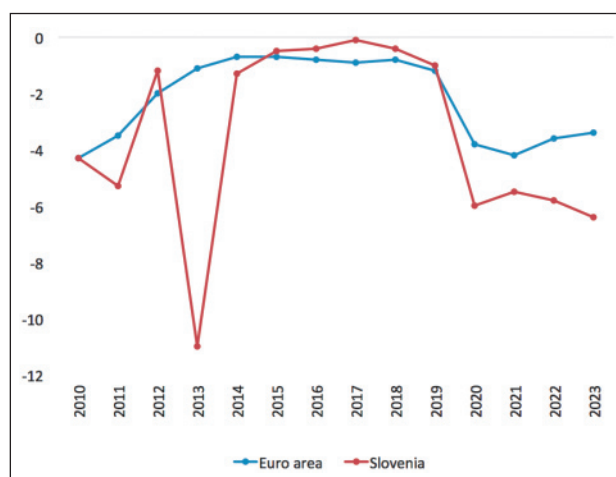
Source: Eurostat. ESDE

Figure 26. Real household disposable income (YoY %)



Source: Eurostat. Own calculations

Figure 27. Structural balance % GDP



Source: Eurostat. ESDE

negative (Figure 24). The drop in real income in 2022 occurred for the first time after the euro area crisis during 2012. Intervention policies in terms of price caps on energy prices, tax reduction, support to families and wage increases mitigated the adverse shock but could not prevent real income from falling. Although the real disposable income fell in 2022, the strong labour performance in terms of historically record high level of number of individuals in employment and low in unemployment observed in 2002 and still in the 2023Q3 suggests that the labour market has significantly contributed to mitigate the adverse price developments in households' disposable income.

Monetary policy response

With inflation increasing above policy targets at the end of 2021 against the backdrop of the strong post lockdown

reopening in demand and supply shocks, central banks begun embarking on monetary policy tightening. The key issue for policy makers has been the disentanglement of the effects of the supply and demand shocks on prices and preventing inflation from becoming entrenched. With the additional massive shock on energy and food prices triggered by the war in Ukraine, the policy decisions moved in advance countries including the euro area to policy tightening. The US' Fed begun increasing rates earlier in March 2022 than the ECB. Probably, as discussed above, this was the case due to the relatively broader base price increase in the US beyond those of energy and due to the acceleration in price dynamics in the last quarter in 2021. In the euro area inflation decelerated towards 2021Q4, to get again momentum in 2022Q1 on the back of the war in Ukraine. The ECB begun increasing interest rates

in July 2022 and at the same time concluded with its non-standard monetary policy measures of quantitative easing. Prior to the monetary decision and due the pandemic, the ECB's balance sheet expanded by about 75% between 2019 and 2021. In 2022 the ECB's balance sheet started to decrease.

The central banks response to inflation besides withdrawing from quantitative easing has so far consisted in large, relatively fast and sustained increase in interest rates. The FED increased its key policy interest rates by an accumulated 4.65 p.p. in a relative brief period between February 2022 and March 2023. Prior to the pandemic (2016-2019Q2) the FED embarked in a gradual tightening cycle in which the key rate was 2.4% at its highest level in 2019 and then it fast decreased close to zero by January 2020. The ECB increased its key deposit facility rate by an accumulated 3.5 p.p. over a 9-month period, which is also its largest accumulated interest rate increase and its first rate increase after 12 years.

With monetary policy affecting inflationary expectation and financial variables in the short run, and with a lag to other variables, the effect of the interest rate hikes and withdrawing from QE policies is still unfolding. Taking into such perspective, the ongoing developments in financial markets, banking system, credit activity and lately economy should be assessed. The changes in monetary policy stance in 2022 has resulted in repricing of risk and adjustment of financial position affecting balance sheets. More recently the interaction of interest rates and financial conditions has resulted in bank failures in two vulnerable banks in the US and Credit Suisse in Switzerland. In the euro area banks are better prepared than in the past to withstand the risk of monetary policy tightening effect on bonds portfolios as they are now better capitalized, have more liquid assets and are less exposed to credit risk. This is particularly the case of the banking system in Slovenia, with high capital ratios, low exposure to credit risk and a non-financial corporate sector and households with low debt. This fundamentally contrasts to banking crisis in Slovenia following the global financial crisis. Better conditions in the banking system in Slovenia are the result of capitalisation, enhanced of policy regulation and supervision and the overhaul of the corporate governance of Slovenian banks. Looking beyond recent financial turbulence in the US and Switzerland, the key challenge comes from inflation becoming persistent beyond current expectations of its downward trajectory, leading to additional significant rate increases. Such a scenario could trigger financial stress considering existing vulnerabilities of non-banking financial intermediaries in major economies, hitting real economic activity

beyond expectations. The European Commission most recent forecast (EC 2023) foresees the euro area and the EU avoiding a recession in 2023 and growth increasing in 2024.

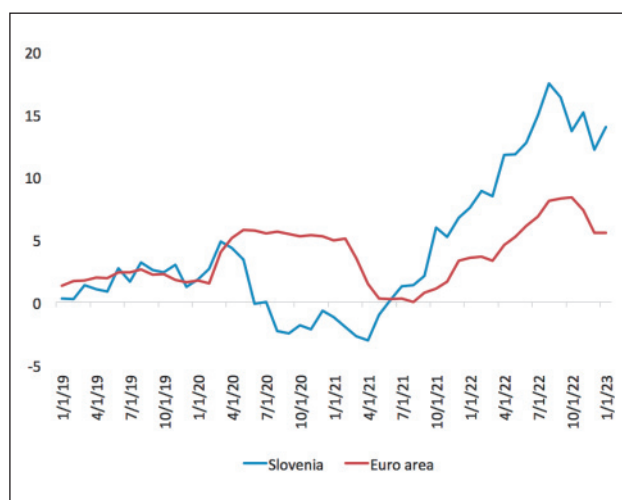
Looking at recent credit developments, they reflect primarily the shocks to the economic activity due to the pandemic and energy crisis and to a lesser extent the effects of monetary policy tightening. In the case of non-financial corporations in Slovenia, credit contracted in 2020 and then recovered again with the reopening of the economy. The acceleration of credit activity in the second half of 2022 is mostly related to energy crisis as energy companies borrow to hedge against liquidity risks. In the case of the euro area the credit activity followed a different dynamic compared to that in Slovenia in 2020 and 2021 (Figure 25). In looking at recent credit trend dynamics is important to notice the overall meagre credit growth for the non-financial sector prior to the pandemic when interest rates were negative. In the case of households, credit activity in Slovenia significantly decreased in 2020-2021, reflecting large savings, to rebound to the pre-pandemic growth rates towards the second half of 2022 (Figure 26). To some extent, the credit activity in that period was also related to households' energy efficiency investments. In the last quarter of 2022 credit activity started to decelerate.

Beyond existing benign expectations of the unfolding of monetary tightening on economic activity (EC 2023 and UMAR 2023), there are potential risks the Slovenian economy faces in terms of economic activity (GDP) and well-being. This can be illustrated in terms of economic activity and well-being with the results of economic simulations made using the Dynamic Stochastic Equilibrium model Quest (Varga et.al., 2013) calibrated for Slovenia including a welfare metric in terms of shadow prices to identify well-being effects (Bonnet et.al., 2023). A terms of trade deterioration of 4% in Slovenia, which is similar to that observed in terms of its accumulated decrease in 2021-2022, triggers an increase in interest rate following the Taylor rule, decreases in investment and production. As result GDP falls by 0.72 p.p. after the shock and by 0.46 over the long term. Well-being decreases by 0.8 following the shock and the adverse impact increases and reaches 2 p.p. over the medium-term.

Geeconomic fragmentation following US-China trade war, pandemic and war in Ukraine

To understand the potential medium to long-term policy implications of the shocks and events over the past three years on inflation, competitiveness, growth and ultimately

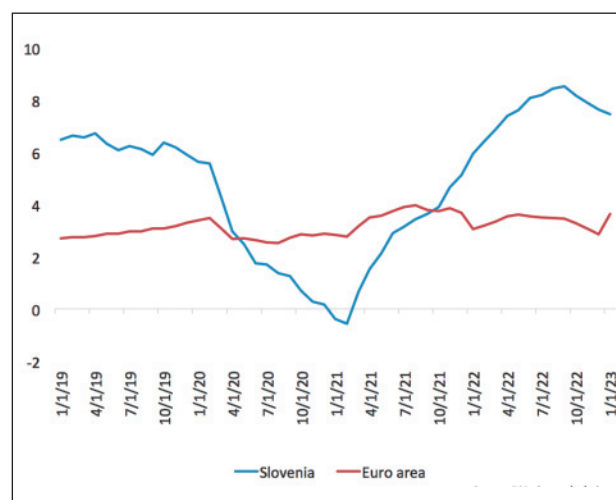
Figure 28. Credit to non-financial corporations (YoY%)



Source: ECB. Own calculation

on well-being it is necessary to look at them in the context of the process of globalisation over the past two decades and the events that could lead to reversal of global economic integration. Importantly in this context is the growing importance of China in global trade and as FDI destination. There is evidence that globalisation has contributed to the low inflation environment prior to the pandemic. Also, after China joined the World Trade Organization in 2001 global trade almost doubled increasing the availability of goods (IMF 2023). Technological diffusion and FDI flows have contributed to the catching up with the less advanced countries and increase in global demand. Yet, with nationalism gaining momentum in the US during the Trump administration, and the US growing trade deficits vis-à-vis China, the US triggered trade war in 2018 by imposing tariffs against China. After retaliation the trade tension have since then continued, escalated and lately widened in their scope under the current US administration. Another key development affecting globalisation has been the supply-chain disruptions in the aftermath of the severe phase of the pandemic in 2020. More recently the war in Ukraine which is reshaping supply chains among countries with similar political preferences. According to the IMF (2023), with the Covid and War in Ukraine a large number of multinational corporations show increasing interest in reshoring and friend-shoring. While the reconfiguration of supply chains can strengthen domestic security and opportunities, the question is the cost of fragmentation and trade reduction and ultimately the impact on prices at least over the medium term. The issue in this context is also the exacerbation of protectionism which can unnecessarily hinder trade, contribute to increase in-

Figure 29. Credit to households (YoY%)



Source: ECB. Own calculation

security and rise prices of such important goods as food. Within this context the key issue is whether because of global past dynamics, the pandemic and the war in Ukraine there is an ongoing regime change and structural shift in the world economy. In particular, whether the benefits of globalisation in terms of expanding the world production frontier and lower costs have reached their limits and, whether due to the war in Ukraine the geopolitical changes will result in a permanent relocation of gas supply and change in relative competitive position of Europe and Slovenia.

There are various estimates of the costs of global economic fragmentation suggesting a positive relation between the magnitude of fragmentation and the associated costs (Ayar et al., 2023 and Attinasi et al., 2023). According to the IMF (2023) and depending on the assumption, the cost to global output from trade fragmentation could range from 0.2% (in a limited fragmentation/ low-cost adjustment scenario) to up to 7% of GDP (in a severe fragmentation/ high-cost adjustment scenario).

There are estimates of the costs of geoeconomic fragmentation for Slovenia in terms of GDP and well-being, proxied by the lowering of the "openness to imports" parameter for the euro area (Bonnet et al., 2023). In the simulation a decrease of euro area imports by 10 p.p. would have adverse impact on the economy due to its degree of openness. Export decrease by 4 percent in the short run and by 0.5% in the medium to long run. GDP decreases by 1.8 p.p. in the first years and remains lower by 0.83 p.p. in the medium-term. Well-being is reduced significantly by 2.4 p.p. in the short-run and the adverse effect remains over the medium term 0.4 p.p.

Conclusion and policy recommendations

Over the past three years, the world economy has undergone severe multiple shocks whose consequences are still on the making as the impact of major central banks' synchronized monetary policy tightening is still uncertain in terms of financial stress and economic activity. At the same time there is uncertainty about energy prices and provision of gas. Understanding the implications of the shocks requires looking at the underlying market structures and its interconnectedness. Importantly, the import dependency of energy in Europe particularly of gas from Russia prior to the war in Ukraine and the emergence of and international market for liquefied natural gas which could be more volatile. Another important dimension is the growing integration of supply chains over the past two decades and globalisation of the world economy which is currently under test. The vulnerabilities from a more volatile energy market and geoeconomic fragmentation are becoming more challenging as supply-chains might be redefining across political preferences which on the one hand can enhance security but on the other might result in cost in terms of more protracted and volatile inflation, competitiveness, economic activity, and well-being. In this context, increasing protectionism, such as in the food market, can add to price volatility. The necessary transition to a low-carbon economy, an issue not touched upon in this article which has clearly long-term benefits can add to the costs in the current more volatile environment. Even under a scenario of a soft landing from the current inflationary environment, the policy driven structural changes and re-accommodation of markets and supply chains, might have more persistent effects on costs and inflation beyond those arising from the rebalancing of demand and supply in Europe and for Slovenia. This could be particularly the case for energy intensive industries, as the cost of natural gas and thus of electricity are going to remain above those prior to the pandemic and war in Ukraine as a result of moving away from Russia's gas supply. This is likely to result in permanent loss of competitiveness unless productivity increases, alternative sources of energy are deployed, and international trade markets remain open. In this context, for a small and highly open economy like that of Slovenia the policy response should consist of enhancing energy production capacity; creating a welcoming business environment to potential benefitting from reshoring and avoiding missing again the opportunity of attracting FDI inflows which was the case in the run of the EU eastern enlargement and; Slovenia's pursuing as a member of the EU open market policies.

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Fiscal policy at the crossroads of crises and inflation

*Aleš Delakorda**

Fiscal policy remained strongly supportive throughout the epidemic and energy crisis. Contrary to suggestions, also in Slovenia it relied heavily on non-targeted and in addition permanent measures. The macroeconomic environment has proven increasingly challenging in a transition from the first into the second crisis as fiscal policy was additionally faced with high inflation, which also needs to be taken into account when introducing measures to support the private sector. This occurs in an environment of higher financing costs, requiring an even more tailor-made approach, which is credible, and which does not endanger public debt sustainability.

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1. Fiscal policy orientation during the crisis

Due to its stabilisation function, fiscal policy is typically heavily discretionary during the crisis, with the amount of discretion being chiefly conditional on existing buffers. The pandemic and energy crises are no exception to this finding. From the point of policy intervention, the two crises are however fundamentally different. While during the epidemic crisis, monetary and fiscal policy have been aligned, trying to support economy by implementing extraordinary supportive measures, the macroeconomic environment has changed considerably during the transition from epidemic to energy crisis.

The change in underlying conditions has to some extent also been the result of unprecedented interventions under-

taken during the epidemic, that among other implications resulted in spurring inflationary pressures. Consequently, monetary and fiscal policies have begun to diverge. Whereas the monetary policy has shifted its orientation towards the normalisation in its endeavours to contain inflation, fiscal policy has continued to provide support, along with discretionary measures not directly linked to mitigating inflation. These were also enabled by the higher-than-expected revenues (see EFB, 2022) at the exit from the crisis.¹ Tightening monetary conditions have inevitably – and rather swiftly due to strong previous role of monetary policy in sovereign debt secondary markets – been mirrored in required yields on sovereign bonds, thus potentially implying a change in the assessments of government debt sustainability by the markets. The described developments regarding the euro area as a whole are very similar to those observed in Slovenia (see latest several vintages of the Fiscal Council's Public finance and macroeconomic developments).

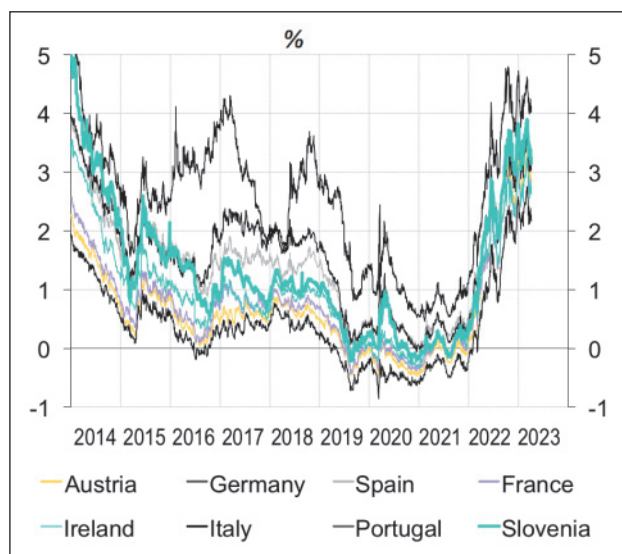
2. The flexibility of fiscal policy within the EU economic governance framework

A great deal of flexibility was provided to fiscal policy in recent crises in order not to repeat austerity-oriented mistakes from the near past. During both crises, the flexibility of fiscal policy was ensured via the invoked general escape

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¹ According to EFB (2022), if all countries had stuck to original budget plans, euro area deficit would not be 5%, but closer to 3% of GDP in 2021. More room for manoeuvre would have been useful to counter energy price hikes.

Figure 1: Sovereign bond (10y) yields in selected euro area countries



Source: Bloomberg.

and exceptional circumstances clauses at EU and at national level respectively, complemented with the State aid temporary framework. However, the flexibility happened to be misused at several instances, as also frequently pointed out by the Fiscal Council, via measures not directly related to the crisis.² In the case of temporary shocks, the overall fiscal policy orientation should to the largest extent possible avoid becoming overly lax and thus remain neutral in structural terms, unless it needs to deal with structural changes affecting the economy.³ Also, the orientation of national fiscal policy in a monetary union should not diverge substantially from the orientation of monetary policy, as this may be self-defeating.

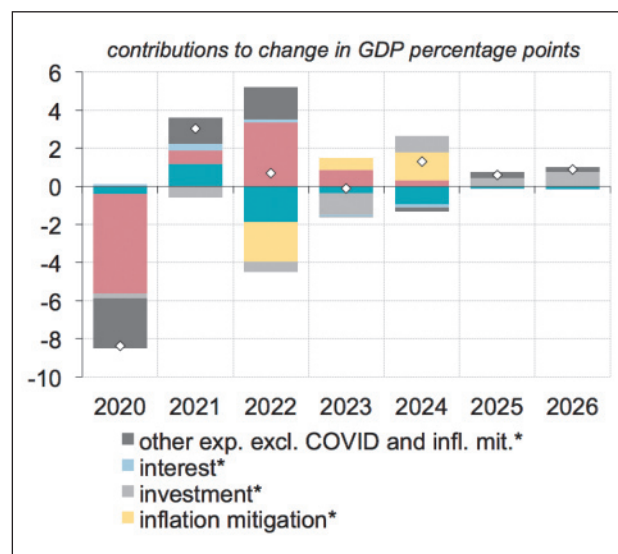
The escape clauses have been duly prolonged, on some occasions on weak grounds⁴ while continuously changing the conditionality regarding the validity of escape clauses. The heterogenous economic developments in member countries have namely weakened the co-habitation of EU and national escape clauses. In the end, the extension of escape clauses into 2023 was merely based on the uncertainty, although the levels of economic activity in most coun-

² See Box 2.1 in Fiscal Council (2021) or Box 2.2 in Fiscal Council (2022a). According to these estimates, the direct budgetary effect of discretionary measures, taken during the crisis but not linked to the crisis itself, amounts to 2% of GDP in Slovenia.

³ An example is a support to the re-structuring of energy intensive industries under the assumption of permanently higher energy prices.

⁴ This was the case with indicators, used by the European Commission (EC). See Fiscal Council (2022a). Such changes also made the ex-ante assessments of fiscal policy less credible. Also, according to EFB (2022), reporting under the SGP during the crisis fell short of requirements and practice, hampering transparency and medium-term orientation. In addition, continued recourse to the SGP's severe economic downturn clause was creating a harmful vacuum of quantitative fiscal guidance, which seems to persist today and is to some extent eventually reflected in the economic governance reform proposal.

Figure 2: Changes in general government budget



Source: MoF, SORS, FC calculations. Note: *positive sign denotes a decrease, negative sign denotes an increase

tries have long before recovered to the pre-crisis level. A relatively lax approach to the use of escape clauses has encouraged governments to significantly support the economy. Current estimates show that in the EU, epidemic related government measures on average amounted to 9.3% of GDP, while inflation mitigation measures add further 2.5% of GDP to government interventions during the crises.⁵ Slovenia stands clearly above both figures even when not taking into account the extensive discretionary measures undertaken during the crisis, but not related to it directly.

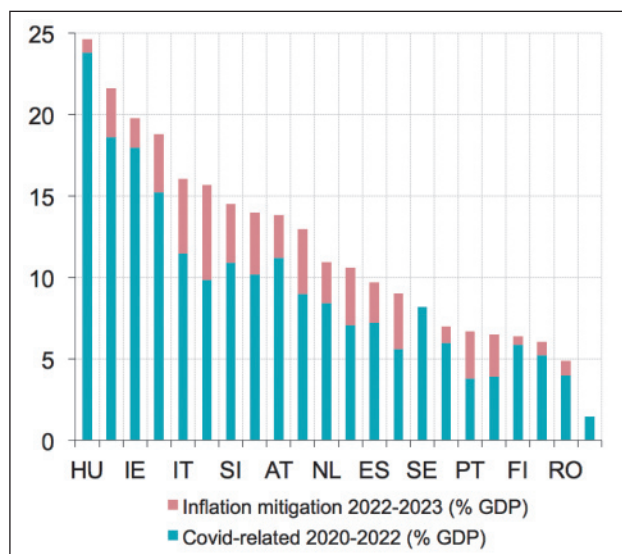
3. Fiscal policy measures during the crises

Heavy fiscal support in both crises has to a large extent been broad based, which was not in line with crisis specifics. The general preference of fiscal policy in both crises for non-targeted measures contrasted the general guidelines. All international institutions suggested that measures to counter the temporary shocks should be targeted and temporary instead of being broad-based and permanent. In the majority of countries, however, the measures were predominantly non-targeted⁶, with author's estimates showing the share of such measures to represent around three quarters of all measures undertaken in Slovenia. A significant proportion of non-targeted measures is to some extent reasonable, as governments tried to introduce them at short notice, while the general allowances to a cer-

⁵ Data from various issues of European Fiscal Monitor, published by the EU Network of Independent Fiscal Institutions. Available at: <https://www.euifis.eu/publications>

⁶ See e.g. Schnabel (2022) or Bruegel (2023).

Figure 3: Fiscal policy interventions during the epidemic and energy crisis in EU



Source: EU IFI Network. Note: Estimates for Slovenia from Fiscal Council (2023).

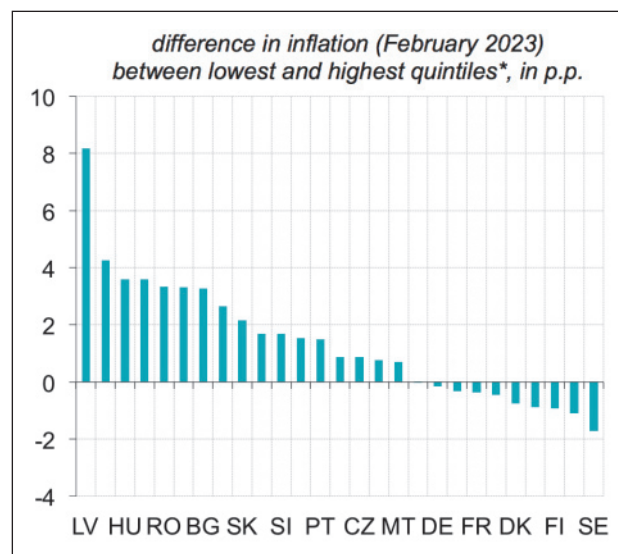
tain extent also reflect weak digitalisation of public administration to back-up more tailored measures.⁷ As a rule, broad-based measures increase inequality in addition to being inefficient and costly. The unequal burden of inflation carried by different household groups in the energy crisis is clearly shown by heterogeneous inflation rates in different household income groups, which amounted to around 2 pp in mid-2022 between lowest and highest quintiles in the euro area (ECB, 2022).⁸ According to the research by OECD (Causa et al., 2022), among the most affected by high inflation are also rural households and older population. A sign that the non-targeted measures may have increased inequality is that higher income groups perceive inflation mitigating measures as more adequate than lower income groups (ECBa, 2022). According to IMF research (Ari et al., 2022), measures that would target the poorest fifth and the poorest two fifths of the population would in addition to dampening inequality effects of inflation, cost only one and two thirds of the support oriented at total population respectively.⁹ In addition, non-targeted

⁷ See e.g. OECD (2022). This is a strong signal for one of the important tasks to be undertaken by the public administration in the near future.

⁸ The figure is about the same in Slovenia (Bank of Slovenia, 2023), while there are major differences among EU countries (see Figure 4). Think tank Bruegel regularly publishes updates of the related data at: <https://www.bruegel.org/dataset/inflation-inequality-european-union-and-its-drivers>

⁹ This is clearly confirmed by Graph 1 in EC (2023a), which shows the relation between budgetary costs of energy measures and the increase in energy spending of vulnerable households (which implies the required targeted measures). According to author's estimates, the amount of budgetary costs of energy measures by the EC at below 1 % GDP is underestimated for Slovenia, thus leading to even larger gap between the measures and the actual adequate support. A similar over-reaction by the government to actual energy-related costs for the business sector is also indicated by IMF (2023: Figure 1.19, Panel 2).

Figure 4: Inflation differentials by income classes



Source: Bruegel. Note: * quintiles in the case of Belgium.

measures typically do not preserve market incentives, and also do not stimulate green transition (see Varga et al., 2022). Price measures on energy may even reverse it, as price signals in this case do not encourage consumers to reduce energy consumption.¹⁰ Thus, income measures are preferable to price measures,¹¹ whereas in the energy crisis, the bulk (roughly two thirds) was actually represented by the latter (see e.g. OECD, 2022). The measures taken during the crisis were also to a certain extent permanent and not linked to the crisis itself. According to the estimates by the Fiscal Council (2022a), such discretionary measures, taken during one year until September 2022, amounted to around 2% of GDP, chiefly increasing the public expenditure.¹²

4. Effects of crisis related fiscal policy on the economy and vice-versa

Fiscal policy undoubtedly prevented significant scarring effects to the economic activity during the recent crises, but it also contributed to some negative side effects, including higher inflation. Fiscal policy measures of such a volume have contributed significantly to not just economic activity declining less than initially feared, but the recovery having surprised on the upside at the exit from the epidemic crisis. However, estimates show (see e.g. de Soyres et al., 2022)

¹⁰ IMF research (Amaglobeli et al., 2022) reports short-time price elasticities of demand for energy reaching around -0.2.

¹¹ Eurogroup (2022) and IMF (2022).

¹² Additional dynamic simulations of these measures indicate that the initially strong negative budgetary effect could be to some extent temporary and partly reversed due to strong effect of measures on households' disposable income.

that large fiscal stimulus faced with relatively inelastic supply during the pandemic may have also led to excess inflation in the range of close to 2 pps in the euro area, which is only marginally less than in the US. The estimates for the euro area, presented in Schnabel (2023), are lower by one third.¹³ These estimates also indicate a profile where the effects of fiscal policy discretionary measures on inflation become more prominent only with a lag (major part of this effect is probably due to a reversal of a range of price measures), in 2024 and 2025.¹⁴ These findings are in line with those of ECB (2022b), showing that in the initial phase of epidemic crisis, supply factors were the main determinant of underlying inflation. Although the role of supply factors in explaining inflation further increased with the energy shock at the outset of the Russian aggression in Ukraine, aggregate demand¹⁵ has begun to importantly add to price pressures during 2022 with a lag in the euro area. Such findings are to a large extent similar to analysis of Slovenian headline inflation (see Bank of Slovenia, 2022), where demand factors of inflation also gained on importance in 2022, and to the analysis of Slovenian personal consumption deflator (see EC, 2023a), where the unexplained part of inflation after taking into account imported factors is attributed to pressures of domestic origin. The impact of inflation on fiscal position is in general favourable in the short term, but inflation becomes burdensome already with a relatively short lag. Conditional on effects on real spending, inflation pressures typically provide for higher tax revenues in the initial phase of the inflationary cycle, including due to the fiscal drag. The initial effect on fiscal balance is thus positive in general, without considering discretionary measures to mitigate the consequences of higher inflation. IMF (2022) estimates that an unexpected 1 percentage point higher inflation rate in advanced economies increases budget revenue by 0.3%, while the initial effect on expenditure is negligible, because these are usually pre-defined in nominal terms.¹⁶ The longer-term fiscal effect of a temporary higher inflation is typically unfavourable as indexation usually leads to a persistent increase in expenditure, worsening the structural fiscal position. Simulations by ECB (2023) show that euro

area budget balance is adversely affected by inflation shock already after one year. The negative effects on budget get more pronounced if inflation becomes permanently high. This leads to a slowdown in the economy and consequently lowers revenue growth in the long run.¹⁷ The negative effect is further exacerbated by the eventual tightening of monetary policy.¹⁸ A favourable short-run effect also applies to debt-to-GDP ratio via the denominator as well as lower snowball effect.¹⁹ The related inflation's effect on debt ratio reached around 2 percentage points of GDP in advanced and roughly 4 percentage points of GDP in emerging economies in 2021 (IMF, 2022). In Slovenia, inflation (GDP deflator) contributed 1.8 percentage points (out of 5 percentage points to the reduction in the debt-to-GDP ratio in 2021), while the contribution reached 2.5-fold that in 2022, explaining almost all of the debt ratio decline.²⁰ However, any positive effect is generally significantly reduced in just over five years following the initial price shock with new debt issued at higher interest rates (Akitoby et al., 2014).²¹ ECB (2023) simulations nevertheless show that the nature of the shock crucially defines the final effect of inflation on public finances, as the negative impact on economic activity from adverse external supply shock (e.g. via the terms of trade shock) outweighs the positive impact of higher inflation on debt ratios, while domestic demand shock would reduce the debt burden in the medium term.

At several occasions, the Fiscal Council has called for moderation in government spending during the crisis and in times of various types of supply-side restrictions, specifically due to very optimistic investment plans, in order not to contribute to creating macroeconomic disequilibria, including inflation, in a relatively strong cyclical environment.²² These calls related to the lack of adequate macroeconomic and administration absorption capabilities and the counterfactual that strong public investment

¹³ The impact of strong fiscal stimulus on inflation in EU is also confirmed by EFB (2022). IMF (2023) finds that a one per cent rise in government spending leads to an average hike in inflation of around 0.5 per cent, with the total effect flattening out after 3 to 4 years.

¹⁴ As presented in Box 1 (EC, 2023a), policy measures had a strong negative effect on inflation during the initial stage of energy crisis.

¹⁵ The analysis does not disentangle between private and public sector demand.

¹⁶ Fiscal Council (2022b) and CBO (2022) confirm low initial fiscal effects of temporary higher inflation without considering support measures. On the contrary, OBR (2022) shows strong negative budgetary consequences of higher inflation in the UK due to its immediate and strong effect on interest payments, that is related to a high share of inflation-linked bonds.

¹⁷ See estimates of the impact of an increase in energy prices on the level of potential output in euro area countries in Schnabel (2022), being clearly on the negative side.

¹⁸ See simulations in Fiscal Council (2022b: Box 3.1).

¹⁹ According to ECB (2023), inflation effects on fiscal position depend on the nature and size of the inflation shock, the fiscal response to the inflation shock, institutional aspects of budgets (e.g., price indexation of some public expenditure and characteristics of tax systems), and the monetary policy reaction. IMF (2023) estimates that in countries with public debt above 50 % of GDP, a one per cent increase in surprise inflation reduces public debt by 0.6 pp of GDP, with the effect lasting several years.

²⁰ This is in line with the following back-of-the-envelope calculation: if we assume the inflation spike will last two years, the ECB increases interest rates in that period by 4 pp and considering that only 10% of GDP of Slovenia's sovereign debt matures over next two years, the short-term cost of higher interest rate may reach 0.4% of GDP. A surprise inflation at 6-8% (currently expected 8-10% minus ex-ante expected 2% by creditors when lending) with debt at 80% of GDP implies the denominator effect at 4.8-6.4% of GDP. The overall inflation effect on the lower debt ratio would thus reach 4.5-6.1% of GDP.

²¹ Simulations (ECB, 2021: Box 18) show that such debt increasing effect occurs notwithstanding the continuation of a negative 'i-g'.

²² See e.g. Fiscal Council (2022b) or Fiscal Council (2022c)

accelerations typically lead to investment inefficiency, either in terms of inefficient use of funds or in lower multiplier, whereby the latter is more significant in the case of e.g. tight labour market.²³

In addition to being very generous, the predominantly non-targeted broad measures during the pandemic have also contributed to a build-up of expectations regarding further government support²⁴ by both private and public sector, as the energy crisis struck just when epidemic support measures have started to be withdrawn. In Slovenia, such expectations are clearly reflected in continuing demands for the government to make-up for the loss in purchasing power of households and of high costs of non-financial corporations, although both may dispose of certain buffers in the form of savings and strong increase in profits, where the latter may also be the source of a “greedflation”.²⁵ It is clear that after repetitive shocks of a huge scale and consequently reduced fiscal buffers, burdens need to be shared among the public and private sector. As is the case in many other instances, a full-blown government support, trying to mitigate the crises, may be self-defeating in the end. At the same time, this once again makes a clear lesson of how important fiscal policy and its measures are in the formulation of expectations by economic agents.

5. Fiscal policy on the way out of the crisis

Preserving fiscal buffers is especially important in an environment of expected future fiscal pressures and in the view of changing economic governance framework in EU. An adequate size of the fiscal buffer is typically difficult to define as the underlying estimates of fiscal space are notoriously unstable. Also, fiscal space may change non-linearly once the debt approaches upper limits, that are accepted by market participants. Nevertheless, according to EC's review of debt sustainability issues,²⁶ Slovenia has been continuously among the countries with highest risks

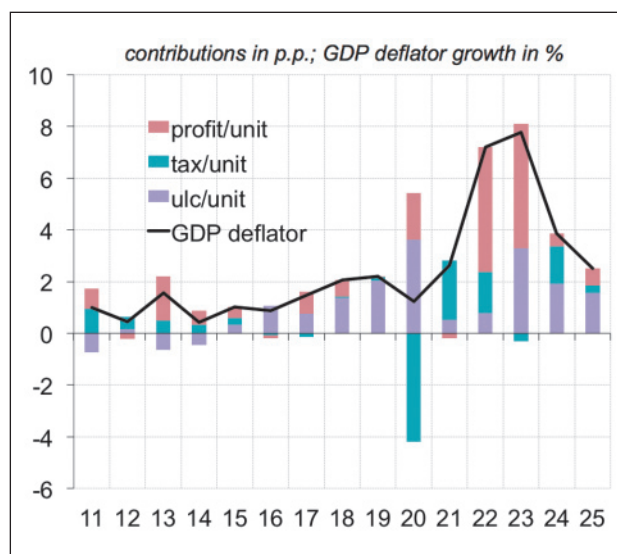
²³ See Brložnik (2021) and references therein.

²⁴ This is evidently mirroring the general perception that government will smoothen all (major) shocks, dubbed as »increasingly automatic state rescue reflex«, and a »snowballing problem of their own making« by FT commentator, or as another commentator puts it, »crisis have left us in a “doom loop” of insuring risky behaviour“. See: <https://www.ft.com/content/0853917d-538f-4e86-a6a1-56f559ff4264> and <https://www.ft.com/content/027e83a3-1505-40c1-83c1-7f2a8fe0a3a5>. However, these reservations regarding the role of the government do not refer to an urgent need to ensure certain public goods in order to deal with future challenges (e.g. energy, security).

²⁵ According to estimates by the Fiscal Council (2023), rise in unit profits contributes around two thirds of a rise in GDP deflator in 2022 and (forecast of) 2023. This is similar to estimates for the euro area (see Arce et al., 2023). It is worth noting that companies are in general more flexible when dealing with commodity price shocks compared to households, as the former can pass higher costs to prices, reallocate production factors and are more able to switch between alternative energy sources (see IMF, 2023).

²⁶ See EC's (2022) Fiscal Sustainability Report and EC's (2023b) Debt Sustainability Monitor.

Figure 5: Contributions to change in GDP deflator



Source: SORS, IMAD, author's calculations.

to medium- to long-term government's debt sustainability in relation to demographic challenges and social security systems not adapted to the related ongoing and expected changes. This is confirmed by the Fiscal Council's (2023) estimates of future transfers by the state budget to social security funds, which are set to rise further.

At the same time, the initial fiscal position will be one of key items in determining the required path for public finance in the proposed changes to the EU economic governance framework, as also shown in Figure 6.²⁷ Thus, in addition to ensure that long-term debt trajectory becomes aligned with sustainability requirements, it is of utmost importance that fiscal policy also remains on track in 2023 and 2024. The fiscal outcome of these two years will serve as base when defining the paths of net primary domestic expenditure, a new key operational indicator of public finances in the EU.²⁸

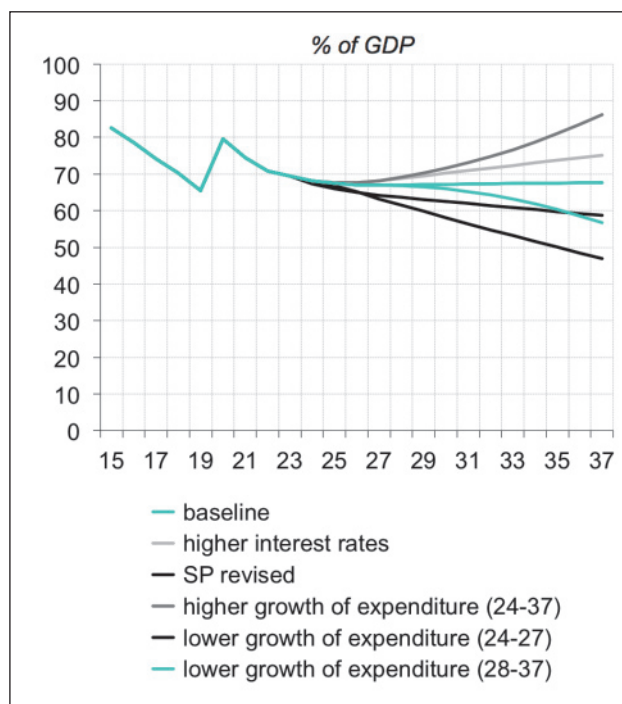
In that respect, credible medium-term budgetary frameworks will play a significant role in reducing the uncertainty, which is one of the major goals of fiscal policy in crisis management. Credible budgetary frameworks are underpinned by transparent and verifiable calculations of the effect of major measures undertaken to ensure fiscal sustainability. Such plans should also include well-designed risk scenarios and contingency plans to address them.²⁹ Together with clear communication, the credibility and transparency should reassure finan-

²⁷ See scenario "SP revised". For a further insight into the relation between public debt and different aspects of the assumptions that may play a role in the proposed EU governance framework, see simulations in Delakorda (2023).

²⁸ See EC (2023a: Chapter 5).

²⁹ See IMF (2021).

Figure 6: Debt simulations under different assumptions

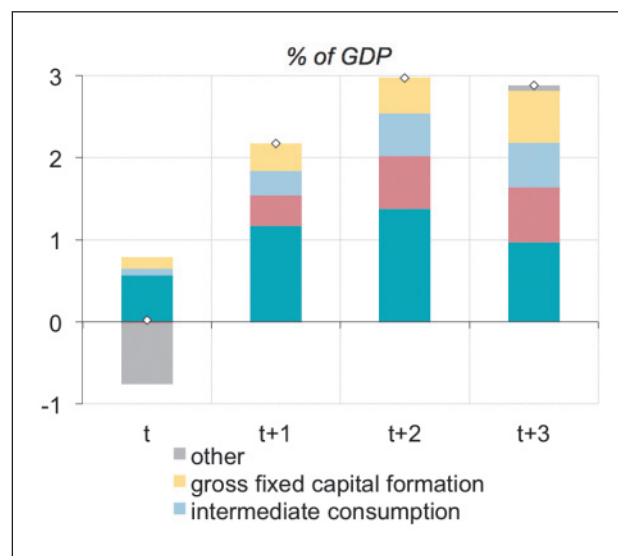


Source: SORS, MoF, author's calculations. The figure is taken from Delakorda (2023).

cial markets and, in addition to efficient debt management, limit a rise in borrowing costs in an environment of less accommodative monetary policy and higher debt.³⁰ According to the analysis by the Fiscal Council (see Brložnik, 2023), the current medium-term budgetary framework in Slovenia is faced with numerous challenges, including the systematic backloading of fiscal consolidation, which consists of the underestimation of planned government expenditures in practically all components (see Figure 7). These issues will need to be addressed as, in addition to other disadvantages the malfunctioning of the budgetary framework brings along, such planning shall no longer be possible under the new EU economic governance framework. Finally, with respect to inflationary effects on budget and the related uncertainty, it makes clear the case for continuous safety margins and buffers in budgetary planning, as also requested by the legislation (the national Fiscal Rule Act) in general terms.

³⁰ Simulations [ECB, 2021] show that monetary policy in a high inflation scenario can tighten without endangering debt sustainability of high-debt countries, if there are credible expectations of a return to prudent fiscal policy in the medium to long run. Bianchi and Melosi (2022) confirm that fiscal authority's credibility in stabilising fiscal imbalances may critically affect inflation persistence. If inflation instead reflects fiscal imbalances, monetary tightening can cause a so called "fiscal stagflation".

Figure 7: Contribution to mean error of public expenditure projections



Source: SORS, MoF. The figure is taken from Brložnik (2023). Note: total expenditure excludes the effect of bank recapitalisation in 2011-2014 and the effect of measures for mitigation of consequences of the epidemic in 2020 and 2021. Positive sign denotes that the outturn was higher than the projection.

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Slovenia's debt management approach to sustainable finance

*Marjan Divjak and Martina Berlič Horvat**

This article presents Slovenia's approach to sustainable finance from the perspective of the Slovenian Development Strategy and the Debt Management Strategy, which, together with other strategic documents, follow the global trend of the transition to a sustainable economy and a sustainable society. Slovenia started integrating sustainable finance into its debt management strategy relatively early. In cooperation with the ministries of the Government of the Republic of Slovenia, the Treasury Directorate in June 2021 and January 2023 Slovenia prepared frameworks for sustainable bonds, which are being updated in order to meet the requirements of the EU Taxonomy Regulation to the extent possible. In this context, the article touches upon the principles and standards prevailing in the capital markets and the expectations about the European Green Bond Standard (EuGBS). In this paper, the Sustainability Bond Framework structure on the basis of which Slovenia issued its sustainability bonds is presented, as well as the sustainability bond's outperformance in terms of greenium, bid-ask spread and its trading volume comparable to their conventional comparator bonds.

JEL H61 H68 Q01

1. Introduction

The European Union has so far been the most ambitious political force behind global efforts on climate change. In December 2019, the European Commission presented the European Green Deal, which launches new initiatives with the aim of making Europe the first climate-neutral continent by 2050, as well as plans to mobilise sustainable investments over the next decade. The financial sector has a key role in facilitating financial flows to these investments.

The Strategy for Financing the Transition to a Sustainable Economy aims to support the financing of the transition of the economy towards sustainability by proposing actions in four areas: financing the transition to sustainability, inclusiveness, resilience and contribution of the financial system, and global ambition. The strategy sets out how the financial sector can contribute to meeting Green Deal targets, while also becoming more resilient and more effective in combatting greenwashing. The Corporate Sustainability Reporting Directive (CSRD), Sustainable Finance Disclosure Regulation (SFDR), and EU Taxonomy Regulation are, together with other tools, the building blocks of the EU sustainable finance framework. The CSRD aims to improve the way companies report sustainability information, using a double-materiality perspective according to the information needs

of investors and other stakeholders. The principal objective of the SFDR is to enhance investor protection and help investors to make well-informed decisions via harmonised rules on how institutional investors and financial advisers should inform end-investors about sustainability risks that could affect the value of their investments and on a potentially negative impact that such investments could have on the environment and the society. The EU Taxonomy Regulation is a common classification of economic activities significantly contributing to environmental objectives, using science-based criteria. The EU Taxonomy Regulation sets out six environmental objectives: *climate change mitigation, climate change adaptation, sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, and protection and restoration of biodiversity and ecosystems*. In order for an economic activity to be classified as environmentally sustainable according to the EU Taxonomy, it must not only contribute to at least one of the six environmental objectives, but it may/must not harm the other ones either. The classification of an economic activity in terms of sustainability is based on the three pillars of the EU Taxonomy Regulation: *i) the economic activity significantly contributes (SC) to one of the six environmental objectives, ii) the economic activity does no 'significant harm' (DNSH) to any of the six environmental objectives, and iii) the economic activity meets 'minimum safe-*

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guards' (MS) such as the UN Guiding Principles on Business and Human Rights to not have a negative social impact.

The EU sustainable finance framework thus consists of the *EU taxonomy* a common classification of economic activities substantially contributing to environmental objectives, using science-based criteria, *Disclosures* a comprehensive disclosure regime for both non-financial and financial institutions to provide investors with the information necessary to make sustainable investment choices, and *Tools* a broad toolbox for companies, market participants and financial intermediaries to develop sustainable investment solutions, while preventing greenwashing. The latest development is that, in April 2023, the European Commission launched a four-week feedback period on a new set of EU Taxonomy criteria for economic activities making a substantial contribution to one or more of the non-climate environmental objectives, namely: sustainable use and protection of water and marine resources, transition to a circular economy, pollution prevention and control, and protection and restoration of biodiversity and ecosystems.

This article is organised in Chapter 2 to summarise the current situation and the development in the field of thematic bond standard, mainly in the context of the EU taxonomy and the upcoming European Green Bond Standard (EuGBS). In Chapter 3, we present the structure of Slovenia's first sustainability bond framework of June 2021, the elements of the allocation and the impact report, as well as Slovenia's second sustainability bond framework of January 2023 and the improvements that have been made. In Chapter 4, we present the analysis of the SLOREP¹ bond market from the perspective of the secondary market performance of the sustainability bonds compared to conventional comparator bonds. We conclude with an outline of the expected and necessary next steps in the field of Sustainable finance.

2. Sustainable finance definitions, principles, and standards

The 2030 Agenda for Sustainable Development, the UN Climate Change Conference, as well as designed nationally determined contributions (NDCs) have helped to accelerate growth in sustainable finance, which refers to taking environmental, social and governance (ESG) considerations into account (Boffo and Patalano, 2020), when making investment decisions in the financial sector. With the growing of awareness of the need for and the importance of sustainable finance, rules and standards have been de-

veloped to which issuers are willing to commit. Issuers and investors can take these standards into account partially or fully on a voluntary basis, with the features of sustainable finance widely discussed in scientific literature (Pipan, 2021).

The International Capital Market Association's Green and Social Bond Principles and Sustainability Bond Guidelines (ICMA, 2021a, b, c) are the most widely used standards in the market, utilising the use of proceeds structure with core components (*use of proceeds, process of project evaluation and selection, management of proceeds and reporting*) and two recommendations (*bond framework and external review*) recommending transparency and disclosure. The Sustainability-Linked Bond Principles (ICMA, 2020b) are general-purpose structured. This means that the proceeds of the Sustainability-linked bonds can be used for general purposes with core components (*Selection of Key Performance Indicators (KPIs), Calibration of Sustainability Performance Targets (SPTs), bond characteristics, reporting and verification*) recommending structuring features, disclosure, and reporting. With Sustainability-Linked bonds, issuers are committing to future improvements in sustainability outcomes within a predefined timeline. The financial and/or structural bond characteristics depend on whether the issuers achieve predefined Sustainability (ESG) objectives with imbedded features like a coupon step-up. The sustainability outcomes are measured by predefined Key Performance Indicators (KPIs) and assessed against agreed Sustainability Performance Targets (SPTs). The Republic of Chile is a reference issuer of the sustainability-linked bond (Rust 2022) within the sovereign space. It is thought that Sovereign Sustainability-linked Bonds could help sovereign issuers make progress towards carbon emission reduction targets (Gong, Ehlers, Packer, 2022). The challenges for this structure are insufficiently robust or ambitious KPIs and targets, improperly designed incentives, and a weak link between sustainability and financial outcomes. Another prominent market standard is the Climate Bonds Initiative's Standards (Climate Bonds Initiative, 2023) which are based on both the International Capital Market Association's Green Bond Principles (ICMA 2021a) as well as the Climate Bonds Taxonomy comprising the low-carbon and climate resilience environmental objectives. The science-based criteria are developed by Technical/Industry Working Groups for some of the sectors, including power generation, transport, buildings providing detailed definitions for the eligibility of specific projects and assets.

Pre-issuance and Post-issuance certification are required. The objective of these principles and standards is to find a common language for issuers and investors and to ensure

¹ SLOREP are the Republic of Slovenia domestic bonds issued under Slovenian Law, in KDD (Slovenia CSD), listed on LJSE. SLOVEN are the Republic of Slovenia international bonds issued under English Law in ICSD, listed on LuxSE.

that green bonds are credible and transparent financial instruments. There is sometimes the perception that there is a lack of clear and harmonized definitions for green projects and green bonds, which makes it difficult for investors to identify green bonds of sufficient quality, potentially leading to market fragmentation and concerns around greenwashing. Consequently, the prevalence of such concerns could result in reduced investments directed towards sustainable projects. Pietsch and Salakhova (2022) in their study provide arguments for the need for a regulatory standard that will provide a clear definition of green bonds and requirements to assure that proceeds raised from the issuance of green bonds contribute to the transition. To close this gap, in July 2021 the Commission proposed a regulation on a voluntary European Green Bond Standard (EuGBS). The ambition of the European Commission (2021) was to set a new “gold standard” for green bonds for all types of fixed income products.

The EuGBS proposal was published at the beginning of the Slovenian Presidency term. The Slovenian Presidency² prepared a balanced proposal on the EuGBS, following constructive discussions with the European Commission, EU member states and, in the latest stage, with the incoming French presidency. The objective was to strike the right balance between the level of transparency and protection provided to investors and the additional costs and regulatory burden imposed on issuers. The Slovenian Presidency made significant progress on the file and was close to reaching the general approach. The discussion was focused on the full EU Taxonomy alignment versus the flexibility pocket, grandfathering, the powers of ESMA versus national competent authorities (NCAs), and the scope of supervision by NCAs, as well as on external review. The Council confirmed its position on the proposal during the French Presidency term in 2022, and in February 2023, the European Parliament, the European Commission, and the Council of the EU reached an agreement regarding the European Green Bond Regulation. The agreement now needs to be adopted by the Council and the EU Parliament, and the final text published. The key elements of the EuGBS include that the issuer will comply with the Regulation voluntarily. Issuers will need to allocate 85 % of the proceeds of the bond to finance Taxonomy-aligned economic activities and meet the three criteria of Taxonomy Regulation (Significant Contribution, Do not significant

harm, Minimum Safeguard). A 15 % flexibility pocket will be allowed for allocations to projects or economic activities for which EU Taxonomy technical screening criteria (TSC) are not yet developed, but which still provide an environmental benefit. The use of the flexibility pocket will be re-evaluated at a later point in time. In addition to a standardized reporting process in a template format, issuers of EU Green Bonds will have to show how investments feed into the transition plans of the issuer. A registration and supervisory system for External Reviewers will be established to ensure an independent assessment of whether the bond is green.

3. Slovenia's approach to sustainable finance

Slovenia is fully committed to the Paris Climate Agreement and to the achievement of the United Nations' Sustainable Development Goals (SDGs). The Slovenian development planning model integrates the vision of Slovenia into the Slovenian Development Strategy 2030 (Republic of Slovenia, Ministry of Cohesion and Regional Development, 2017) with 5 strategic orientations, and 12 development goals mapping to the 17 SDGs of the UN with the strategic actions and programs. Sustainability (2023) outlined the National Energy and Climate Plan (NECP), the Resolution on the National Environmental Action Programme 2020-2030, the Active Ageing Strategy and the Common Agricultural Policy Strategic Plan 2023-2027 for Slovenia as being relevant for the Sustainability Bond Framework.

Strategic objectives of incorporating sustainable finance in the debt and risk management strategies (Jonasson and Papaioannou, 2018) are to articulate commitment to environmental and social goals, building markets for ESG debt, accessing cost-effective funding, diversifying the investor base, promoting of the cooperation within the government in the field of Sustainable Finance (Lindner and Chung, 2023). The Treasury Directorate, on the basis of the Slovenian development planning model, promptly embarked on the sustainable finance course. The Green Bond Framework of rather limited size of 300 million euros was prepared, aligned with the Green Bond Principles 2018, and verified by Sustainability in the year 2019. As the next step, the Treasury Directorate in 2021 broadened the scope to social expenditures and appointed a structuring advisor³ with the objective of increasing the size of identified portfolio of eligible projects. The Government of Slovenia established in 2021 the Sustainability Bond Working

² The European Council working group on the European Green Bond Standard was chaired by Marjan Divjak and Nina Stražišar. Maja Praprotnik Zupan, Andrej Žagar from the Ministry of Finance and Mateja Janša from the Permanent Representation to the European Union, Brussels, significantly contributed to the work of the working group.

³ Excellent cooperation with the investment bank *Credit Agricole* during the preparation of the 2021 Sustainability Framework and Allocation and Impact report is acknowledged.

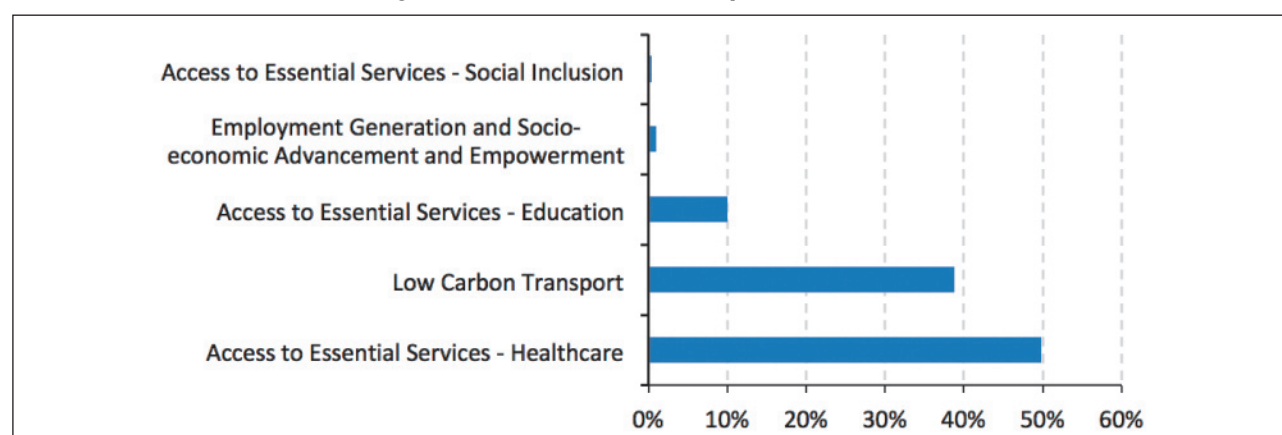
Group⁴ (SSSB) led by the Treasury Directorate. The Sustainability Bond Framework (Republic of Slovenia, Ministry of Finance, 2021) was prepared in accordance with the ICMA Green Bond Principles 2021, Social Bond Principles 2021, and Sustainability Bond Guidelines 2021 and comprised of seven green and five social ICMA categories (*Green Buildings and Energy Efficiency, Energy Transition, Low Carbon Transport, Sustainable Environmental Management, Water and Wastewater Management, Eco-efficient and/or Circular Economy Research & Innovation (R&I) and Access to Essential Services – Education, Healthcare, Social Inclusion, Affordable Housing, Employment Generation and Socioeconomic Advancement and Empowerment*) mapping the SDGs goals and targets ICMA (2020a). The size of the eligible portfolio of projects identified under the Framework was 2.6 billion euros given the budget horizon between 2020 – 2022 where the split between estimated green and social eligible expenditures was 39 – 61 % respectively. The presented green and social projects categories fall under the eight ministries. The Framework was reviewed in the process of obtaining the Second Party Opinion by Sustainalytics (2021). In June 2021, the Republic of Slovenia entered the markets with the inaugural 10-year maturity sustainability SLOREP benchmark bond issuance of EUR 1 billion issue size subsequently tapped for EUR 150 million. This landmark transaction makes the Republic of Slovenia the first sovereign in the CEE and the second in the European Union to issue a sustainability bond.

In July 2022, the Ministry of Finance published the first Allocation and Impact Report (Republic of Slovenia, Ministry

of Finance, 2022) relating to its inaugural Sovereign sustainability bond issued. 1.05 billion of net proceeds were allocated, 58 % to finance new projects, while 42 % were used to refinance existing projects. The proceeds were allocated on one green and four social ICMA categories (*Low carbon transport, Access to essential services-Education, Social Inclusion, Healthcare, Employment generation and socioeconomic advancement and empowerment*) where the allocation by category is shown on Figure 1. The Low Carbon Transport was the only green category to which proceeds were allocated. The activities and projects relate to the financing of electric railway rolling stocks purchases and construction, the upgrade of networks and railways which are according to their own assessment substantially contributing to climate change mitigation, in line with »6.1. passenger interurban rail transport« and »6.2. freight rail transport« of the EU Taxonomy technical screening criteria. The environmental legislation relevant for the activities and projects of the Low Carbon Transport category, and the UN SDG mapping to Sustainable Cities and Communities (11) and Climate Action (13) was examined. The estimation of the working group was that the projects within the Low Carbon Transport category meet the DNSH criteria related to the Climate change adaptation where the investments do not increase temperature. For more, see Slovenia (2022). The MS criteria of the EU Taxonomy require the implementation of policies or regulations together with supporting management systems and processes to ensure that the activities financed comply with OECD, ILO, and other relevant business conduct standards. Our own assessment is that the MS criteria of EU Taxonomy have been met. The alignment of the Framework and the allocation report was assessed by Sustainalytics (2022) which concluded that the Allocation report is in line with the ICMA guidelines. Key impact indicators to measure the impact of allocated amounts in budget years

⁴ The Sustainability Bond Working Group (SSSB) was chaired by Marjan Divjak and Maja Praprotnik Zupan. Thanks for participating in the first and second working group go to Andrej Žagar, Eva Križnik, Bojan Dejak, dr. Nevenka Ribič, Sonja Gostiša, Maja Vidic, mag. Boris Munišič, Branko Matjašec, Zoran Bricman, mag. Monika Kirbiš Rojs and Simona Poljanšek, Franc Lenarčič, Iztok Žigon, Anita Zakšek, Sibil Klančar, Irena Brcko Kogoj.

Figure 1: Slovenia Sustainability Bond Allocation



Source: Ministry of Finance

Table 1: Impact indicators

Category	Impact indicators
Low Carbon Transport	→ Number of rolling stocks
	→ Passenger/tonne kilometres per year
	→ Tonnes of annual CO ₂ reduction
Access to Essential Services – Education	→ Share of children with subsidy for kindergarten
	→ Share of pupils/students with co-financed lunches
	→ Number of educational institutions receiving the funds
Access to Essential Services – Healthcare	→ Number of healthcare institutions receiving the funds
	→ Number of people benefiting from the programmes/activities
	→ Number of activities performed
	→ Number of new beds
Access to Essential Services - Social Inclusion	→ Number of people benefiting the programmes/activities
Employment Generation and Socio-economic Advancement and Empowerment	→ Number of people benefiting the programmes/activities

Source: Ministry of finance

2020 and 2021 are presented in Table 1 and in more detail in Slovenia (2022) and Slovenia (2022a).

The Government of Slovenia established in 2022 the Second Sustainability bond working group (SSSB) led by the Treasury Directorate. BNP Paribas⁵ was appointed as the structural advisor. The Sustainability Bond Framework was prepared in accordance with the ICMA Green Bond Principles 2021, Social Bond Principles 2021, and Sustainability Bond Guidelines 2021 (Republic of Slovenia, Ministry of Finance, 2023) comprised of four green categories (*Low Carbon Transport, Energy Efficiency, Sustainable Environmental Management, Climate Change Adaptation*), which are expected to promote the transition to a low carbon, climate-resilient and environmentally sustainable economy, and four social ICMA categories (*Access to Essential Services: Education, Healthcare, Social Inclusion, and Employment Generation and Socioeconomic Advancement and Empowerment*), which are expected to promote the commitments to creating opportunities for employment, education, creativity and dignified, safe and active life, mapping to the relevant SDG goals and targets ICMA (2020a). Budget expenditures that support or promote the burning of fossil fuel for power generation and transportation, nuclear power generation, weapons, tobacco, gaming, or palm oil industries were explicitly excluded. The size of the Framework was 2.3 billion euros given the budget horizon between 2022 – 2025, the split between estimated green and social eligible expenditures was 36 – 64 % respectively. The mandate of the SSSBs Working Group is to review the Framework (Republic of Slovenia, Ministry

of Finance, 2023) from time to time and update and amend it as appropriate. The strategic objective is to make continuous progress regarding the quality and credibility of the Framework. The Second Sustainability Bond Framework was reviewed for the alignment against the ICMA Green Bond Principles, Social Bond Principles and Sustainability Bond Guidelines and where possible the eligible green use of proceeds was assessed against the Substantial Contribution Criteria of the EU Taxonomy. The Low Carbon Transport and Energy Efficiency green categories included in the Framework were mapped to 12 economic activities of the EU Taxonomy and were independently reviewed for alignment with the applicable Substantial Contribution criteria of the EU Taxonomy (Sustainalytics 2023). The EU Taxonomy TSC for the Sustainable Environmental Management and the Climate Change Adaptation green categories of the Framework have not yet been developed. Sustainalytics (2023) provides an overview of the alignment of the Framework with the TSC criteria for the corresponding NACE activities in the EU Taxonomy. The Framework was not reviewed for the alignment to the DNSH and MS Criteria of the EU Taxonomy. In January 2023, the Republic of Slovenia entered the markets with EUR 10-year Sustainability Bond benchmark issuance of 1.25 billion euros.

4. Slovenia's bond market

Thematic bonds, which include green, social, sustainability, and sustainability-linked bonds, are emerging as a central financial solution for the NDCs and SDGs (The World Bank, 2022). The sustainable bond market still represents a small share of the total bond market, but it is exhibiting exponential growth across instruments, issuer types and geographies. To ensure the continued growth of the sustain-

⁵ Excellent cooperation with the investment bank BNP Paribas during the preparation of the 2023 Sustainability Framework and the continuation of this cooperation is acknowledged. We would also like to thank to Gemma Bedford, BNP Paribas for reading the article and for giving us very useful and to the point comments and suggestions.

ability bond market and the availability of financial resources for the sustainable transition, these instruments must gain the confidence of investors. The presence of a premium for green bonds, which is called *greenium*, may indicate investor confidence and preferences for these instruments and the credibility of issuers issuing sustainability bonds. The green premium is the yield difference between a sustainability bond and a conventional comparator bond of the same issuer of comparable characteristics. It refers to pricing benefits for an issuer because investors are willing to sacrifice the *greenium* for investing in sustainable projects.

In theory, the green premium can be positive or negative. On the one hand, the issue amount and liquidity of green bonds are lower than those of a conventional bond, which could result in a negative premium. On the other hand, investors' environmental, social and governance preferences for green bonds, and the additional information requirements about the use of proceeds may justify a positive premium. The notion of *greenium* attracted the interest of a number of researchers. Ando, Fu, Roch and Wiradinata (2023) collected an extensive collection of data on sovereign green bonds, on the basis of which they estimated the value of the sovereign *greenium*. They found that the average green premium is small, but positive of around 4 bp and that the estimated green premium varies considerably according to the country level of development and bond currency. The estimated *greenium* is larger in developing economies and in bonds denominated in foreign currency. Baker, Bergstresser, Serafeim, and Wurgler (2022) studied the US corporate and municipal green bond markets and found that green bonds are indeed issued at a premium, with yields lower by several basis points. The World Bank (2022) summarised the studies with the conclusion that the *greenium* exists across markets. Doronzo, Siracusa, and

Antonelli (2021) in their empirical analysis of the secondary market, by contrast, conclude that green bonds do not substantially outperform their conventional comparator bonds. The World Bank (2022) concludes that further research is needed to provide better evidence of a *greenium* as well as other technical elements, such as the difference in the investor base for both bonds and the volume outstanding, which could also play a role and help explain the pricing difference.

The sustainability bonds of Slovenia issued in 2021 and 2023 experienced more spread tightening during the primary market pricing process than conventional bonds landing at the secondary market level, although priced in a very different interest environment. The objective of this empirical analysis is to examine if the difference between the spread of the conventional SLOREP bonds and the sustainability SLOREP bonds exists. Barclays ESG research (2022) continues to see sustainability bonds for developed markets corporates trading around 2-3bp tight to their non-ESG equivalents lower than for green and social bonds, but still with a meaningful premium. In Figure 2, SLOREP benchmark bonds are shown on the redemption profile and on the yield curve where two sustainability SLOREP bonds are shown in green colour.

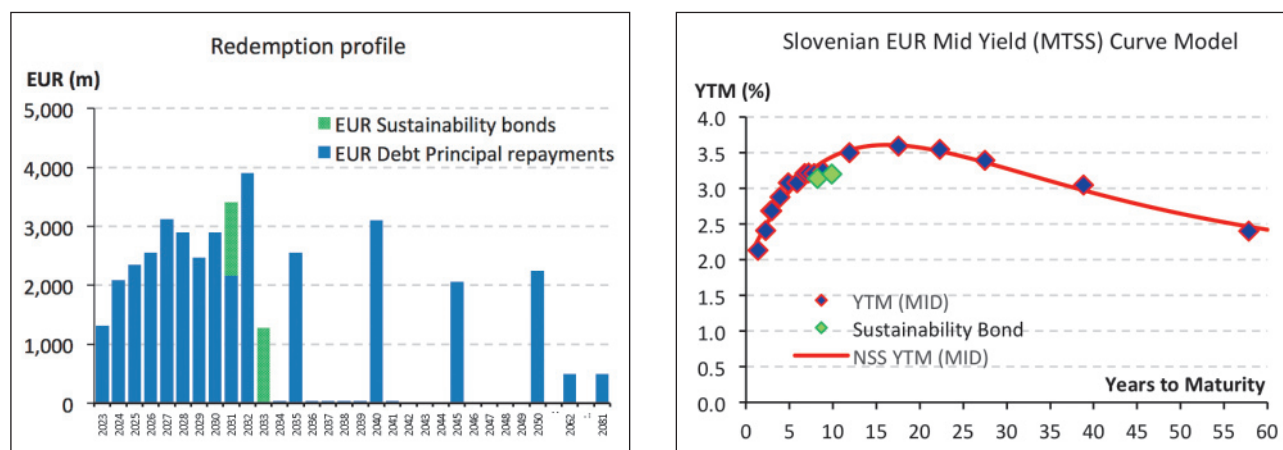
The MID⁶ I⁷-spread⁸ (I) of a bond is the difference between its MID yield to maturity (Ytm) and the linearly interpolated mid swap rate (MS^{Int}) of the same maturity, which we write as follows: $I = Ytm - MS^{Int}$ (1). The Bond pricing equation is written as follows:

⁶ By using MID side of the market which is the average of the BID and ASK market levels, more reliable comparison is achieved given the general level of SLOREP liquidity.

⁷ I-Spread adjusted for the residual maturity is used to eliminate the shape of the Mid-Swap curve.

⁸ Doronzo et al (2021) use the Z-spreads or zero volatility adjusted for the residual maturity. The OAS spread is an appropriate measure when the yields of different bonds embedding options are compared.

Figure 2: Slovenia redemption profile and yield curve



Source: Ministry of Finance, 25 April 2023

$$P = \sum_{i=1}^t \frac{C}{(1 + \frac{MS^{Int} + I}{Ytm})^i} + \frac{F}{(1 + \frac{MS^{Int} + I}{Ytm})^t} \quad (2)$$

where F is face value of bond and MS^{Int} is the interpolated mid swap rate written:

$$MS^{Int}_t = MS_T + (MS_{T+1} - MS_T) \cdot \frac{(t - t_{MS_T})}{(t_{MS_{T+1}} - t_{MS_T})} \quad (3)$$

where t is time to maturity, T is the whole number of time t . Thus, the I-spread can be recovered from the Bond price equation (2) or as the difference expressed by the equation (2).

The data set is a series of I-spreads of conventional SLOREP bonds and sustainability SLOREP bonds. The purpose of the analysis is to compare I-spreads of a sustainability bond and of the conventional comparator bond. From the Equation (2) given bond prices and interpolated mid swap rates expressed by the Equation (3) the I-spreads for the conventional SLOREP 0.875 07/2030, SLOREP 0.000 02/2031, SLOREP 2.250 03/2032, SLOREP 1.500 03/2035 bonds and for sustainability SLOREP 0.125 07/2031, SLOREP 3.625 03/2033 are recovered. Alternatively, the difference between the yield to maturity of a bond and interpolated mid swap rates matching the bond maturity is calculated. Because of the different time to maturity of the bonds which are being compared the adjustment value Δ_i is calculated and used to adjust the I-spread of the conventional comparator bonds.

From I-spreads of the conventional bonds SLOREP 0.875 07/2030 and SLOREP 2.250 03/2032 in the period from 1 July 2021 to 5 Jan 2023, we calculate the interpolated values of the I-spreads corresponding to the remaining maturity of the conventional comparator bond SLOREP 0.000 02/2031 and the interpolated values of

I-spreads which correspond to the remaining maturity of the sustainability bond SLOREP 0.125 07/2031. The values Δ_i for this period are obtained as the difference between the interpolated value of the I-spread of the conventional bond which correspond to the remaining maturity of the sustainability bond SLOREP 0.125 07/2031 and the interpolated value of the I-spread of the conventional bond which correspond to the remaining maturity of the conventional comparator bond SLOREP 0.000 02/2031. From I-spreads of the conventional bonds SLOREP 0.000 02/2031 and SLOREP 1.500 03/2035 in the period from 6 Jan 2023 to 6 April 2023, we calculate the interpolated values of I-spreads corresponding to the remaining maturity of the conventional comparator bond SLOREP 2.250 03/2032 and the interpolated value of the I-spreads, which correspond to the remaining maturity of the sustainability bond SLOREP 3.625 03/2033. The values Δ_i for this period are obtained as the difference between the interpolated value of the I-spread of the conventional bond which correspond to the remaining maturity of the sustainability bond SLOREP 3.625 03/2033 and the interpolated value of I-spreads conventional bond which correspond to the remaining maturity of the conventional bond SLOREP 2.250 03/2032. The generic interpolation equation on the time interval $t_{bond_1} < t_{bond_2} < (4)$ is written as follows:

$$I^{Int}_{bond_t} = I_{bond_1} + (I_{bond_2} - I_{bond_1}) \cdot \frac{(t - t_{bond_1})}{(t_{bond_2} - t_{bond_1})} \quad (5)$$

and the values Δ_i are written:

$$\Delta_i = \begin{cases} I_i^{Int}_{7/2031} - I_i^{Int}_{2/2031}; & i \in \{1 \text{ July 2021} - 5 \text{ Jan 2023}\} \\ I_i^{Int}_{3/2033} - I_i^{Int}_{3/2032}; & i \in \{6 \text{ Jan 2023} - 6 \text{ April 2023}\} \end{cases} \quad (6)$$

The data set for the conventional comparator bonds are I-spreads of the SLOREP 0.000 02/2031 from 1 July 2021 to 5 Jan 2023 and I-spreads the SLOREP 2.250 03/2032 from 6 Jan 2023 to 6 April 2023, which we write as follows:

$$\text{Conventional Bond } I_t^{I-spread} = \begin{cases} I_{i2/2031}; & i \in \{1 \text{ July 2021} - 5 \text{ Jan 2023}\} \\ I_{i3/2032}; & i \in \{6 \text{ Jan 2023} - 6 \text{ April 2023}\} \end{cases} \quad (7)$$

The adjusted data set for the conventional comparator bonds is obtained by adding the set of the value Δ_i to the I-spread of the conventional bond, what is written below:

$$\text{Adj. Conventional Bond } I_t^{I-spread} = \text{Conventional bond } I_i^{I-spread} + \Delta_i \quad (8)$$

so that the adj. conventional comparator bonds I-spreads can be compared to the I-spreads of sustainability bond where for the period from 1 July 2021 to 5 Jan 2023 I-spreads are of the sustainability bond SLOREP 0.125 07/2031 and for the period from 6 Jan to 6 April 2023 re of the sustainability bond SLOREP 3.625 03/2033, written as follows:

$$\text{Sustainability Bond } I_t^{\text{I-spread}} = \begin{cases} I_{i7/2031}; & i \in \{1 \text{ July 2021} - 5 \text{ Jan 2023}\} \\ I_{i3/2033}; & i \in \{6 \text{ Jan 2023} - 6 \text{ April 2023}\} \end{cases} \quad (9)$$

Greenium is the difference between the adjusted I-spread of a conventional bond and the I-spread of a sustainable bond, written as follows:

$$\text{Greenium}_i = \text{Adj. Conventional Bond } I_t^{\text{I-spread}} - \text{Sustainability Bond } I_i^{\text{I-spread}} \quad (10).$$

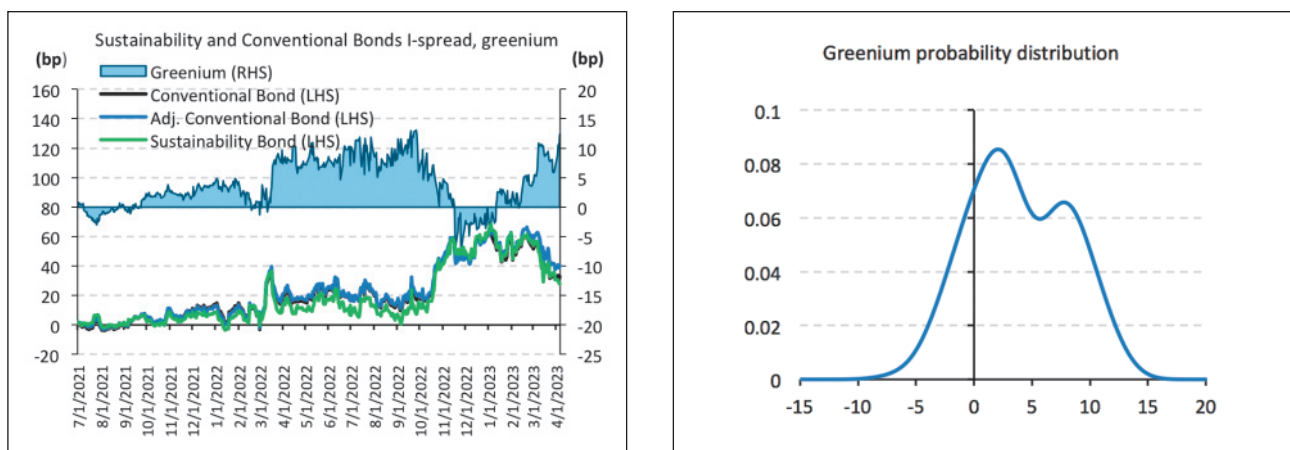
In Figure 3, the adjusted I-spread of a conventional comparator bonds, the I-spread of a sustainability bonds and *greenium* (RHS) are shown, from where we can conclude that the positive *greenium* implies that investors are willing to sacrifice a portion of the spread when investing in sustainable investments. During the period of 461 days the average *greenium* is 3.92 bp with the standard deviation 4.22 bp, the skewness 0.058, and the kurtosis 2.151. The number of days when the *greenium* was negative is 92. The empirical probability density function of the *greenium* is shown in Figure 3. The mean of the empirical probability distribution of the Ytm of the sustainability bonds is 1.722 % with the standard deviation 1.343 %, skewness 0.0467 and kurtosis 1.478 compared to the conventional comparator bonds mean of 1.77 % with the standard deviation 1.354 %, skewness 0.0093 and kurtosis 1.468. The mean of the empirical probability distribution of the sustainability bonds is smaller than that of the conventional comparator bonds implying the positive *greenium* of the sustainability bonds. Pietsch and Salakhova (2022) in their study provide evidence that a key factor explaining the *greenium* is the credibility of a green bond itself and/or that of its issuer.

The performance of the sustainability bonds and the conventional comparator bonds is examined during the sell-off

period which is for the purpose of this comparison defined as the period of the largest increase of the benchmark MS rate. The periods are identified, the first from 21 Jan to 13 June 2022 when the MS rate increased from 0.378 % to 2.372 %, the second from 28 Feb to 6 May 2022 when the MS rate increased from 0.79 % to 1.946 %, and the third from 3 Aug to 27 Sep 2022 when the MS rate increased from 1.692 % to 3.155 %. The increase of the I-spread of the sustainability bonds was in the first period smaller by 4 bp, in the second by 7.5 bp, and in the third by 3.8 bp compared to the I-spread increase of the conventional comparator bonds. The correlation between the MS rate and the I-spread of the Sustainability bonds was in the first period 0.371, in the second -0.182 and in the third period -0.027 while the correlation between the MS rate and the I-spread of the conventional comparator bonds was in the first period 0.61, in the second 0.097, and in the third period 0.344. The hypothesis that the sustainability bonds sustained the period of the market sell-off better than comparable conventional bonds thus cannot be rejected.

Doronzo at all (2021) published a study theorizing that the green bond market is still at the early stage of development, with a lack of transparency on bond market flows and conventional comparator bonds. The percep-

Figure 3: Sustainability and Conventional Bonds I-spread, greenium, greenium probability density function



Source: Ministry of Finance, 6 April 2023

tion is that the thematic bond market is dominated by the buy and hold investors whose presence is preventing secondary market flows to match the volumes of their conventional comparator bonds. The approach by the Treasury Directorate was to integrate the sustainability bond in the funding instruments portfolio under the assumption of equivalent secondary market liquidity with the strategic approach to avoid undermining the second-

ary market liquidity of outstanding conventional SLOREP bonds. The *BID-ASK spreads*⁹, of the conventional comparator SLOREP bond, are compared to the BID-ASK spreads of the sustainability bonds. The data set for the conventional bonds are BID-ASK spreads of the SLOREP 0.000 02/2031 from 1 July 2021 to 5 Jan 2023 and BID-ASK spreads of the SLOREP 2.250 03/2032 from 6 Jan 2023 to 6 April 2023, which we write as follows:

$$\text{Conventional Bond}_t^{BID-ASK} = \begin{cases} BID - ASK_{i_{2/2031}}; & i \in \{1 \text{ July } 2021 - 5 \text{ Jan } 2023\} \\ BID - ASK_{i_{3/2032}}; & i \in \{6 \text{ Jan } 2023 - 6 \text{ April } 2023\} \end{cases} \quad (11)$$

The data set for the sustainability bonds are BID-ASK spreads of the SLOREP 0.125 07/2031 for the period from 1 July 2021 to 5 Jan 2023 and the BID-ASK spreads of the sustainability bonds 3.625 03/2033 for the period from 6 Jan to 6 April 2023, written as follows:

$$\text{Sustainability Bond}_t^{BID-ASK} = \begin{cases} BID-ASK_{i_{7/2031}}; & i \in \{1 \text{ July } 2021 - 5 \text{ Jan } 2023\} \\ BID-ASK_{i_{3/2033}}; & i \in \{6 \text{ Jan } 2023 - 6 \text{ April } 2023\} \end{cases} \quad (12)$$

The BID-ASK spreads of the bonds are shown in Figure 4. The average BID-ASK spread of the sustainability bonds was 6.369 bp with the standard deviation 2.578 bp compared to the BID-ASK spread of 6.693 bp with standard deviation 2.584 bp of the conventional comparator bonds. The BID-ASK spread of the sustainability bonds was on average 3.24 bp tighter than that of the conventional comparator bonds.

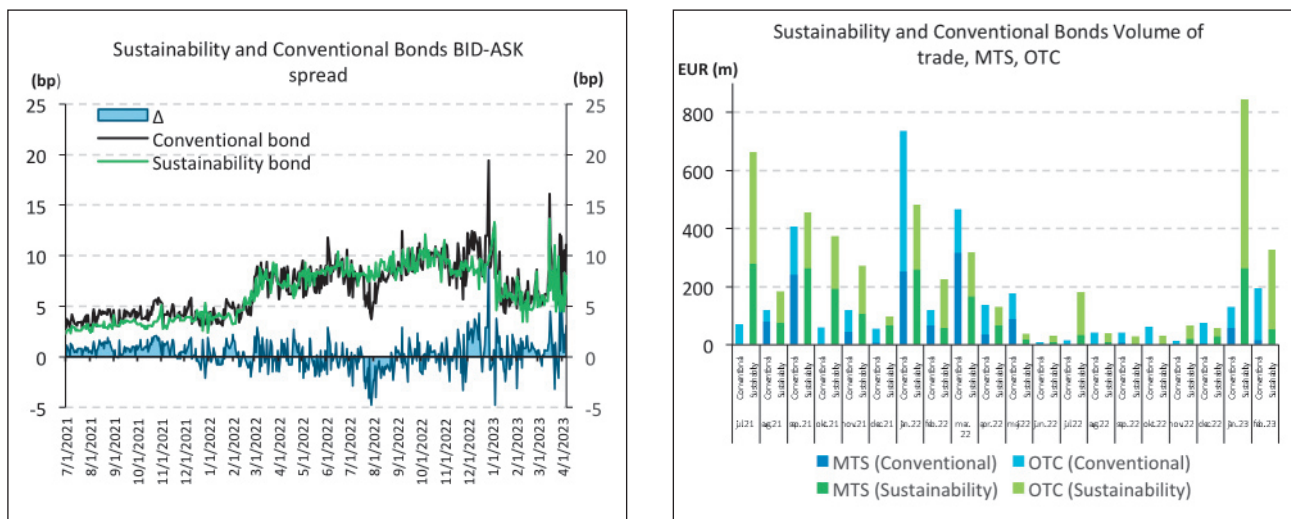
Doronzo at all (2021) restricted the secondary market analysis, namely to France, Belgium, Netherlands, and Ireland, as these are the most liquid green bond markets. Their conclusion is that green bonds are in general less liquid compared to conventional comparator bonds measured by BID-ASK spread which are on average between 1.5-2 bps compared to 0.5-0.8 bps for their non-green equivalent comparators. This might be explained

because of the smaller outstanding amounts of green bonds.

The volume of trade on MTS Slovenia and OTC of the conventional comparator bonds are compared to the volume of trade of the sustainability bonds. The issue size of the sustainability bonds is 1.25 billion euros and the issue size of the conventional comparator SLOREP 0.000 02/2031 is 2.14 billion euros and the issue size of SLOREP 2.250 03/2032 is 3.88 billion euros. The data set for the conventional comparator bonds are the volume of trade of the SLOREP 0.000 02/2031 from 1 July 2021 to 5 Jan 2023 and the volume of trade of the SLOREP 2.250 03/2032 from 6 Jan 2023 to 6 April 2023, which we write as follows:

⁹ The *BID-ASK spread* is perceived to be one of the most widespread measures of bonds liquidity.

Figure 4: Sustainability and Conventional Bonds BID-ASK spread and volume of trade



Source: Ministry of Finance, 6 April

$$\text{Conventional Bond}_t^{\text{Trade Volume}} = \begin{cases} \text{Trade Volume}_{i_{2/2031}}; & i \in \{1 \text{ July 2021} - 5 \text{ Jan 2023}\} \\ \text{Trade Volume}_{i_{3/2032}}; & i \in \{6 \text{ Jan 2023} - 6 \text{ April 2023}\} \end{cases} \quad (11)$$

The data set for the sustainability bond is the volume of trade of the SLOREP 0.125 07/2031 for the period from 1 July 2021 to 5 Jan 2023 and the volume of trade of the sustainability bond 3.625 03/2033 for the period from 6 Jan to 6 April 2023, written as follows:

$$\text{Sustainability Bond}_t^{\text{Trade Volume}} = \begin{cases} \text{Trade Volume}_{i_{7/2031}}; & i \in \{1 \text{ July 2021} - 5 \text{ Jan 2023}\} \\ \text{Trade Volume}_{i_{3/2033}}; & i \in \{6 \text{ Jan 2023} - 6 \text{ April 2023}\} \end{cases} \quad (12)$$

The volume of trade of the bonds per month is shown in Figure 4. The total volume of trade of the sustainability bonds was 4.8 billion euros, of which MTS trading was 1.9 billion euros and OTC trading was 2.9 billion of trading compared to the total volume of trade of the conventional comparator bonds of 3 billion euros, of which MTS trading was 1.2 billion euros and OTC trading was 1.8 billion of trading. Total trading volume of the sustainability bonds exceeded the volume of trade of conventional comparator bonds by 1.8 billion euros. The volume of trade is shown in Figure 4 on MTS and OTC per month both for the sustainability bonds and for the conventional comparator bonds.

5. Conclusion

The environmental, social and governance (ESG) awareness of the global financial system is growing. Despite the tough economic environment and all the accompanying geopolitical risks, it is expected that the process of transformation to a sustainable economy and a sustainable society will continue. This is opening investment opportunities, and issuers will have to provide the necessary funds to facilitate the transition to a sustainable society. The NDCs, as part of significant financial needs to meet the United Nations SDGs, will require substantial funding with State Treasuries playing and expected to play an important role. In this context, the objectives for ESG thematic bond issuance should be well defined and integrated into a sovereign's debt management strategy and issuance plans. The benefits and risks of introducing ESG debt to the debt portfolio should be assessed. The issuance of debt instruments that are not fungible with the existing outstanding debt instruments could have implications for price discovery in primary markets and it could reduce secondary market liquidity by fragmenting the government bond market. Strong political support and commitment are important prerequisites for ESG bond issuance, as well as a high degree of cooperation between

government ministries and agencies. A working group at the government level dedicated to Sustainable Finance within the government can gather the needed information and make technical decisions. The debt managers play a key role with regards to the coordination of such a working group and are the central point of contact for external communication in the issuance of ESG bonds. The government of Slovenia established a working group for the preparation of the Frameworks for green and sustainable bonds, on the basis of which the reference sustainable bonds were issued in 2021 and 2023. The sustainability bonds performed well on the primary market and on the secondary market they outperformed the conventional comparator bonds by credit spread, BID-ASK spread and trading volume. The sustainability bonds weathered a market sell-off better than the conventional comparator bonds. The strategic debt management commitment is to tap the sustainability bond market in benchmark issue size every second year or subject to the availability of eligible green and social expenditures and subject to application of exclusion criteria which are reducing the scope of the Framework. Slovenia's Framework is aligned with the ICMA SBP 2021 and, to the extent possible, to the criteria of the EU Taxonomy and the supplementing Delegated Act. The green categories of the Sustainability Bond Framework 2023 were mapped to the economic activities of the EU Taxonomy for which technical screening criteria (TSC) are developed and verified for the alignment to the substantial contribution criteria of the EU Taxonomy by the external verifier. The Green Categories of the Framework have already been to the extent possible mapped to relevant and applicable laws and regulations and the next step will be to analyse the overlap of DNSH criteria with existing legislation and to further align the Framework with the EU Taxonomy's DNSH criteria. A dialogue and engagement with ESG investors on sustainability topics and broader reporting requirements will also be crucial.

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A turbulent environment for Central and Eastern Europe's corporates

*Laurent Maurin, Rozália Pál and Simon Savšek**

We analyse how the rise in energy prices impacted firms in Central and Eastern Europe (CEE). We implement two scenarios, one in which the rise is fully absorbed by profit margins and a second one in which it is also partly passed through into selling prices. Owing to their higher energy dependence, our results show that the CEE firms are more impacted than their EU peers, especially in the first scenario. In case higher energy costs are partially passed through, the difference is more subdued. When considering the vulnerabilities caused by the COVID-19 pandemic, our cross-country analysis confirms that corporates in most CEE countries tend to be more impacted.

JEL G3 E31 I15

Introduction

Supported by a strong post-COVID-19 recovery, corporate investment remained resilient until the middle of 2022.

Nevertheless, several drawbacks such as the energy shock, huge uncertainty, trade disruptions and the harsh rise in borrowing costs are likely to severely deteriorate firms' investment plans in the short- to medium run.

While the pandemic mostly affected contact-intensive sectors, the war in Ukraine impacted more substantially energy-intensive sectors. Indeed, the impact of the two shocks differs across sectors and countries. Southern countries were more impacted by the pandemic while the war is affecting the Central and Eastern Europe's economies more. In this article, we analyse the implications of the new energy shock on the CEE firms' vulnerabilities. We assume that exports to Belorussia, Russia, Ukraine (BRU) are suspended and consider two scenarios. In the first one, the rise in energy prices is absorbed by profit margins. In the second one, the rise is partially passed through into selling prices so that the impact on profit margin is dampened but at the cost of lower sales. We show that the CEE firms are more impacted than their EU peers, especially under the first scenario. When we allow for a partial pass-through, the difference is less obvious.

First, we discuss the post COVID-19 recovery, build the scenarios, and conclude with a short policy consideration.

Post-COVID-19, a strong but interrupted economic recovery

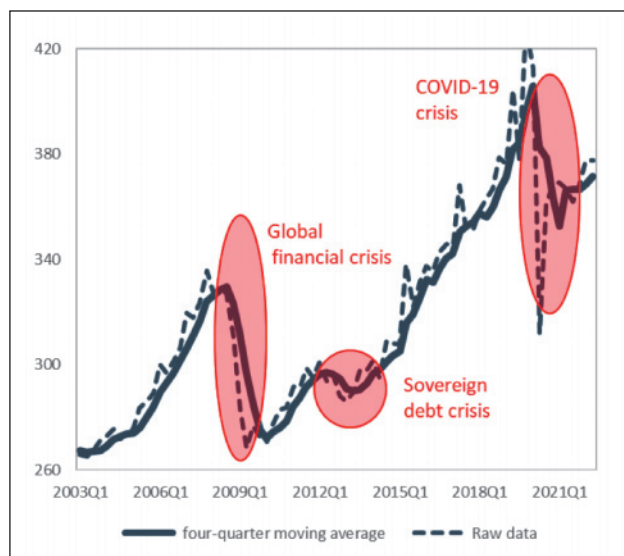
During the COVID-19 crisis, corporate investment pulled back sharply, declining to 13% below its pre-crisis level, a fall comparable to the one recorded during the global financial crisis. The recovery in corporate investments began in mid-2021. It was strong, fuelled by the massive and coordinated policy support deployed during the crisis (Harasztosi et al, 2022). As shown in **Figure 1**, the recovery was in full swing up until the energy crisis hit. Nevertheless, by the second quarter of 2022, in real terms, annual flows were still about 6% below the pre-COVID-19 levels.

Some sectors, such as information and communication, benefited from the pandemic. In those sectors, corporate bankruptcies decreased below the pre-crisis levels (**Figure 2**). Conversely, sectors such as accommodation and food services or transports were hit more substantially and recorded a surge in bankruptcies. At first glance, firms weathered the coronavirus crisis better than feared, and investment and bankruptcies reacted less to the collapse in economic activity, owing to policy support, as well as technical factors.¹ However, bankruptcies are on the rise, sharply so in some sectors, as the policy support is phased out. Indeed, some sectors did still not fully recover and face deeper challenges in the wake of digitisation and green transition (Delanote et al., 2022).

* All European Investment Bank. The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of the EIB. Any remaining errors are the sole responsibility of the authors.

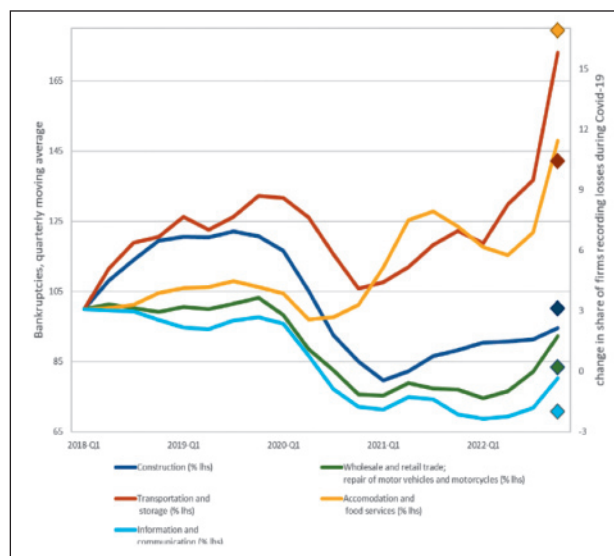
¹ The obligation to file for bankruptcy was suspended in several EU countries. For example, see OECD (2021).

Figure 1 - Real corporate investment (real terms in 2005 euro)



Source: Authors' estimates based on Eurostat data. Note: Latest Figures 2022 Q2. Latest figure is 2022 Q4. The index of firms ceasing to operate is based to 100 in 2018Q1. The proportion of firms recording losses based on simulations achieved in 2022 (EIB, 2022).

Figure 2 - EU firms ceasing to operate (in %) and expected losses related to COVID-19 related losses (rhs, inverted scale)



Source: Authors' estimates based on Eurostat data. Note: Latest figure is 2022 Q4. The index of firms ceasing to operate is based to 100 in 2018Q1. The proportion of firms recording losses based on simulations achieved in 2022 (EIB, 2022).

The energy shock triggered by the war in Ukraine

At the firm level, the war in Ukraine propagates to firms directly through two main channels (EIB, 2023). First, it reduces the sales of those firms exporting to the conflict area. Second, by raising the price of energy and commodities, it increases production costs substantially, leading to a compression of profit margins. Taking into consideration also the pre-existing vulnerabilities, the same shock propagated very asymmetrically across EU economies owing to differences in their export dynamics, vulnerability to international trade disruptions, as well as their energy dependency and energy mix.

First, regarding the direct export exposure to Russia, the direct exposure is generally low at the European level (about 1% of GDP in 2019 on average), with marked differences among economies. The share is above 1.5% of GDP in ten EU Member States and well above 5% in Estonia and Lithuania. In general, the CEE economies have a higher share of exports to Russia and Ukraine. On the other hand, SE economies are much less exposed, consistently with the gravity model of external trade, where countries closer to each other have stronger trade ties than far-off ones. Second, regarding the propagation of international energy prices. Across EU economies, such propagation to domestic prices is indeed very different, especially in the short-term. As shown in **Figure 3**, for the same evolution in the international price of energy sources coal, gas and oil, the domestic price of energy charged to corporates varies significantly across EU economies. It increased by 107% in

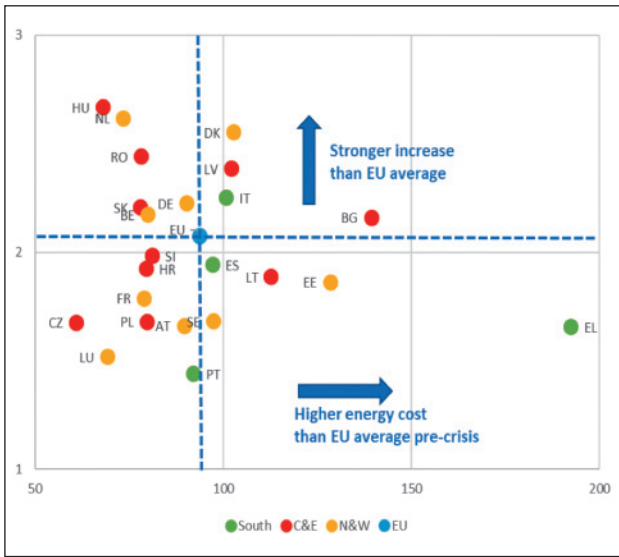
the EU between 2021 and the end of 2022, ranging from close to zero in Malta to as high as 167% in Greece. These asymmetries are explained by differences in the energy mix, as well as other factors such as price settlement contracts, taxes, regulation, transportation costs and local margins (Du Bella et al., 2022).

While energy dependence has generally declined, energy costs remain a substantial drag on EU corporate margins. Over time, as European economies have grown, they have become more services oriented. Since services sector tend to be less energy intensive, the evolution has alleviated part of the energy dependence of production. Moreover, energy efficiency has increased thanks to technological progress and strengthened concerns about climate change. Despite these developments, Europe remains a very large energy importer: some EUR 330 billion in 2019. Following the rise in energy prices, the energy bill more than doubled in 2022.

Across the EU, economies are differently exposed to the rise in energy prices. **Figure 4** shows the corporate dependence on energy, taken from the input-output tables.² The differences, from a low of 2% of production in Luxembourg to above 14% in Lithuania, Greece and Croatia, reflect the diverse sectoral composition of the European economies, as well as differences in the energy efficiency of production. It follows that countries from the CEE region

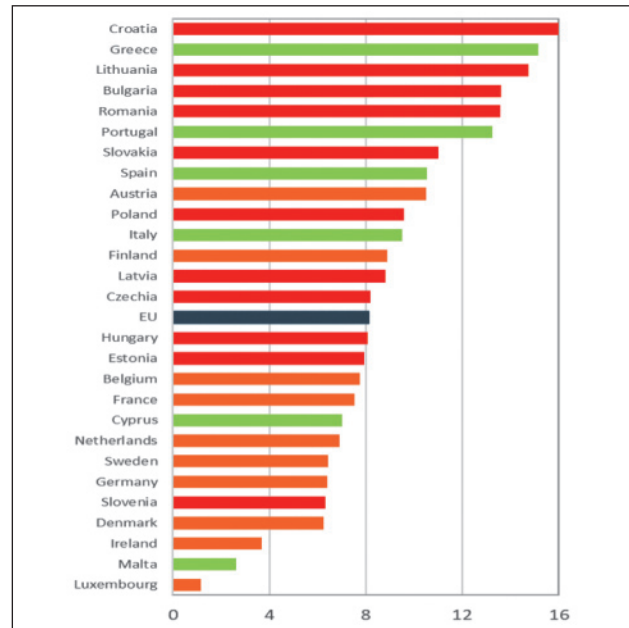
² We use the OECD (2018) input-output tables for the 27 EU economies that relate to 2015. The simulations take into account the direct content of energy and do not consider the energy absorbed via intermediate consumption.

Figure 3 - Energy prices charged on corporates: pre-crisis level (x-axis) and change (y-axis)



Source: authors' calculations based on EUROSTAT, European Commission, weighted electricity, and gas prices. Note: X-axis is the price in euros per Mega-watt hour, in 2021H2 in euros. Y-axis is the price in 2022Q4 compared to the average price in 2021. Red indicates Central and Eastern economies; Green indicates Southern economies and Orange indicates Northern and Western economies.

Figure 4 - Direct energy intensity of production (%)

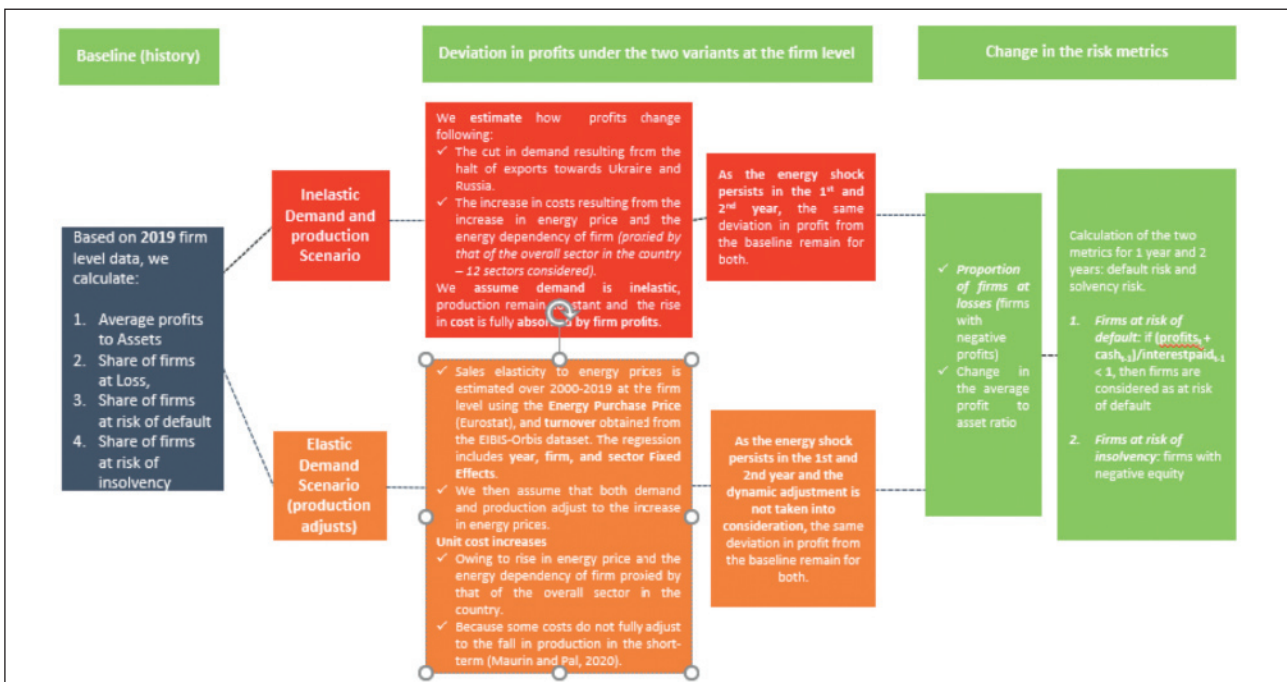


Source: authors' calculations based on OECD Input-Output Tables 2018. Note: % reported on the x-axis. See note Figure 3 for the colours of the bars.

tend to have a higher energy dependence. Over time, higher energy costs are associated with lower profits for European enterprises. Most noticeable, in 2012, when energy prices reached a record high level, firms' profits plunged. We infer the impact of the recent rise in energy prices and export reduction on firms profits by considering two scenarios. Those are implemented on the sample of firms having

participated in the European Investment Bank Investment Survey (EIBIS), a sample of around 60 000 EU firms. The scenarios are presented in detail in **Table A**. In the first step, when simulating the impact on profits, our methodology accounts for differences in countries' export exposures, in energy prices at the country level, on firms' dependencies on energy at the sector and the country level. In the second step, when analysing the impact on firms' vulnerabilities,

Table A - Transmission channels considered in each scenario



initial differences in balance sheet conditions and profitability are considered at the firm level. In the “no reaction” case, it is assumed that selling prices are kept constant, so that demand is not affected by changes in prices but only by a reduction in exports. Production is maintained and the energy shock is fully absorbed by companies’ profit margins. In the “adjustment” case, part of the energy cost increase is passed on through higher selling prices, so that demand declines in the medium term and this lowers production. As production is reduced, certain costs, such as employment costs, decrease, but do not react fully as those are sticky in the short to medium term (Maurin and Pál, 2020).

The results of the scenarios are shown in **Figure 5**. From 11% normal-time level³, the return on assets of EU firms falls by 3 percentage points in the “adjustment” case and by 4 percentage points in the “no reaction” case. The share of firms reporting losses increases by 7 percentage points in the “no reaction” scenario, almost doubling compared to normal times, and by 5 percentage points in the “adjustment” scenario. As firms’ reaction dampens the increase in vulnerabilities to a limited extent, the impact is stronger in the “no reaction” case.

We then consider a pre-crisis balance sheet structure to illustrate the changes in firms’ vulnerabilities, solvency and default risks. We link the estimated change in firms’ profits to financial and balance sheet characteristics. Lower profits or higher losses reduce firm’s capacity to repay its debt, and therefore increase the default risk, especially when firms cannot draw from liquid assets to fund their financial

expenses. In parallel, higher losses also imply higher insolvency risks, as the capital base is depleted.

Default risk – the proportion of firms unable to fully pay back their financial expenses with their profits – rises from 5% to 9% in the first year for the EU countries and even more for the CEE, reaching a ratio of as close to 16% of firms in the most adverse variant (all cost increases are absorbed by profit margins). Insolvency risk also increases. The proportion of firms with zero or negative equity, raises by 3 pp in the first year, from 3% to 6% for the EU and from 4% to 6% for the CEE firms (**Figure 5**).

In **Figure 6**, we consider the adjustment variant for two consecutive years. As explained, in this case, companies are here able to pass through higher costs to selling prices. However, over time, higher prices lower the sales and costs fully adjust with some lags. This also explains why firms record lower profits. In this scenario, the default risk increases from 5% to 10% both in EU and CEEs while insolvency risk increases relatively mildly.

The resulting changes in firms’ vulnerabilities differ across sectors, mainly in accordance with energy dependence (EIB, 2023, Bialek et al., 2023). In **Figure 7**, the rise in firms’ vulnerability⁴ is correlated with energy intensity at the sector level. The sectors such as the chemical, pharmaceutical and transportation sectors, as well as raw material production, are energy intensive. They are most hit by the rise in energy prices. Conversely, IT and telecommunications, construction, services, and trade are less reliant on energy inputs and therefore are less affected.

³ 2019 is considered as normal since no major shock occurred and the EU economy was growing around potential.??

⁴ This is based on a synthetic vulnerability indicator averaging the three sources of vulnerabilities: the share of firms at losses, the share of firms with an interest rate coverage ratio below 1 and the share of firms with negative equity.

Figure 5 - Rises in vulnerabilities in the “No reaction” scenario after one year

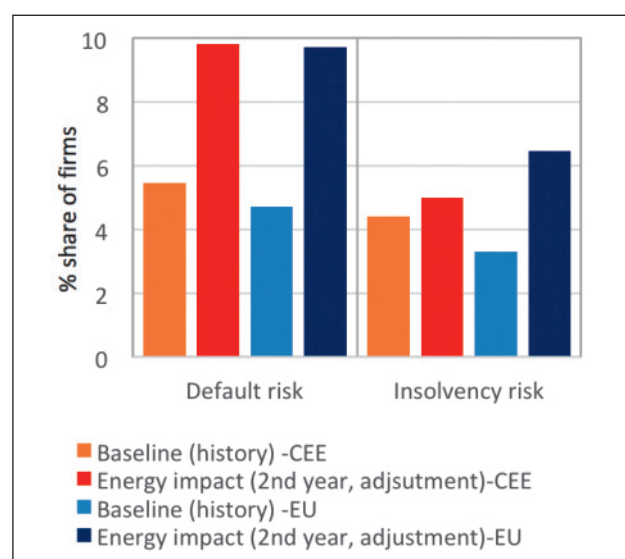
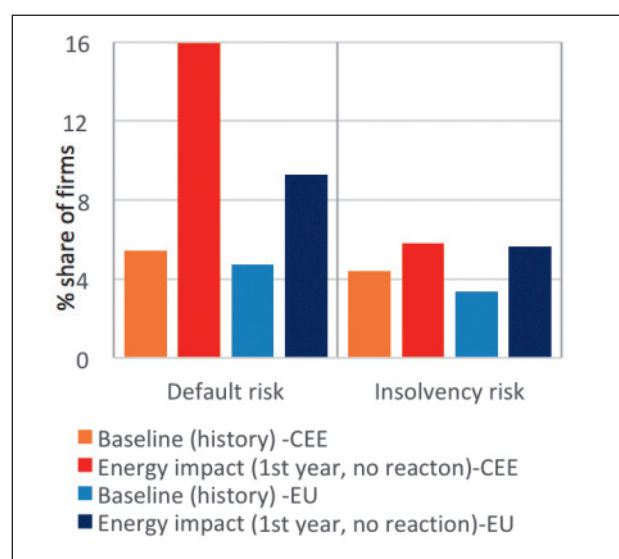
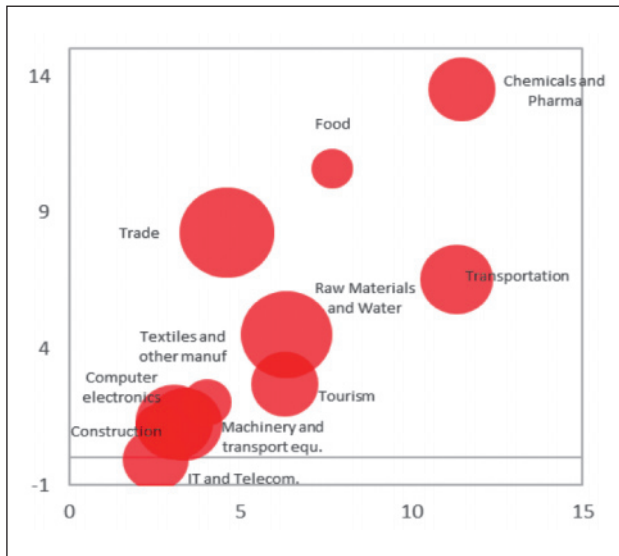


Figure 6 - Rises in vulnerabilities in the “Adjustment” scenario after two years



Source: authors’ estimations based on EIBIS-ORBIS historical matched database and EUROSTAT turnover statistics. Note: see EIB (2023)

Figure 7 - Energy dependence (x-axis) and firm vulnerabilities across sectors (y-axis)



Source: authors' estimations. Note: The x-axis depicts the energy dependence in each sector. The y-axis indicates the increase in the vulnerability indicator. The size of the dot reflects the share of the sector in the EU economy.

Cross-country differences are very pronounced, as differences in the domestic energy price increases, the sectoral composition of the EU economies, as well as the initial financial strength of the corporate sector, jointly explain the uneven impact of the energy shocks across countries. The CEE economies tend to be more energy dependent. The CEE countries such as Romania, Latvia and Croatia are more severely impacted, but also some Southern-EU countries like Greece, Italy and Spain show higher vulnerability. As shown in **Figure 8**, the countries that have been hit hard during the COVID-19 crisis also tend to have a wider GDP gap. For the countries located in the North-East of the figure, the current situation is particularly cumbersome as the post-COVID-19 fragilities have not been fully absorbed.

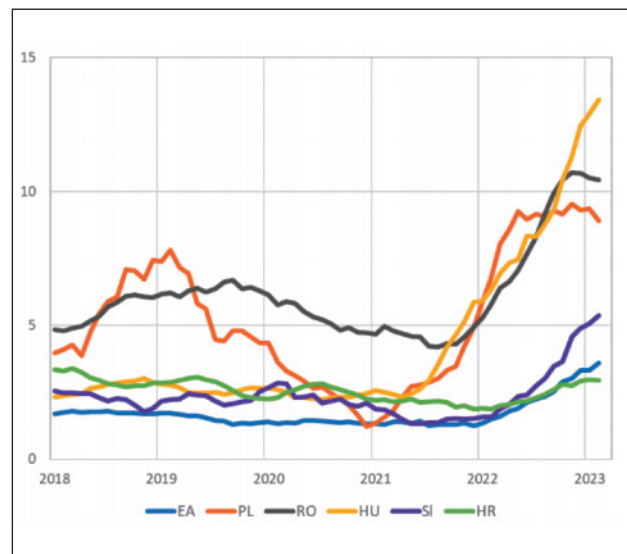
Besides the legacies of the COVID-19 crisis and the pass-through of the rise in energy prices, corporates also face the central banks' tightening cycle. Higher key interest rates transmit into higher corporate borrowing rates. **Figure 9** reports the composite borrowing rates for firms in some major CEEs versus the euro area average. In some CEEs, short-term rates increased much more. Besides, credit standards have started to tighten since the beginning of 2022, a trend that even strengthened with the start of the war in Ukraine, especially in the CEEs (EIB, 2023). The Russian invasion of Ukraine is therefore a major source of uncertainty that triggers a rise in volatility, declining equity prices, higher credit spreads, leading to even more muted investment outlook.

Figure 8 - Pre-war GDP gap (x-axis) and increase in vulnerabilities (y-axis)



Source: authors' estimations. Note: x-axis is the gap between real GDP in 2021, and its expected value before the COVID-19 crisis, in the Autumn 2019 EC projections. The y-axis reflects the increases in the vulnerability indicator, rescaled by the min and max.

Figure 9 - Cost of corporate bank borrowing, selected CEEs and euro area (% p.a.)



Source: authors' estimates based on ECB.

Policy implications

The initial fears of massive bankruptcies and high unemployment did not materialize during the pandemic, owing mostly to the massive policy support. However, new adverse developments such as monetary policy tightening or the energy crisis add to the existing vulnerabilities, with bankruptcies again being on the rise. Starting from the uneven sectoral and cross-country recovery from the pandemic, our simulations show that the energy shock has further amplified firms' vulnerabilities depending on several

characteristics at a firm-, sectoral- and country-level. Our findings confirm that firms from some CEE countries are likely to be even more negatively impacted by the energy shocks.

Policies can turn challenging environment into opportunities for change. Empirical analysis shows that the policy support deployed during the COVID-19 crisis has been an essential step to support firms' resilience. What is more, it allowed firms to transform and adapt to the new environment by accelerating digitalisation. The experience of the pandemic might be useful when calibrating the policy support today, with the energy crisis and the green transition emerging as short and long-term challenges but also opportunities for firms. Targeted support, compensating vulnerable firms in the short term should be mindful of incentives for the green transition while avoiding economic contraction and contagious liquidation of businesses.

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Private sector business results one year after the start of the energy crisis

*Bojan Ivanc**

Slovenia's GDP growth slowed down considerably in Q3 and Q4 2022 what as a consequence of several factors, one of which is the energy crisis, which was confluence of increasing prices of crude oil and its derivatives, natural gas and on top of that also electricity prices. The focal point of this article are private enterprises in Slovenia and the impact of higher energy prices on their operations. We point out the difference between spot prices of several energy sources and its impact as well as the government measures that reduced the transition of the wholesale energy prices to retail prices of the firms.

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An accurate definition of an energy crisis is a challenge *per se* as prices of energy commodities (crude oil, coal, natural gas) are transparent and publicly available¹, whereas prices of other energy sources as electricity are locally set on regional exchanges². An additional layer of uncertainty comes from the fact that businesses use a varying degree of forward and futures contracts that delay a transition from the current spot prices to their input prices. This is especially the case for electricity, partly for natural gas, but less for crude oil and coal. On the side of the companies, we therefore must differentiate between the current market prices and the prices they actually pay in a certain period of time. The first set of prices is easily observed and established, whereas for the second set of prices, their influence can only be established later on, most accurately when companies publish their annual financial statements although there are some proxies we can use (producer prices in energy sector, quarterly financial ratios based on samples, etc.). Another confusing element of energy prices is that fiscal interventions limited the passthrough of the prices from the retail/distributors level to the final prices, what was especially the case for electricity prices for SMEs and small companies and partly for crude oil prices (fixed margin). Companies reacted to high energy prices by increasing their final prices (observable by producer prices index),

increasing the efficiency of their operations (reduced use of energy input per unit of output by applying new technologies or techniques or adapting to variable intra-day prices, what applies to large electricity consumers) or reducing the consumption of energy by reducing output. In this article, we will therefore take an in-depth view of prices on the energy markets, import prices in industry, producer prices in industry and trends in value added by activity. Available statistics is based on monthly or quarterly period, which implies that national accounts statistics is not available yet for the first quarter, whereas a detailed sector account as part of the national accounts based on production method are not available yet. Yet data on sales and industrial production are available for most sectors on a monthly level, which implies that output trends are available although this data can be later revised. At the end of this article, we will look at the latest forecasts for the energy markets although we must be careful and should not take this for granted as the past experience has shown.

Difficulty in defining the start of the energy crisis

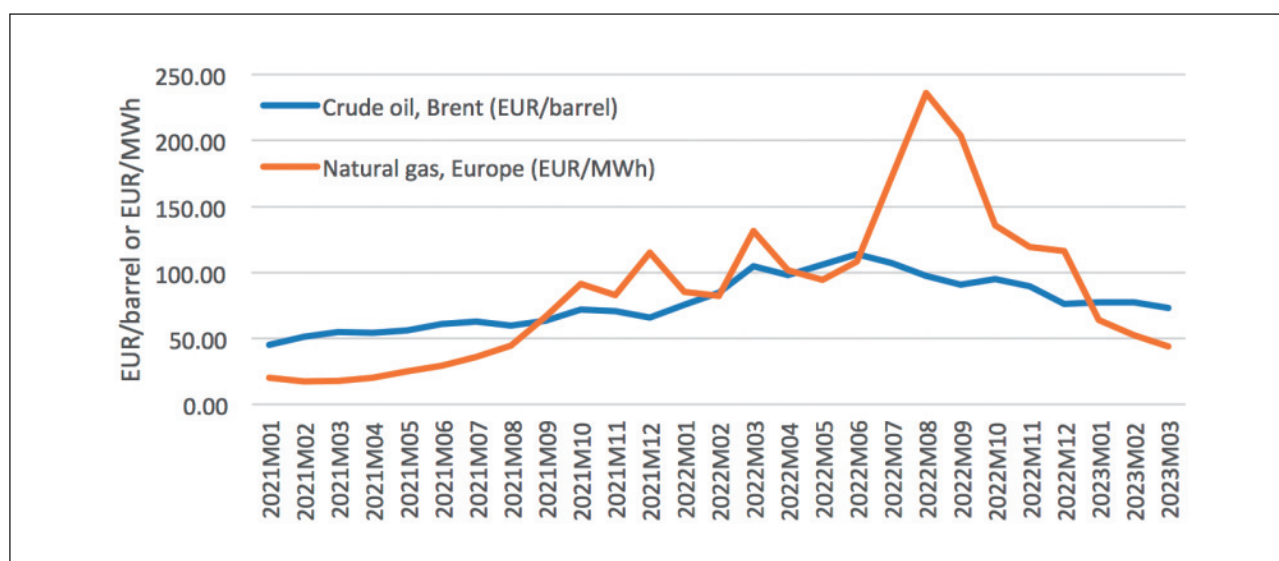
For the purpose of this article and subject to timely availability of different set of data, we decide to focus on year 2022 and compare it to the year 2021. One cannot put a finger on when the energy crisis started as, for example, in the case of the natural gas prices in Europe, which started to increase much since the second half of 2021. Crude oil prices (brent, in USD) on the other hand surpassed the USD 100 threshold in March 2022. When it comes to

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¹ World Bank Commodity Prices or IMF Primary Commodity Prices

² E.g. Hungarian Derivative Energy Exchange (Hudex) applies to Slovenian customers

Graph 1: Natural gas and crude oil price dynamics



Source: World Bank, Eurostat, Analytics CCIS

electricity prices, it is even more difficult to determine the starting date of the 'energy crisis' as the majority of companies enjoyed a fixed price in 2022 and started paying a high price in 2023. Market prices for electricity with the delivery date in 2023 started rising together with natural gas prices, but exceeded 300 EUR/MWh in July 2023, touched briefly a 1,000 milestone and then started to fall ending the year at about 250 EUR/MWh³.

Petroleum products number one energy source

Measuring by final use of energy⁴ (OECD methodology, toe), non-household users consume about three quarters of all energy in the Slovenian economy according to the latest available annual data⁵. This has not changed much over the years, since it is based on various factors such as temperature, transportation/mobility trends and business use. Of the non-households' users, transportation accounts for half of energy consumption (petroleum products, mostly road diesel), followed by manufacturing and construction (35%) and other services (12%). Agriculture and forestry

³ Average price in the past years was about 80 EUR/MWh

⁴ Bojan Ivanc, CFA, CAIA, Chief Economist at Chamber of Commerce and Industry of Slovenia

⁵ Data for 2022 will be available in October 2022

Table 1: Energy consumption by final energy use in Slovenia, by sector, 2021

	As % of total	As % of non-household users
Total consumption of energy	100.0%	
Transportation	37.5%	49.4%
Manufacturing and construction	26.8%	35.3%
Other consumers	9.1%	12.0%
Agriculture and forestry	1.5%	2.0%
Energy sector	0.2%	0.3%
Non-energy use	0.7%	0.9%
Households	24.1%	

Source: Statistical Office of RS

account for 2% of final energy consumption. Taking a look across energy sources, non-household users consume 94% of total petroleum products, 82% of natural gas, one third of renewables and waste (including wood), 72% of all electricity and 56% of all heat. Of total energy consumed by final non-household users, petroleum products account for 53% of total consumption (transportation sector as the main user), followed by electricity (23%; manufacturing as the main user) and natural gas (14%; again, manufacturing as the main user).

Table 2: Energy consumption by final energy use in Slovenia, 2021

	Petroleum products	Electricity	Renewables and waste	Natural gas	Heat	Geotherm.. solar etc.	Solid fuels	TOTAL
Non-households use, in % of total energy consumed	94.3%	71.9%	33.7%	81.9%	56.4%	13.6%	99.9%	75.9%
Non-households use, in % of total energy consumed within non-household use	52.9%	22.9%	6.3%	13.9%	2.9%	0.3%	0.8%	100.0%

Source: Statistical Office of RS

Higher mobility needs increased use of fuels

In 2022, across the whole economy⁶, consumption of lignite fell (-23%), mostly due to accident at Premogovnik Velenje lowering further the production of electricity. The use of diesel fuel across the whole economy increased by 15% and unleaded gasoline by similar percentage (14%), whereas recovery in long-distance tourism increased demand for jet fuel in aviation sector (+110%). The use of natural gas fell by 12% and was most heavily concentrated in the Q4 (-22%) as a result of high temperatures, as well as lower consumption by the industry, most notably in manufacturing. As regards electricity consumption by non-household customers, it fell by 2% compared to 2022, which was almost entirely attributable to a drop in manufacturing (-6.2%) that consumed 52% of all electricity among non-household users. The biggest contributor to lower reduction in use was the accommodation and food

⁶ This data cannot be decomposed into household and non-household use

Table 3: Consumption of selected energy commodities in Slovenia, 2022/2021

Lignite/Brown Coal (tonnes)	-23.0%
LPG (tonnes)	-1.2%
Unleaded Gasoline (tonnes)	14.3%
Jet Fuel (tonnes)	107.7%
Diesel Oil (tonnes)	15.3%
Natural Gas (1000 Sm ³)	-11.8%

Source: Statistical Office of RS

services sector (proxy for tourism) which increased its use by 22% accounting for 5.2% of all electricity consumed. This was followed by a rise in the real-estate sector (+3.8%) and the arts, entertainment and recreation sector (+15%), which benefited from higher consumption of services by households.

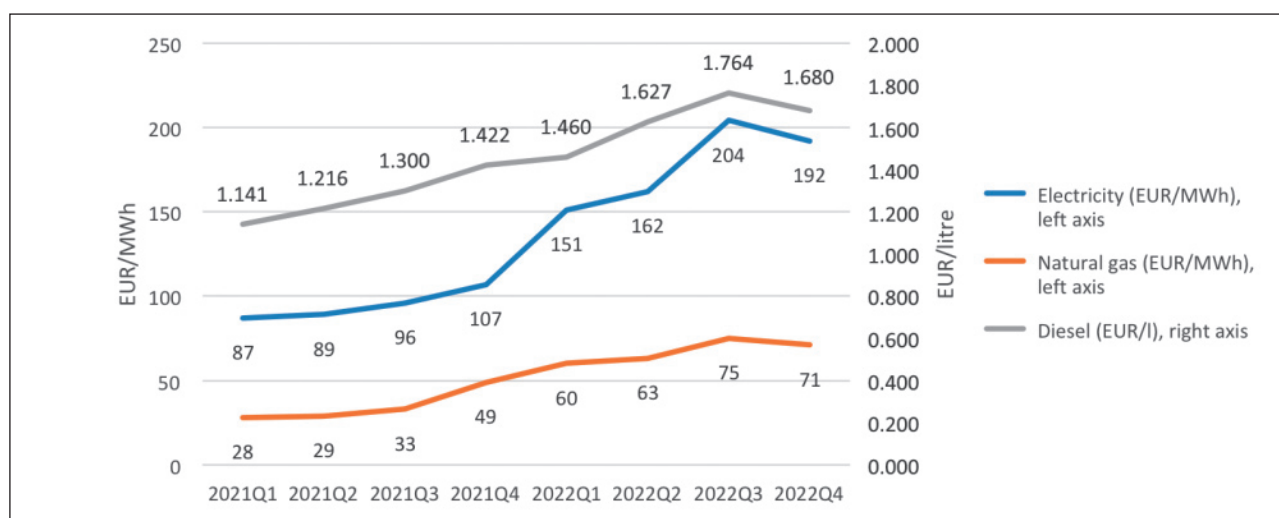
Energy prices fell in Q4 for companies

Three most important energy prices for the Slovenian business sector are diesel, electricity and natural gas prices. Diesel prices rose by 29% in 2022 and in Q4 they fell in Q3. Electricity prices (177 EUR/MWh throughout 2022) rose by 87% and then dropped in Q3. One has to be careful by drawing fast conclusions here, as electricity prices increased more for larger consumers (IF: +121% in 2022; IE: +110%; ID: +100%) than for smaller ones (IA: +22%; IB: +46%, IC: +88%), which was also due to government interventions that took place in Q4. This also explains that prices across these categories fell in Q4 compared to Q3. In Q1 2021, the largest electricity consumers paid on average a price 25% lower than the Slovenian average for non-household consumers and that shrank to a 7% difference in Q4 2022. The same stands also for natural gas (67 EUR/MWh), where the price doubled in 2022 and then also decreased in Q4. The rise in prices for the largest consumers (I4: +99%, I3: +104%; data for I5 is not available) surpassed those charged to small consumers (I1: +79%, I2: +89%), although the price dynamics was not as distinctive as for electricity.

Table 4: Consumption of electrical energy in production and service activities, main sectors by usage, 2022

	2022, share in total	2022/2021	Contribution to annual change
Activity - TOTAL	100.0%	-1.9%	100.0%
C Manufacturing	52.4%	-6.2%	181.0%
G Wholesale and retail trade. repair of motor vehicles and motorcycles	9.7%	-0.2%	1.1%
L Real estate activities	6.3%	3.8%	-12.2%
I Accommodation and food service activities	5.2%	21.7%	-48.8%
E Water supply. sewerage. waste management and remediation activities	3.1%	-2.1%	3.5%
O Public administration and defence. compulsory social security	2.8%	1.0%	-1.4%
Q Human health and social work activities	2.8%	3.5%	-4.9%
H Transportation and storage	2.5%	0.4%	-0.5%
J Information and communication	2.4%	3.6%	-4.4%
P Education	2.3%	7.3%	-8.2%
B Mining and quarrying	1.8%	-7.2%	7.2%
M Professional, scientific and technical activities	1.7%	1.8%	-1.6%
R Arts, entertainment and recreation	1.6%	14.7%	-10.5%
F Construction	1.2%	8.0%	-4.8%

Source: Statistical Office of RS

Graph 2: Prices of three most important energy sources for businesses in Slovenia

Source: Statistical Office of RS

High employment numbers as a sign of confidence

We can estimate the effect of the energy crisis on employment which usually tracks closely the value added and is also a sign of confidence on the side of the businesses. Em-

ployment figures hit all-time record highs in 2022, surpassing 920 thousand. About 22 thousand people were added to employment, with the largest sector contributors in construction (24% of total; +7.8%), manufacturing (24%

Table 5: Persons in employment, 2022 and 2021, Slovenia

Persons in employment	2022	2022-2021	2022/2021	2022. share	Contribution to change in 2022/2021
TOTAL	921,998	21,736	2.4%	100.0%	100.0%
F CONSTRUCTION	73,045	5,283	7.8%	7.9%	24.3%
C MANUFACTURING	210,775	5,160	2.5%	22.9%	23.7%
I ACCOMMODATION AND FOOD SERVICE ACTIVITIES	37,680	2,749	7.9%	4.1%	12.6%
Q HUMAN HEALTH AND SOCIAL WORK ACTIVITIES	72,268	2,062	2.9%	7.8%	9.5%
P EDUCATION	77,471	1,595	2.1%	8.4%	7.3%
M PROFESSIONAL, SCIENTIFIC AND TECHNICAL ACTIVITIES	59,531	1,473	2.5%	6.5%	6.8%
J INFORMATION AND COMMUNICATION	31,225	1,418	4.8%	3.4%	6.5%
G WHOLESALE AND RETAIL TRADE, REPAIR OF MOTOR VEHICLES AND MOTORCYCLES	115,995	1,175	1.0%	12.6%	5.4%
H TRANSPORTATION AND STORAGE	56,676	845	1.5%	6.1%	3.9%
S OTHER SERVICE ACTIVITIES	17,365	412	2.4%	1.9%	1.9%
N ADMINISTRATIVE AND SUPPORT SERVICE ACTIVITIES	34,362	248	0.7%	3.7%	1.1%
R ARTS. ENTERTAINMENT AND RECREATION	15,779	236	1.5%	1.7%	1.1%
L REAL ESTATE ACTIVITIES	4,815	140	3.0%	0.5%	0.6%
D ELECTRICITY, GAS, STEAM AND AIR CONDITIONING SUPPLY	8,115	85	1.1%	0.9%	0.4%
E WATER SUPPLY, SEWERAGE, WASTE MANAGEMENT AND REMEDIATION ACTIVITIES	10,512	48	0.5%	1.1%	0.2%
B MINING AND QUARRYING	2,300	46	2.0%	0.2%	0.2%
T ACTIVITIES OF HOUSEHOLDS AS EMPLOYERS. UNDIFFERENTIATED GOODS- AND SERVICES-PRODUCING ACTIVITIES OF HOUSEHOLDS FOR OWN USE	732	36	5.2%	0.1%	0.2%
O PUBLIC ADMINISTRATION AND DEFENCE, COMPULSORY SOCIAL SECURITY	49,492	-100	-0.2%	5.4%	-0.5%
K FINANCIAL AND INSURANCE ACTIVITIES	18,982	-333	-1.7%	2.1%	-1.5%
A AGRICULTURE, FORESTRY AND FISHING	24,880	-840	-3.3%	2.7%	-3.9%

Source: Statistical Office of RS

of total; +2.5%) and in the accommodation and food services (13% of total contribution; +8%). Sectors where the state is the majority employer (public administration, education, health, and social work) added 16% to total employment. The energy crisis therefore has not created any significant effect on the labour market, with exception of basic metal production (-1.0%; -100). The lack of semiconductors was more troublesome for manufacturing of motor vehicles (-4.3%) as the number of jobs lost there was seven times higher than in basic metal production. Rising labour costs also added to cost pressure in labour intensive industries such as apparel and leather manufacturing that shed 5.5% of their workforce respectively. The employment figures therefore have not reacted to the energy crisis.

Slow-down across majority of the sectors in H2 2022

The figures for value added were very similar and indicated that the energy crisis did slow economic growth in the second half of 2022, but the economy managed to continue to grow in real terms, although with lower amplitude. In the H1 2022, real GDP rose by 9.4% and by 1.8% in H2 2022 (year-on-year comparison, not adjusted for calendar nor seasonally adjusted). In manufacturing (22% of value added according to production method of GDP), value added rose by 2% in 2022 and was unchanged in H2 2022 after a 4% rise in H1 2021. In trade, transportation, accommodation and food services⁷, H2 2022 growth remained positive (+5%) but was far lower than in the H1 2022 (+24%). In professional, scientific,

⁷ A more detailed set of data is not available yet.

Table 6: Gross value added by sector, 2022/2021, Slovenia

Sector	H1 2022/H1 2021, in %	H2 2022/H 2 2021, in %	2022/2021. in %	2022. share within sector GVA
A Agriculture, forestry and fishing	7.2	-2.3	2.5	2%
BCDE Mining and quarrying, manufacturing, electricity and water supply, waste management	4.6	-3.3	0.6	26%
..of which: C Manufacturing	4.0	0.0	2.0	22%
F Construction	7.8	12.7	10.2	7%
GHI Trade, transportation and storage, accommodation and food service activities	23.7	4.8	14.2	22%
J Information and communication	8.3	6.4	7.3	4%
K Financial and insurance activities	6.8	5.4	6.1	4%
L Real estate activities	2.6	-1.2	0.7	7%
MN Professional, scientific, technical, administrative and support services	12.2	9.8	11.0	10%
OPQ Public administration, education, human health and social work	3.8	1.5	2.7	16%
RST Other service activities	22.0	4.3	13.1	2%
Value added, total	9.4	2.7	6.1	100%
Net taxes on products	9.5	-5.1	2.2	
GDP	9.4	1.8	5.6	

Source: Statistical Office of RS

technical, and administrative services, growth in H2 2022 (+10%) was only slightly lower than in H1 2022 (+12%), whereas in construction, the opposite took place. In H2 2022 (+13%) value added in construction has grown higher than in H1 2022 (+8%).

EBITDA outpaced the growth of gross value added in H2 2022

Quarterly statistics of the non-financial sector accounts provide additional hindsight into businesses although figures are not deflated, neither adjusted for calendar and season⁸. Gross value added in the business sector increased by one fifth in H1 2022 and by 15% in H2, but EBITDA⁹ dynamics was better (+21% in H1 and +24% in H2). The share of EBITDA in gross value added (GVA) therefore increased from 2021 (35%) to 2022 (37%) implying on the other hand that the share of compensation of employees fell from 67% to 63% of GVA. On the other hand, the busi-

⁸ Not corrected for inflation

⁹ Approximated by gross operating surplus plus gross mixed income

Table 7: Non-financial corporations, non-financial sector accounts, Slovenia, 2022/2021

	H1 2022/H1 2021	H2 2022/H2 2021	2022/2021
Gross capital formation	45.5%	13.4%	29.2%
Compensation of employees	10.1%	10.9%	10.5%
Gross value added	19.9%	14.9%	17.2%
EBITDA*	20.9%	24.2%	22.7%

Source: Statistical Office of RS

ness sector increased its investments, that grew by 29% in one year (+45% in H1 and +13% in H2). In 2021, investments represented two thirds of total EBITDA, whereas in 2022, it surged to 72%. One should note that Q4 was a weaker quarter for investment, but the first nine months were remarkably strong.

Heterogenous sector trends across manufacturing

Industrial production rose by 1.5% in 2022, which was led by rise in the production of manufactured goods (+4.1%) and mining (+18%; of which other mining increased and mining of lignite fell) but there was a drop in electricity and steam production (-26%). The sectors that took a hit were various and cannot be connected only to the energy crisis but also to a lack of supply in the European automotive sector and lower competitiveness in the labour-intensive sectors due to continued rise in labour costs. Industrial production fell much in manufacturing of motor vehicles (-10%)¹⁰, repair and installation of machinery (-8%) and manufacturing of paper and paper products (-8%), although a 3-4% drop was also present in manufacturing of wood, rubber and plastics (part of the automotive value chain) and basic materials (-4%). Looking only at Q4 2022, a drop of industrial production was particularly high in manufacturing of paper and paper products (-18%), basic materials (-14%), motor vehicles (-12%) and wood and wooden products (-12%). We should also not forget to point out the sectors that more than cushioned the negative effect of declining sectors. This were manufacturing of electronic and optical products (+25% in 2022; +19% in Q4), electrical equipment (+11% in 2022; +12% in Q4), other transport equipment (+25% in 2022; +35% in Q4), fabricated metal products

(+8% in 2022; +3% in Q4) and pharmaceuticals (data is subject to statistical secrecy and we estimate the growth at 10%).

High-cost inflation improved sales figures

High producer price inflation (+17% in manufacturing in 2022) generally led to high growth in sales as only manufacturing of motor vehicles faced a drop in sales (-1%). Sales growth was therefore present also across sectors that suffered due to energy crisis and was higher by one third in manufacturing of basic metals, paper and paper products and printing. This was closely followed (+28%) by the following set of sectors: manufacturing of metal products, electronic and optic products, and electrical equipment. In business services¹¹, producer prices increased far less (+7% in 2022) what explains a generally lower negative effect of the energy crisis on services.

Energy costs across sectors (2021)

Across 85 business sectors (level 2 classification of Nace Rev.2) in Slovenia, energy costs accounted from 0% to 42.3% of total sales in 2021. Weighted average of energy costs stood at 2.1% of sales. A share of energy costs that was above 5% of sales was present in 12 sectors, that together accounted for 12% of total value added. Among those, transportation sector, manufacturing of basic metals, non-metallic mineral products and real estate activities stood out in terms of economic importance. The importance of energy costs in sales is likely to rise in 2022, but we estimate the aggregate share to rise to about 2.5% of total sales.

¹¹ Data is available only for transportation, accommodation and food services, ICT, real estate, professional, scientific, and technical activities and administrative and support services.

¹⁰ Year-on-year comparison

Table 8: Industrial production and sales across manufacturing sectors, 2022/2021 and Q4 2022/Q4 2021

	23 Manufacture of other non- metallic mineral products	24 Manufacture of basic metals	25 Manufacture of fabricated metal products. except machinery and equipment	26 Manufacture of computer. electronic and optical products	27 Manufacture of electrical equipment	28 Manufacture of machinery and equipment n.e.c.	29 Manufacture of motor vehicles. trailers and semi-trailers	30 Manufacture of other transport equipment	31 Manufacture of furniture	32 Other manufacturing	33 Repair and installation of machinery and equipment
Share in total industrial production, in %	3.1%	6.2%	12.7%	3.5%	9.4%	7.3%	5.9%	N. A.	1.6%	1.6%	3.2%
Industrial production, 2022/2021	1.5%	-3.8%	7.6%	24.8%	10.5%	2.6%	-10.3%	25.5%	0.5%	11.1%	-8.1%
Sales, 2022/2021	18.2%	33.2%	27.6%	27.8%	27.7%	16.6%	-1.4%	20.9%	5.6%	14.9%	4.1%
Industrial production, Q4 2022/Q4 2021	-8.0%	-13.8%	3.0%	19.3%	12.2%	-1.3%	-11.5%	34.4%	-7.0%	7.4%	-8.3%
Sales, Q4 2022/Q4 2021	15.1%	10.4%	21.3%	34.4%	35.1%	18.2%	5.3%	16.3%	0.4%	17.7%	9.8%

Source: Statistical Office of RS, figures are not adjusted for calendar nor season

Table 9: Energy costs across energy intensive sectors in Slovenian economy, 2021

	Energy costs in sales (in %)	Gross value added, in % of total
Mining of metal ores	42.3%	0.0%
Land transport and transport via pipelines	18.9%	4.0%
Other mining and quarrying	8.9%	0.2%
Manufacture of paper and paper products	8.7%	0.7%
Manufacture of other non-metallic mineral products	7.2%	1.3%
Air transport	7.1%	0.1%
Water collection, treatment and supply	6.3%	0.7%
Remediation activities and other waste management services	6.0%	0.0%
Water transport	5.9%	0.0%
Manufacture of basic metals	5.7%	2.0%
Accommodation	5.4%	1.2%
Real estate activities	5.4%	2.0%
All sectors	2.1%	100.0%

Source: Kapos, companies data for 2021

Foreign demand and economic uncertainty more pronounced challenges

Limiting factors to growth among industrial sectors is a statistic, worth to look at as it explains how the views of businesses, most affected by energy crisis and general slow-down of growth in EA-20 changed in one year time. About 15 p.p.¹² more companies in manufacturing experienced insufficient foreign demand as limiting factor and 14 p.p. more saw uncertain economic conditions. 8 p.p. more noted that shortage of labour in general is a challenge. On the positive side, 14 p.p. less companies had problems with shortages of raw materials. Sluggish foreign demand was particularly a more acute challenge for manufacturing of paper and paper products (+47 p.p.), electrical equipment (+45 p.p.) and other transport equipment (+32 p.p.). Manufacturing of beverages saw higher challenge in shortage of labour (+44 p.p.). Uncertain economic conditions were more widespread across sectors. In one year (Dec. 2022/Dec. 2021), the sentiment indicator fell by 3.8 and was led by lower confidence in manufacturing (-12 p.p.) and consumer confidence (-7 p.p.), whereas sentiment in services increased by 7 p.p. and in retail trade by 10 p.p. In construction it fell by 3 p.p. but stayed far above its long-term average.

¹² Percentage points.

Fiscal support should double in 2023

IMAD and the Fiscal Council estimate that total national measures to shield the economy from high energy prices amounted to 1.2% of Slovenia's GDP in 2022 – EUR 740 m although in EA-20 share was lower (0.9% of GDP). The estimates of Fiscal Council include only effect of these measures on fiscal deficit which was lower (0.8% of GDP). Direct effect of those measures for businesses stood at EUR 150 m and was paid out as subsidies whereas EUR 60 m was the reduced revenue from the part of the businesses. For the year 2023, the Fiscal Council estimates that the value of the measures stands at EUR 1.7 bn, whereas the lower spot prices in Q1 reduce the required sum.

Conclusion

The energy crisis has changed the business dynamics of Slovenia's economy most notably from Q3 onwards, when sectors that took hit were those that already felt the higher spot prices of natural gas and electricity. The Q4 energy prices dropped slightly compared to Q3 but foreign demand also dropped, and industrial production fell across majority of energy intensive sectors. Trends in 2023 will be subject to fiscal intervention and decision to extend them (particularly the case for SMEs), whereas for the larger companies we do not see a strong possibility of a sudden rebound in industrial production as agreed upon purchase prices were already set in 2022¹³. The business results for 2022 are expected to be quite good on average, despite the headwinds in the energy-intensive sectors in H2 2022. The services sector and construction are expected to be the main drivers of business growth in private sector and within manufacturing, higher availability of materials and subcomponents is expected to boost the growth in some sectors that were hit hard in 2022, especially the automotive value chain.

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¹³ We have to point out here that there is a diverse set of situations across firms what makes this estimate extremely difficult. Some companies have only chosen to purchase electricity prices upfront for Q1 2023, whereas some decided to purchase them for the whole 2023 at prices, that are far above the current prices for the same consumption period.

Slovenian banking system remains resilient in the face of several recent stress events

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The paper examines key features of both the Slovenian banking sector and banking sectors within the euro area. This comparative analysis serves to identify significant disparities between them, shedding light on areas of divergence. Additionally, it highlights the significance of enhancing the cost and profit efficiency of banks through digitalisation, consolidation, and a shift towards decarbonisation.

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1. Introduction

Over the last three years, the global economy and financial systems across the world have endured several stress events (the Covid-19 pandemic, supply chain disruptions, the war in Ukraine, inflationary pressures), but major adverse effects have been prevented by a fast and wide-ranging response by putting in place economic policy measures. Economic entities have thus succeeded in adapting to the altered circumstances. The persistently high inflation and the resulting fast and decisive interest rate hikes by the ECB are meanwhile already being reflected in a slow-down in lending activity in Slovenia and elsewhere in the euro area (hereinafter: the EA), and the future economic situation remains relatively uncertain in Slovenia and across the EA, despite this year's slight improvement in the economic sentiment.

The Slovenian banking system remains one of the smallest in the EA, and Slovenian banks are not significantly altering their business models. Household lending remains the focus on the asset side, although there have recently been large holdings of liquid assets, while deposits account for much of the funding side. The latest simulations of consolidation of the Slovenian banking system suggest that the banking system could become moderately concentrated after the completion of the merger of two large banks, which would raise Slovenia from the EA average to the top third of the countries with the highest banking system concentration.

By contrast, the Slovenian banking system is significantly behind the EA average when it comes to digital transformation. The share of green loans also remains low, which means that there is a great potential for the banks to support decarbonising the economy.

2. The banking system has adapted relatively well to difficult circumstances

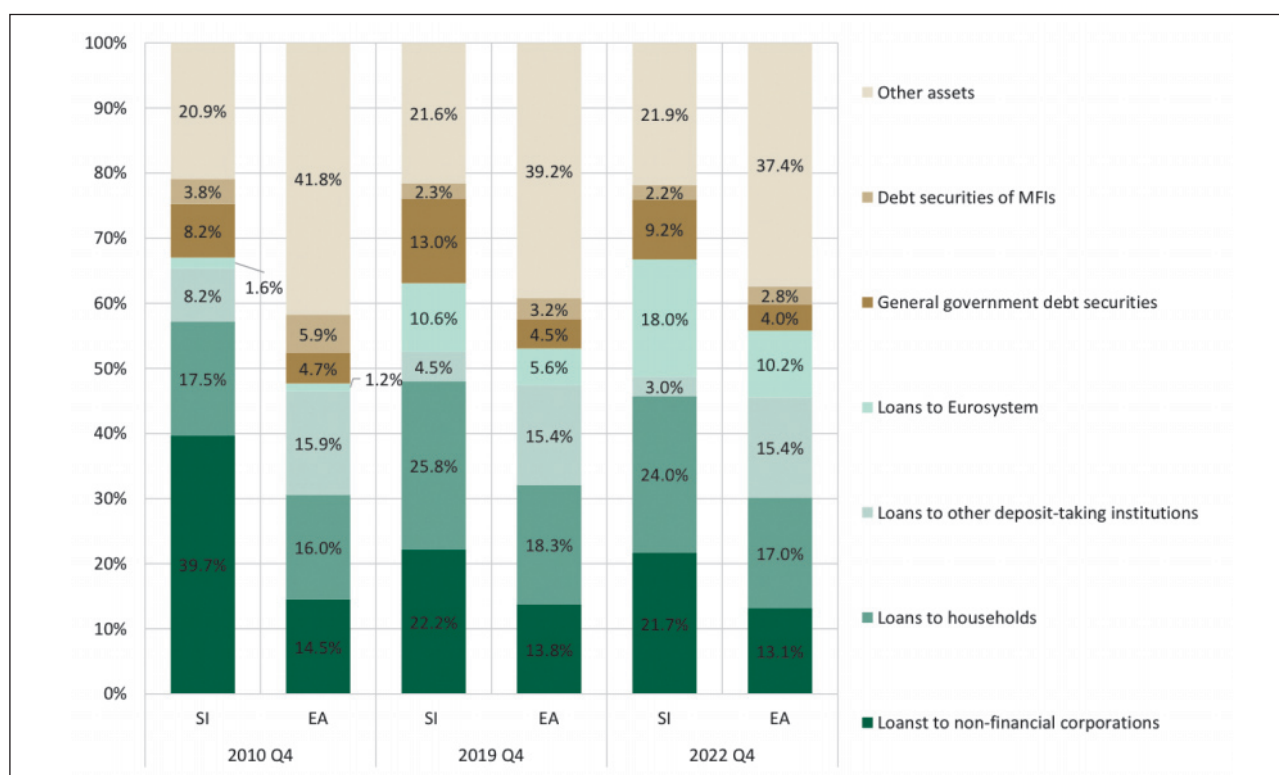
Household loans remain the largest component of the banking system's assets

The Slovenian banking system has remained among the smallest in the EA over the last twelve years. The balance sheet total of Slovenian monetary institutions (excluding the ESCB¹) amounted to EUR 52 billion at the end of 2022, equivalent to 88% of Slovenia's GDP, less than a third of the EA average (292%). There has been a significant change in the structure of the Slovenian banking system's assets over the aforementioned period. Following the dominance of lending to non-financial corporations (NFCs) before the global financial crisis (GFC), the recapitalisation of the banking system and the transfer of a large part of the NFCs portfolio to the Bank Asset Management Company after the GFC, and the gradual recovery in lending activity in the middle of the last decade, the banks have focused more of their lending to the non-banking sector on households. Amid relatively weak lending to NFCs, the share of bank portfolios accounted for by household

* All Banka Slovenije.

¹ Excluding the European System of Central Banks, which consists of the ECB and the national central banks of all EU Member States.

Figure 1: Breakdown of total assets of EA MFIs (excluding the Eurosystem)



Note: Other assets include loans to general government, loans to financial corporations other than MFIs, loans to insurance corporations and pension funds, fixed assets, external assets, holdings of equity and non-MMF IF shares, other euro area residents' debt securities and remaining assets.

Sources: ECB Statistical Data Warehouse, own calculations

loans has gradually increased, with housing loans and consumer loans both increasing in stock. The banks nevertheless did not succeed in fully directing the huge inflow of deposits

by the non-banking sector seen in particular during the Covid-19 pandemic (2020 and 2021) into loans or other asset classes, which sharply increased their holdings of liquid assets in accounts at the central bank. The share of the balance sheet total that they account for stood at 18% at the end of 2022 (illustrated in Figure 1 as loans to Eurosystem), well above the EA average (10%).

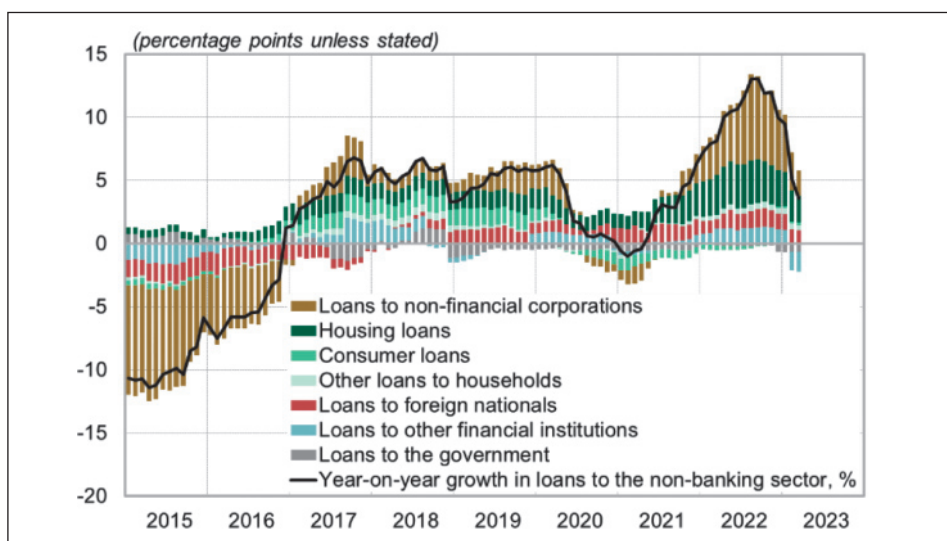
Year-on-year growth in loans to the non-banking sector fluctuated around 5% between 2017 and 2020, before slowing sharply at the outbreak of the Covid-19 pandemic in early 2020 and moving into negative territory for a few months at the beginning of the following year. Certain significant changes occurred in the household lending segment during the period of relatively stable growth, as consumer loans recorded double-digit year-on-year growth for several years. The issue of excessive consumer lending was addressed by Banka Slovenije macroprudential measures at the end of 2019, following which growth in consumer loans began to slow, before falling sharply with the outbreak of the pandemic a few months later and the

crash in consumer demand, and by the end of 2022 it had moved into negative territory.

During this time the dominant role in household lending was taken by housing loans: growth strengthened sharply from early 2021 amid surging residential real estate prices and interest rates at record low levels, and had reached 11.9% by June 2022, the highest rate of the last ten years and one of the highest figures in the EA, where the average stood at 5.4% in that month.

While lending to NFCs recovered strongly in 2022, and the contribution to aggregate growth in loans to the non-banking sector made by corporate loans also increased significantly, much of this consisted of a recovery in lending following the great decline during the pandemic and was also attributable to a low base effect. As growth in housing loans remained uninterrupted even during the pandemic, and then subsequently gained further pace, household loans remained the most important component on the asset side of the banking system's balance sheet, accounting for 24.2% of total assets in March 2023 (compared with 20.5% for loans to NFCs). Lending in the majority of segments slowed discernibly in the early months of this year in the wake of monetary policy tightening and the increased uncertainty surrounding the outlook for the economy.

Figure 2: Growth in loans to the non-banking sector, and contributions by individual segments and loan types



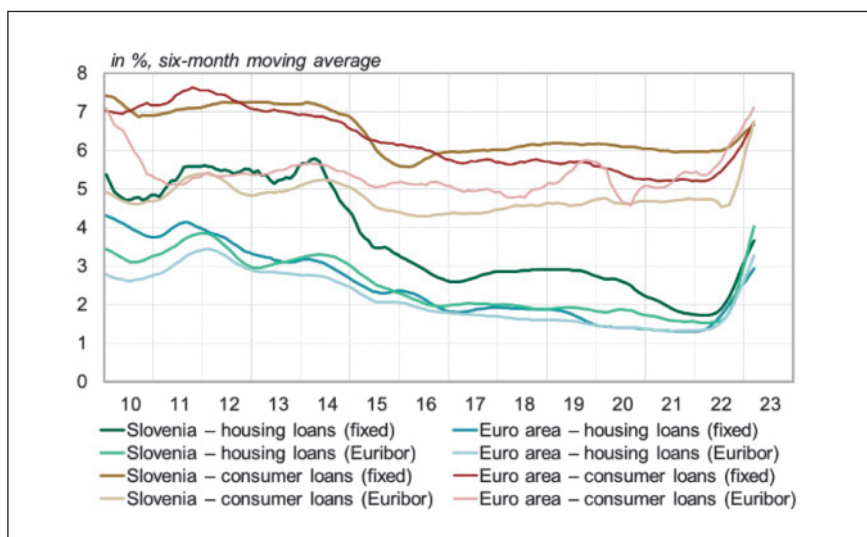
Source: Banka Slovenije

The end of the period of low interest rates

Extremely favourable financing conditions have been a major feature of the last ten years. Interest rates on loans to the non-banking sector fell for a sustained period, amid accommodative monetary policy with key interest rates close to zero and other less conventional monetary policy measures in place and reached a record low average in 2022. The trend of falling interest rates at banks was evident across different segments of the non-banking sector and also compared with other EA countries and the EA average. Interest rates at Slovenian banks converged on those seen across the EA, most evidently with regard to housing loans and loans to NFCs. Interest rates on housing loans in the Slovenian banking system reached their low in January 2022. Fixed interest rates had fallen to 1.7%, and variable rates (Euribor plus a premium) to 1.5%.

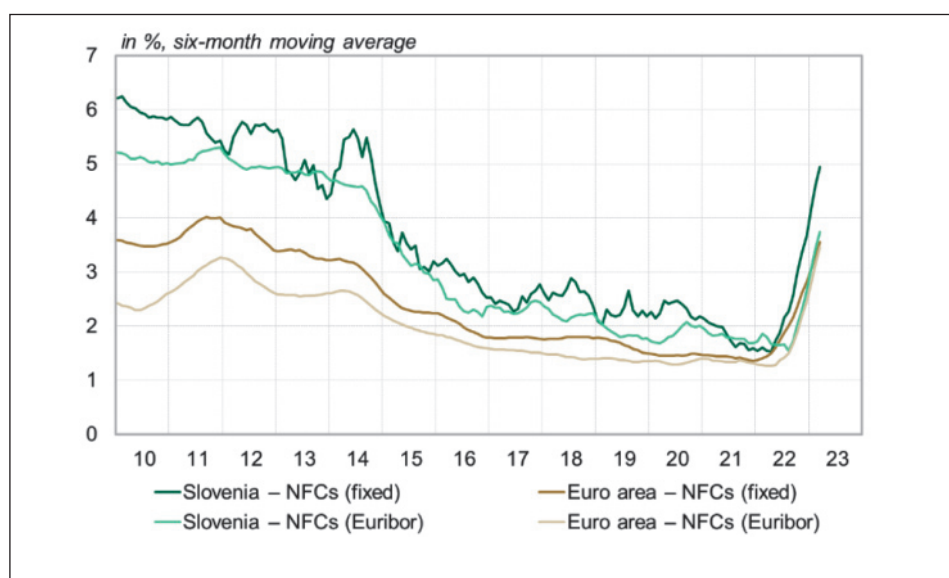
Interest rates on loans to NFCs have shown greater volatility from month to month, on account of the larger variations in loan amounts and loan terms typically seen in this segment and reached their low in the first half of 2022. Amid rising inflation in EA countries, July of that year saw the first in a series of hikes in the ECB's key interest rates, to which the banks have responded quickly by beginning to raise interest rates on loans to the non-banking sector. By May of this year the ECB's key interest rates have risen by 3.75 percentage points, and further rises are expected as inflation remains persistently high. While fixed interest rates on housing loans at Slovenian banks have risen to 4.0% by March of this year, variable rates have risen to 4.7%. It is similar with loans to NFCs: fixed interest rates have risen by more than 3 percentage points, and variable rates by more than 2 percentage points.

Figure 3: Interest rates on household loans



Source: Banka Slovenije, ECB Statistical Data Warehouse, own calculations

Figure 4: Interest rates on loans to non-financial corporations



Source: Banka Slovenije, ECB Statistical Data Warehouse, own calculations

Deposits remain the most important source of funding for the banking system

With the repayment of debt to banks in the rest of the world and the increase in deposits by the non-banking sector, the structure of the Slovenian banking system's liabilities has changed markedly over the last twelve years. The share of the balance sheet total accounted for by wholesale funding, which includes liabilities to foreign banks (largely included under deposits of deposit-taking corporations except central bank in Figure 5) and issued debt securities, declined by 30 percentage points between 2010 and 2022 to reach 6.6%, while bank funding via deposits by households and NFCs increased sharply. The share of the balance sheet total that they account for almost doubled over the aforementioned period, and stood at 70% at the end of 2022, which ranks Slovenia among the EA countries with the highest reliance on this source of funding. The figure was broadly unchanged over the early months of 2023.

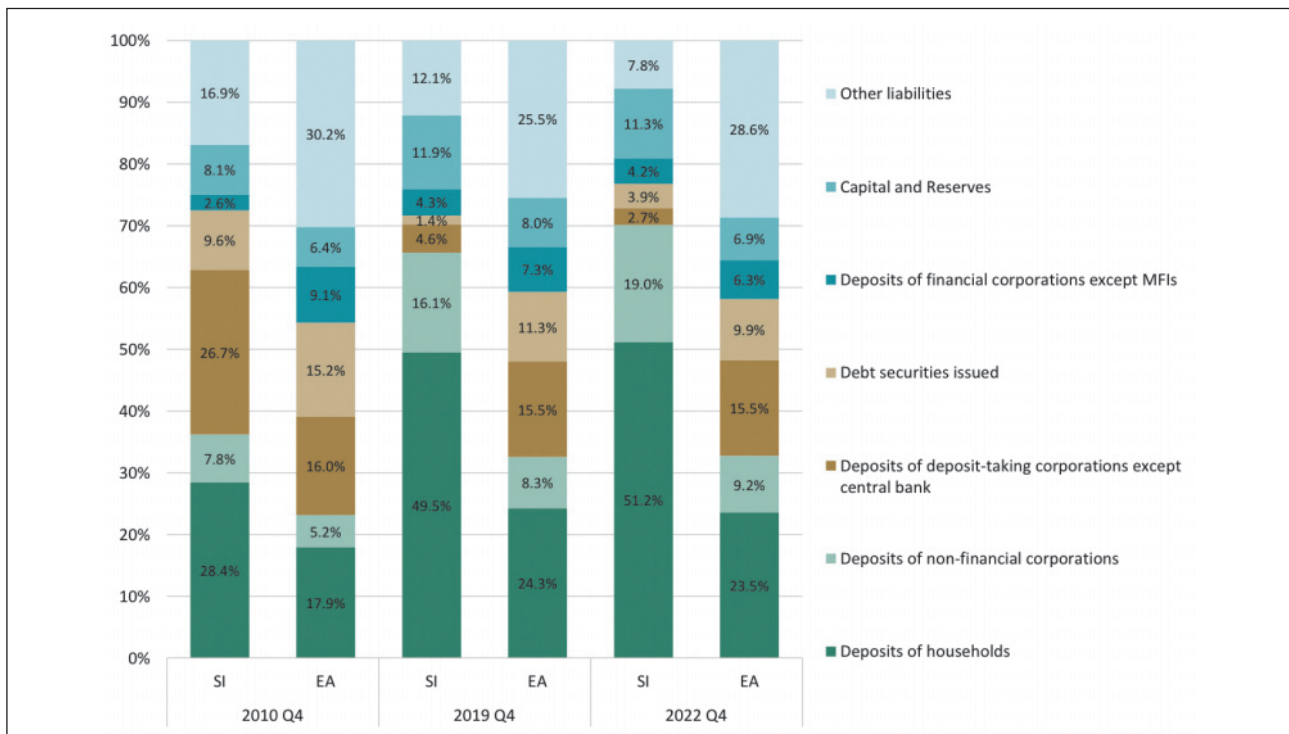
Similarly to the majority of other EA countries, deposits by households and NFCs increased significantly during the time of the Covid-19 pandemic (2020 and 2021) despite record low interest rates on deposits, in part because of the limited opportunity to spend or to make investments. They also remained a stable source of funding for the Slovenian banking system even during the difficulties encountered by one of the banks in Slovenia after the outbreak of the war in Ukraine (March 2022), when fast and effective resolution meant that savers retained their confidence in the functioning of the Slovenian banking system.

The sharp rise in inflation in the second half of 2022, which along with low interest rates on deposits is reducing the

real value of savings at banks, might drive a withdrawal of bank deposits to be moved into other higher-yielding but higher-risk asset classes. Thanks to the traditional conservative behaviour of Slovenian savers, the shallow capital market, and the lack of alternative investments, for now there has nevertheless been no major withdrawal of deposits from banks.

It is not only on the lending side that monetary policy transmission has occurred, but also partly on the deposit side, which in the future could lead to a change in the structure of bank funding in individual EA countries. A rapid rise in interest rates on fixed-term deposits is more evident in countries where deposits account for a lower share of funding, and with greater dependence on wholesale funding or liabilities to the Eurosystem, as deposits remain a cheaper source of funding than the aforementioned sources, despite rising interest rates. Although banks in Slovenia have begun to gradually raise interest rates on deposits, they are significantly below the EA average. Given their large stock of liquid assets and deposits by the non-banking sector, for now Slovenian banks have no great need for additional funding, and they have little dependence on costlier wholesale funding and other sources. However, it can be expected that a further rise in interest rates on deposits will gradually shift the maturity breakdown of savers' deposits. With interest rates on fixed-term deposits virtually zero, households and NFCs had little motivation to make fixed deposits in the past years, and sight deposits therefore accounted for the majority of their savings (87% at the end of 2022, compared with 66% in EA average). Rises in interest rates on deposits will likely encourage savers to tie up at least some of their savings.

Figure 5: Breakdown of total liabilities of EA MFIs (excluding the Eurosystem)



Note: Other liabilities include deposits by central bank, deposits by central government, money-market fund shares, external liabilities and remaining liabilities.

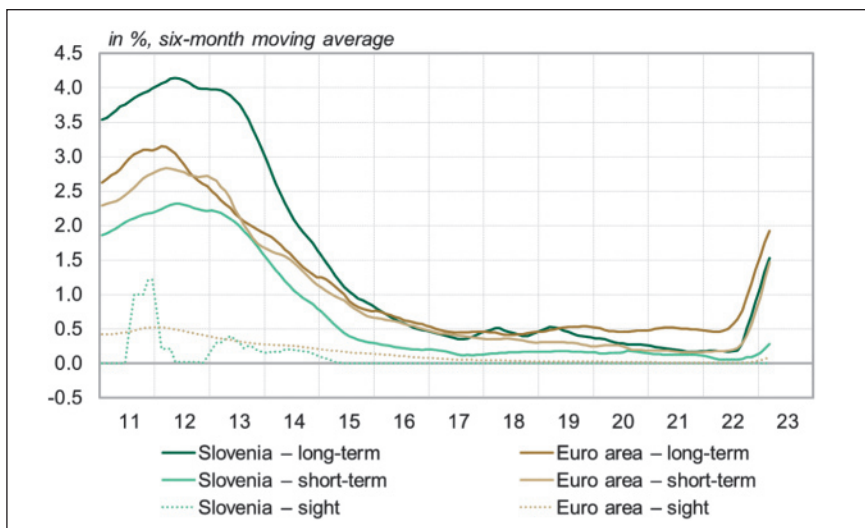
Sources: ECB Statistical Data Warehouse, own calculations

The rapid rise in interest rates is driving up income, and improving bank performance over the short term. Similarly to banks elsewhere in the EU and the EA, banks in Slovenia have in recent years faced challenges in generating stable (net) interest income. Slovenia has mostly seen a decline in the net interest margin (NIM) for more than two decades now. Having stood at 2.18% at the end of 2014, it underwent a sustained decline between 2015 and the beginning of the second quarter of 2022 driven by price effects (the low interest rate environment), and

relatively low growth in loans. Following an improvement in lending growth in 2021, growth in net interest income turned positive again in early 2022.

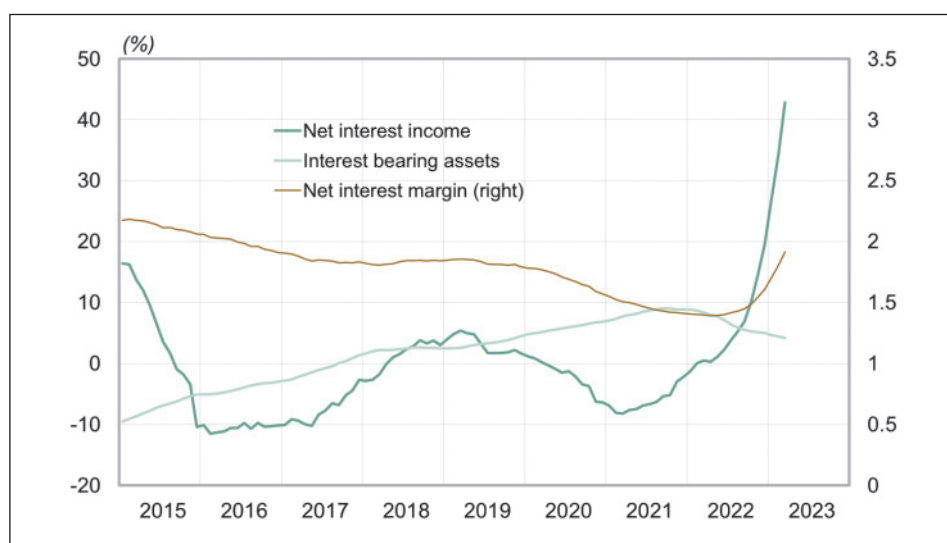
The conditions for generating income from net interest, which is the most important component of gross income, were improving rapidly, particularly with the ECB's interest rate hikes. Net interest income in 2022 was up a fifth on 2021, and in the first quarter of this year more than doubled in year-on-year terms. The increase in net interest is driving a rise in income and profits. These trends have

Figure 6: Interest rates on new household deposits



Source: Banka Slovenije, ECB Statistical Data Warehouse, own calculations

Figure 7: Year-on-year growth in net interest and interest-bearing assets, and net interest margin



Note: The net interest margin is calculated for the preceding 12 months. Growth in net interest and interest-bearing assets is calculated from the 12-month figures.
Source: Banka Slovenije

been particularly pronounced as of the final quarter of last year.

The banks have large holdings of liquid assets, where the rise in ECB interest rates is immediately reflected in higher net interest income. Interest income on loans is also growing fast: more than half of loans to NFCs and households carry a variable interest rate, while on the funding side sight deposits are prevalent, and costlier wholesale funding accounts for only a small share of total liabilities.

The banks are responding very slowly and cautiously in raising liability interest rates. Compared with other countries, they have relatively high interest income and very low interest expenses at the same time. Positive price effects on the asset side of the balance sheet therefore prevail at present. Net interest income in the first quarter of this year was up fully EUR 152 million or 96% in year-on-year terms. The year-on-year increase in net interest in the first quarter of this year alone exceeded that in the whole of 2022 (EUR 123 million). The increase in net interest is also being reflected in rapid growth in the net interest margin, which stood at 1.92% over the 12 months to March 2023, up more than 0.5 percentage points in year-on-year terms. The net interest margin in the first quarter of 2023 already amounted to 2.65%, which is comparable to the figures seen more than a decade and a half ago. Under these conditions of rising income, the banking system's gross income in the first quarter was up almost a third (31.1%) on the same period last year, while net income was up 43.2%. The banks can also be expected to increase their income generation over the following months, with a positive impact on their performance.

Bank profitability in Slovenia compared with banks across the EU and the EA

The Slovenian banking system has recorded relatively high ROE in recent years. It stood at 10.8%² in 2022, similar to its average between 2017 and 2022. During this period of challenging conditions for generating income and economic uncertainty, Slovenian banks realised an average annual pre-tax profit of around EUR 0.5 billion. The banking system's profit in the first quarter of this year amounted to EUR 152 million, up significantly (57%) on the same period last year, and its pre-tax ROE was 12.4%.

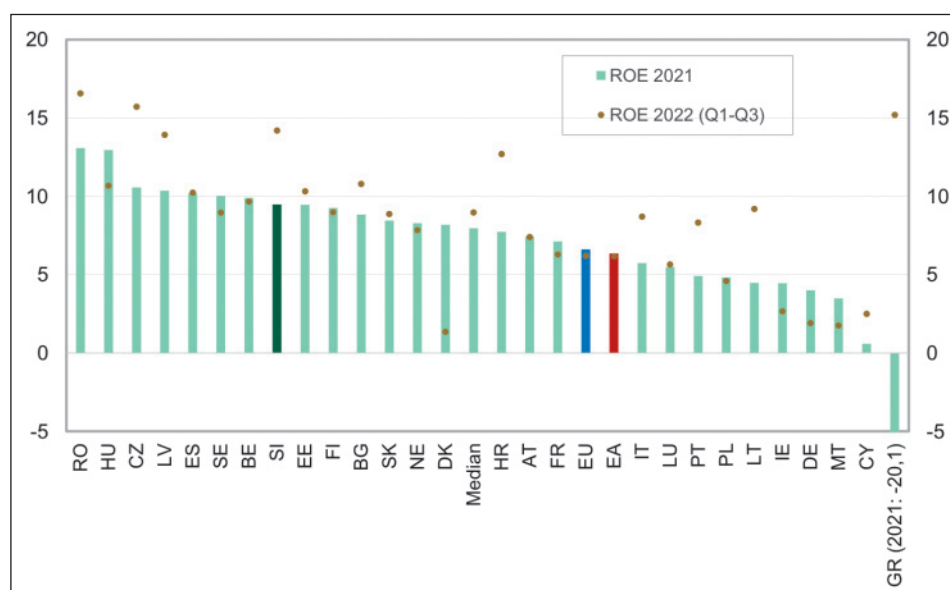
ROE in the Slovenian banking system has been above the EU and EA averages in recent years.³ Average ROE between 2017 and 2021 was double the figures seen in the EU and the EA overall. ROE averaged 10.2% in Slovenia over this period, compared with 5.1% in the EU and 4.9% in the EA (ECB SDW, CBD, latest whole-year figures), while average ROE at banks of comparable size in the EU and the EA was a little lower again (4.5% and 4.4% respectively). A similar gap was seen in the figures up to the third quarter of 2022. Slovenia's figure of 14.2% last year significantly exceeded the average of the EA and the EU, in part because of the one-off effect of the acquisition of one bank by the largest banking group in the first quarter of 2022. Even excluding this effect, its ROE of around 10% would still rank it at the top of the second third of the distribution of countries with the highest values.

A major factor in the high profitability of Slovenian banks in recent years has been the net release or very low creation of impairments and provisions, while one-off factors that drove up non-interest income also played a role in raising profit (at the large banks) in individual years (2020 and 2022). The net release of impairments and provisions (or

² Individual bank data, pre-tax ROE.

³ Consolidated bank data (ECB SDW, CBD), ROE after tax.

Figure 8: ROE in EU Member States at the end of 2021 and to the third quarter of 2022



Note: Data to the third quarter of 2022 is annualised.
Source: ECB SDW (CBD)

low net creation) was a major factor in the maintenance of high profitability at the banks, particularly during the period of low interest rates: four of the years between 2017 and 2021 saw a net release of impairments and provisions, while 2020 saw impairments and provisions at a level comparable to the EU and the EA overall. Slovenia's net impairments and provisions in 2022 were among the lowest of any country (Banka Slovenije, 2023).⁴ A longer time horizon of comparison with EU Member States otherwise shows that Slovenia's ratio of net impairments and provisions to the balance sheet total was above-average for several years after the last financial crisis (2010 to 2015).

The net creation of impairments and provisions again prevailed at banks in Slovenia in 2022, but at a low level, comparable to other European countries, and to figures seen in Slovenia over the past two decades. The trend remained similar in the first quarter of 2023.

A comparison between the banking systems in Slovenia and other EU and EA countries in terms of certain income and cost indicators measured against the balance sheet total shows the Slovenian banking system achieving a slightly higher net interest margin, net non-interest margin and, in particular, net commission margin. At the same time the ratio of operating costs to the balance sheet total and the cost-to-income ratio (CIR) were also higher in Slovenia. Conversely, when compared with banks of similar size (small banks in the EU and the EA), the Slovenian banking system has mostly recorded similar or slightly higher figures for the net interest margin in recent years. The figures for

net non-interest margin and net commission margin were comparable, while banks in Slovenia were notable for the slightly lower values for the ratio of operating costs to the balance sheet total and the CIR.

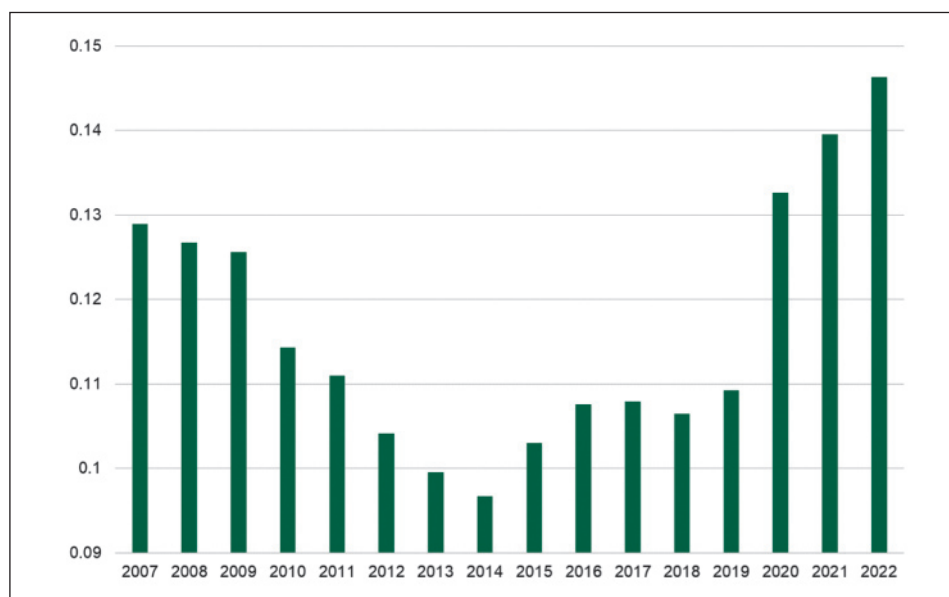
3. Banking system consolidation

Consolidation refers to the process of merging two or more financial institutions to create a larger entity. Consolidation in general has resulted in the creation of large financial institutions that have a significant market share and, as a result, have a considerable degree of market power. The level of competition in the banking industry has an impact on its ability to withstand shocks and maintain financial stability, which has long-term implications for the economy. When there is healthy competition among banks, it can improve their efficiency and encourage them to innovate in terms of their products and services, resulting in lower interest rates for borrowers and reduced probability of loan defaults. However, according to some studies (FSR, 2019), excessive competition may push banks to take on too much risk, and if they experience financial distress, it can have significant spillover effects on the broader economy.

According to econometric analysis presented in the FSR (2019), the relationship between competition and bank stability in the euro area can be illustrated as an inverted U-shape. This means that there exists an optimal level of competition in terms of maintaining bank stability. In particular, if the market power of banks is increased up to that ideal level, it would result in a more stable banking sector. However, if the market power goes beyond that level, it could result in a more vulnerable banking sector.

⁴ Consolidated bank data (ECB SDW, CBD), comparison to third quarter of 2022.

Figure 9: HHI for the Slovenian banking system

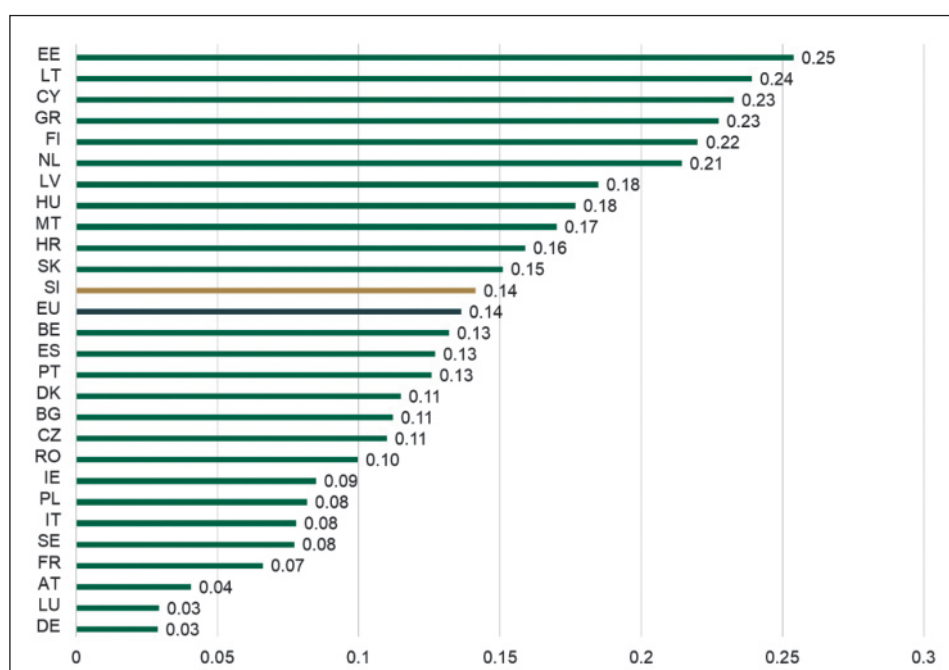


Sources: Banka Slovenije, own calculations
 Note: HHI: Herfindahl-Hirschman Index by total assets at the end of 2022

Several studies have also explored the interactions between market power, competitiveness, and financial stability in the banking sector. For instance, Claessens et al. (2001) examined the relationship between bank competition and stability, and found that increased competition can improve stability. However, Beck et al. (2013) argued that a higher degree of concentration in the banking sector can lead to lower financial stability. Furthermore, Demirgüç-Kunt and Huizinga (2010) investigated the relationship between bank concentration and competition, and found that an increase in concentration could lead to a reduction in competition. Furthermore, Berger et al. (2004) found that

increased concentration in the US banking industry was associated with higher profit margins and reduced competition. Similarly, Bikker and Haaf (2002) found that increased concentration in the European banking industry was associated with lower efficiency and higher costs. In Slovenia the process of consolidation of the banking system has been present since independence. There are 16 commercial banks and savings banks at present, and the process of consolidation continues. With regard to banking market concentration in Slovenia, the value of the Herfindahl-Hirschman Index (HHI), a commonly accepted measure of market concentration, stood at 0.126 in terms

Figure 10: HHI in the EU (2021)



Source: ECB
 Note: HHI: Herfindahl-Hirschman Index (total assets) in 2021

of total assets at the end of 2008 (see Figure 9). It reached its lowest value of 0.097 at the end of 2014, and then started to rise. The HHI of 0.146 at the end of 2022 shows that the banking industry in Slovenia was still unconcentrated. The HHI in the EU stood at 0.136 in 2021 (latest available data; see Figure 10). The HHI for 2022 does not take account of the merger of Nova KBM and SKB, but a simulation estimates the post-merger HHI at 0.182, which already means a moderately concentrated banking market. In light of such developments it should be considered that instead of two large banks with approximately the same market share by total assets and a few relatively smaller ones, the banking system would probably function better and be more stable if there were three or more banks of approximately equal size.

4. Digital transformation⁵ and use of fintech⁶ in the banking system

Digitalisation and new financial technologies (fintech) are having an increasing impact on the banks' performance and business models. Appropriate digital transformation and using fintech gives banks an initial competitive advantage in the banking and non-banking markets, but later becomes a prerequisite for survival (Banka Slovenije, 2022). The development of the fintech sector, which is based on the use of innovative information technology in financial services, began to change the use of technology in the development of new banking products and services and business models (OECD, 2020). On this basis banks have begun using certain fintech with the aim of making a digital transformation of their business and maintaining competitiveness on the market. Fintech such as machine learning is being used by certain banks in particular in areas such as cyber security and anti-money laundering. Digital transformation also has an impact on bank profitability, where the benefits of digitalisation vary according to the size of the bank and their business model (OECD, 2021). Digital transformation usually requires substantial initial investment, which can be a problem for smaller and less-profitable banks (IMF, 2021).

In the area of digital transformation banks are in some way forced to adapt their strategies and business models to the new situation in the banking market. Banks work with external partners on implementing a digital transformation strategy, mainly by purchasing services and hiring consul-

ants. There is also increasingly evident collaboration between banks and fintech firms with regard to digital transformation. The challenges faced by banks in digital transformation mainly relate to a shortage of human resources, and a lack of alignment between the business and IT strategies. Cost management is another challenge, as digital transformation is often undertaken within the bounds of strict limits on investment. Digital transformation also brings certain risks for banks, in connection with cyber security, greater dependence on ICT outsourcers, money laundering and fraud, and the potential loss of customers. Digital transformation is nevertheless necessary to banks, given customers' changing requirements, and the pressure to reduce costs and increase efficiency. Banks have no option but to consider the use of advanced new financial technologies. The Covid-19 pandemic had a significant impact on digital transformation, creating a direct need for banks to communicate with their customers via digital channels such as platforms and apps, with social distancing heavily enforced during this period.

The objectives of the digital transformation in banking focus on controlling costs, raising income, and managing risks in a way that offers new/improved contactless banking products and services. In the cost realm they aim to use digital transformation to reduce personnel costs, and to optimise business processes and the range of services. The primary impact of the digital transformation of the banking system is on business processes, and activities that improve internal and external business processes, such as open banking,⁷ AML/CFT monitoring, payments settlement, and data quality (Banka Slovenije, 2022). The digitalisation of the banking system is also increasing the importance of cyber security, and it is therefore vital that banks devote enough attention to activities that strengthen resilience to cyber-attacks (see Figure 11). Conversely digital transformation can speed up the consolidation of the banking system and reduce the costs of bank mergers.

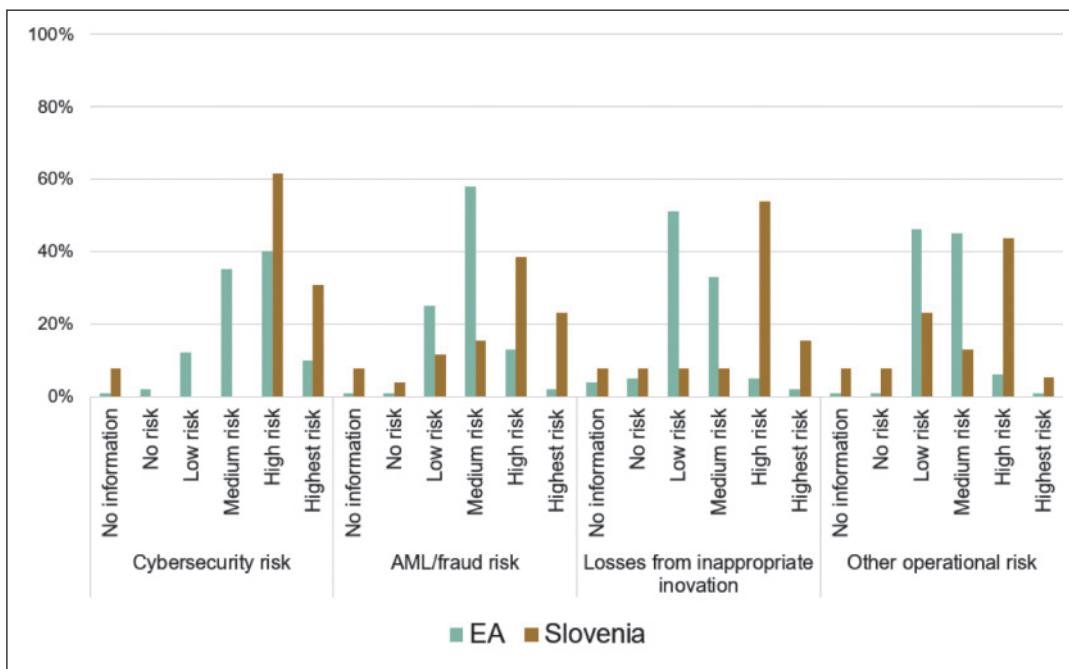
Banks' main focus in adopting new financial technologies is to increase their competitiveness in the market and improve their business performance (BIS, 2021). Banks are using digital/mobile wallets, biometrics and big data to raise competitiveness on the market. Meanwhile they are using fintech such as cloud computing and artificial intelligence (including machine learning) to improve profitability (see Figure 12). It can still be seen that banks are investing more and more to develop new products based on fintech, but the actual sums are still limited (Banka Slovenije, 2021).

⁵ Digital transformation means a comprehensive change in the functioning of the institution, using and upgrading ICT with the aim of raising the bank's productivity, growth, and competitiveness.

⁶ Fintech includes cloud computing, digital/mobile wallets, biometrics, big data, AI (including machine learning), smart contracts, and distributed ledger technology.

⁷ Open Banking brings together different stakeholders in the new financial industry (banks, third party ICT service providers and other financial institutions operating in the market).

Chart 11: Challenges arising from digital transformation, in 2022



Sources: ECB, Banka Slovenije

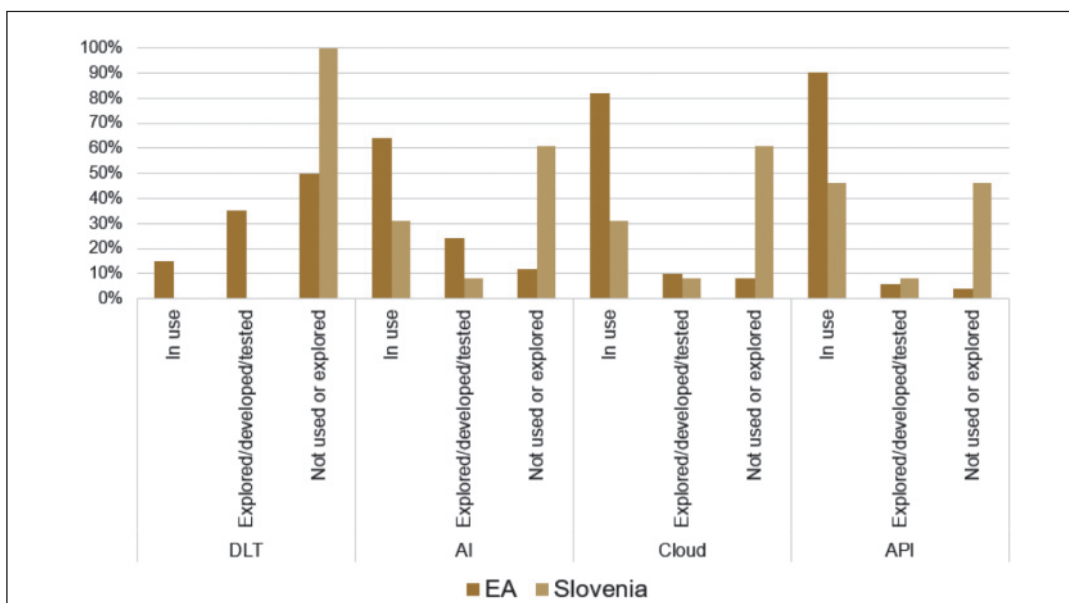
Banks remain conservative in their introduction of fintech, which means that they make a thorough assessment of the added value of the technology before deciding to implement it. There has been no major shift in the use of fintech at Slovenian banks in recent years.

5. Green transition

Global warming constitutes a risk to the financial system too. The growing importance of banks in supporting the green transition is a trend that will be continued as part of the EU reaching its objective of net zero greenhouse gas emissions by 2050. Cardillo et al. (2021) identify three

main channels by which banks may expand their role in the climate agenda: the reallocation of market portfolios via sustainable investment strategies, the direct financing of green firms/projects, and specialist advisory services. Slovenian banks offer green loans, which can be used to purchase and build energy-efficient real estate, or for investments in energy-efficient systems (solar panels, heat pumps, heat recovery systems, etc.) (Banka Slovenije, 2021). These loans are still rare: there were just 231 loans approved for energy-efficient systems in 2022, accounting for less than 0.2% of total new household loans. At the same time there were just 772 housing loans secured by residen-

Chart 12: Adoption rates of innovative technologies, in 2022, in %



Sources: ECB, Banka Slovenije

tial real estate (2.6% of the total) granted for the purchase or construction of energy-efficient real estate.⁸ Although households generate approximately a fifth of all carbon emissions, decarbonising the entire economy requires significant investment by the NFCs sector. The high share of value-added accounted for by industry (27%, compared with the EU average of 19.6%) points to larger transition risks,⁹ but is also indicative of opportunity for banks in financing green sectors. The exposure to climate-sensitive sectors (manufacturing, construction, electricity, and transport) reflects the structure of the economy, at a size of between one-third and approximately 60% of bank lending to NFCs.

The banks must offer greater support for decarbonisation efforts. The results of the first climate risk stress tests reveal great differences between the banks with regard to their readiness to address climate risks. At the same time the tests showed the banks' progress in their consideration of climate risks in their business, their risk management frameworks, and their disclosure practices. The banks will above all have to improve their gathering of data in this area in the future.

6. Conclusion

The trend of increase in the Slovenian banking system's exposure to households has continued over the last few years when the global economy and financial systems have been hit by numerous stress events. This was reflected most evidently on the funding side, where household deposits have increased sharply, and account for more than half of total bank funding, while on the asset side the ratio between household loans and loans to NFCs has not changed significantly. This is helping to build a large liquidity reserve and to maintain a high assessment of the banking system's resilience in the liquidity segment, but questions also arise with regard to the effectiveness of financial intermediation in Slovenia, the support for broader economic development, and the viability of the banks' business models in light of the rapid development of finance in the wider sense.

The general rise in interest rates is improving bank performance over the short term, but it should not be overlooked that a rise in interest rates on loans will sooner or later be followed by a significant adjustment in interest rates on deposits. Slovenian banks are still considerably behind the EA average in this segment. In light of the announcement of a

merger between two of the larger banks, our assessment is that concentration in the banking market will be increased significantly by this step, which could have an adverse impact on financial stability. It can also be observed that Slovenian banks remain highly cautious in the introduction of fintech, as there are no major shifts in the use of fintech, while the share of green loans remains low.

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⁸ The reason for the scarce data in international comparisons is that the first disclosures under Pillar 3 reporting were made as at 31 December 2022. In addition this reporting only covers large banks listed on the stock market.

⁹ Transition risks occur when moving towards a less polluting, more sustainable economy. For more, see Sokolovska (2020).

ESG Risk Management in EU Banking*

*Mojca Marc, Matej Marinč and Vasja Rant***

Financial institutions are embarking on a challenging path towards sustainable development. They need to integrate ESG factors into their business, understand ESG risks, define them and address them quantitatively and qualitatively. This article defines ESG risks, reviews quantitative and qualitative indicators, metrics and methods for assessing ESG risks, highlights different methodological approaches for assessing ESG risks, examines frameworks for ESG risk management and reviews EU regulation on ESG risks.

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"It is a mistake to assume that anything that cannot be measured cannot be managed. This is an expensive myth" (Deming, 2000).

1. Introduction

In the light of Deming's quote, we can set out on a long journey to sustainable development. Financial institutions, companies, investors and regulators are increasingly recognising that environmental, social, and governance (ESG) risks have a significant impact on business performance rather than being an end in themselves, or a tool to demonstrate green virtue. For example, Dietz et al. (2016) estimated that up to 30 percent of global assets under management could be at risk from climate change as a result of asset and productivity losses. Battiston et al. (2017) found that direct and indirect exposures to climate-policy-relevant sectors represent a large portion of investors' equity portfolios, whereas the portion of banks' loan portfolios exposed to these sectors is comparable to banks' capital.

ESG risks need to be understood and managed properly, or they can have a negative impact on the stability of finan-

cial institutions and the financial system. Whereas general awareness about ESG risks has been increasing, there is also evidence that corporate sector responses to these risks are slow and inadequate (Gadenne, Kennedy & McKeiver, 2009; Goldstein et al., 2019). To facilitate consideration of ESG risks in decision making, definitions and methodologies for their measurement, management and regulation have been developed at an accelerated pace in recent years.

This article defines ESG risks, reviews quantitative and qualitative indicators, metrics and methods for assessing ESG risks, highlights different methodological approaches for assessing ESG risks, examines frameworks for ESG risk management and reviews EU regulation on ESG risks. The focus is on ESG risks in banking.

2. Definition of ESG risks

To understand and measure ESG risks, we first need to establish common definitions of what ESG factors are and how ESG factors affect the performance of financial institutions and the financial system as a whole (EBA, 2021a). While various international frameworks and standards are unified around the three pillars of sustainability (environmental, social, and governance), they avoid narrow definitions of ESG factors, which makes it difficult to define them uniquely.

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The EBA (2021 a) defines ESG risks as risks that have any negative financial impact on an institution arising from the current or future impact of ESG factors on counterparties or on invested assets. Therefore, in order to identify ESG risks, we first need to define ESG factors.

The European regulatory framework gives as examples of *environmental* ESG factors: greenhouse gas emissions, energy consumption and efficiency, exposure to fossil fuels, water, air and soil pollutants, water consumption, recycling and resource management, land degradation, desertification and soil sealing, waste generation and management (hazardous and non-recyclable), raw material consumption, biodiversity and protection of healthy ecosystems, deforestation.¹ In practice, financial institutions use the following environmental ESG factors: material, energy and water consumption, greenhouse gas and other air and water emissions, waste and wastewater production and management, biodiversity protection, research and development of low carbon and other environmental technologies (Coleton et al., 2020).

Examples of *social* ESG factors cited by the EBA (2021 a) include implementation of ILO conventions on occupational safety and health, violation of the UN Global Compact Principles, inclusion and inequality, exposure to controversial weapons, discrimination, inadequate whistleblower protection, accident rates and days lost due to injury and accident, death or illness, human rights protection, investment in human capital and communities, and human trafficking. In practice, financial institutions apply the following social ESG factors: quality and innovation in customer relations, customer rights to information on environmental issues, human rights, labour practices in human resource management and employee relations, diversity issues, gender equality, health and safety in the workplace, access to credit and financial inclusion, security of personal data (Coleton et al., 2020).

Examples of *governance* ESG factors mentioned by the EBA (2021 a) are anti-corruption and anti-bribery measures, excessive CEO pay, diversity (unadjusted gender pay gap and gender diversity on the board) and inclusiveness.

Environmental factors can cause negative financial impacts through different channels, which can be classified as physical risks and transition risks (Sanderson et al, 2019). Physical risks, i.e. risks arising from the physical consequences of climate change and environmental degrada-

tion, can be further subdivided into acute risks (such as extreme weather events) and chronic risks (such as rising sea levels). Acute risks are the direct result of environmental destruction, while chronic risks are the result of slower shifts in climate and weather conditions and the slow loss of ecosystem functions (EBA, 2021 a).

Transition risks arise from the long-term impact of the environment on the economy and are driven by environmental policies, technological change, and changes in consumer preferences and behaviour. Environmental policies may affect the future prices and profitability of carbon-intensive sectors. Technological change may lead to the obsolescence of current technologies. Since environmental policies are often enacted through changes in regulation, transition risks entail a strong regulatory risk component (Stroebel & Wurgler, 2021). Changes in consumer preferences and behaviour towards a stronger environmental emphasis are reflected in the choice of financial products and services, which financial institutions need to consider to safeguard their reputation.

A proper definition of ESG risks facilitates the incorporation of quantitative and qualitative indicators into the metrics and methods for assessing and managing risks in financial institutions.

3. Quantitative and qualitative indicators, metrics and methods for assessing ESG risks

Financial institutions should strive to cover all relevant risks, including ESG risks, when building a sound risk management framework (Greenbaum, Thakor, and Boot, 2019). Challenges arise due to specificities of ESG risks. ESG risks are characterised by a high degree of uncertainty. It is difficult to predict with certainty the timing of the introduction of environmental policies and regulation, as well as the timing and impact of physical risks on a financial institution's assets and counterparties. ESG risks may only become apparent over a longer time horizon, which may span several decades, whereas a typical risk management framework is designed to address risks over a shorter time horizon. This is why Carney (2015) characterized the climate crisis as the Tragedy of the Horizon, beyond the typical timeframe of the financial industry. ESG risks may affect a financial institution through a number of different points and types of exposure. They can be non-linear in nature and cause a chain reaction, cascading their impact.

All the challenges should not discourage financial institutions from integrating ESG risks into their risk management system. Rather, they need to make an extra effort to do so. Financial institutions need to establish a system of qualitative and quantitative indicators based on an ESG taxon-

¹ Regulation (EU) 2020/852 of the European Parliament and of the Council establishing a framework to promote sustainable investments and amending Regulation (EU) 2019/2088 and the Common Regulatory and Technical Standards on ESG disclosure standards for financial market participants (European Supervisory Authorities, 2021).

omy framework, which encourages financial institutions to properly identify and establish ESG risk indicators, while preventing greenwashing.

At the EU level, a system for identifying, measuring and managing environmental risks has emerged in the recent years, based on several strategic documents and other efforts aimed at sustainable development, including in particular the Sustainable Finance Framework. This framework comprises three key pillars: i) the taxonomy of sustainable economic activities, ii) mandatory disclosure of information on environmentally sustainable economic activities for financial and non-financial companies, and iii) sustainability tools. It is expected that a similar framework will be developed in the future for the social and governance factors, which will also have implications for the systematic identification, measurement and management of risks in these two areas.

In the EU, an economic activity is classified as environmentally sustainable under Regulation (EU) 2020/852 establishing a framework to promote sustainable investments and amending Regulation (EU) 2019/2088 (the "Taxonomy Regulation") if it contributes to one or more environmental objectives, while at the same time "does not significantly harm" another environmental objective, is carried out in compliance with minimum safeguards, and meets technical screening criteria. The Taxonomy Regulation defines the following environmental objectives: mitigation of climate change, adaptation to climate change, sustainable use and protection of water and marine resources, transition to a circular economy, prevention and control of pollution, and protection and conservation of biodiversity and ecosystems. Delegated regulations prescribe more detailed technical screening criteria to check whether companies' activities comply with the environmental sustainability taxonomy (the Taxonomy Climate Delegated Act 2021/2139) and the content and reporting templates for environmental performance indicators (the Disclosures Delegated Regulation 2021/2178). Mandatory disclosure of information on sustainable economic activities is governed by four acts: the Non-Financial Reporting Directive (2014/95/EU; NFRD) and its successor the Corporate Sustainability Reporting Directive (2022/2464; CSRD), as well as the Sustainable Finance Disclosures Regulation (2019/2088; SFDR) and Capital Requirements Regulation II (2019/876; CRR II). The first two acts apply to large non-financial and financial companies (over 500 employees in the case of NFRD and over 250 employees in the case of CSRD, including all listed SMEs and excluding micro-enterprises). The last two are specific for financial institutions. The third pillar of the EU sustainable finance

framework is a set of tools for investors, including financial product benchmarks (e.g. low-carbon indices), standards (e.g. the EU Green Bonds Standards) and labels (e.g. extending the Ecolabel to retail financial products).

The EBA (2021b) has published guidance on the calculation of environmental Key Performance Indicators (KPIs) to demonstrate how and to what extent a financial institution's activities are classified as environmentally sustainable under the Taxonomy Regulation. In accordance with the Disclosures Delegated Regulation 2021/2178, the EBA proposes the introduction of a Green Assets Ratio (GAR) to show how much of the financial activities in a financial institution's banking book (including loans, debt, and equity) are related to economic activities that are consistent with the EU environmental taxonomy. At the moment, financial institutions will only have to calculate GAR for companies that are subject to disclosures under the NFRD/CSRD directives (i.e. large corporates and listed SMEs), however, in the future, they will also have the option to include non-NFRD/CSRD exposures in their GAR calculation.

Financial institutions are required to disclose an aggregated green asset ratio and a breakdown of the green asset ratio by environmental objective (initially split between climate change mitigation and climate change adaptation assets), by stock and new lending (showing the shift towards sustainability), and by adaptation activities (i.e., those contributing to climate change mitigation objectives) and enabling activities (i.e., those promoting other activities that make a significant contribution to environmental objectives). At the same time, the financial institution should disclose a breakdown of the green asset ratio by specialised lending, showing the extent to which it finances counterparties with the aim of making them more sustainable.

For example, a financial institution is required to calculate two intermediate environmental indicators (KPIs) for loans. The first intermediate KPI shows the share of loans and receivables and of loan and equity financial instruments that finance economic activities covered by the EU taxonomy compared to *total* loans and receivables and loan and equity financial instruments. The second intermediate KPI shows the share of loans and receivables and of loan and equity financial instruments that finance economic activities that are *consistent with* the EU taxonomy, compared to loans and receivables and of loan and equity financial instruments that finance economic activities that are covered by the EU taxonomy. The green asset ratio is calculated as the share of loans and receivables and of loan and equity financial instruments that finance economic activities that

are consistent with the EU taxonomy compared to total loans and receivables and of loan and equity financial instruments (EBA, 2021).

4. Methodological approaches for assessing ESG risks

The EBA (2021a) breaks down three methodological approaches for assessing ESG risks: the Portfolio Alignment Method, the Risk Framework Method (which includes stress testing) and the Exposure Method. The Portfolio Alignment Approach is based on an in-depth understanding by financial institutions, investors, and supervisors of the extent to which a financial institution's portfolio is aligned with globally harmonised sustainability objectives. As examples, the EBA (2021a) cites the 2DII PACTA tool (Paris Capital Transition Agreement, developed by the 2 Degrees Investment Initiative)² and UNEP FI (United Nations Environment Programme).³

The Risk Framework Method assesses how sustainability-related factors affect the risk profile of a bank's portfolio and the associated standard risk indicators. The Risk Framework Approach paints an in-depth picture of a financial institution's exposure to ESG risks through climate stress testing and climate sensitivity analysis.

The Exposure Method identifies how ESG factors affect individual exposures and the financial institution's counterparties. In doing so, it assesses the impact of ESG factors on the standard assessment of financial risk categories. In addition to providing additional information on the impact of ESG factors on established risk management practices, the Exposure Approach facilitates dialogue with counterparties and investors. The exchange of views can improve counterparties' strategies and business models in the light of a deeper understanding of the impact of ESG factors and thus contribute to a sustainable economy.

5. ESG risk management

The EBA (2021a) makes several suggestions on how to adapt banks' business strategies to ESG risk exposures. ESG risks should be integrated into banks' business models with a view to a longer time horizon of at least 10 years. If financial institutions have not developed quantitative assessments for a period longer than 5 years, they should at least consider a qualitative assessment.

Financial institutions should develop, disclose, and implement specific ESG risk-related objectives or limits, including associated environmental indicator KPIs, that are appropriate to risk appetite and take into account the size, nature,

and complexity of the activities of financial institutions. ESG risk-related objectives or limits should be both qualitative and quantitative, and may draw on data derived from the Taxonomy Regulation. Financial institutions should develop a framework for ESG risk management in communication and cooperation with borrowers, investors, and other stakeholders. Financial institutions should also develop new, sustainable products and services and align current products and services with ESG objectives.

The EBA (2021a) suggests that financial institutions should integrate ESG risk treatment into their internal control processes. The integration of ESG risks should be supported by senior managers in the assignment of tasks and responsibilities related to ESG risks, in the setting up of appropriate internal control processes and ESG risk management, in the setting up of a remuneration system that is established on the long-term tracking of the financial institution's business strategy, objectives, and values. ESG risks should be integrated into the corporate governance structures through detailed working procedures for business processes, internal control functions, and management. Work tasks and responsibilities in relation to ESG risks should be accurately segregated, including the division of responsibilities among members of management. Employees throughout the organisational structure should receive additional training, where necessary, in the detection of exposure and management of ESG risks. ESG indicators and ESG targets or limits should be used in the design of remuneration policies, while at the same time avoiding greenwashing.

The EBA's proposals (2021a) further elaborate on the risk management framework. Financial institutions should include ESG risks in their risk appetite framework, where they should describe not only risk appetite, acceptable risk levels, risk overshoots, and limits, but also how risk indicators and limits are distributed within the banking group, across business lines, and branches. ESG risk data should be collected at the loan origination stage and adjusted for potential changes when assessing the creditworthiness of counterparties. ESG risk control metrics should be built at individual exposure, counterparty, and portfolio level. ESG risks and their impact on financial risks should be considered through existing risk management frameworks as required by the Internal Capital Adequacy Assessment Process (ICAAP) and the Internal Liquidity Adequacy Assessment Process (ILAAP).

The EBA will pursue a gradual introduction of the ESG approach into the risk management framework, with an initial focus on environmental ("E") risks and the subsequent inclusion of social ("S") and governance ("G") factors.

² <https://2degrees-investing.org/resource/pacta/>

³ <https://www.unepfi.org/>

6. Overview of EU regulation of ESG risks

This subsection reviews how ESG risks are currently integrated into the regulation and supervision of EU banks through the three pillars of the Basel Accord.

Under Pillar 1 of the Basel Accord, which addresses the prudential treatment of minimum capital requirements, the EBA is required under CRR2,⁴ in consultation with the European Systemic Risk Board, to consider whether environmental and/or societal risks should be included in the prudential regulatory treatment of exposures. In doing so, the EBA should consider methodologies for assessing the risk of exposures that are related to environmental and/or social objectives compared to the risks of other exposures. At the same time, it should assess physical and transition risks, as well as downside risks due to regulatory changes. It should also assess the potential impact of the prudential regulatory treatment of exposures to assets or activities that are linked to environmental and/or social impacts on financial stability and bank lending in the European Union. In its discussion paper, the EBA (2022a) makes preliminary proposals and seeks appropriate solutions to integrate environmental risks into the first pillar of the Basel Accord. It examines how environmental risks are reflected in the current regulatory treatment of credit, market, and operational risks. It concludes that there is a need to be vigilant about the integration of environmental risks into the overall regulatory framework and not only into the first pillar of the Basel Accord. It points out that it is better to use the existing regulatory framework and existing risk identification mechanisms to incorporate environmental risks than to introduce additional risk-adjusted factors. Double counting of the same risks should be avoided, and it makes sense to take a forward-looking approach to risks, relying on empirical and scientific evidence. At the same time, the EBA warns that stability regulation should focus on risks and not on other environmental objectives.

Under the second pillar of the Basel Accord, which governs regulatory supervision, 98. Article 2 of Directive (EU) 2019/878 of the European Parliament and of the Council of 20 May 2019 amending Directive 2013/36/EU as regards exempted entities, financial holding companies, mixed financial holding companies, remuneration, supervisory actions and powers and capital conservation measures, tasks the EBA to assess whether ESG risks should be included in the regulatory review of financial institutions.

In response to Directive (EU) 2019/878, the EBA (2021a) shall develop common definitions of ESG risks, including physical and transition risks, including risks related to asset write-downs as a result of regulatory changes. The EBA (2021a) shall consider how it would be appropriate to integrate the treatment of ESG risks into the analysis of banks' business models, internal governance mechanisms, and the assessment of risk-based capital. It notes that the current assessment of the long-term performance of a financial institution does not sufficiently incorporate the long-term impact of ESG risks and suggests using a longer time horizon (10 years instead of 3-5 years). The EBA (2021a) proposes that the supervisory review should include the impact of ESG risks in the assessment of internal governance, including the functioning of the board of directors, the risk culture, remuneration policies, the risk management framework and information systems, and internal controls. At the same time, financial institutions should consider the impact of ESG risks on credit risk, market risk, and operational risk, which may have an impact on the financial institution's capital and liquidity risk and its ability to refinance (EBA, 2021a). The EBA intends to include ESG risks in the revised SREP Guidelines.

The ECB has issued supervisory recommendations (ECB, 2020) setting out recommendations to banks on the treatment of climate and environmental risks within existing risk categories in the design and implementation of business strategies and in the management and control of risks. Banks are expected to understand the impact of climate and environmental risks in the short, medium, and long term. Banks should take this impact into account when building their business strategy and risk appetite framework. They should define responsibility for managing climate and environmental risks within the corporate governance framework, and evaluate the impact on the bank's capital adequacy and the riskiness of the loan portfolio (by integrating climate and environmental risks into individual loan approval processes).

Under Pillar 3, which regulates market pressure, incentives and requirements for financial institutions to disclose their exposure and the exposure of different financial products and services to ESG risks as transparently as possible are being strengthened. Regulation (EU) 2019/2088 of the European Parliament and of the Council of 27 November 2019 on sustainability-related disclosures in the financial services sector (SFDR) requires financial market participants to disclose how they consider ESG risks in their decision-making processes and in their financial products, and the impact of investment decisions and products on ESG factors (i.e. following the double materiality principle).

⁴ Under Article 501c of Regulation (EU) 2019/876 of the European Parliament and of the Council of 20 May 2019 amending Regulation (EU) No 575/2013 as regards the leverage ratio, the net stable funding ratio, capital and qualifying commitment requirements, counterparty credit risk, market risk, exposures to central counterparties, exposures to collective investment undertakings, large exposures, reporting and disclosure requirements and Regulation (EU) No 648/2012.

Regulation 2019/2088 is further enhanced by Commission Delegated Regulation (EU) 2022/1288 of 6 April, 2022 supplementing Regulation (EU) 2019/2088 of the European Parliament and of the Council with regard to regulatory technical standards specifying the content and presentation of information on the principle of "no material adverse impact", the content, methodologies and presentation of information on sustainability indicators and adverse sustainability impacts, and the content and presentation of information on the promotion of environmental or social characteristics and objectives of sustainable investments in pre-contractual documents, on websites and in periodic reports.

Under Pillar 3, which focuses on non-financial disclosures, Directive (EU) 2022/2464 of the European Parliament and of the Council amending Regulation (EU) No 537/2014, Directive 2004/109/EC, Directive 2006/43/EC and Directive 2013/34/EU as regards corporate sustainability reporting (the Corporate Sustainability Reporting Directive, CSRD) builds on Directive 2014/95/EU of the European Parliament and of the Council amending Directive 2013/34/EU as regards disclosure of non-financial and diversity information on certain large companies and groups (Non-financial Reporting Directive, NFRD), which ensures that investors and other stakeholders have access to quality sustainability information on large and listed companies.

In accordance with Article 449a of Regulation (EU) 2019/876, the EBA has issued draft implementing technical standards on regulatory disclosures under Pillar 3 of the Basel Accord (EBA, 2022b) proposing quantitative disclosures on the transitional and physical risks associated with climate change, including information on the impact of carbon-related assets and assets subject to chronic and acute climate change impacts. The draft technical standards contain quantitative disclosures on mitigation measures that financial institutions use to help counterparties transition to a carbon-neutral economy and adapt to climate change. At the same time, the draft implementing technical standards contain a Green Asset Ratio (GAR)⁵ and refer to the Taxonomy Regulation in this respect. Furthermore, they also mandate another KPI in addition to GAR, called the Banking Book Taxonomy Alignment Ratio (BTAR), which is similar in concept to GAR, but also includes non-NFRD/CSRD exposures.

The EBA has also conducted an EU pilot stress test on climate risks (2020-2021) and issued a report on sustainable

securitisation (EBA, 2021c, 2022c).⁶ It has yet to determine how banks' ESG risk exposures will be included in banks' supervisory reporting in light of the Banking Package proposal⁷ and to provide guidance on green retail lending and mortgages.

7. Conclusion

Financial institutions are embarking on a challenging path towards sustainable development. They need to integrate ESG factors into their business, understand ESG risks, define them and address them quantitatively and qualitatively. Quantitative and qualitative indicators and metrics and methods for assessing ESG risks help them to do this. Financial institutions need to adapt their existing risk management frameworks by integrating ESG risks into their operational processes. A single regulatory environment for sustainability will help to unify approaches to sustainable development while preventing greenwashing.

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⁶ Acharya et al. (2023) review the regulatory frameworks for climate stress testing. They call for further understanding of the dynamics of behaviour of market participants and the feedback loops between climate change and the economy including compounding effects of climate risks and other risks.

⁷ Article 430(1)(h) of the Proposal for a Regulation of the European Parliament and of the Council amending Regulation (EU) No 575/2013 as regards credit risk, credit valuation adjustment risk, operational risk, market risk and exit threshold requirements (European Commission, 2021).

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How can Slovenian banks embrace sustainable finance

*Uroš Ačko**

This article takes you through the geopolitical and strategic context for sustainable finance and highlights some trends in the development of sustainable finance globally and in Europe. It outlines a number of possibilities where Slovenian banks can adapt their business models to meet sustainability objectives and support Slovenia's green transition. Sustainable finance can become an important competitive advantage for some banks, especially those that are the first to recognise the new opportunities that already exist or will arise from upcoming regulatory and technology-driven changes in banking and capital markets.

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Introduction

This article takes you through the geopolitical and strategic context for sustainable finance and highlights some trends in the development of sustainable finance globally and in Europe. It outlines a number of possibilities where Slovenian banks can adapt their business models to meet sustainability objectives and support Slovenia's green transition. Sustainable finance can become an important competitive advantage for some banks, especially those that are the first to recognise the new opportunities that already exist or will arise from upcoming regulatory and technology-driven changes in banking and capital markets.

Sustainable finance

The term 'sustainable finance' is very widely used and there may be differences in definition between different users around the world. For the purposes of this article, the definition used is that of the European Commission (European Commission, 2023), which is as follows: "Sustainable finance refers to the process of taking environmental, social and governance (ESG) considerations into account when making investment decisions in the financial sector, leading to more long-term investments in sustainable economic activities and projects. Environmental considerations might include climate change mitigation and adaptation, as well as the environment more broadly, for instance the preservation of biodiversity, pollution prevention and the circular

economy. Social considerations could refer to issues of inequality, inclusiveness, labour relations, investment in human capital and communities, as well as human rights issues. The governance of public and private institutions – including management structures, employee relations and executive remuneration – plays a fundamental role in ensuring the inclusion of social and environmental considerations in the decision-making process. In the EU's policy context, sustainable finance is understood as finance to support economic growth while reducing pressures on the environment and taking into account social and governance aspects. Sustainable finance also encompasses transparency when it comes to risks related to ESG factors that may have an impact on the financial system, and the mitigation of such risks through the appropriate governance of financial and corporate actors."

Strategic and geopolitical context

Many countries around the world have set ambitious sustainability targets to achieve net-zero emissions by 2050 (e.g. EU, US, Japan, Switzerland, UK, Australia, UAE, Canada), some a few years later, i.e. by 2060 (e.g. China, Russia, Saudi Arabia) and some by 2070 (e.g. India). Countries with longer timeframes or no commitments are usually less developed or have other strategic priorities. The European Union's (EU) commitment to reduce greenhouse gas emissions by 55% by 2030 puts Europe on a path to climate neutrality by 2050, potentially making Europe the world's first carbon-neutral continent. As an EU

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Member State, Slovenia has committed to the same targets as the EU.

There have been a number of recent studies on the level of investment required to meet the Paris Agreement targets on global warming and achieve net-zero emissions by 2050. According to a study by McKinsey, there is an estimated global investment gap of USD 275 trillion, meaning that current investment would need to increase substantially by USD 3.5 trillion from a level of USD 5.7 trillion per year to an average of around USD 9.2 trillion per year (approx. +61% more per annum). To close the investment gap, the private sector needs to effectively complement the public sector (Krishnan, M., Samandari, H., Woetzel, J., Smit, S., Pachod, D., Pinner, D., Naucler, T., Tai, H., Farr, A., Wu, W., Imperato, D., 2022).

Climate investment is growing but is still well below what is needed to meet Europe's net-zero emissions target by 2050, according to the EIB's Climate Investment Report 2022-2023. The EIB report notes that meeting the EU's climate targets by 2030 will require investments of around EUR 1 trillion per year, some EUR 356 billion per year more than in the period 2010 to 2020. In addition, the EU will spend up to EUR 300 billion by 2030 to become independent of energy supplies from Russia. Increased uncertainties such as geopolitical risks, restrictive monetary policies, energy crisis, high inflation, expected economic slowdown, higher cost of capital in combination with higher debt levels may force EU member states to consolidate their finances by cutting public investment in the future. The report also notes that the green transition to succeed, much of the investment will need to come from private funds in addition to public funds. Sustainable finance, which has already developed significantly and grown in volume, will play a very important role in the transition (EIB Economics Department, 2023).

In Slovenia, the estimated investment gap between the investment potential and the investment needs identified in the National Energy and Climate Plan is somewhere between EUR 8.0 billion and EUR 8.7 billion, i.e. around 2.0% of GDP per year, according to a report by the Fiscal Council of the Republic of Slovenia (Brložnik, J., 2022). Similar to the global and EU context, closing Slovenia's investment gap will require an effective mix of public and private funds, as well as preparedness for contingencies. According to BlackRock, the recent energy crisis combined with the war in Ukraine is accelerating the transition to lower emissions in the long term. In Europe, the race for clean energy leadership among the superpowers is likely to accelerate and intensify in response to the Inflation Reduction Act (IRA), particularly in the industrial and technol-

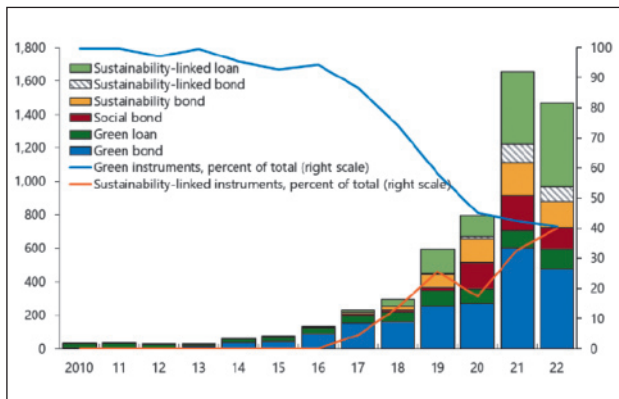
ogy sectors. The IRA, passed by the US Congress last summer, provides some USD 369 billion in grants, loans and tax credits for the deployment of renewable energy and clean technologies in the US, of which some USD 90 billion has already been approved. Earlier this year, the European Commission unveiled the Green Deal Industrial Plan (in addition to the existing The Green Plan from 2019) to boost the competitiveness of Europe's zero-carbon industries and support a rapid transition to climate neutrality. With the new measures (simplifying state aid, European Sovereignty Fund, etc.), the EU is widening the so-called subsidy race with the US and other advanced countries (Japan, the UK, China, etc.) for key technologies and allowing EU Member States to increase public spending. The risk of climate policy gridlock, in the context of developed economies failing to increase public investment or take action to achieve net-zero emission targets, is closely linked to other geopolitical risks, such as strategic competition between the US and China, and global technology decoupling (BlackRock Investment Institute, 2023). All these major strategic and geopolitical developments are bound to affect the future of sustainable finance in Europe and Slovenia.

Trends in sustainable debt and capital markets developments

Sustainable debt has grown exponentially in recent years, moving from the fringe to the mainstream. The high growth of sustainable debt turned downward in 2022 due to increased global uncertainties (war in Ukraine, energy crisis, high inflation, rising interest rates and cost of capital, etc.), with global outstanding sustainable debt falling by around 11% from USD 1.7 trillion to USD 1.5 trillion. Nevertheless, the growth of sustainable debt is expected to continue to accelerate, supported by strong geopolitical and strategic ambitions around the world. The trends show a strong momentum for sustainability-linked instruments, which have increased their share of the total sustainable debt from 33% to 40% in 2022.

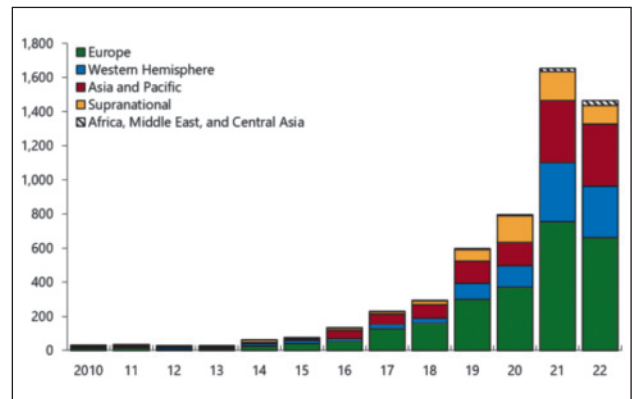
Advanced countries are the main borrowers with the most sustainable debt issuance in 2022, with Europe's share of total issuance remaining high and stable at 45% in 2022 (Gardes-Landolfini C., Gautam, D., Kemp, E., Xiao, Y. 2023). According to McKinsey, sustainable bond issuance currently accounts for about 12% of total global bond volume, with a similar share in the global syndicated loan market, where the volume of sustainability-linked loans accounts for about 13% of total global syndicated loan volume. In the sustainable debt market, it is interesting to note that sustainability-linked loans (SLLs) are growing much

Figure 1: Global Sustainable Debt Issuance by Instrument (in billions of US dollars)



Source: Bloomberg Finance L.P. and IMF staff calculations.

Figure 2: Global Sustainable Debt Issuance by Region (in billions of US dollars)



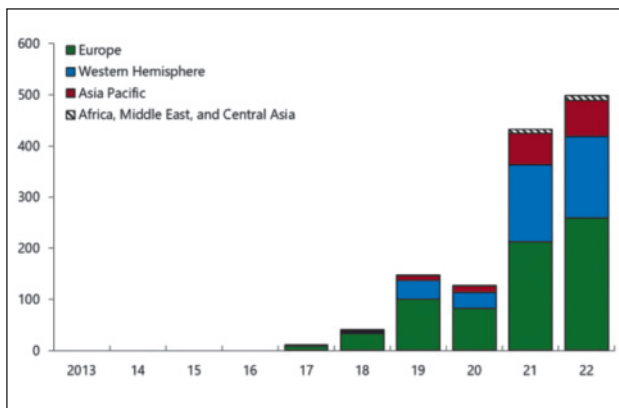
Source: Bloomberg Finance L.P. and IMF staff calculations.

faster than green bonds, which may be due to the dominance of bank financing globally. SLLs are performance-based instruments designed to be more flexible than "use of proceeds" instruments such as green bonds, which can only be used for specific, earmarked projects according to specific guidelines (EU taxonomy, ICMA principles, etc.). SLLs can mobilise significant capital for transition finance, although the evaluation of SLLs and their KPIs needs to be rigorous to ensure credibility and avoid greenwashing. According to the McKinsey study, banks are building innovative green businesses across all segments in products and services, as well as various advisory or trading platforms for their clients, enabling them to embark on a sustainability pathway. The figure below, prepared by McKinsey & Company, provides a comprehensive view of the new sustainable finance businesses in banking. (Cooke, M., Feldman, P., McCarthy, K., Runggatscher, M., Depin, C., 2022).

The AMFE report notes that Europe's global attractiveness as a place to invest in is falling further behind other coun-

tries. EU domestic market capitalisation of listed shares accounted for 10% of the world's total in 2022, a decline from 18% in 2000. The report shows that the progress of the EU CMU (Capital Markets Union) lags behind that of other advanced economies, particularly in terms of the widening equity gap between the EU and its global peers and the sluggish securitisation market, which continues to be a major drag on the EU financial system. In the EU, on average, about 9.4% of non-financial corporations use the capital markets for bond and equity financing. This is more than 10 percentage points less than in the US and the UK. Since the beginning of the pandemic, the share of corporate financing through the capital markets has been declining, largely due to the increase in the cost of capital and the high level of governments supporting the economies. The figure below shows that companies in Slovenia do not generally use the capital market to raise funds, indicating a strong reliance on bank financing compared to other European countries. Typical bond issuers in Slovenia, apart from the government, are usually banks and occasionally

Figure 3: Sustainability-linked Loan Issuance by Region (in billions of USD)



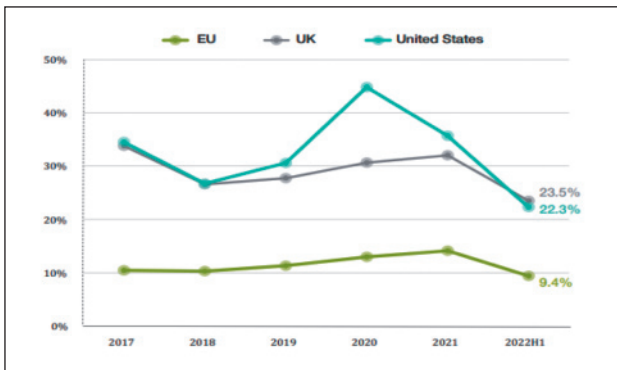
Source: Bloomberg Finance L.P. and IMF staff calculations.

Figure 4: Banks' innovative green lines of businesses

Business type	Examples
Products and services	Lending Retail banking: Electric-vehicle (EV) loans, green mortgages CIB: Sustainability-linked loans, green loans, securitized loans (eg. residential solar), supply chain financing
	Tailored offerings for sectors, technologies, or customer groups Capital markets CIB: Green-bond issuance, equity issuance for cleantech companies, M&A advisory
Investments	Retail banking and CIB: Green deposits Wealth and asset management: Climate technology funds, climate transition funds, decommissioning funds, blended finance funds
	Other innovative services Retail banking: Car subscription, reverse leasing of rooftop solar Wealth and asset management: Proxy voting choice, climate-based security selection and portfolio modeling
Platforms	Dedicated advisory or trading platforms for a wide range of customers Retail banking: EV education, purchasing, and financing resources for retail customers CIB: Energy-efficiency education and financing resources for customers that are small and medium-size enterprises
	Asset placement platform CIB: Originate-to-distribute platforms for green assets (eg. renewable-infrastructure assets)
	Carbon markets All: Carbon footprint tracking, carbon offset solutions

Source: McKinsey & Company

Figure 5: Market Finance Indicator (NFC equity and bond issuance as a % of total NFC annual financing)



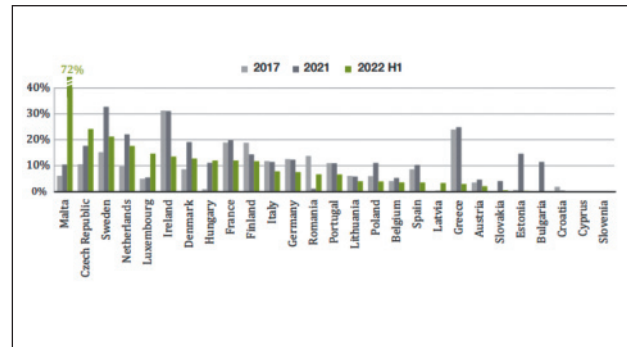
Source: AFME, Capital Markets Union, Key Performance Indicators – Fifth Edition, November 2022

larger companies, which also issue commercial paper from time to time. There are virtually no large initial or secondary public offerings on the capital markets.

To improve the functioning of capital markets in Europe, the European Commission has introduced a number of overhaul regulations in recent years, notably in the areas of securitisation and ELTIFs (European Long Term Investment Funds). The European Commission's CMU Action Plan proposes securitisation as a key tool for European capital markets to reduce the over-dependence on bank financing and improve access to capital markets for European borrowers. Securitisation is particularly valuable in freeing up bank balance sheets (RWA, capital optimisation, MREL requirements), facilitating financing for SMEs and mid-caps, and providing new investment opportunities for domestic and cross-border investors. According to AFME, green securitisation alone has huge potential and could exceed EUR 300 billion per year by 2030, including residential mortgages for energy-efficient properties, loans for green home renovations and financing for electric vehicles (AFME, 2022). Beyond green securitisation, the potential for securitisation more broadly is much greater, in particular because of the potential to achieve economies of scale by aggregating smaller illiquid loans into larger liquid packages, thus creating new attractive alternative investment opportunities for a broader investor base.

Synthetic securitisation has been used more commonly in Europe recently, and interestingly also by smaller banks in Central and Eastern Europe (CEE) and South-eastern Europe. A good recent example of a synthetic securitisation can be found in Romania, where Raiffeisen Bank S.A., in cooperation with the EIB Group, securitised a EUR 308 million non-retail loan portfolio, which remained on the bank's balance sheet and was split into senior, mezzanine and junior tranches. The risk of the mezzanine tranche was

Figure 6: Market Finance Indicator by country for bond and equity issuance by the Non-Financial Corporates (NFCs) as a % of total NFC financing



Source: AFME, Capital Markets Union, Key Performance Indicators – Fifth Edition, November 2022

assumed by the EIF, while the risks of the senior and junior tranches were retained by the bank. The synthetic securitisation was used to optimise capital and MREL requirements, thereby increasing the bank's corporate lending capacity. Similarly, Raiffeisenbank Austria d.d., the Croatian subsidiary of Austria's Raiffeisen Bank International AG, undertook a EUR 366 million synthetic securitisation of its SME and corporate loan portfolio, with the EBRD assuming the risks of the mezzanine tranche through an unfunded protection guarantee. As in the previous example, the bank was able to reduce its RWA, and optimise capital and MREL requirements. The transaction is seen as a green securitisation as the new financing will support sustainability objectives.

The next major development in the capital markets is the revised ELTIFs regulation (ELTIF 2.0), which will be fully operational in early 2024 and is expected to boost investment in the EU economy as the new rules make it easier for asset managers to launch products for both institutional and retail investors. Key new benefits include easier access for retail investors, an expansion of eligible assets, the use of prudent levels of borrowing to increase investment potential and the ability to co-invest with other funds. The ability of ELTIFs to lend on a cross-border basis within the EU is a key feature of the ELTIF regulation. Over the next five years, the new ELTIF 2.0 could support an additional EUR 100 billion of financing for EU companies, growing exponentially from its current level of EUR 10 billion, according to the AFME report (AFME, 2022). The latest revision of ELTIF is part of the EU's wider Capital Markets Union initiative, which aims to strengthen EU capital markets and reduce reliance on bank funding. According to BlackRock, ELTIFs are virtually the only scalable vehicle capable of distributing private markets to retail investors across Europe's borders.

Banks around the world are accelerating investment in their

ESG capabilities, driven by strategic paths to zero emissions and new regulatory requirements on climate risk, reporting and disclosure. The most advanced and forward-thinking banks have already adapted their business models by enhancing their competitive advantage and creating a positive public image. The pace of change in sustainable debt, equity and alternative investment funds is exponential. Banks and other financial institutions, such as asset managers, insurance companies, infrastructure funds and other institutional investors, are becoming increasingly involved and committed to sustainable finance, increasing competition between participants both locally and internationally.

Sustainable finance possibilities for banks in Slovenia

The following section presents some possibilities and views on how Slovenian banks, together with some improvements in the capital market, could position themselves and integrate sustainable finance into their business models, thus contributing even more significantly to the green transition in Slovenia.

Hypothetically, Slovenian banks could be constrained by a lack of capital at some point during the green transition. Assuming a dysfunctional domestic capital market, this could lead to delays in the green transition or the need to involve more public funds. It is essential to prepare adequately for contingencies and to adapt as much as possible to the new realities created by global strategic and geopolitical drivers. The Slovenian banking system is considered relatively well consolidated and characterised by high household and corporate deposits compared to European banks. According to the Bank of Slovenia's Financial Stability Report, the liquidity coverage ratio at the level of the Slovenian banking system was around 290% in mid-2022, one of the highest in Europe. This implies a liquidity surplus above the regulatory requirement of around EUR 8.7 billion, about a quarter higher than before the start of the pandemic (Bank of Slovenia, 2022). Part of this surplus could gradually be transferred to the capital markets as attractive opportunities for households emerge over time. To stimulate the capital market, new investment opportunities need to be attractive in terms of return, risk and diversification benefits, and they need to be accessible quickly, easily and at low cost.

In the past, the strong liquidity position of banks in Slovenia and the steady growth of deposits have discouraged banks from actively issuing bonds, which has largely contributed to the low level of bond issuance and the absence of new forms of financing such as covered bonds and securitisation. In addition, the reliance of corporates on bank financing has been very high, probably due to favourable

financial conditions and simpler and less costly procedures compared to capital market financing. Over the decades, this has resulted in a strong domestic banking system, which enjoys high public confidence, and an underdeveloped domestic capital market, especially compared to other European countries. It is also important to note that Europe lags far behind the most developed countries, such as the US and the UK, in terms of capital market development, and Slovenia is at an even greater disadvantage in this respect.

Assuming that deviations and anomalies revert to the mean in the long run, and in the context of strategic ambitions to strengthen the EU CMU (EC Capital Markets Action Plan) and the Slovenian capital market (Strategy for the Development of the Capital Market in Slovenia by 2030), financial resources in general, including those of Slovenian households, are likely to be allocated more optimally in the long run. Under this assumption, Slovenian banks will need to gradually increase the share of financial instruments on their balance sheets and, where appropriate, use them to optimise sustainability objectives with capital and MREL requirements. If this were to happen, Slovenian banks could actively use ESG-labelled financial instruments as part of their liabilities, such as green, social or sustainability senior preferred notes, senior non-preferred notes, AT1/T2 bonds, green covered bonds, green or brown securitisations and other innovative green instruments. Moreover, taking into account the fact that the Slovenian economy is highly dependent on bank financing and that the domestic capital market is rather underdeveloped, it can be expected that, at least in the initial phase, the share of green, social, sustainability and sustainability-linked loans as part of banks' assets will be the dominant financing compared to non-bank financing. Green, social, sustainability and sustainability-linked bond issuance in the non-bank sector is likely to remain limited to large corporates (at least until new distributed ledger technologies emerge).

Given the relatively small size of the Slovenian banking system and its capital market compared to its peers, it would be most practical to focus on a small number of solutions with the highest potential. The sustainable finance instruments with the highest potential for Slovenian banks could be green covered bonds (especially in the case of a structural decline in bank deposits over the next decade), green, brown or other types of securitisation (new supply of alternative investments with attractive risk/return profiles and diversification benefits) and investment funds (in particular ELTIFs, which are able to mobilise private funds on a larger scale). To accelerate the development of sustainable finance and gain a competitive advantage in this area,

Figure 7: Hypothetical new possibilities in the domestic banking system and the capital market

Slovenian banking system as at 31.12.2022 (m EUR)			Hypothetical new possibilities in banking system	Hypothetical new investment opportunities in capital market
Assets	50,600	100%		
Cash, CB, sight deposits at banks, Securities/Financial assets	19,204	38%	<---- green repos; green, social, sustainability securities / financial assets	Green and / or brown securitisation ---> investor universe: insurance companies, pension funds, asset managers, commercial banks, etc.
Loans to non-banking sector	27,538	54%	<--- green and/ or brown securitisation (originate-to-distribute model, synthetic or true sale) <---sustainability-linked loans, green, social loans, etc.	ELTIFs (max. 20% in securitisation, other exposures to infrastructure, sustainable bonds, real estate, alternative investment funds, etc.) ---> investor universe: professional and retail investors
Residual	3,858	8%		
Equity and liabilities	50,600	100%		
Liabilities to non-banking sector (deposits by NBS)	39,756	79%	<--- green deposits	
Debt securities	2,066	4%	<--- sustainable debt securities (e.g. commercial papers, covered bonds, SP, SNP, T2, AT1)	Distributed Ledger Technology - issuance, trading and settlement of tokenised financial instruments of SMEs and MidCaps ---> investor universe: professional and retail investors
Shareholder equity	5,151	10%		
Residual	3,627	7%		

banks and capital market participants need to use modern automation and artificial intelligence means to provide their clients with attractive investment or financing opportunities, not only in terms of risk/reward/diversification benefits, but also in terms of time and customer experience.

The figure below shows the structure of the Slovenian banking system and hypothetical possibilities in the area of sustainable finance for domestic banks in relation to the domestic capital market. Banks have a wide range of sustainable finance instruments at their disposal that they could use in the future, and they can also play a greater role than in the past in the development of the capital market.

Figure 7: Hypothetical new possibilities in the domestic banking system and the capital market

Finally, securitisation and ELTIFs deserve further consideration. Surprisingly, European banks currently make little use of securitisation and the use of ELTIFs is currently insignificant compared to their potential use as a means of efficiently allocating financial resources on a larger scale to support the green transition. In Slovenia, securitisation and ELTIFs are perhaps even more relevant because the relatively small size of individual transactions (loans, funding, investments) makes it almost impossible to achieve high efficiency in terms of liquidity, costs, profitability, and overall attractiveness to investors. Securitisation and ELTIFs could open the doors to new funding and financing opportunities for Slovenian banks and new investment opportunities for a wider range of investors by aggregating smaller tickets and different assets into larger pools with enhanced characteristics. Investors would benefit by participating directly or indirectly in loans through securitisation or ELTIFs, while banks would optimise their RWA and capital after selling their loans or transferring risks and gain capacity for re-lending to new projects. As the green transition in Slovenia requires the mobilisation of a significant share of private funds, securitisation (green and/or brown) and ELTIFs have the potential to play an important role.

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An energy transition risk stress test for the banking system of the Slovenia

Slaven Mičković*

This paper describes the stress test exercise under a energy transition scenario. In order to assess the impact of fossil fuel price volatility on economic growth, the fossil fuel basket is defined, based on Slovenia's energy supply structure and including oil, natural gas and coal. Special attention is paid to assessment of the economic and financial impacts of the energy transition scenario. PD adjustment factors by industry are estimated for the corporate and retail portfolios and allow banks to instantly convert existing default probabilities to default probabilities in the event of a change in (environmental or fiscal) policy.

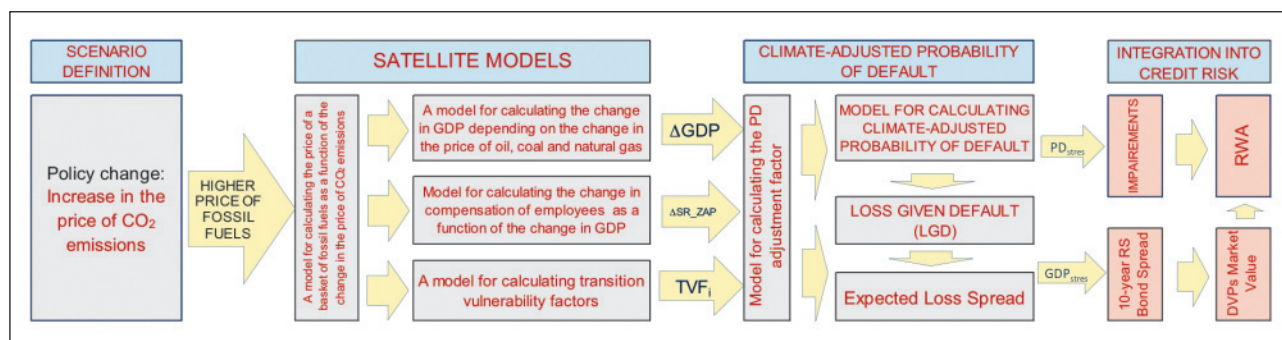
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1. Introduction

Climate change presents both risks and opportunities for the economy and, by extension, for the financial sector. Understanding the risks is key to preparing for a successful transition to a global low carbon economy, which will unlock many opportunities for technological progress and structural transformation along a path that the financial sector will need to adapt to and support. This paper presents an emerging approach to assessing the impact of climate change or policies on banking sector stability risks.

is uncertain to what extent the Paris Agreement will be translated into concrete policy actions that support the transition to a low-carbon economy, iii. it is unknown how technological developments will affect the energy transition. As a result, many different scenarios for the energy transition can be imagined, the relative likelihood of which is very difficult to assess. In the light of these uncertainties, stress testing is a useful way to quantify the risks of the energy transition. A schematic illustration of the methodology for stress testing is given in Figure 1.1.

Figure 1.1. Schematic representation of the methodology for energy transition stress testing



Climate change and the transition to a low-carbon economy are subject to fundamental uncertainties: i. projections of the pace and extent of global warming vary widely, ii. it

In this paper, particular attention is paid to the estimation of the climate-adjusted probability of default (PD) under a climate transition scenario (assuming a change in the price of CO₂ emissions), which is surely the most important parameter of credit risk. The methodology for calculating the

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climate-adjusted PD presented in this paper consists of the following steps, each of which is described in detail in a separate section:

- i. defining an energy transition scenario that assumes a large increase in carbon prices,
- ii. calculating the change or slowdown in economic growth relative to the increase in carbon prices; this step assumes the development or application of a model describing the relationship between the dynamics of oil, coal and natural gas prices on the one hand and GDP growth on the other,
- iii. estimating the relationship between the change in GDP and changes in macroeconomic variables that have a significant impact on the default rate of individuals (e.g. compensation of employees),
- iv. the calculation of transition vulnerability factors (TVFs) for the above scenario; the vulnerability of industries to the energy transition mainly stems from their dependence on fossil fuels and the resulting CO₂ emissions; the transition vulnerability factors capture the vulnerability of industries to the economy as a whole; and
- v. Calculation of the climate-adjusted PD or adjustment factor by sector:
 - for the corporate portfolio, taking into account changes in fossil fuel prices and
 - for the retail portfolio, using an adjustment factor taking into account macroeconomic variables relevant for the creditworthiness of physical persons.

The calculation of the other credit risk parameters is largely conditional on the calculation of the probability of default. For example, the loss given default can be calculated using the Frye-Jacobs approach, which only assumes the use of a stressed PD. Once we have calculated the climate-adjusted PDs and LGDs, we can calculate most of the other categories presented in the above flowchart.

2. Defining the energy transition scenario

Recent studies show that, despite complexity, achieving the Paris Agreement targets and limiting global warming is feasible if supported by reforms to reduce carbon emissions. Delivering on this promise of the Paris Agreement will require significant reductions in global greenhouse gas emissions. This requires a global transition to a low-carbon economy and energy system. Such an energy transition could create significant risks for the most carbon-intensive industries and create shocks that could be disruptive for the financial system. The energy transition scenario underlying the calculation of the climate-adjusted probability of default and loss given default is based on two key assumptions:

- a. Slovenia's economy and households are heavily dependent on fossil fuels; and
- b. the same greenhouse gas emissions tax will be introduced across the EU.

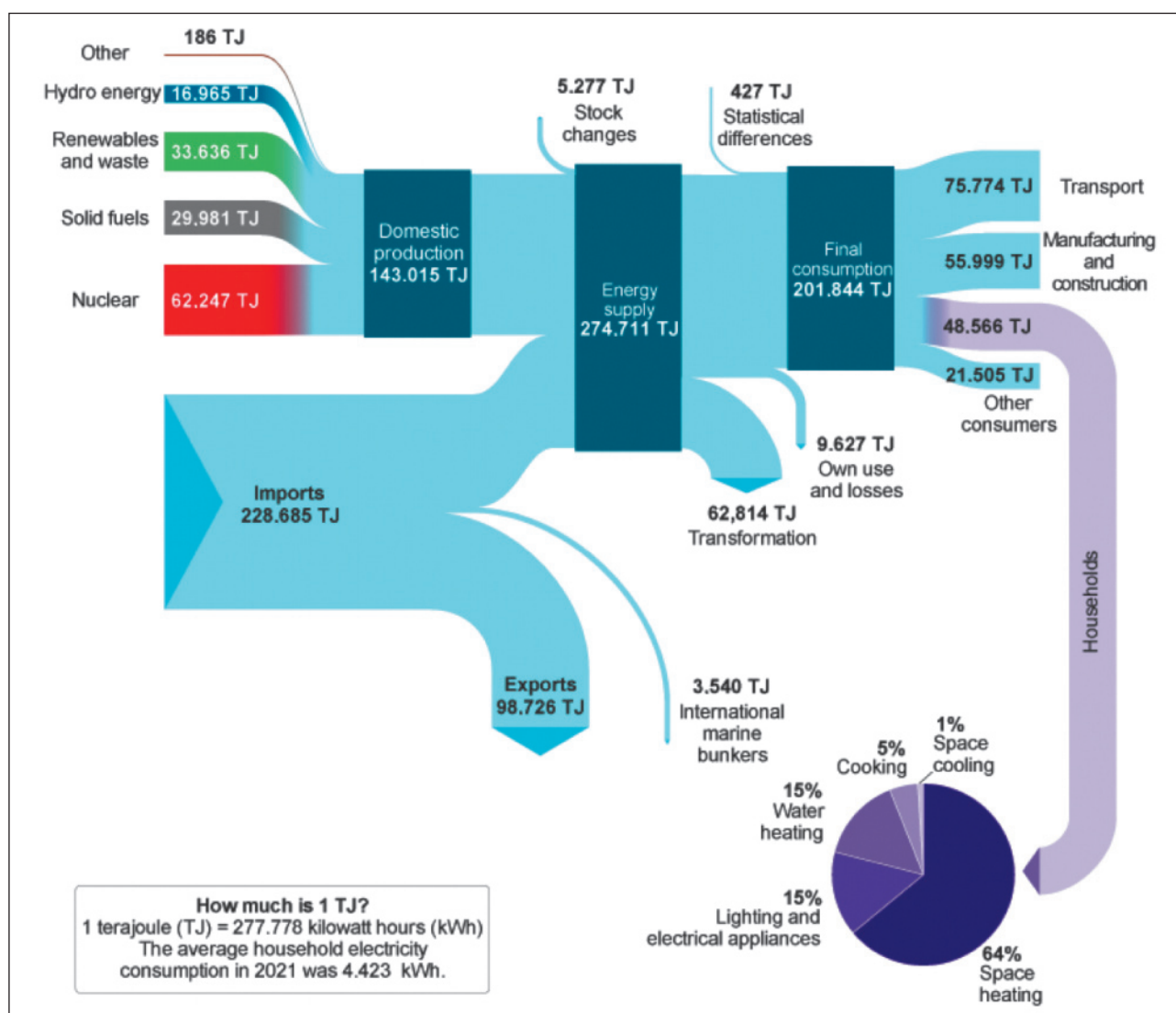
In 2021, taking into account energy imports and exports, almost 275,000 TJ were available for energy supply in Slovenia (Figure 2.1). The energy supply structure was dominated by petroleum products with a share of 31%, followed by nuclear energy (23%), renewable energy together with hydropower (20%), coal (14%) and natural gas (12%). The structure of final consumption in 2021 was dominated by oil products (almost 43%), followed by electricity (24%), renewables (16%), natural gas (13%), heat (4%) and solid fuels (1%) (Table 2.1).

The table above shows that the share of oil products in final consumption has fallen by more than 6 p.p. over the last ten years, but still stands at just under 43% in 2021. Over the same period, the share of natural gas in final consumption has risen by 1.5 p.p. It can be concluded that, despite a slightly reduced share in final consumption, the economy and households are still heavily dependent on fossil fuels. Consumption of fossil fuels is higher than socially desirable also because the social costs of greenhouse gas emissions are not sufficiently passed on in product prices. This market failure can in principle be addressed by levying a tax equal to the marginal carbon damage. In order to put a price on the externalities of GHG emissions, taxes could be levied on the emissions themselves or on the energy products that cause the GHG emissions, such as natural gas or oil. The advantage of taxing emissions is that the tax is directly targeted at the social cost causer, which will raise the cost of high emitting products compared to lower emitting products. In addition, GHG emissions not directly linked to energy consumption, e.g. emissions during chemical production processes or agricultural methane emissions, could be taxed.

There are basically two instruments for taxing emissions:

1. The first is to tax the amount of carbon dioxide and other greenhouse gases that are emitted. Although this puts a "price" on the carbon emitted, emissions as a whole can fluctuate. This gives corporations certainty about the cost of emissions, which benefits investment decisions to reduce emissions. However, the government will face some uncertainty about the extent to which emission reduction targets will be met.
2. An alternative instrument is an emissions trading scheme, where the government sets a cap on total emissions and under which corporations can buy tradable certificates for carbon emissions. This instrument caps maximum

Figure 2.1. Energy Balance, Slovenia, 2021



Source: Statical Office of the Republic of Slovenia

Table 2.1. Structure of final energy consumption in Slovenia over the period 2011-2021

Energy source	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021
Solid fuels	1.14%	1.11%	1.09%	1.12%	0.98%	0.86%	0.91%	0.96%	0.95%	0.79%	0.59%
Petroleum products	48.70%	48.70%	46.55%	47.19%	45.84%	46.52%	46.25%	46.40%	45.45%	42.07%	42.59%
Natural gas	11.43%	11.04%	11.22%	11.20%	11.78%	12.15%	12.22%	11.96%	12.07%	12.99%	12.92%
Nuclear energy	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Hydro energy	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
Geothermal, solar, etc.	0.73%	0.79%	0.90%	0.98%	1.04%	1.13%	1.20%	1.23%	1.30%	1.53%	1.64%
Renewables and waste	13.08%	13.18%	14.30%	13.15%	13.72%	13.09%	12.57%	12.43%	12.76%	13.82%	14.19%
Electricity	21.17%	21.50%	22.16%	23.04%	23.08%	22.70%	23.22%	23.51%	23.96%	24.92%	24.17%
Heat	3.75%	3.68%	3.79%	3.32%	3.56%	3.55%	3.63%	3.52%	3.51%	3.88%	3.90%
TOTAL	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Source: Statical Office of the Republic of Slovenia

emissions, but carbon prices can fluctuate. Fluctuating carbon prices can create uncertainty among businesses, which can hamper investment in green technologies.

In this paper, we analyse a scenario that assumes that the same carbon tax is introduced across the EU. The economic impacts under the current situation will be calculated in the framework of the carbon tax scenario. The projections are

Figure 2.2. EU ETS coupons price movements in the period January 2020 - February 2023



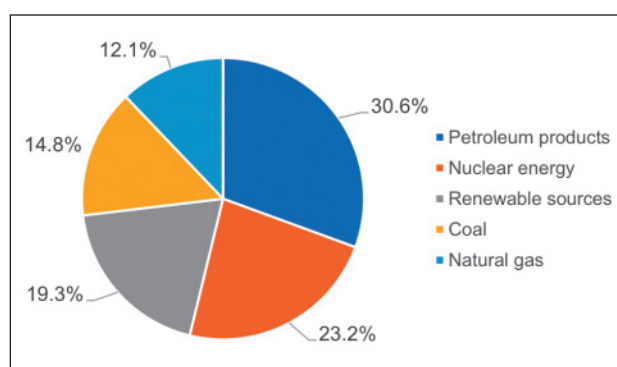
Source: <https://ember-climate.org/data/data-tools/carbon-price-viewer/>

made for the next few years and do not cover the longer-term period when companies will start to make fundamental adjustments to reduce their emissions as a result of the carbon tax. In the environmental policy change scenario presented, the EU-wide carbon price increases by €100 per tonne of CO₂ emitted. A price increase of €100 per tonne of CO₂ emissions is a very unfavourable but plausible scenario, given the current price of ETS allowances (€100.23 per tonne of emissions on 27.2.2023). The macroeconomic effects of this scenario are modelled by shocking the prices of fossil fuels (oil, natural gas, coal) in a manner consistent with a €100 per tonne increase in the carbon price. First, consider that an oil barrel contains 42 gallons (1 gallon = 3.785 litres) of oil, and burning one gallon of crude oil produces 10.3 kg of CO₂. As a result, burning a barrel of crude oil emits 432 kg of CO₂. An increase in the price of CO₂ of €100 per tonne would therefore raise the price of a barrel of oil by $€100 \cdot 0.432 = €43.2$. For coal, we know that 0.21 tonnes of coal is the energy equivalent of one barrel of oil. Burning one tonne of coal coke emits 3,107 kg of CO₂. Thus, burning a "barrel" of coal emits 653 kg of CO₂, which means a price increase of €65.3. Natural gas emits 0.054 kg of CO₂ per standard cubic foot (scf). Since 5801 scf is equivalent to one barrel of oil, we can calculate that burning the equivalent of a barrel of oil emits 316 kg of CO₂. The increase in the price of natural gas due to the higher carbon tax would then be €31.6.

To assess the impact of fossil fuel price volatility on economic growth, it is necessary to identify the price of the fossil fuel basket in Slovenia's energy supply structure. The calculation of the fossil fuel basket price is based on:

- Slovenia's energy supply structure; and
- the translation of the volumes of coal and natural gas used for stock exchange listings into quantities equivalent in energy terms to one barrel of oil.

Figure 2.3. Energy supply, Slovenia, 2021



Source: *Statistical Office of the Republic of Slovenia*

The share of petroleum products in the fossil fuel mix is 53.2% (30.6%/57.5%), the share of coal is 25.7% (14.8%/57.5%) and the share of natural gas is 21% (12.1%/57.5%) (Figure 2.3).

Since 0.21 tonnes of coal is the energy equivalent of one barrel of oil, and since the price of coal on the stock exchange is expressed in USD per metric tonne, the price of coal must first be translated into EUR and then multiplied by 0.21 to get the price equivalent to one barrel of oil in EUR. To calculate the price of gas, which is the energy equivalent of one barrel of oil, we need a few more steps. 5801 standard cubic feet is equivalent to one barrel of oil, and one cubic foot is equivalent to approximately 0.0283 cubic metres. Since the price of natural gas is expressed in MWh (megawatt hours), we need to convert cubic metres into megawatt hours. For natural gas, we know that $1 \text{ m}^3 = 10.55 \text{ kWh}$. It follows that one barrel of oil is the energy equivalent of $5801 \times 0.0283 \times 10.55/1000 \text{ MWh} = 1.732 \text{ MWh}$ of natural gas. Based on the above, it follows that the price of a basket of fossil fuels, which is the energy equivalent of one barrel of oil, is calculated using the following formula:

$$pfg = 0,532 \cdot pnafta + 0,257 \cdot 0,21 \cdot ppremog + 0,211 \cdot 1,732 \cdot pplin$$

at what is

- pfg - the price of a basket of fossil fuels, which is the energy equivalent of one barrel of oil
 pnafta - the price of oil expressed in EUR per barrel
 ppremog - price of coal expressed in EUR per metric tonne
 pgas - price of natural gas expressed in EUR per MWh

3. Assessment of the economic and financial impacts of the energy transition scenario

Once the energy transition scenario has been determined, it is necessary to calculate the impact of this scenario on banks in the Slovenian financial system or to assess the effects of higher CO₂ prices on banks' credit risk exposure:

- the economy-wide assessment assumes an assessment of the impact of a higher CO₂ price on economic growth and employment dynamics,
- the industry-level assessment assumes the calculation of so-called transition vulnerability factors, which capture the dependence of a specific industry on CO₂ emissions relative to the economy as a whole.

The first step in modelling the impact of fossil fuel price fluctuations is to define a measure of the change in the price of fossil fuels. In the analysis presented here, three different methods of defining the measure of the price change are tested:

- The "symmetric approach" uses the following linear measure of the change in the price of fossil fuels:
 $O_t = 100 \cdot (\log pfg_t - \log pfg_{t-1})$
 where pfg_t is the price of fossil fuels at time t at the quarterly level (Hamilton 1983).
- The "asymmetric approach" (changes in the price of fossil fuels have an asymmetric effect on economic growth) distinguishes between positive and negative changes in the price of fossil fuels:
 $\Delta oil^+ = \max(O_t, 0)$ (= O_t if O_t > 0; 0 otherwise)
 $\Delta oil^- = \min(O_t, 0)$ (= O_t if O_t < 0; 0 otherwise)
- The Net Fossil Fuel Price Increase (NFFPI) approach allows for a change in the current price of fossil fuels and an impact on the economy only if the price exceeds the highest price of the previous four quarters (otherwise the NFFPI is assigned a value of zero):

$$NFFPI_t = 100 \cdot \max(0, \log(pfg_t) - \log(\max(pfg_{t-1}, pfg_{t-2}, pfg_{t-3}, pfg_{t-4})))$$

As a consequence, the change in fossil fuel prices detected by the NFFPI is not equal to the quarterly change in the

price of fossil fuels. The specifications of the measures of the change in fossil fuel prices do not affect the structure of the model for estimating the impact of fossil fuel price fluctuations on GDP growth.

Before modelling the impact of fossil fuel price fluctuations on GDP growth, a causality analysis is carried out: the Granger causality test is used to examine the antecedent-lag relationship between the above-unconsidered changes in the price of a basket of fossil fuels and economic growth. According to Granger, changes in the price of a basket of fossil fuels (O_t, oil⁺; oil; NFFPI) should cause a change in GDP if past values of the change in the price of fossil fuels help to predict current economic growth. If a change in the price of fossil fuels actually causes a change in economic growth, then it is possible to predict economic growth given the past history of changes in fossil fuel prices.

The basic model for estimating the impact of fluctuations in the price of a basket of fossil fuels on GDP growth belongs to the ARX (Autoregressive with Extra Input) family of models and is defined by the following equation:

$$\Delta BDP_t = \beta_{1,0} + \sum_{i=1}^p \varphi_i \cdot \Delta BDP_{t-i} + \sum_{j=1}^q \beta_j \cdot \Delta pfg_{t-j} + \varepsilon_t$$

where

- ΔBDP - economic growth
 Δpfg - a measure of the change in the price of fossil fuels
 p - the number of lags of the change in gross domestic product,
 q - the number of lags of the change in the price of the fossil fuel basket
 β - equation parameters
 ε - independent normally distributed errors.

Depending on the quality of the contribution to the interpretation of GDP dynamics, as well as data availability, other macro categories (e.g. consumer price index or short-term interest rate) can potentially be included in the model as explanatory variables.

Transition vulnerability factors are calculated to capture the sensitivity of each industry to scenario developments. We assume that the vulnerability of an industry to the energy transition is mainly due to its dependence on fossil fuels and the resulting CO₂ emissions. The methodology for calculating the corresponding vulnerability factors is based on the simplifying assumption that producers of intermediate goods fully pass on the cost of the carbon price to producers of final goods. Therefore, the carbon price affects the industry in proportion to the amount of CO₂ emissions in the entire supply chain for final goods and services. Transition vulnerability factors are calculated using input-

output tables and CO₂ emissions data. An input-output table is a simplified representation of the production and use of goods and services in a country or region. Input-output tables are presented with a combination of balanced rows and columns: the rows show the composition of the destination of the products sold (outputs), while the columns show the composition of the raw materials and gross value-added expenditure (inputs) (see Figure 3.1).

To calculate the TVF of a selected industry, we determine the emissions inherent in the processes of that industry per unit of value added by dividing them by the total emissions inherent in the whole economy, i.e.:

$$TVF_{GP_j} = \frac{CO_2(\text{an integral part of the industry chain } GP_j)/VA_{GP_j}}{CO_2(\text{whole economy})/VA_{\text{whole economy}}}, j=1, 2, \dots, 64$$

where

GP_i - industry j

TVF_{GP_i} - the transition vulnerability factor of the industry GP_i

CO₂ - emissions CO₂ (v Gg - 1 gigagram = 1000 tonnes)

VA - value added

The descriptive approach to calculating the TVF has several advantages:

1. the approach effectively penalises the use of CO₂ - intensive final goods and services - not only direct emissions are taken into account, but also the emissions of companies in the supply chain,
2. calculations of CO₂ emissions that are an integral part of the whole chain of an industry, using input-output tables and CO₂ emissions, are well supported in the literature,
3. the calculation of TVFs is simple and transparent.

The calculation of the climate-adjusted probability of default is based on the idea presented in the context of the top-down stress test for the Dutch banking sector (Daniëls et al. (2017)) and is further adapted in the ECB's report on climate risks and financial stability with regard to the applicability of the bottom-up stress test exercise. "The 'climate-adjusted' PD is calculated using the following equation:

Figure 3.1. Structure of the input-output table

		Intermediate demand				Final demand					
		01 Agricultural, hunting, fishing and related service activities	02 Forest products and services for forestry	03 Fish and other aquatic organisms, caught or farmed, services to	goods and services produced	TOTAL	Final consumption expenditure	Gross fixed capital formation	Exports	TOTAL	TOTAL CONSUMPTION
Demand sector	Supply sector	composition of product sale destinations (outputs)									
		input _{ij}									
Intermediate input	Supplied goods and services										
	TOTAL										
	Composition of raw materials and gross value added expenses (inputs)										
Gross value added	Purchases abroad by residents										
	Domestic purchases by non-residents										
	Net taxes on products										
	Total intermediate consumption/final										
	Compensation of employees										
	Other net taxes on production										
	Depreciation of fixed capital										
Operating surplus											
TOTAL											
Output at basic prices											
Imports											
Total supply in basic prices											

$$PD_{t, \text{stress}} = PD_{\text{pit}} \cdot G_{i,t, \text{stress}}$$

where

- $PD_{t, \text{stress}}$ - PD at time t , adjusted to the energy transition scenario,
 PD_{pit} - existing PD at time t ,
 $G_{i,t, \text{stress}}$ - stress or 'adjustment' factor that adjusts the existing PD to the energy transition at time t for industry i ,
 i - industry.

The formula for calculating the industry-specific adjustment factor is shown below:

$$G_{i,t, \text{stress}} = \beta^i \cdot \Delta X_t \cdot G_{i,t-1, \text{stress}}$$

where

- ΔX_t - the macroeconomic shocks identified in the chosen scenario for year t
 β - elasticity vector with respect to risk factors
 i - industry
 t - year

4. Results of the calculation of the climate-adjusted probability of default

4.1 Causality analysis

The Granger causality test is used to test the usefulness of changes in fossil fuel prices for predicting changes in economic growth - according to Granger, a change in the price of fossil fuels causes a change in economic growth if the change in the price of fossil fuels is useful for predicting economic growth, or if it reduces the prediction error when added to the model. Granger causality only provides information about the forecasting potential, it does not provide insight into the true causal relationship between two variables.

Based on the results of the causality test, a measure of fossil fuel price change based on the net fossil fuel price increase (NFFPI) approach is chosen. From Table 4.1 below we can conclude that:

- in the case of the NFFPI, we cannot reject the hypothesis that a change in GDP growth does not Granger-cause a change in the price of the fossil fuel basket (the

associated probability is 10.6%), but we do reject the hypothesis that a change in the price of the fossil fuel basket does not Granger-cause a change in GDP growth (the associated probability is 3.3%). Therefore, Granger causality seems to run in a unidirectional direction from a change in the price of the fossil fuel basket towards a change in GDP growth, rather than the other way around.

4.2 A model for estimating the impact of fluctuations in the price of a basket of fossil fuels on GDP growth

GDP growth is forecast using the following econometric model:

$$GSLO_t = 1,65 + 0,82 \cdot GSLO_{t-1} - 0,39 \cdot GEU_{t-4} - 0,10 \cdot NFFPI_{t-6} - 1,11 \cdot EURIBOR3M_{t-6} + 6,60 \cdot DUM2020$$

where

- $GSLO$ - Slovenia's real GDP growth rates compared to the same quarter of the previous year
 GEU - EU countries' real GDP growth rates compared to the same quarter of the previous year
 $NFFPI$ - measure of the change in the price of a basket of fossil fuels
 $DUM2020$ - dummy variable explaining the variation in dynamics between variables in 2020 and 2021 (in all quarters between 2018 and 2020, the NFFPI variable has a value of 0 and does not affect the dynamics of $GSLO$ during this period)
 t - quarter

The coefficient next to the NFFPI variable (-0.1014) represents the expected change in economic growth per unit change in the measure of the change in the price of a basket of fossil

fuels (NFFPI) while holding other variables in the model constant. Translated to the fossil fuel price itself, an increase in the price of a "barrel" of fossil fuels of €46.45 (if the

Table 4.1. Results of the Granger test of causality

Change in fossil fuels price	The null hypothesis	F-statistics	Probability	Test results
NFFPI	A change in the price of basket of fossil fuels does not Granger cause a change in GDP	3.70117	0.0333	Null hypothesis rejected
	Changes in GDP do not cause changes in the price of fossil fuels, according to Granger	2.37511	0.1057	We cannot reject the null hypothesis

price of CO₂ emissions increases by €100, the price of a basket of fossil fuels increases by €46.45), or from €70.85 (the average price of a basket of fossil fuels in the fourth quarter of 2021) to €117.29 ($pf_{g,t+1}=1.66 pf_{g,t}$), implies a fall in GDP of 5.11% ($= 10.14\% \cdot \ln(1.66)$).

4.3 Model for estimating the elasticity of compensation of employees with respect to gross domestic product

For the purpose of calculating the elasticity of compensation of employees with respect to gross domestic product, the following econometric model is estimated:

$$\Delta \log(\text{SR_ZAP}_t) = 0,003 + 0,733 \cdot \Delta \log(\text{GDP}_t) - 0,024 \cdot \text{DUMMY}$$

where

$\Delta \log(\text{SR_ZAP}_t)$ - change in the logarithm of the compensation of employees

$\Delta \log(\text{GDP}_t)$ - change in the logarithm of gross domestic product

DUMMY - dummy variable explaining the variation in dynamics between variables in 2010 and 2011

t - quarter

Before estimating the above equation, the time series are deseasonalised. To isolate the effects of the pandemic, the equation is estimated for the period 2000q1-2019q4.

4.4 Results of the calculation of transition vulnerability factors

Figure 4.1 shows the transition vulnerability factors for the Slovenian economy, where the CO₂ emissions of the entire chain of a specific industry are calculated on the basis of the structure of the inputs of each industry to the industry for which the vulnerability factor is calculated. The original values of the transition vulnerability factors, which are calculated following the procedure described in Chapter 3, are then standardised so that the average value of all factors (for the whole economy) is 1.

The industries whose transition vulnerability factor values stand out in terms of size are (expected) Manufacture of paper and paper products (C17), Manufacture of non-metallic mineral products (C23), Manufacture of basic metals (C24), Electricity, gas and steam supply (D35) and Air transport (H51).

4.5 Calculation of the adjustment factor by industry

The calculation of the adjustment factor is done for a scenario with CO₂ price dynamics: at the end of 2023, the EU ETS coupon price rises by €100 and remains unchanged in 2024, 2025 and 2026. In the scenario calculations, we assume that the elasticity of the PD with respect to changes in GDP is equal to -1 and that the average price of a barrel of fossil fuels in 2023 will be €70.85.

The table below shows the average values of the adjustment factor for the corporate and retail portfolios.

Figure 4.1. Transition vulnerability factors for Slovenian industries

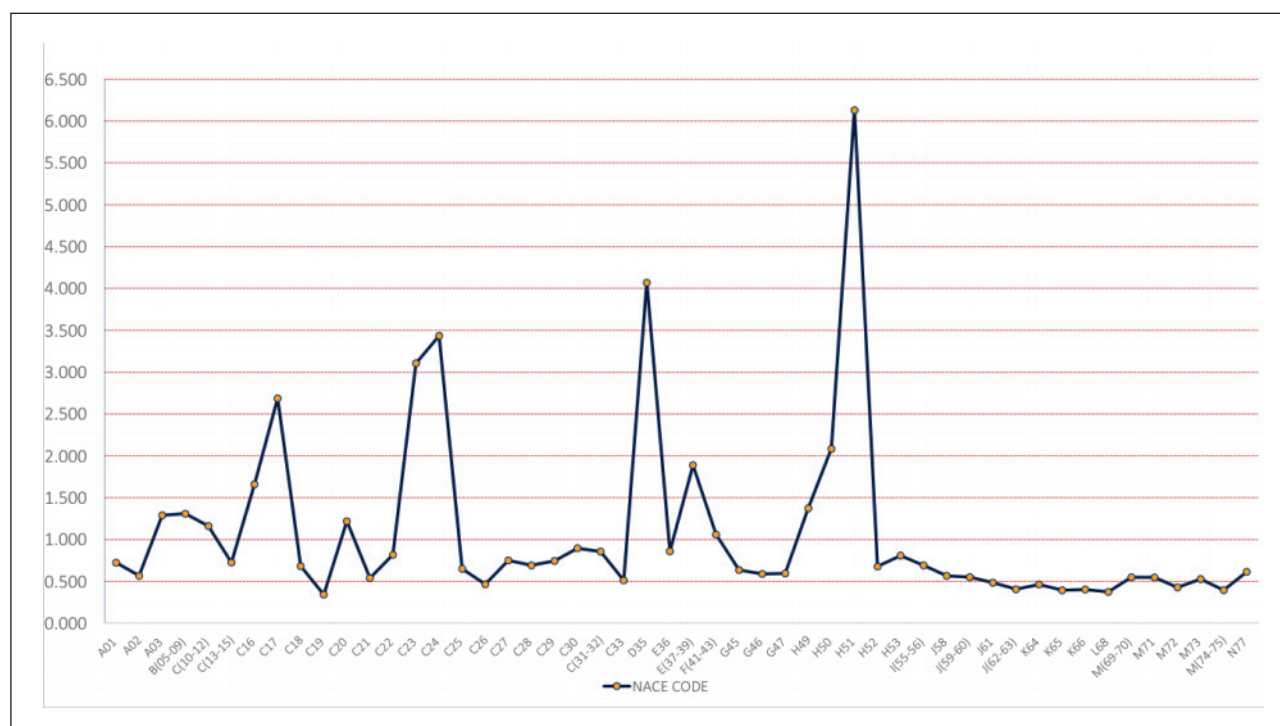


Table 4.2. Average values of the PD adjustment factors

Portfolio	G ₂₀₂₃	G ₂₀₂₄	G ₂₀₂₅	G ₂₀₂₆
Corporate	1.000	1.051	1.051	1.051
Retail	1.000	1.037	1.037	1.037

The explanation of the results of the adjustment factor calculation is straightforward:

- the probability of default of the sovereign in the period 2024-2026 will be on average 5.1% higher in each year relative to the original values of the probability of default,
- the default probability of a Slovenian borrower (natural person) over the period 2024-2026 will be on average 3.7% higher in each of the years separately from the original default probability values.

In the case of corporates, the value of the adjustment factor is that for which the relevant industry matches the core business of the company. In the case of physical persons, the value of the adjustment factor shall be that where the relevant industry corresponds to the industry in which the person is employed.

5. Conclusion

This paper has presented an assessment of the change in the probability of default under a transitional climate scenario assuming an increase in CO₂ prices (policy change).

The assessment assumes:

- a. calculating the impact of a change in the price of fossil fuels on economic growth,
- b. calculating the distribution of macroeconomic effects on individual sectors of the economy (calculating vulnerability factors); and
- c. calculating the elasticity of compensation of employees with respect to gross domestic product.

In order to include key fossil fuels in the scenario calculation, a fossil fuel basket is defined, based on Slovenia's energy supply structure and including oil, natural gas and coal. The common denominator for the fossil fuel basket is the energy equivalent of a barrel of crude oil. This allows the shock resulting from the increase in CO₂ prices to be spread appropriately across the key fossil energy sources. Appropriate models have been developed and tested for all calculations (9 diagnostic tests for the econometric models). Adjustment factors are calculated for the corporate and retail portfolios and allow banks to instantly convert existing default probabilities to default probabilities in the event of a change in (environmental or fiscal) policy. The calculated (moderate) increase in the default probab-

ity opens up sufficient room for manoeuvre to design appropriate products to support banks' execution of their own "ESG strategies" as well as the transition to a carbon-free economy.

It is important to stress that the calculations presented here represent a type of "what-if" analysis, i.e. the values of the adjustment factors reflect solely the impact of a change in the price of fossil fuels on economic growth. Depending on the existing PD models available to banks, other macroeconomic variables that could potentially affect changes in the probability of default may also be included in the calculations. In the analysis presented here, compensation of employees is included, which can have a significant impact on the probability of default of physical persons.

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ZBS¹ Združenje bank Slovenije
The Bank Association of Slovenia

BANKING CONFERENCE

Slovenia one year after the outbreak of global energy crisis and development priorities

Friday, 2. June 2023

Hotel Union, Ljubljana, Steklena dvorana
Miklošičeva cesta 3, Ljubljana

Programme:

- 08.30 – 09.00 Registration
- 09.00 – 09.05 Welcome Address
Stanislava Zadavec Capriolo, M.I.A., conference moderator, Managing Director, Bank Association of Slovenia
- 09.05 – 09.20 Address by the Chairman of the Supervisory Board of Bank Association of Slovenia **Blaž Brodnjak**, President of the Management Board, Nova Ljubljanska banka d.d.
- 09.20 – 09.35 The government's response to the energy crisis
Klemen Boštjančič, Minister, Ministry of Finance
- 09.35 – 09.50 Address by Governor of Banka Slovenije
mag. Boštjan Vasle, Governor, Banka Slovenije
- 09.50 – 10.00 Discussion
- 10.00 – 10.30 Energy crisis and geopolitical risks - business unusual
Helena Schweiger Ph.D., EBRD
- 10.30 – 11.00 The macroeconomic environment of Slovenia one year after the outbreak of global energy crisis
Marijana Bednaš, M.Sc., Director, Slovenian Institute for Macroeconomic Analysis and Development
- 11.00 – 12:30 **Panel Discussion:** Financial stability and the economy in the EU and Slovenia one year after the outbreak of the energy crisis
Chair: **prof. dr. Mojmir Mrak**, University of Ljubljana, School of Economics and Business
Panellists:
Blaž Brodnjak, President of the Management Board, Nova Ljubljanska banka d.d.
dr. Primož Dolenc, Vice Governor, Banka Slovenije
Aleš Delakorda MSc, Head of the analysis service, Fiscal Council
John Michael Denhof, President of the Management Board, Nova kreditna banka Maribor d.d.
Matevž Frangež, State Secretary, Ministry of the Economy, Tourism and Sport
Vesna Nahtigal, General Director, Chamber of Commerce and Industry of Slovenia
- 12.30 – 12.45 Coffee Break
- 12.45 – 13.15 Slovenian development priorities in the light of the green transition as a result of the energy crisis
dr. Aleksander Jevšek, Minister, Ministry of Cohesion and Regional Development
- 13.15 – 14.45 **Panel Discussion:** Slovenian development opportunities in the process of energy independence and investment priorities - the role of development and commercial banks
Chair: **Bojan Ivanc**, Chief Economist, Chamber of Commerce and Industry of Slovenia
Panellists:
Borut Jamnik, President of the Management Board, Slovenska izvozna in razvojna banka d.d.
mag. Andrej Lasič, Management Board member, Nova Ljubljanska banka d.d.
Danijel Levičar, President, The Strategic Council of the Chamber of Commerce and Industry for the Energy Transition
dr. Simon Savšek, Head of the EIB Group Office, European Investment bank
mag. Hinko Šolinc, General manager, Energy Directorate, Ministry of the Environment, Climate and Energy
dr. Iztok Tiselj, Senior researcher, Inštitut Jožef Stefan
- 14.45 – 15.00 Concluding remarks
Stanislava Zadavec Capriolo, M.I.A., Managing Director, Bank Association of Slovenia
- 15.00 Networking, Banquet

Presentations will be given in Slovenian. The panel discussion will be held in Slovenian and English. Simultaneous interpreting will be provided. We will be happy to provide you with any further information regarding the organisation of the conference at https://www.zbs-giz.si/izob_programi/bancna-konferenca/

