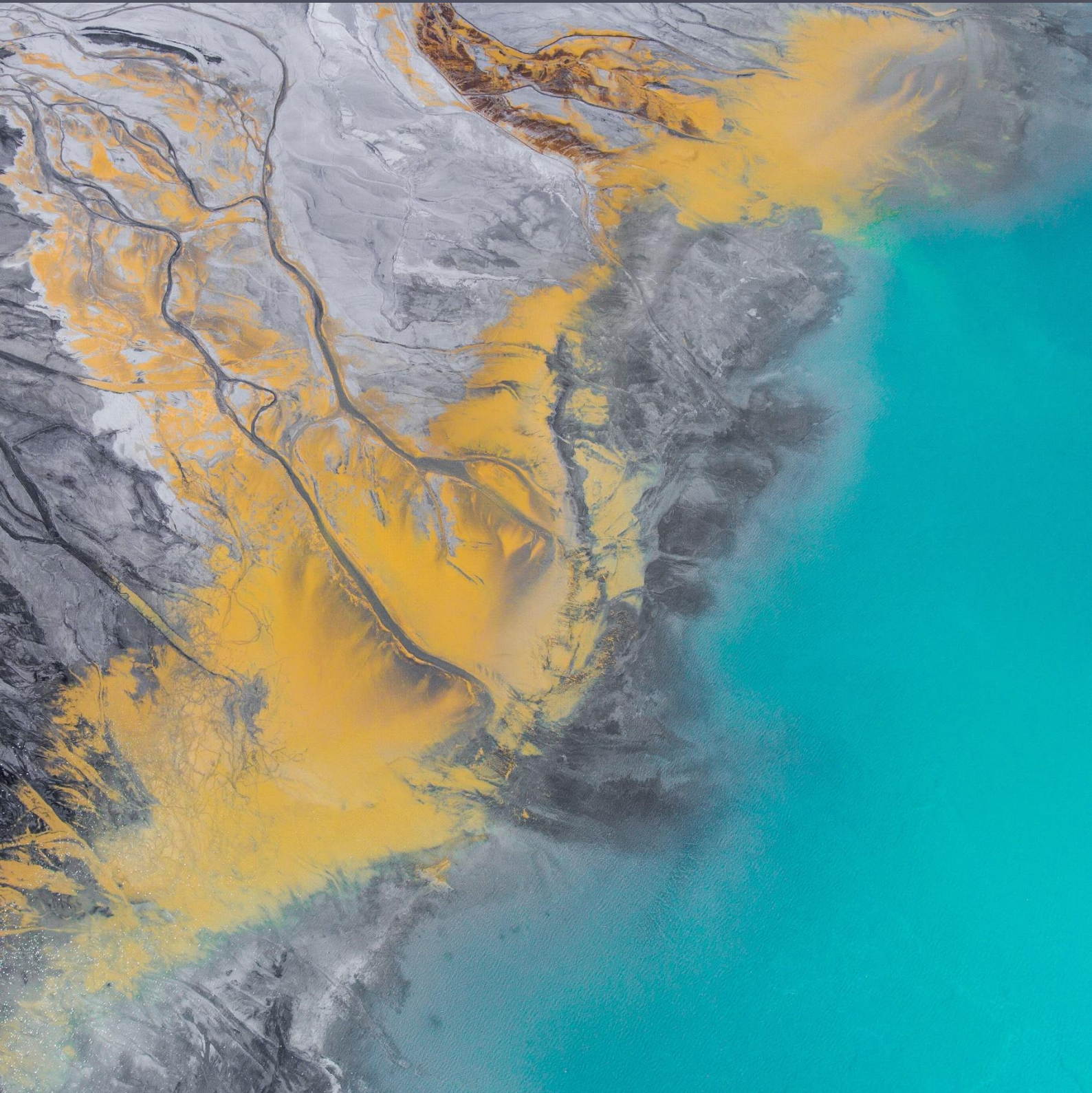


# MACROPRUDENTIAL RISK SCANNER

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## 1. Introduction

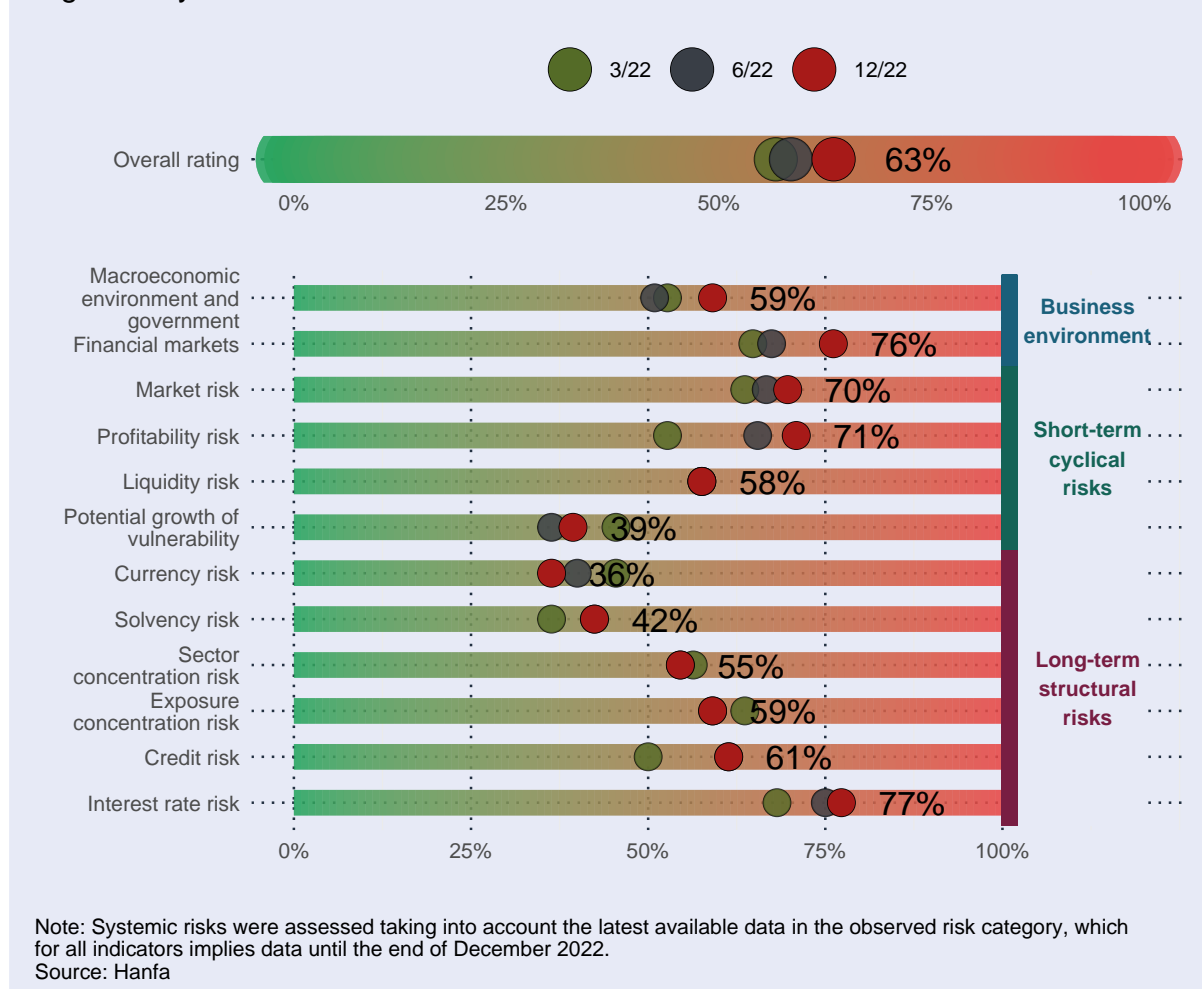
Together with the Croatian National Bank and the Ministry of Finance, the Croatian Financial Services Supervisory Agency (hereinafter: Hanfa) is responsible for the stability of the financial system in the Republic of Croatia; therefore, promoting and preserving financial stability, in accordance with the Act on the Croatian Financial Services Supervisory Agency, is one of the basic goals of its work. A *stable financial system* implies the smooth functioning of all its segments (financial institutions, markets, services and infrastructure) in the process of resource allocation, risk assessment and management, and carrying out payments, as well as its resistance to sudden shocks.

Financial stability can be disrupted by the processes that arise and develop within the system, creating vulnerabilities that may materialise in the event of certain shocks in the form of disturbed liquidity and capital positions of financial institutions, disabling the smooth functioning of a part or the entire financial system. Such shocks can be external, i.e. transferred from the international environment, or idiosyncratic, i.e. generated by domestic macroeconomic and financial developments, economic policy or changes in the institutional environment. Therefore, any risk to which the system is exposed and which can have adverse effects on the functioning of the entire financial system or its part, thus causing a serious negative impact on the real economy, represents a *systemic risk*.

Over the past few years, global progress has been made in the area of understanding and consequently identification, evaluation and monitoring of systemic risks of the financial sector. However, in order to prevent the identified risks in time, and to mitigate the effect of their materialisation, it is necessary to develop an appropriate set of instruments and tools, i.e. policies aimed at preservation of the stability of the system as a whole, called *macroprudential policies*. Therefore, in the European Union (EU), bodies with macroprudential powers have been established at the national and international level after the global financial crisis, and frameworks for international cooperation have been developed along with macroprudential tools. Although in the initial phase of macroprudential capacity development, the focus was primarily on the banking sector, the growing share and importance of the non-banking part of the financial system creates structural changes and requires further development of the macroprudential framework, as well as the expansion to the financial services sector in order to adequately address systemic risk and prevent regulatory arbitrage. In addition, financial integration is constantly deepening, creating the need for a holistic approach, which views the system as an inseparable whole, the key part of which consists of monitoring and addressing vulnerabilities in a cross-sectoral, but also cross-border context.

The publication *Macroprudential risk scanner* therefore seeks to provide insight into the process of identifying, assessing and monitoring the evolution of systemic risks in the financial services sector under Hanfa's supervision in order to timely take appropriate measures to prevent their materialisation and the impairment of the financial system stability. This contributes to better understanding of systemic risks, particularly in the vulnerability identification and risk spreading segment, encourages action planning and measures that provide adequate protection against the materialisation of such risks and contributes to greater confidence in the financial system and strengthening the system's resistance to shocks.

Figure 1 Systemic risk matrix - 4Q 2022



The overall rating of systemic risk exposure of the financial services sector deteriorated mildly in the fourth quarter of 2022, with the exposure being at an elevated level at end-2022, largely due to worsened macroeconomic and market circumstances. Although the Croatian economy grew at a solid rate of 6.3% in 2022, mounting inflationary pressures and heightened geopolitical tensions triggered a deterioration of macroeconomic risk indicators. Bearing in mind the current global developments, economic growth is expected to slow down even more in the short run. A marked deterioration was also seen in financial markets, which was largely attributable to tighter financing conditions of central banks and a drop in investor sentiment, leading to valuation corrections of financial instruments amid high volatility. As a result, the market risk exposure of the financial services sector rose mildly. Notwithstanding the slightly smaller exposure to interest rate risk due to the shorter residual maturity of the bond portfolio, interest rate risk remains the most prominent structural risk of the financial services sector as interest rates are expected to continue to rise in 2023. This may also have an unfavourable effect on the relatively concentrated and poorly liquid domestic capital market, elevating the risk of diminished profitability and creating potential liquidity pressures for some institutional investors in the forthcoming period. Croatia’s accession to the euro area at the beginning of 2023 will mostly eliminate currency risk exposure of the domestic financial services sector and provide access to some hedging instruments against systemic shocks, which may add to the sector’s stability in the upcoming uncertain period characterised by considerable cyclical systemic risks.

## 2. Macroeconomic and financial environment risks

### 2.1 Macroeconomic environment

The sharp growth of the domestic economy in the first half of 2022 was hampered in the second half of the year by considerable inflationary pressures that dampened the purchasing power of domestic consumers, while the dwindling of foreign demand was due to an economic downturn in major trading partners. The interest rate increase triggered by the inflation deviation from its long-term target has not yet significantly affected the financing costs in the domestic market, partly thanks to abundant liquidity in the domestic system, further bolstered by the euro adoption. However, the growth dynamics and intensity of debt repayment costs in the upcoming period might also curb consumption, particularly of lower-income households, which are being particularly hard hit by price increases. The relatively warm winter and energy price caps have scaled down expectations regarding the economic slowdown in 2023, but negative risks remain present in the context of the ongoing war in Eastern Europe, the strained relations between the US and China, the likely opening of the Chinese economy as a potential driver of inflation expectations, and the uncertain sustainability of public and private debt amid high interest rates.

Notwithstanding Russia's invasion of Ukraine in early 2022 and its severe consequences for the European economy, the dynamic growth of the domestic economy from the end of 2021 continued into the first half of 2022, with the annual real GDP growth rate reaching 8.7% in the second quarter on the back of increased household consumption, exports and, to a lesser extent, investments. Despite the surge in private sector investment in terms of the larger volume of construction works and capital goods imports coupled with the generation of revenues in

tourism-related activities, the annual GDP growth rate dropped to 4% in the fourth quarter of 2022 as a result of the slower growth in the second half of the year (Figure 2.1). The real economic growth rates in euro area countries<sup>1</sup> and peer CEE countries were lower than the domestic growth rate, with a notable slowdown in mid-year being attributable to higher inflation in some countries and the drop in real disposable income and overall consumption. The economic sentiment indicator and its components pointed to a sharp fall in optimism in the third quarter in various segments of the EU economy. The gradual stabilisation of energy prices and the maintenance of low unemployment triggered a reversal in the trend and a partial recovery of economic sentiment towards the end of the year, particularly in the consumer and retail segments, which suggests that the economic slowdown might be less severe than anticipated. Economic sentiment in Croatia improved slightly in the fourth quarter due to optimism in the services sector caused by the robust tourist season. However, the slight fall in the volume of industrial and construction output late in the year adversely affected the overall market sentiment in Croatia and was paired with the persistently high risk of deterioration in other economic sentiment components in the forthcoming period (Figure 2.3).

Personal consumption, gross investments and services exports were the main components of domestic aggregate demand that gave the strongest boost to growth in the first three quarters of 2022. This reflected the robust labour market and sustained foreign demand, as well as the savings accumulated during the pandemic that helped to maintain household consumption. The rise in revenues from tourism

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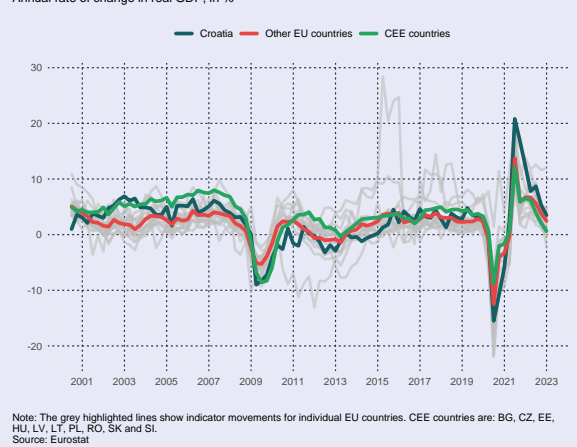
<sup>1</sup> According to [Eurostat](#) data, euro area real GDP remained stable in the fourth quarter of 2022 relative to the previous quarter.

and related activities kept the real GDP growth rate at relatively high levels in the second and third quarters. However, amid rising negative risks in the fourth quarter, the effects of favourable tourism performance are expected to subside, while conditions in the labour market might deteriorate, resulting in slower economic activity in the next year. The slowdown of the domestic economy and neighbouring countries would raise the probability of growth in investor risk premium as well as materialisation of market and credit risks in the financial sector, with potential adverse effects on the profitability of the financial services sector.

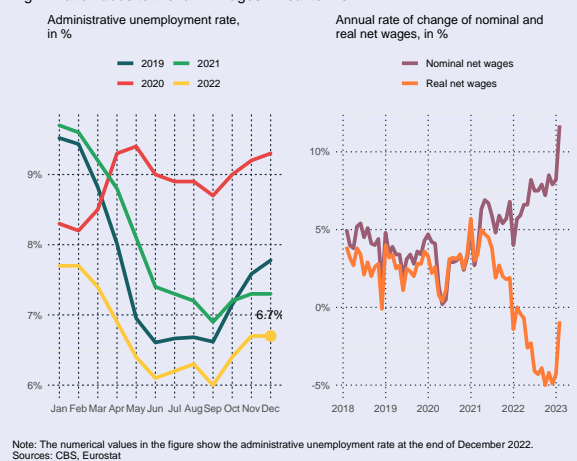
In line with economic developments in 2022, labour market conditions remained favourable, with a growing demand for workers in certain industries. Notwithstanding the rise in nominal wages, real disposable income decreased owing to inflationary pressures (Figure 2.2), giving a large contribution to the expected economic slowdown towards the end of the year. The unemployment rate stood at 6.7% at the end of 2022, which was 1 percentage point less than at the end of the pre-crisis 2019. The labour intensive IT sector and tourism- and trade-related activities gave the largest contribution to the annual growth in employment of 1.2% in December. The growing demand for labour and labour shortages in some industries were partly compensated by labour immigration from third countries<sup>2</sup>, while tighter labour market conditions were also reflected in the rise of nominal wages, which grew by 8.2% on an annual level. Nevertheless, the real position of the labour force was further weakened by the drop in real wages amid persistently high inflation<sup>3</sup>. In view of the fact that more than 30% of the labour force is employed in the manufacturing sector and activities related to wholesale and retail trade, the recent year-on-year decline in industrial output and trade, of 2.4% and 0.8%, respectively, in December,

suggests that both employment and economic growth might slow down.

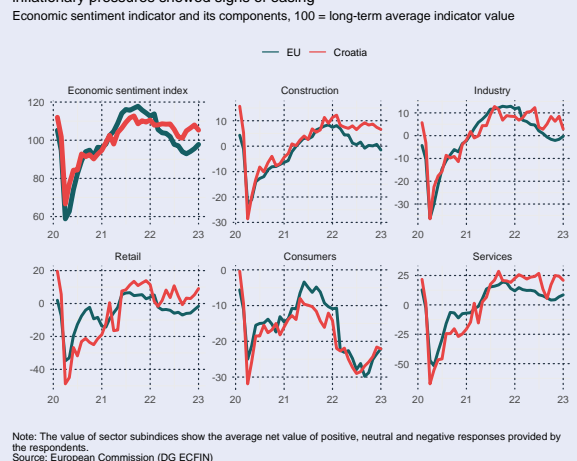
**Figure 2.1** Despite slower economic growth, GDP growth rate for Croatia remains above the EU average



**Figure 2.2** Drop in unemployment contributes to nominal growth in salaries, but high inflation adds to the fall in wages in real terms



**Figure 2.3** Subdued consumer sentiment improved slightly towards the year-end as inflationary pressures showed signs of easing



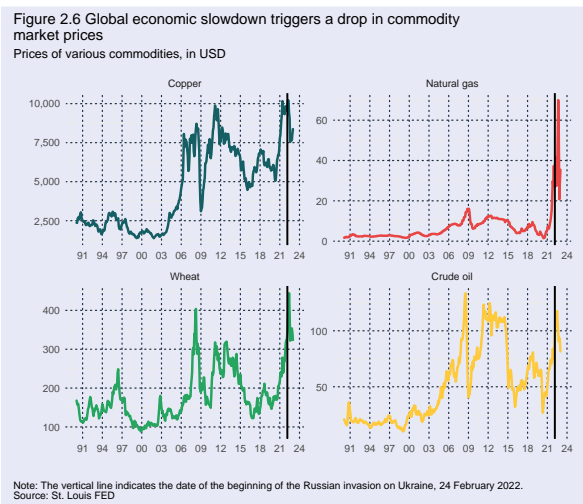
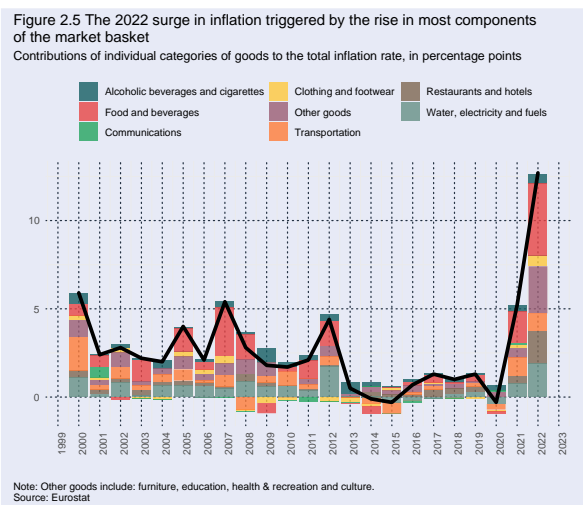
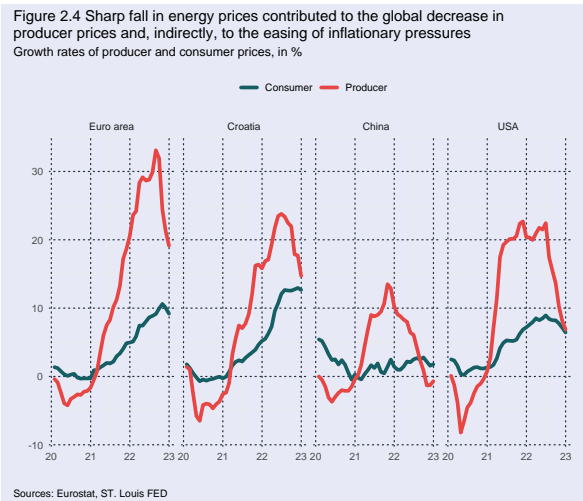
The main source of risks in the macroeconomic environment at the end of 2022 were heightened

<sup>2</sup> The term “third countries” refers to the countries outside the European Union.

<sup>3</sup> The year-on-year fall in real net wages was 4.3% at the end of December.

inflationary pressures, contributing to the possible anchoring of inflation expectations at higher levels. Inflationary pressures peaked in November, when the annual inflation rate reached 13.5%, after which it decreased by 0.4 percentage points in December. Inflation has shown signs of deceleration on a monthly basis in recent months, largely owing to stabilisation of energy and transport prices.<sup>4</sup> The Russian invasion of Ukraine was an important factor behind the 2022 surge in prices; it sharply restrained exports of goods from the two countries, which are leading global exporters of energy, cereals, mineral fertilisers and non-ferrous metals, with price increases being also driven by economic sanctions imposed on Russia. As global input prices moderated in the second half of 2022, also affecting producer prices with a certain time lag, upward pressures on euro area consumer prices have eased in the recent past<sup>5</sup> (Figure 2.4).

Stabilisation of the general price level was also aided by the combination of oil price caps imposed by EU countries and the normalisation of other energy prices, in particular natural gas, due to the filing of European gas storage facilities and lower-than expected demand during the heating season (Figure 2.6). Global supply chain pressures were alleviated following the easing of strict epidemiological measures in China in December and the slackening of demand in major economies, but the level of uncertainty regarding the normalisation of supply chains remained elevated. As a result of the emerging processes of deglobalisation, which imply a reorganisation of global supply chains (nearshoring) and *de facto* higher labour costs, inflation may become entrenched at above-target levels in the medium run<sup>6</sup> (Figure 2.7).



Supply side factors, such as supply chain constraints and high producer prices, continue to be the primary sources of inflationary

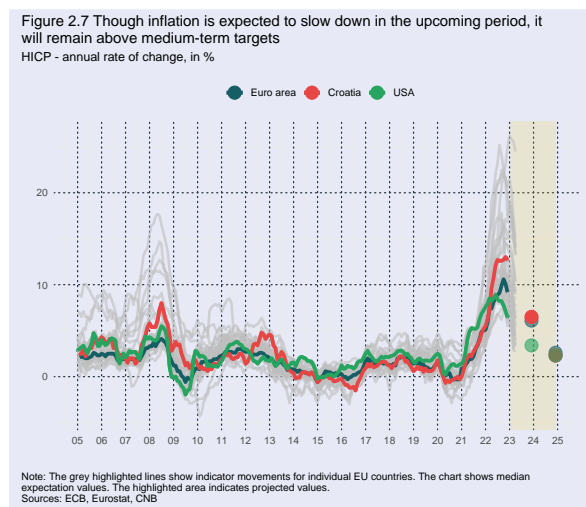
<sup>4</sup> The monthly inflation rate stood at -0.3% in December, which was 1.2 percentage points less than in November.

<sup>5</sup> In Germany, after more than two years, producer prices of industrial products recorded a monthly decrease in October, of

4.2%, primarily as a result of the fall in the prices of electricity and natural gas.

<sup>6</sup> According to European Commission projections, inflation in Croatia might reach 6.5% in 2023 and drop to 2.3% in 2024.

pressures, with rising demand and the forthcoming euro adoption also giving a boost to inflation in the second half of 2022. The largest contribution to inflationary pressures was made by the price components of energy and food and beverages as well as other goods, reflecting the pass-through of rising foreign prices to the domestic market, strengthening of demand, particularly during the tourist season, and price increases before the euro introduction (Figure 2.5).



In efforts to protect the most vulnerable population groups and check the rise in consumer prices, in early September 2022, the Croatian government introduced a new [package of measures](#), worth HRK 21bn, which put a cap on the prices of electricity, gas and some essential food items and raised the amount of non-taxable income of employees and students as well as one-off cash benefits to the unemployed and pensioners. While these measures have eased inflation expectations of consumers and businesses in the short run, the long-term impact on inflation expectations largely depends on possible further fiscal interventions in case of renewed price increases and additional price shocks that might put fresh upward pressure on public expenditures in 2023.

Notwithstanding larger budget revenues associated with solid economic performance in 2022 and the positive price effect on tax revenues, the government’s fiscal position remains exposed to downside risks due to growing budgetary needs and tighter financing conditions (Figure 2.8). The steep rise in the prices of goods and services and the successful tourist season supported by strong domestic and foreign demand were the main factors behind the annual increase in budget revenues of 7% in the first half of 2022. Along with the strong cyclical growth in tax revenues, of 19.2%<sup>7</sup>, largely associated with taxes on consumption and corporate profits, a decrease in total expenditure, of 1.4%, also helped to improve the central government budget position. This was largely due to the withdrawal of job preservation grants to pandemic-affected activities in efforts to make room for further fiscal intervention aimed at preserving the purchasing power of households. As a result of these changes, the budget deficit was reduced to HRK 3.5bn, or 0.7% of GDP, in the first half of 2022, which was a decrease of 1.7 percentage points from the same period in 2021. In the same period, the indicator of the general government’s indebtedness improved due to the annual decrease in public debt, of 0.4% in late September 2022, and a sharp growth in nominal GDP. As a result, the public debt-to-GDP ratio stood at 70.4% at the end of September, falling by 2.7 percentage points from the quarter before.

While the general price increase has a positive short-term effect on general government revenues, the taken anti-inflation measures and stronger union demands put pressure on the expenditure side of public finances and are likely to accelerate the growth of general government debt under the plausible stagflation scenario for 2023. In efforts to address economic shocks, the European Commission has provided for the

<sup>7</sup> VAT revenues amounted to HRK 28.9bn in the first half of 2022, up by 17.9% from the same period in 2021, while profit tax revenues stood at HRK 6.8bn, growing annually by 37.7%.

continued application of the general escape clause of the Stability and Growth Pact through to the end of 2023, thus allowing for more expansive fiscal policy aimed at helping the most vulnerable segments of the economy and alleviating the impact of the universally restrictive monetary policy. Also, Croatia's accession to the euro area at the beginning of 2023 will increase the level of the country's integration with developed euro area Member States. This has already been incorporated in lower borrowing costs and it may mitigate the growth of financing costs in a scenario of severe systemic stress in financial markets (for more information, see [Box 1 Impact of euro adoption on the capital market and the financial services sector](#)).

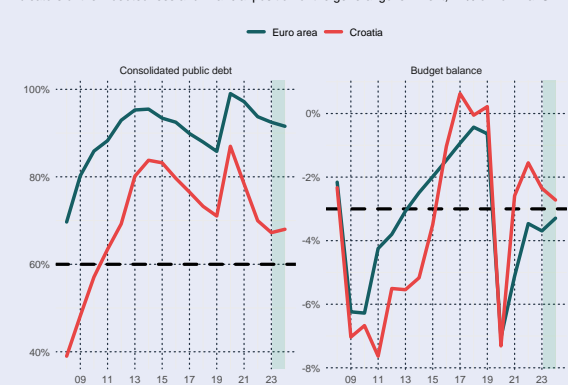
spillover of shocks between financial institutions and the non-financial sector. Although debt indicators of domestic households and non-financial corporations are presently at moderate levels when compared with other European countries (Figure 2.9), a potential increase in credit risk due to lower income and harsher financing conditions may worsen the financial position of the real sector and slow down the performance of non-financial institutions.

## 2.2 Financial environment

In the second half of 2022, global financial markets were characterised by elevated market volatility, growing investor risk aversion and tighter financing conditions. Lack of liquidity in some segments of the global market and the overall drop in investor optimism, particularly in stock and cryptocurrency markets, added to the rise in risk premium and valuation corrections of almost all financial asset classes. These developments also affected the domestic financial market and institutional investors, which recorded negative financial returns in 2022.

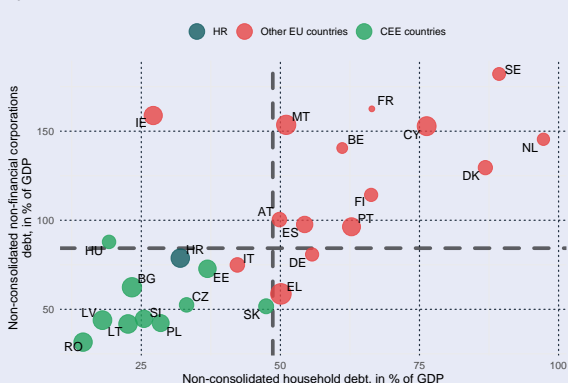
Driven by inflationary pressures, central banks' monetary policies continued to tighten in the second half of 2022, putting even more pressure on the market valuations of financial assets. The Fed's target range was 4.25% to 4.50% in late 2022, while the ECB's key interest rate on refinancing operations stood at 2.50%, with further increases expected in case of stronger inflation expectations. Recent announcements suggest that the monetary authorities will make consistent efforts to ensure the return of inflation to the 2% medium-term target and to prevent the anchoring of inflation expectations, while the soft-landing dynamics itself (Figure 2.10) will depend on macroeconomic developments. In their most recent statements in February 2023, Fed leaders left open the possibility of smaller increases in interest rates or their levelling off as the disinflationary process has started. On the

**Figure 2.8 Fiscal indicators are expected to deteriorate mildly amid growing macroeconomic risks**  
Indicators of the indebtedness and financial position of the general government, in % of nominal GDP



Note: The highlighted area indicates projected values. The highlighted levels indicate the levels of public debt and the budget balance defined by the convergence criteria under the Maastricht Treaty.  
Source: European Commission (DG-ECFIN)

**Figure 2.9 Indebtedness is relatively low, but credit risk in the real sector increases in response to the expected economic slowdown**  
Financial position of the non-financial corporations and household sectors at the end of September 2022

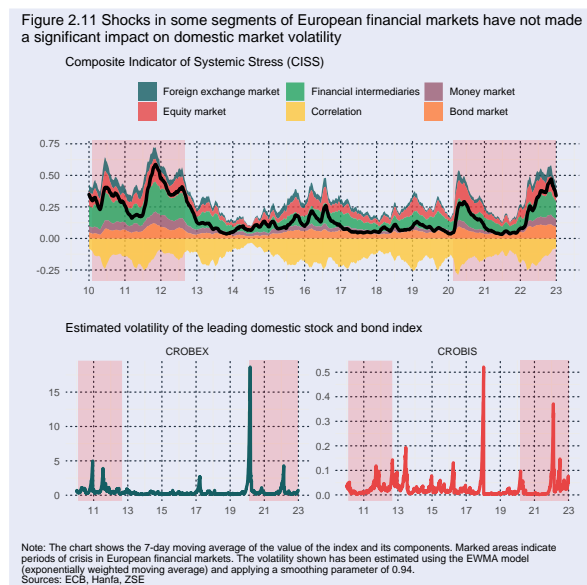
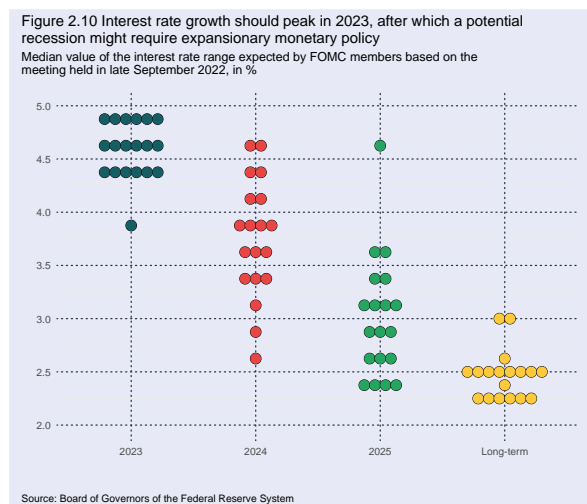


Note: The size of dots indicates interest margin on total loans of the non-financial corporations and households sectors. The lines show median values of the indebtedness of the countries shown.  
Source: ECB

The likelihood of credit risk materialisation increases amid rising interest rates. Coupled with slower economic trends, it may trigger the

other hand, the ECB decisively announced further interest rate increases, noting that their intensity will depend on macroeconomic indicators. The degree of monetary policy restrictiveness in the future will thus be a key factor affecting financial market developments, so that investor sentiment will be strongly affected by any change in benchmark interest rates that is not aligned with market expectations.

inflation levels across European countries also differentiate their sensitivity to the recent tightening of financing conditions, which is reflected in market yields on government bonds, ranging from 1.85% to a high 8.98% at the end of 2022. The sharp volatility in the European bond market was alleviated by the ECB’s announcement of a new [Transmission Protection Instrument](#), which should ensure that the monetary policy stance is transmitted smoothly across all euro area countries by way of purchasing bonds of the countries whose yields do not adequately reflect their macroeconomic fundamentals due to specific market disturbances. European bond markets were characterised by specific shocks in the second half of 2022. The risk premium in the UK bond markets recorded a sharp upturn following the announcements about expansive fiscal policy in late September 2022, which raised the issue of public debt sustainability. In view of the fact that bonds are used as collateral in financial derivatives trading and the high interconnectedness of EU financial institutions, the initial shock created liquidity pressures and triggered significant valuation corrections, raising the overall systemic risk exposure of the European financial system (Figure 2.11).

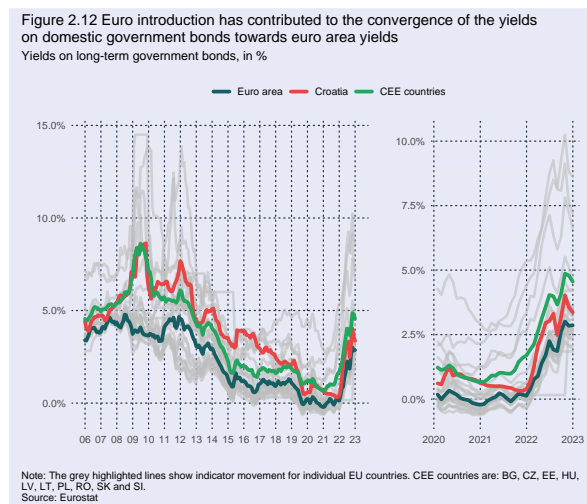


The correlation between monetary tightening, fiscal indicators and geopolitical tensions is a key determinant of investor risk perception of government bonds. Heterogeneous fiscal positions, the degree of energy dependency and

Such volatility was not seen in the domestic market, partly due to the relatively limited interconnectedness and low trading activity in the domestic bond market. The yields on domestic government bonds stood at 3.37% at end-2022, falling by 84 basis points from their mid-October peak. In addition to yield fragmentation across EU countries, the second half of 2022 was characterised by the convergence of the yields on Croatian government bonds towards those of euro area countries, reflecting the pending euro adoption and the upgrading of Croatia’s credit rating to investment grade by leading credit rating agencies<sup>8</sup> (Figure 2.12). Despite the improved

<sup>8</sup> All three leading credit rating agencies upgraded Croatia’s credit rating by one notch in July 2022, to its current level of BBB+ and Baa2, respectively.

investment situation that kept the risk premium on Croatian government bonds at moderate levels, the negative risks prevail in the short run amid macroeconomic and geopolitical uncertainty, which might trigger a rise in the risk premium.



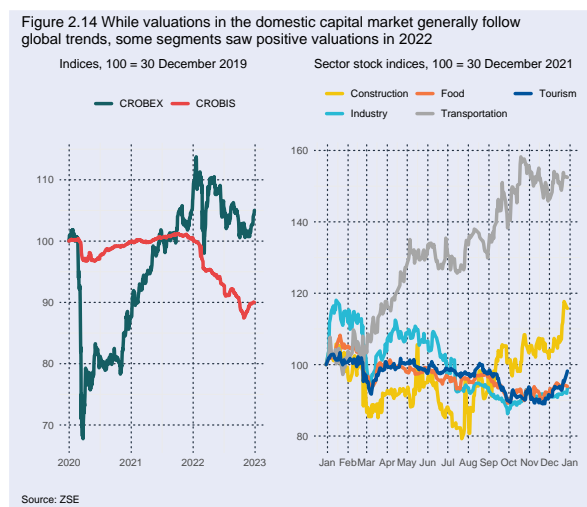
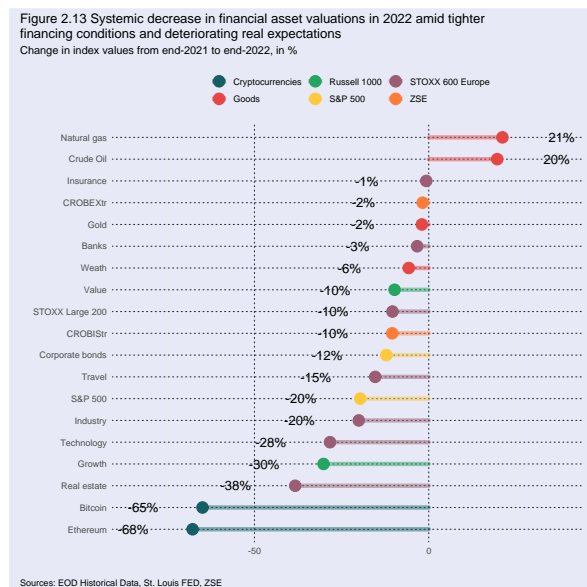
The value of most financial asset classes decreased in a large number of global markets during 2022, so that investors faced difficulties in preserving the value of investments (Figure 2.13). Even the relatively sound strategy of portfolio diversification, which is perceived as the safest method of risk management, failed to shield investors from negative returns, which illustrates the intensity of recent shocks and the extent of deterioration of market sentiment. This was due to the market anomaly seen in 2022, that is, intensification of the same direction change in the yields on stocks and bonds, which was negative or only slightly positive in recent years, shielding investors from large losses.

Such dynamics can be attributed to the consequences of inflation developments that diminished the value of coupon payments and expected dividends in real terms, leading to valuation corrections of stocks and bonds. As a result, most sectoral stock indices recorded a fall in valuation, particularly cyclical stocks, with the real estate, technology and industry sectors

leading the way. Among securities of financial institutions, banks and insurance companies were the two segments that somewhat shielded investors from the overall valuation correction, mostly due to the positive correlation between business performance and interest rate increases. More speculative assets like cryptocurrencies, which was pressured by a number of idiosyncratic events, such as the collapse of a major trading platform<sup>9</sup>, recorded the sharpest fall, of 65%, in the first eleven months of 2022. In the same period, the valuations of energy commodities were slightly corrected compared to the middle of the year due to the slowdown in global aggregate demand, but remained at significantly higher levels compared to the end of 2021. Global market trends and rising interest rate risk continued to spill over to the domestic market, pushing the CROBIS bond index down by 12.6 percentage points in 2022 (Figure 2.14). In view of the large share of government bonds in institutional investors' portfolios, such developments weigh on their profitability and reduce their returns, but they do not undermine system stability in view of its high capitalisation levels (for more information, see Chapter 3 [Risks in the financial services sector.](#)) The CROBEX stock index dropped by 4.8% in 2022, reflecting uncertain economic developments. Notwithstanding the marginal fall in November caused by the normalisation of freight rates, the transport sector, which remained the most important component of the CROBEX index in 2022, ended the year at a level 55.2% higher than at the end of 2021. The construction sector also gave a positive contribution, thanks to the growing volume of construction works, robust demand for residential real estate and planned investments in infrastructural projects. Industry, tourism and food sectors dropped on average by 4.8%, reflecting negative consumer sentiment in late 2022 and the impact of rising import

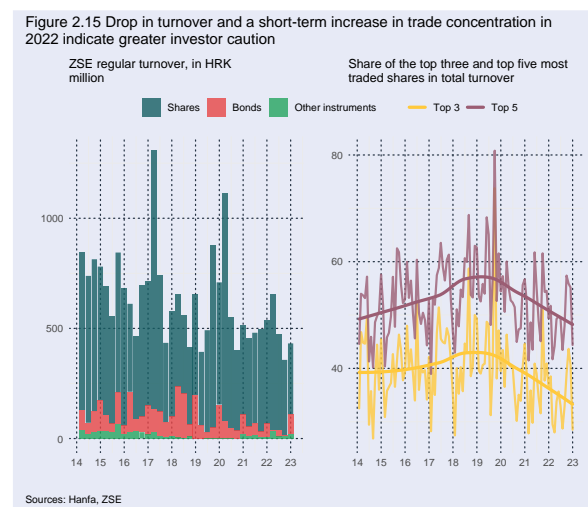
<sup>9</sup> In November 2022, FTX, a leading cryptocurrency exchange confirmed its inability to meet its obligations to investors, which prompted a sharp fall in the valuations of cryptocurrency markets.

prices, which put pressure on margins and corporate earnings. Furthermore, the introduction of the additional profit tax has further reduced the ability of companies to adjust to sluggish economic activity and macroeconomic uncertainty expected in the upcoming period, creating additional pressure on market valuations.



The deterioration in investor sentiment was reflected in a lower trading volume in the third and fourth quarters and higher trading concentration, which accentuated structural deficiencies of the domestic capital market. High inflation, tighter financing conditions and potentially reduced adjustment ability of some companies amid growing uncertainty led to a fall in turnover in the second half of 2022, which remained highly concentrated in a few issues.

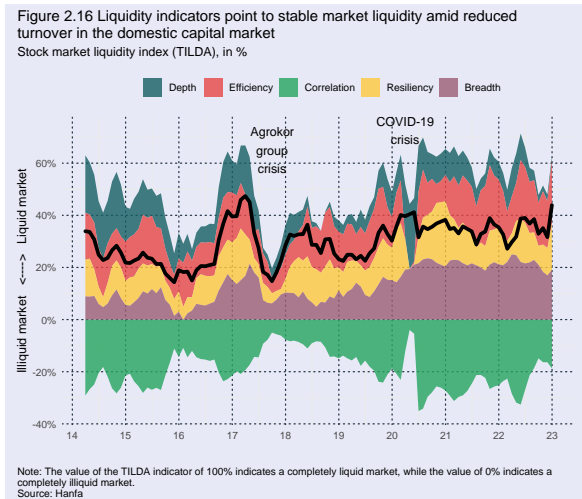
Bearing in mind the speculative nature of some market transactions, these trends make the domestic capital market vulnerable and relatively shallow. At the end of December, the top five and the top three most traded shares accounted for 44% and 29% respectively of the total turnover, which was less than in the preceding months characterised by relatively high concentration (Figure 2.15). Valuation corrections also affected the market capitalisation, which stood at HRK 258.9bn at the end of 2022, decreasing by 5.5% from the end of 2021.



Liquidity conditions in the domestic capital market were relatively stable despite the high concentration and reduced volume of trading. Depth and efficiency indicators reflect lower trading activity and rising implicit and explicit transaction costs in the second half of 2022. Low liquidity and elevated volatility are the main characteristics of the domestic market, latently increasing the risk of diminished profitability of institutional investors in case of both idiosyncratic and systemic disturbances (Figure 2.16).

Along with lower risks and transaction costs, euro adoption offers a potential for deeper integration of the domestic capital market into European financial markets. While cyclical indicators do not suggest that the domestic capital market is overvalued, its identified structural weaknesses make it vulnerable to

potential systemic shocks, the spillover of which is positively correlated with the degree of market integration into international capital flows. Based on the experience of the more recent euro area members, euro adoption offers room for improvement of structural characteristics in the long run, particularly in some segments of liquidity (for more information, see [Box 1 Impact of euro adoption on the capital market and the financial services sector](#)).



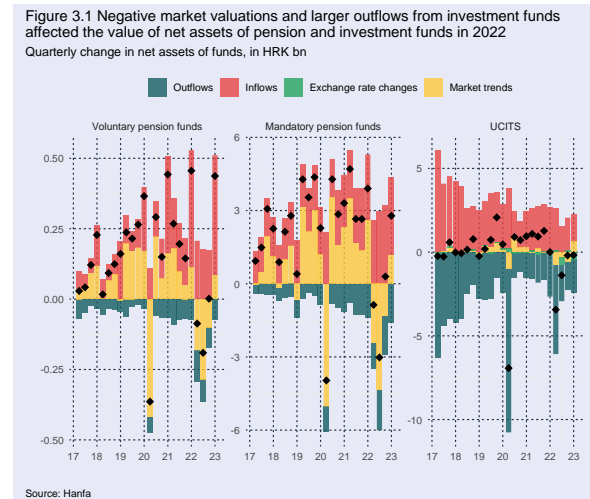
### 3. Financial services sector risks

#### 3.1 Short-term risks

Short-term vulnerabilities of the financial services sector increased in 2022 as market and interest rate risks materialised in the form of a significant drop in the prices of shares and bonds, which are the main investment classes, and elevated volatility in these markets. In 2023, financial markets are expected to remain relatively volatile and highly sensitive to news about macroeconomic and geopolitical developments. The parallel decline in stock and bond valuations sharply reduced the profitability and returns of almost the entire financial services sector in 2022, putting stronger liquidity pressures on the funds industry.

Market developments had a negative impact on net assets of pension funds (for more information, see Chapter [2 Macroeconomic and financial environment risks](#)), which decreased by HRK 3.9bn in the first three quarters of 2022, so that total payments into pension funds offset the impact of negative market developments on their assets (Figure 3.1) as late as in the third quarter. The loss in asset value was almost compensated by favourable market developments in the last quarter of 2022, so that net assets of pension funds stood at HRK 140.1bn at the end of 2022. The decrease in total assets of mandatory pension funds in 2022 was the outcome of the fall in the assets of category B funds, of HRK 3.2bn (2.6%), due to unfavourable market developments, as well as larger outflows triggered by the legally prescribed transition of members to category C funds. In the same period, these inflows offset the negative market effect on assets of category C funds, which rose by HRK 1.9bn in the course of 2022 (growing by 21.1% from the end of 2021). As for category A funds, which account for smaller asset amounts than other fund categories, positive net inflows also neutralised the negative impact of market

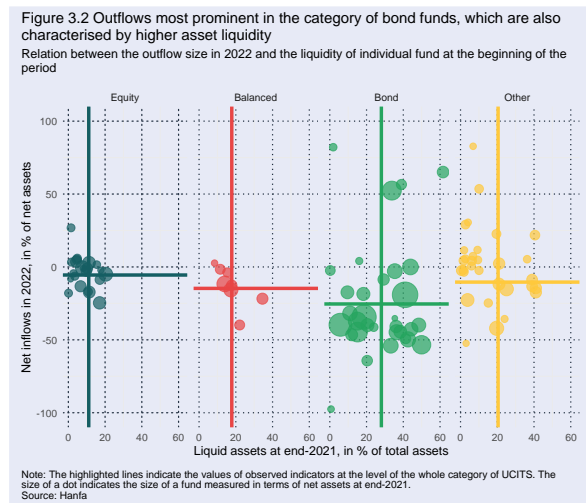
developments. As a result, net assets of category A pension funds grew by HRK 0.5bn (33.8%) from the end of 2021 to the end of 2022.



In the same period, net assets of UCITS decreased by HRK 5.2bn (24.1%) from the end of 2021 to the end of 2022. Together with market pressures, the negative effect on the assets of investment funds was exerted by the deterioration in the sentiment of domestic investors, so that HRK 3.4bn net was withdrawn from UCITS in 2022, or 16.0% of their net assets at the end of 2021. Pressures on payments were strongest in the first quarter amid the tightening of geopolitical relations and the beginning of the invasion of Ukraine, and then they decreased in the rest of the year, but remained at elevated levels.

Notwithstanding the rush of (mainly retail) investors towards UCITS, the liquidity of the financial services sector remained at high levels throughout 2022. Liquidity pressures on investment funds triggered by rising redemption requests were successfully cushioned, largely owing to very high liquidity stocks of domestic UCITS (Figure 3.2). Similar to the situation during the previous wave of redemptions triggered by the pandemic outbreak in early 2020, bond funds faced the strongest pressures as they are particularly attractive to domestic retail investors,

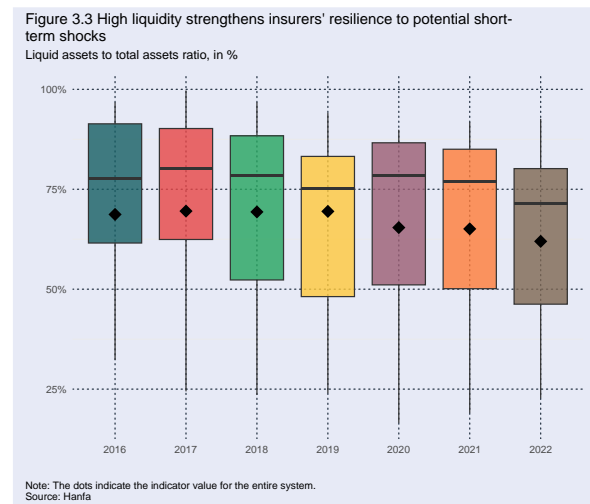
which are the largest category of investors, characterised by strong risk aversion and liquidity needs during crisis episodes. This is why bond funds usually react more strongly to sudden disturbances and uncertainty growth and have comparatively higher liquidity levels (Figure 3.2). This would enable them to make smooth payments in case of hypothetical liquidity shocks of a much larger scale than those experienced recently.



The liquidity of the domestic insurance sector has been steadily decreasing in recent years (Figure 3.3) as a result of portfolio diversification associated with the intensified search for yields. Insurance companies reduced their exposure to domestic debt instruments in favour of investments in less liquid but more profitable instruments. The same downward trend in liquidity was seen in 2022, in part due to the decreasing value of the bond portfolio, which reduced the liquid assets to total assets ratio to 62.0% at the end of 2022. Nevertheless, system liquidity remained at very high levels, though with perceptible differences across companies. As a result, a part of the sector is sensitive to sudden negative developments in the market, which might threaten its short-term liquidity in extreme circumstances.

Though premiums on new contracts have not decreased perceptibly and surrender requests have not increased so far, the continued elevated instability with growing inflationary pressures and consequent further decrease in

the purchasing power of insurance policyholders might put additional pressure on insurers' liquidity in the short run.

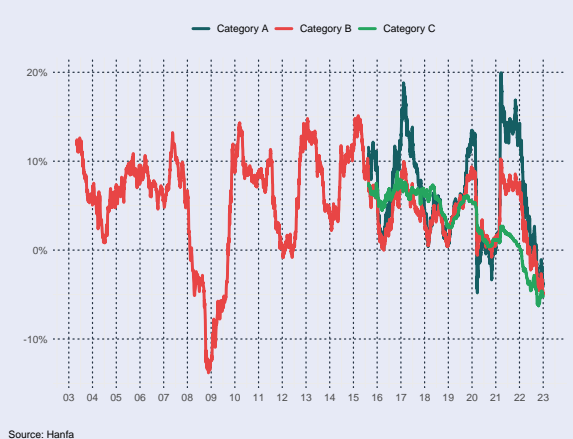


Adverse macroeconomic and market circumstances in 2022 also had a negative effect on the profitability of the financial services sector, particularly the funds and insurance industries, which are more sensitive to market and interest rate risks. As a result, profitability risk of the financial services sector was assessed as mildly elevated in the last quarter of 2022 as well.

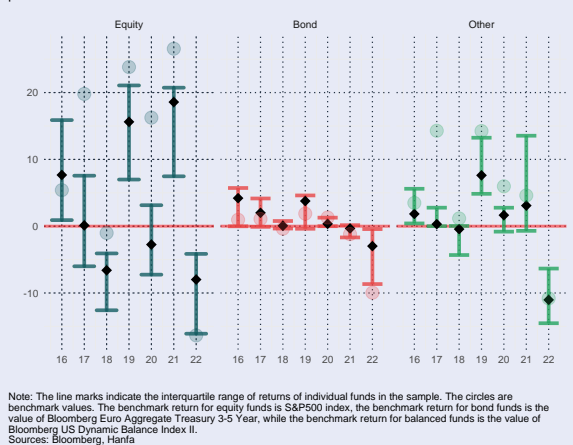
Adverse market developments affected almost all classes of financial assets in 2022 in terms of rising volatility and the largest price corrections in several years, with a negative impact on the returns of domestic pension funds (Figure 3.4). Owing to atypical performance of the domestic capital market in 2022, characterised by the perceptibly stronger contraction of the value of the domestic bond index CROBIS than the CROBEX stock index (for more information, see [Chapter 2 Macroeconomic and financial environment risks](#)), the sharpest fall in returns was seen in risk-averse category C funds, with a relatively conservative portfolio almost entirely composed of domestic bond investments. At the end of 2022, the return of category C mandatory pension funds stood at -5.3%, while category A and B funds recorded a milder decrease in return, of -4.1% and -5.0% respectively, thanks to more diversified portfolios and higher exposure to the domestic stock market. At the

same time, voluntary pension funds generated a return of –6.0%.

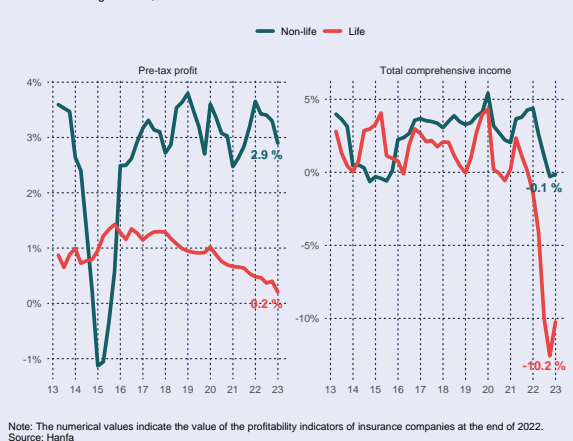
**Figure 3.4** Following a sharp recovery in 2021, the year 2022 was marked by the fall in profitability of all categories of mandatory pension funds  
Annual returns of MIREX indices, in %



**Figure 3.5** Returns of domestic UCITS reflect unfavourable global trends  
Median nominal annual returns of UCITS by fund category and benchmark returns, in percentage points



**Figure 3.6** Unfavourable market trends strongly affected total comprehensive income, particularly in the life insurance segment  
Return on average assets, in %



Profitability of UCITS was also severely affected in 2022, so that all categories of funds recorded negative returns compared with preceding year (the average return of UCITS stood at –10.2%), with returns reflecting the degree of risk of the fund category (Figure 3.5). The ongoing

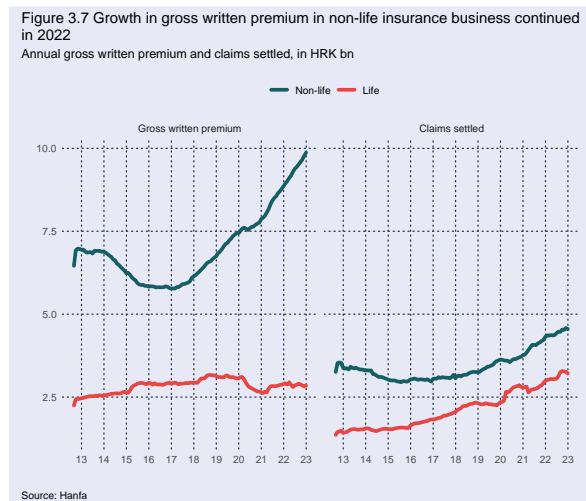
elevated geopolitical and macroeconomic uncertainty, coupled with possible further price corrections in financial markets, will continue to put pressure on fund returns, which will in 2023 largely depend on the alignment of investor expectations with economic performance.

Unfavourable market developments and inflationary pressures have not yet significantly affected the operating profitability of insurance companies. The profitability of the insurance sector, viewed in terms of annual pre-tax profit, was only marginally lower at the end of 2022 than at the end of 2021 (Figure 3.6). The profitability of non-life insurance business remained relatively high, primarily owing to the continuous several-year upward trend in premium income. As usual, the increase in non-life insurance premium, of 11.5% in 2022, was mostly driven by motor vehicle liability insurance, land motor vehicle insurance and property insurance. Increase in unit-linked premium, of a high 46.0% from 2021 to 2022, cushioned the decrease in life insurance premium, so that total life insurance premium decreased by 1.8% in the period observed. Total gross written premium stood at HRK 12.7bn at end-2022, growing by 8.2% from 2021 (Figure 3.7).

The same types of insurance that generated premium growth (unit-linked insurance, motor vehicle liability insurance and land motor vehicle insurance) gave the largest contribution to the 5.7% growth in claims settled relative to 2021, which amounted to HRK 7.7bn at the end of 2022.

Corrections in financial market valuations had a significant negative impact on comprehensive income of insurance companies, particularly in the life insurance segment (Figure 3.6). Losses on revaluation of available-for-sale financial assets amounted to HRK 3.2bn in 2022, of which 76.8% was accounted for by life insurance companies. Because of the nature of their business and the need to align the maturity of investments and liabilities arising from long-term contracts, life insurance companies invested a significant

portion of assets under their management in long-term bonds, whose value was significantly reduced amid rising interest rates in 2022 (for more information, see Chapter 2 [Macroeconomic and financial environment risks](#)). Therefore, bearing in mind a potential further tightening of financing conditions, profitability risk of insurance companies, particularly in the life insurance segment, is likely to remain elevated in the upcoming period.



Introduction of a new international accounting standard, IFRS 17,<sup>10</sup> at the beginning of 2023 will have a major impact on the calculation of profitability indicators of insurance companies, and it may also affect the performance of individual companies. In addition to the characteristics of each insurer’s portfolio, the results will depend on the methodology a company employs to implement the standard (selection of the valuation method, determination of the discount curve and other relevant assumptions).

The total value of newly concluded leasing contracts surpassed HRK 10.5bn in 2022, which is an increase of 29.4% from 2021, while the value of active contracts grew by 12.1% from the end of 2021 to the end of 2022. The profitability of leasing companies measured in terms of return on average assets dropped by 0.45 pp

from end-2021 to end-2022, to 1.6%. In view of relatively favourable developments in the real sector, reflected in the rise in new contracts, the lower profitability of leasing companies was primarily due to higher operating expenses. Operations of leasing companies were not significantly impaired in 2022 despite soaring inflation and interest rate growth, which exert pressure on the net interest margin because the bulk of leasing contracts (71.8%) is contracted with fixed interest rates. The likely economic slowdown in 2023 (for more information, see Chapter 2 [Macroeconomic and financial environment risks](#)) might also adversely affect the operations of leasing companies in terms of a potentially lower volume of new contracts and higher credit risk of their existing portfolio.

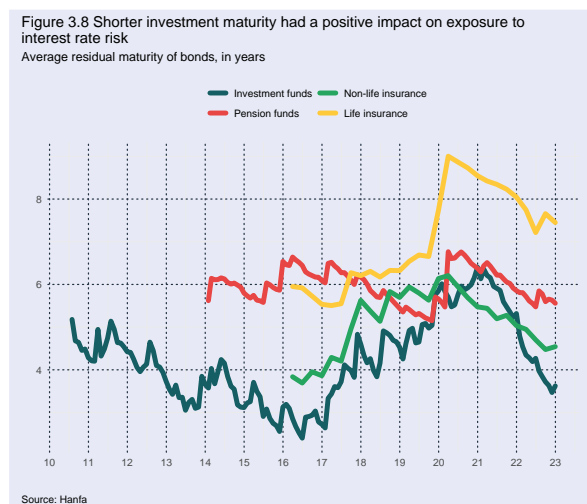
### 3.2 Long-term risks

Exposure of the financial services sector to long-term systemic risks was at an elevated level at the end of the fourth quarter of 2022. Interest rate risk, which partly materialised in the course of 2022, remained the most prominent long-term structural risk facing the domestic financial services sector. In view of likely further increase in reference interest rates in 2023 and the high share of fixed return investments in the portfolios of institutional investors, the value of bond investments is expected to continue to decrease. However, the realisation of interest rate risk should be less material than in 2022 due to the shortening of the maturity of bond investments and potentially less stringent monetary tightening. Capital buffers of the financial services sector continue to be at satisfactory levels, enabling it to absorb potential further losses.

The 2022 shift in the monetary policy of central banks reflected in the rise in reference interest rates led to a materialisation of interest rate risk

<sup>10</sup> More information on the introduction of a new international accounting standard may be found in Box 2 The new IFRS 17 – Insurance contracts in the publication [Macprudential risk scanner No 6](#).

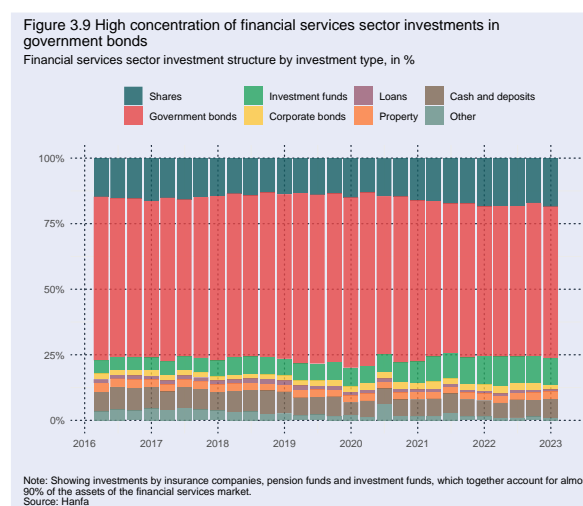
in the financial services sector. Rising returns on bond investments (accounting for as much as 59.5% of investments at end-2022) significantly reduced the value of the fixed-income portfolio of the entire sector. At the end of 2022, sector's bond investments were HRK 6.0bn (4.8%) lower than at the end of 2021. The decrease would have been even larger had institutional investors not shortened the maturity of their bond portfolios in 2021 and 2022 (Figure 3.8), thereby reducing the discount effect of higher interest rates. As regards insurance companies, the net effect of higher interest rates on companies' balance sheets depends on the maturity match of assets and liabilities. In view of the longer maturity of assets than of liabilities, non-life insurance portfolios are put under a much heavier short-term pressure than life insurance portfolios, where the maturity of liabilities exceeds that of assets. The decrease in the value of assets and liabilities associated with interest rate hikes will be somewhat cushioned by the introduction of the euro and the ensuing transition to the relatively lower euro risk-free curve at the beginning of 2023.



Despite the additional short-term adverse impact on the value of bond investments, the likely further growth in reference interest rates will raise coupon returns on new bond investments in the medium term, which will

again become an attractive and competitive investment class in terms of returns.

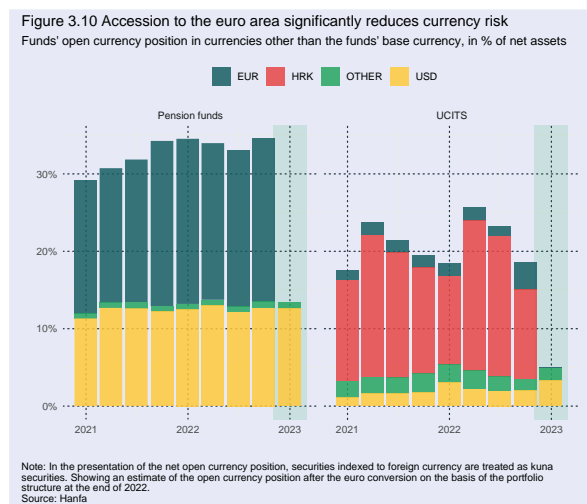
The financial services sector is still relatively highly concentrated. The high investment concentration in specific investment classes and issuers is additionally enhanced due to the high concentration in financial services sector assets (pension funds manage almost 60% of total sector assets). Despite the several-year trend of investment diversification by means of increasing stock investments<sup>11</sup>, which are mostly channelled into stocks of European companies, bonds (mostly domestic government) continue to account for the bulk of total sector investments (Figure 3.9). As a result, the sector continues to be significantly exposed to potential idiosyncratic shocks that may arise from the described investment structure.



Currency risk exposure of the financial services sector stayed at moderate levels due to the increase in foreign investments seen in recent years, which is associated with the search for higher yields. However, this exposure will be significantly reduced following the accession to the euro area at the beginning of 2023. The average net open currency position of investment and pension funds did not change much in 2022, standing at 18.6% for investment funds and 34.6% for pension funds at end-September. Currency risk of the entire sector will be reduced once Croatia joins the euro area. As

<sup>11</sup> The share of stock investments in total assets rose by 3.9 pp in the last five years.

a result, the net open position of funds, assuming there are no changes in the portfolio structure from the end of 2022, could amount to only 5.0% of the net assets of UCITS and to 13.5% of the net assets of pension funds (Figure 3.10). The major part of the remaining net open position is accounted for by exposure to the US dollar, which has become the predominant source of currency risk for the entire financial services sector.



Credit risk of the financial services sector remained slightly elevated in the fourth quarter of 2022, despite the fact that the credit rating of the domestic government, i.e. the most important issuer in investment portfolios, is at its highest level in the past 20 years<sup>12</sup>. The valuations of domestic government bonds, though declining due to macroeconomic and market uncertainty over the year, proved to be relatively more resilient to interest rate shocks than those of peer CEE countries. This is attributable to favourable economic performance in 2022 (for more information, see Chapter [2 Macroeconomic and financial environment risks](#)), as well as Croatia's accession to the euro area, as reflected in lower market yields on government bonds in comparison with peer countries (for more information, see [Box 1](#)

[Impact of euro adoption on the capital market and the financial services sector](#)

Credit risk exposure of leasing companies remained at very low levels in 2022 as the share of non-performing receivables in total receivables stood at 1.7% at end-2022, which is 1.0 pp less than at end-2021, while the coverage of non-performing placements stayed at a high 78.0%.

Despite relatively favourable macroeconomic developments in 2022, persistently high geopolitical tensions and the likely worsening of financing conditions have kept credit risk exposure of the financial services sector at a slightly elevated level.

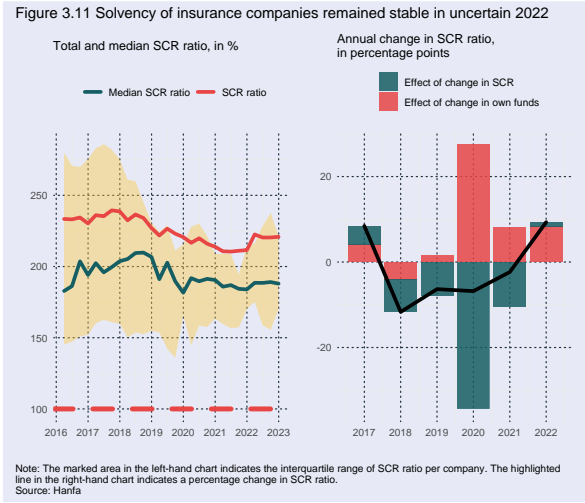
The capitalisation level of the financial services sector remained satisfactory during the crisis year of 2022. Solvency indicators of the insurance sector were relatively stable at the end of 2022, with the median SCR ratio growing by 4.1 pp from the end of the previous year, to 188.0%, i.e. much above the regulatory minimum (Figure 3.11). The downward effect of interest rate hikes on the value of insurers' investments was offset by a comparable impact on their liabilities, which contributed to the rise in insurers' own funds over the course of 2022. At the same time, capital requirements were reduced on an aggregate level, primarily due to the impact of lower capital requirements for equity risk and requirements for spread risk (due to a decrease in the symmetric adjustment of the equity capital charge and the lower value of assets)<sup>13</sup>. Capital buffers of insurers are sufficiently high to secure the stability of insurance sector operations on an aggregate level, also bearing in mind the expected reduction in capitalisation due to the euro introduction at the beginning of 2023.

Capitalisation of leasing companies, measured as the ratio of capital and reserves to total assets, stood at 11.4% at the end of 2022 (1.2 pp less

<sup>12</sup> The Republic of Croatia has been assigned an investment-grade rating by all three major rating agencies (BBB+ by Fitch Ratings and Standard & Poor's, and Baa2 by Moody's).

<sup>13</sup> Symmetric adjustment of the equity capital charge serves to avoid the procyclical effects of regulatory requirements (by raising capital requirements in times of market growth and reducing them during times of market decline).

than at the end of 2021). Notwithstanding the decrease, such capitalisation still provides relatively high capital stocks that strengthen the resilience of leasing companies for the upcoming period of heightened systemic risks.



## Box 1 Impact of euro adoption on the capital market and the financial services sector

With the introduction of the euro as the official currency from the beginning of 2023, Croatia has taken part in the final stage<sup>14</sup> of the Economic and Monetary Union (EMU). As one of the most significant economic changes, euro adoption, that is, and accession to the monetary union affects the entire financial system. Its potential impact on short-term developments, as well as long-lasting, structural characteristics of the domestic capital market and the entire financial services sector has been estimated in a research focused on the EU Member States that joined the euro area in the past. Results of the quantitative analysis do not indicate that accession to the monetary union has statistically significant short-term effects on the capital market. At the same time, the estimated long-term impact on structural market indicators is not exact and largely depends on idiosyncratic developments and specific measures taken to improve the operation of the capital market.

### 1 Process and circumstances of euro adoption in Croatia

Under the theory of optimum currency areas (OCA), certain geographical regions might maximise their economic efficiency by applying a common currency and monetary policy. Countries join a common currency area if perceived benefits of monetary integration exceed its costs.

Optimality criteria have been developed to estimate the optimality of a currency area, that is, benefits of a country's participation in a monetary union. These criteria may be divided into two broad groups. The first group focuses on *reducing Member States' exposure to asymmetric shocks* (labour and capital mobility,

price and wage flexibility, synchronisation of business cycles and economic shocks, degree of an economy's openness and diversification), while the other group focuses on *facilitating the adjustment to asymmetric shocks* (monetary policy efficiency, labour and capital mobility, financial and fiscal integration)<sup>15</sup>.

The European economic and monetary union was established on 1 January 1999. The euro as the common currency was released into circulation on 1 January 2002. In consideration of Croatia's accession to the euro area in the context of the OCA theory, the criteria in its favour are trade, financial and political integration, as well as synchronisation of business cycles, while against it is the relatively modest diversification of the Croatian economy, which according to Kenen (1969), would favour the maintenance of a flexible exchange rate and use of exchange rate measures to absorb external shocks to demand for home goods<sup>16</sup>. A large volume of literature on the topic of euro in Croatia suggests that there is a consensus among authors that the benefits of euro adoption outweigh the associated costs. Among others, the main advantages include the elimination of a large share of currency risk, reduction of transaction costs due to elimination of conversion costs, which, from the standpoint of consumers, enhances competition and transparency of goods and services supply by facilitating an international comparison of prices and reduction of borrowing costs for all domestic sectors due to a decrease in the country's risk premium. Some of the drawbacks are the loss of monetary independence and the

<sup>14</sup>Under the Treaty on European Union from 1992, all EU Member States, with the exception of Denmark and the United Kingdom, committed themselves to introduce the euro as the national currency once they fulfil the convergence criteria or criteria demonstrating their readiness to adopt the euro.

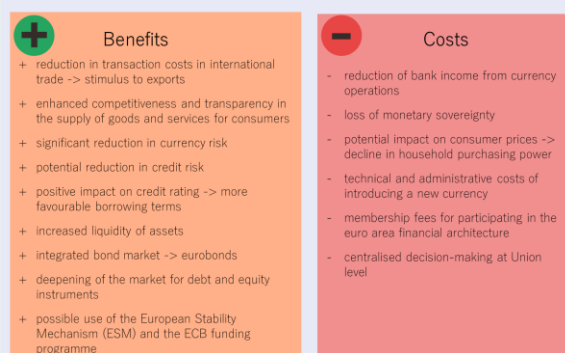
<sup>15</sup>For more information on the criteria of optimum currency areas and the theory itself, see Bilas (2005) and Broz (2005).

<sup>16</sup>Kenen, P. (1969). The Theory of Optimum Currency Areas: An Eclectic View

upward effect on consumer prices, that is, potential acceleration of inflation<sup>17</sup>.

The country's substantial integration into capital and goods flows within the euro area, and the relative openness of the economy characterised by a high degree of currency substitution (euroisation) highlight the benefits of euro adoption for Croatia<sup>18</sup>. A reduction in currency risk indirectly also lowers credit risk due to rating upgrades by credit rating agencies. Such reduction in the risk premium may result in lower borrowing costs, not only for the government, but also for the overall economy, which may ultimately stimulate consumption and economic growth (Figure 1).

Figure 1 Benefits and costs of euro adoption



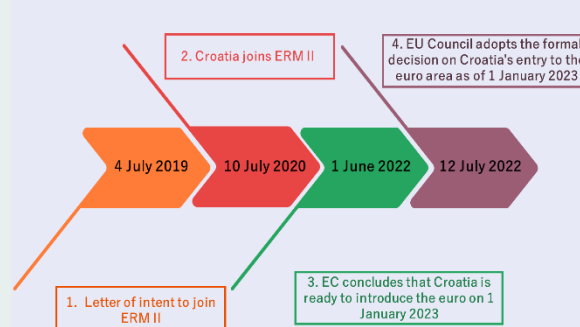
Source: Hanfa

The most noteworthy drawbacks of euro introduction in Croatia are the loss of monetary sovereignty and short-term effects on consumer prices. In case of Croatia, the risks posed by these drawbacks may be considered limited, bearing in mind that the monetary policy pursued by the CNB up to now has been constrained by the high degree of euroisation of both the economy and the financial system. In terms of the negative impact on consumer prices, previous research works suggest that it is

relatively small and heterogeneously distributed across categories of products and services<sup>19</sup>. Other negative effects of the euro are one-off administrative costs of its introduction, loss of bank income from currency operations, and euro area "membership fees".

The process of euro adoption lasts for several years. Croatia took the first formal step towards that goal in July 2019, when it sent a letter of intent to enter the European Exchange Rate Mechanism (hereinafter: ERM II), expressing its readiness to implement reforms to prepare itself for participation in the ERM II<sup>20</sup>. While participating in the exchange rate mechanism, a euro-area candidate country must meet the criterion of exchange rate stability, that is, maintain the exchange rate within a fluctuation band of 15% around the central parity.<sup>21</sup> A minimum period a country needs to spend in ERM II prior to the euro adoption is defined in the Maastricht Treaty (hereinafter: the Treaty). The Treaty also defines the preconditions, that is, convergence criteria, each euro-area candidate country has to meet to demonstrate its readiness for stable functioning within the euro area<sup>22</sup>.

Figure 2 Process of euro adoption in Croatia



Source: Hanfa

<sup>17</sup> For more information on effects of the euro on consumer prices and inflation perceptions, see Pufnik (2017).

<sup>18</sup> For more information on the persistence of euroisation in Croatia, see Dumičić, Ljubaj and Martinis (2017).

<sup>19</sup> Eurostat estimates suggest that the effect of the conversion to the euro on the growth of prices in particular countries was around 0.2 percentage points on an annual level. According to estimates, consumer prices in Croatia might grow by slightly more than 3.0% in the period six months before and after the euro adoption. The first CBS estimate suggests that consumer price indices held steady from December 2022 to January 2023. However, they rose by

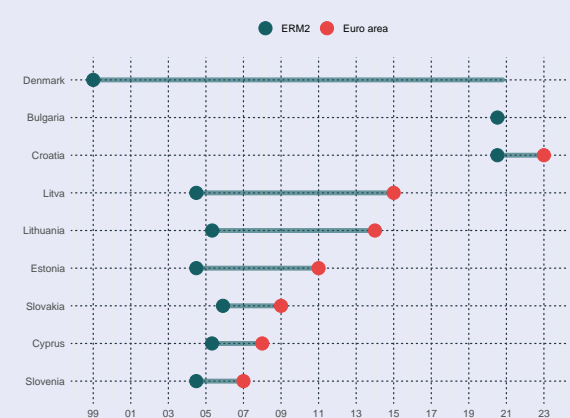
12.7% on an annual level, which implies that some effects have already been incorporated.

<sup>20</sup> For more information on reform areas, see [Letter of intent](#).

<sup>21</sup> For more information on the importance of setting an equilibrium exchange rate and ERM II, see Deskar-Škrbić, Kotarac, Kunovac, Jelić (2021).

<sup>22</sup> These criteria are as follows: price stability, level of long-term interest rates, exchange rate stability and sustainability of public finances.

Figure 3 Various length of stay in the euro area waiting room  
Dates on which individual countries joined ERM II and euro area



Source: Hanfa

At least once every two years, the EC and the ECB assess in convergence reports the progress made by euro-area candidate countries. Where a country meets the criteria at a sufficient level<sup>23</sup>, as was the case with Croatia on 1 June 2022, the EC allows it to make the final steps in the process of euro adoption by issuing a proposal for an EU Council decision and regulation on euro introduction. Finally, following discussions at meetings of the Eurogroup, the Economic and Financial Affairs Council (hereinafter: ECOFIN) and the European Council, and an opinion of the European Parliament and the ECB, ECOFIN adopts three final legal acts necessary for euro adoption, formally completing the preparation process (Figure 2).

## 2 Impact on financing costs

Lower transaction costs and elimination of currency risks, which may give rise to larger foreign investments, enhanced competition and cheaper financing, are some of the major positive effects of euro introduction on the capital market. A comparison between euro and non-euro area countries may be used to assess whether actual developments support the above theoretical assumptions. More specifically, the size of this effect on government borrowing costs may be isolated by introducing a binary

dummy variable of euro area membership in a model estimate of expected yields to maturity on ten-year government bonds, while controlling for fundamental economic and fiscal indicators. To that end, we used a panel-model with fixed effects on a sample of 26 EU Member States in the period from 1999 to 2022 using monthly frequency data. The rationale for using this method, that is, stationarity of the variables used in the model, has been tested by applying the augmented Dickey-Fuller test adjusted for panel data, as proposed by Maddala and Wu (1999)<sup>24</sup>, which is robust to serial autocorrelation and heteroskedasticity<sup>25</sup>.

The long-term impact of euro area accession on government borrowing costs has been estimated by applying a long-term relation where yields on long-term government bonds have been regressed for movements of a risk-free interest rate (yield on German bonds), fiscal sustainability indicators (public debt level and public finance situation), a credit rating indicator, that is, a country's credit risk, and, finally, a dummy variable for euro area membership. The relation is formally presented as follows:

$$\begin{aligned}
 return_t^k = & \alpha^k + b_1 * return_{DE_t} + b_2 * debt_t^k \\
 & + b_3 * balance_t^k + b_4 \\
 & * investment_t^k + b_5 \\
 & * euro\_area_t^k + \varepsilon_t^k
 \end{aligned}$$

The estimated results (Table 1) support the mentioned long-term benefits of the euro for a country's borrowing costs. In other words, the long-term impact of euro adoption is statistically significant, where euro area membership lowers a country's long-term borrowing costs by 0.46 percentage points, conditionally on all other fundamental indicators. This impact is relatively more modest than that of investment credit rating on the level of interest rates, the long-term effect of which stands at 2.3 pp. Results also

<sup>23</sup> Sufficient levels or benchmark levels for nominal convergence criteria are defined under the Treaty on the European Union.

<sup>24</sup> Maddala G.S., Wu S. (1999). A comparative study of unit root tests with panel data and a new simple test. Oxford Bulletin of Economics and Statistics, 61, 631-52

<sup>25</sup> The zero hypothesis, which assumes non-stationarity of the tested variable, has been rejected by the tests.

confirm that the yields of individual countries move "one on one" depending on the movements in the risk-free rate, as well as the importance of the quality of public finances for the level of financing costs for both the government and other residents.

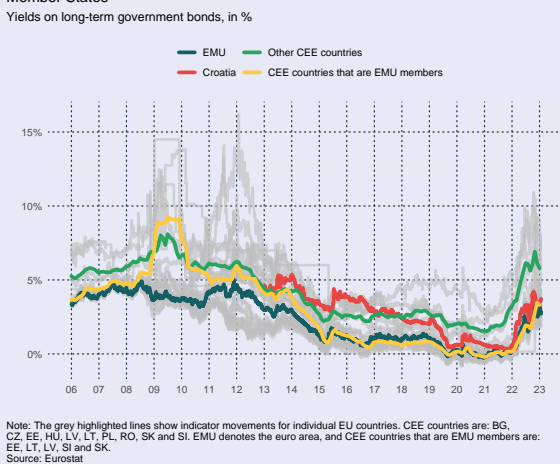
**Table 1 Long-term determinants of yields to maturity on ten-year government bonds**

	Coefficients	P-value and significance
<b>Dependent variable - yield on long-term bonds</b>		
Yield on German bonds	1.010	0(***)
Public debt level (in % of GDP)	0.009	0(***)
General government balance (in % of GDP)	-0.161	0(***)
Investment rating (dummy variable)	-2.319	0(***)
Euro area Member State (dummy variable)	-0.457	0.0005(***)
<b>General model characteristics</b>		
Number of observations	6509	
R <sup>2</sup>	63.100%	
Adjusted R <sup>2</sup>	62.930%	
F statistics	2215.6300	
P-value of F statistics	0.00000	

Note: . p < 0.1; \* p < 0.05; \*\* p < 0.01; \*\*\* p < 0.001

Source: Hanfa

**Figure 4 Yields on Croatian bonds converge towards the yields of euro area Member States**



Note: The grey highlighted lines show indicator movements for individual EU countries. CEE countries are: BG, CZ, EE, HU, LV, LT, PL, RO, SK and SI. EMU denotes the euro area, and CEE countries that are EMU members are: EE, LT, LV, SI and SK.  
Source: Eurostat

As the process of Croatia’s accession to the euro area lasted for several years, its impact on the prices of bonds has already been largely incorporated in market valuations, that is, yields. As a result, yields on long-term Croatian government bonds in the period from 2019 to end-2022 diverged from yields on the bonds of peer CEE countries and converged towards the yields on the bonds of euro area countries (Figure 4). Therefore, the yield on Croatian government bonds stood at 3.4% in late 2022,

while the yields for non-euro area CEE countries averaged 5.8%.

### 3 Impact on the stock market

While the impact of accession to the common currency area on the bond market and borrowing costs is well documented and definite, the impact on the stock market is largely uncertain. For this reason, the text below provides an empirical analysis of potential short- and long-term effects of euro area accession on the stock markets of the countries that completed that process in the last two decades.

Short-term effects in the 12 months before and after the formal accession to the euro area were assessed by means of an event study methodology on a sample of 547 stocks listed in the local markets of seven EMU member countries<sup>26</sup>.

A quantitative assessment of the impact of euro area accession on valuations in local stock markets requires an assessment of atypical rates of market return at the level of individual stocks, which are defined as the difference between actual and “normal” monthly rates of return, that is:

$$AR_t^k = R_t^k - NR_t^k, \text{ where}$$

$AR_t^k$  is an abnormal return,

$R_t^k$  is the observed market return, and

$NR_t^k$  is the estimated normal return.

Normal returns were estimated by means of a market model which assumes a certain relation between the observed stock and trends in the entire market. In this analysis, this relation was estimated using a univariate linear regression, where the returns on the observed stock were regressed in relation to the free member and the representative stock market index<sup>27</sup>, as follows:

$$NR_t^k = \alpha^k + \beta^k * r_t^{S\&P500} + \varepsilon_t^k.$$

<sup>26</sup> These countries are as follows: Cyprus, Lithuania, Latvia, Malta, Slovakia, Slovenia and Estonia

<sup>27</sup> ZS&P500 stock market index was used for the purpose of this analysis.

Finally, the statistical significance of the observed event at time  $\tau \in \{-12,12\}$  is assessed using a statistical indicator called cumulative average abnormal return (CAAR), which is defined as follows:

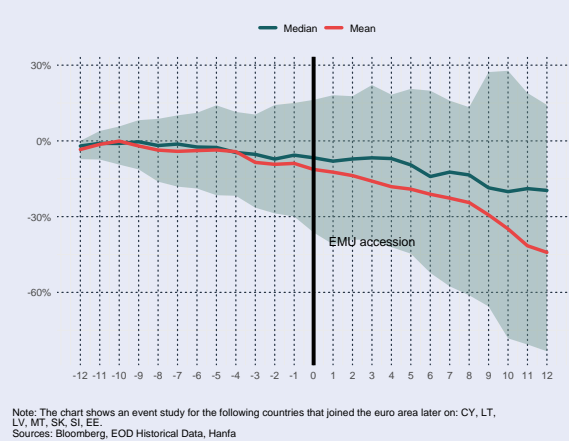
$$CAAR_{\tau} = \frac{1}{N_{\tau}} \sum_{k=1}^{N_{\tau}} CAR_t^k = \frac{1}{N_{\tau}} \sum_{k=1}^{N_{\tau}} \left[ \sum_{t=-12}^{\tau} (R_t^k - NR_t^k) \right],$$

where  $N_{\tau}$  is the number of active stocks in period  $\tau$ . To test the presence of the short-term impact of euro area accession on stock returns, we used a two-sided t-test of statistical significance, which tests the presence of statistically significant deviations of returns from the normal values in the observed period of 12 months before and after the euro adoption.

The estimated results suggest that accession to the euro area does not have a statistically significant short-term impact on stock returns (Figure 5 and Table 2). One reason for this is prior accession to the European Union, which contributed to a greater integration of the markets in the European territory, which is further deepened by the accession to the euro area. Another reason is the long period of waiting and preparing for the new currency, which provided sufficient time to stock market participants to prepare for the common currency. Furthermore, the absence of any short-term effect may be due to the faster shifting of some demand of domestic investors to foreign markets as the euro introduction eliminates some obstacles to such investments (exchange rate risk and lower transaction costs in general, elimination of regulatory currency

limits, etc.). At the same time, that effect is not compensated in the short run by foreign demand, that is, foreign investments, though they are projected to grow following the adoption of the single currency. Also noteworthy are the technical limitations of the used method, which is more appropriate for assessing very short-term effects of events that recur frequently and suddenly, which was not the case with the process of euro area accession. For these reasons, the presented results may underestimate the presence of short-term effects of euro adoption on stock market valuations.

Figure 5 Euro area accession does not have a statistically significant impact on stock valuations  
Cumulative change in returns on stock markets one year before and after the euro adoption, in %



However, the key effects of euro area accession may be found in the long run, that is, the potential favourable impact of euro adoption on market liquidity through increased engagement of foreign investors. In light of the fact that 5.6 years have passed on average since the euro adoption in the eight countries observed, their experience may be used to estimate long-term benefits of euro area accession for market liquidity.

Table 2 Statistical significance of cumulative abnormal stock returns in the short term

Relative period before/after the event (in months)																								
-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	-2	-1	0	1	2	3	4	5	6	7	8	9	10	11	12
-3.64	1.88	1.16	-1.69	-1.61	-0.45	0.37	0.27	-0.48	-2.93	-0.41	0.44	-1.64	-0.98	-0.92	-1.50	-2.04	-1.11	-1.96	-1.43	-1.72	-2.89	-4.14	-5.04	-2.33
(0***)	(0.06)	(0.25)	(0.1)	(0.11)	(0.66)	(0.71)	(0.79)	(0.63)	(0**)	(0.69)	(0.66)	(0.1)	(0.33)	(0.36)	(0.14)	(0.05*)	(0.27)	(0.05)	(0.16)	(0.09)	(0.01**)	(0***)	(0***)	(0.02*)

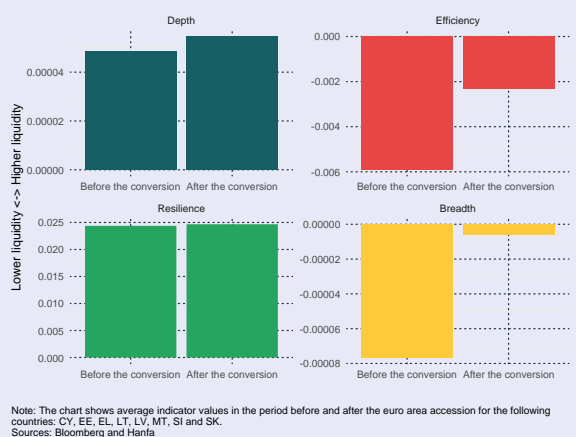
Note: P-value of a two-sided t-test of significance of the CAAR statistics is given in brackets. The zero hypothesis assumes that the CAAR statistics is equal to 0.

p < 0.1; \* p < 0.05; \*\* p < 0.01; \*\*\* p < 0.001

Source: Hanfa

The liquidity of the capital market was calculated by means of a methodology that estimates different dimensions of market liquidity: depth, breadth, efficiency and resilience (for a detailed description of the methodology, see [Box 1 Measuring capital market liquidity](#) in the publication Macroprudential risk scanner No 6)<sup>28</sup>.

**Figure 6 Stock markets recorded some structural improvements after joining the common currency area**  
Liquidity indicators of stock markets in selected countries



The analysis shows that all observed liquidity indicators improved to some extent following euro adoption (Figure 6). The improvement in these indicators points to a decrease in implicit and explicit transaction costs and an increase in the trading volume and activity. The rise in market activity did not have an adverse effect on the market resilience indicator; moreover, it improved slightly in the aftermath of euro adoption.

Based on the example of the countries observed, it may be expected that Croatia’s accession to the euro area will have a positive impact on stock market liquidity in the long run and that it will have an indirect positive effect on the creation of added value owing to improvements in the internal capital allocation process and attraction of new foreign capital. Furthermore, market

resilience to sudden systemic shocks is expected to grow. Though welcome, these potential effects alone are not sufficient to ensure any significant development of the domestic capital market, structurally characterised by low liquidity and significant concentration (for more information, see Chapter 2 [Macroeconomic and financial environment risks](#)), which is an indirect source of systemic risk for the entire financial services sector.

#### 4 Indirect impact of euro adoption on the financial services sector

The presented results suggest that euro area membership brings long-term benefits for both stock and bond markets. With the reduction of currency and credit risks, capital markets become more attractive to foreign investors, which enhances market integration and deepening. Indirectly, it also lowers portfolio risk of domestic institutional investors, while increasing the liquidity of existing investments. In other words, it reduces exposure to systemic risks and improves resilience to short-term shocks.

The downside of euro membership may be stronger integration of the domestic capital market with the European market, which may lead to more prominent cyclical risks in terms of greater sensitivity of the domestic market to sudden external shocks.

While indirect long- and short-term benefits and costs of euro adoption for the domestic financial services sector are still not certain, some direct effects are quite concrete and measurable. In 2021, Hanfa conducted a survey of supervised entities for the purpose of establishing possible benefits of euro adoption and made an estimate<sup>29</sup> of conversion costs<sup>30</sup> (Figure 7).

<sup>28</sup> For the purposes of this analysis, this methodology has been simplified due to the incompleteness of available data.

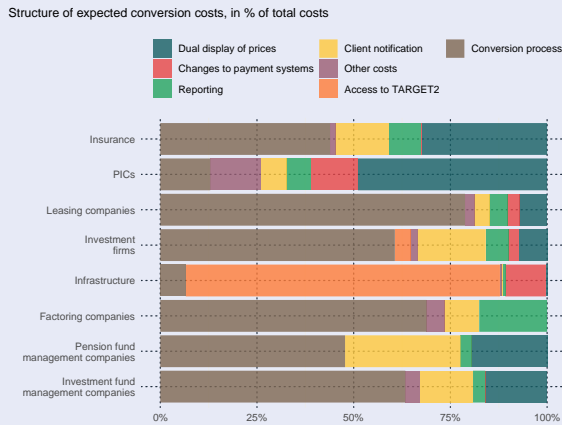
<sup>29</sup> The estimate covered the following: all points of the draft Action plan for financial system adjustment to euro adoption associated with the conversion process, the dual display of prices, client notification and adjustment to euro adoption, all reasonably expected income and costs that may arise before and after euro

adoption and that are directly linked to that process, and all foreseeable adjustment costs associated with changes in the operation of payment systems estimated on the basis of available information.

<sup>30</sup> The costs associated with the conversion process, for example, the costs of changing and adjusting internal records related to the

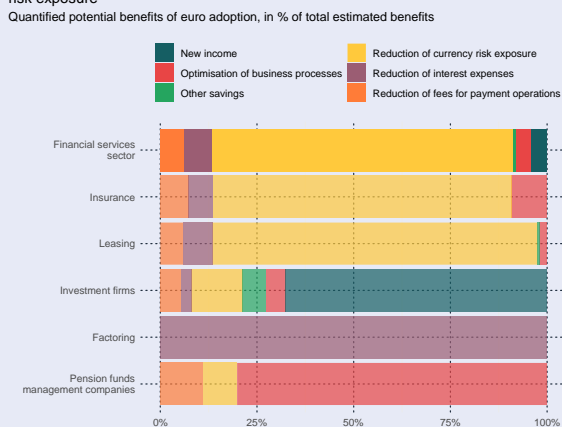
The biggest cost for most supervised entities is the conversion itself, followed by the dual display of prices and client notification. Investment firms bear the largest costs in relative terms, but this is primarily due to their size<sup>31</sup>. In absolute terms, the greatest costs are borne by insurance companies, of HRK 8.9m, accounting for only 1.35% of pre-tax profit in 2021.

**Figure 7 Conversion process itself creates the largest costs for the financial services sector**



Sources: Hanfa, supervised entities

**Figure 8 Largest potential benefits associated with the reduction of currency risk exposure**



Sources: Hanfa, supervised entities

Among the most important potential benefits of euro adoption,<sup>32</sup> entities supervised by Hanfa mentioned a reduction in currency risk and the associated reduction in interest expenses, and even optimisation of operations. In their

conservative quantitative assessments, the greatest benefits are again envisaged by investment firms (Figure 8).

## 5 Conclusion

Euro area membership and introduction of the single currency have many benefits to the financial system, as well as some drawbacks. Analysis results suggest that euro introduction and euro area membership may amplify some long-term benefits for the capital market in terms of enhanced market liquidity and greater resilience to short-term shocks. Numerous research works indicate that accession to the EMU should have a favourable effect on economic growth, which may indirectly have a positive (though lagged) impact on the domestic capital market as well.

Survey results also clearly show a positive attitude of the financial services sector as regards the direct impact of euro adoption. The mentioned drawbacks mostly refer to short-term and one-off costs (conversion process, dual display of prices and client notification), while benefits of euro area accession are far more numerous and long-lasting. Reduction of currency risk, transaction costs of financial services and the country's borrowing costs, greater market integration and deepening may promote the development of stock and bond markets in the long run, which would in turn reduce exposure to long-term systemic risks. However, short-term systemic risks increase at the same time due to greater sensitivity of the domestic capital market to sudden external shocks, which reflects stronger integration with foreign markets.

conversion of securities, liabilities and claims; for the Central Depository and Clearing Company: the cost of conversion of the nominal value of book-entry securities conducted *ex officio*, and for all entities: adjustment of documentation and records for which dual reporting is not required and which are not regulatory and reporting documentation or similar costs.

<sup>31</sup> This cost amounts to only 8.2% of income in 2021.

<sup>32</sup> The offered categories of responses were: yes, no, do not know; where possible, entities were asked to provide a quantitative assessment.

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## List of abbreviations

bn – billion	HRK – Croatian kuna
CBS – Croatian Bureau of Statistics	IFRS – International Financial Reporting Standards
CEE – Central and Eastern Europe	m – million
CISS – composite indicator of systemic stress	OCA – optimum currency area
CNB – Croatian National Bank	PF – pension fund
DG ECFIN – Directorate General for Economic and Financial Affairs	pp – percentage point
EC – European Commission	SCR – solvency capital requirement
ECB – European Central Bank	TILDA – stock liquidity market index
ECOFIN – Economic and Financial Affairs Council	UCITS – undertakings for collective investment in transferable securities
EMU – Economic and Monetary Union	USD – US dollar
ERM II – exchange rate mechanism II	VAT – value added tax
ESM – European Stability Mechanism	ZSE – Zagreb Stock Exchange
EU – European Union	<b>Country codes:</b> AT – Austria; BE – Belgium; BG – Bulgaria; CY – Cyprus; CZ – Czech Republic; DE – Germany; EE – Estonia; EL – Greece; ES – Spain; FI – Finland; FR – France; HR – Croatia; HU – Hungary; IE – Ireland; IT – Italy; LT – Lithuania; LV – Latvia; MT – Malta; NL – Netherlands; PT – Portugal; PL – Poland; RO – Romania; USA – United States of America; SE – Sweden; SI – Slovenia; SK – Slovakia
EUR – euro	
EWMA – Exponentially Weighted Moving Average	
FED – Federal Reserves	
FOMC – Federal Open Market Committee	
GDP – gross domestic product	
Hanfa – Croatian Financial Services Supervisory Agency	
HICP – Harmonised Index of Consumer Prices	

