# FINANCIAL STABILITY

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HANFA

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Croatian Financial Services Supervisory Agency
Franje Račkoga 6
10000 Zagreb
www.hanfa.hr
Phone: +385 1 6173 200
Fax: +385 1 4811 406

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# 1 Introduction

Along 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 execution of payment transactions, 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 of 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 any of its parts, thus causing a serious negative impact on the real economy, represents a *systemic risk.*

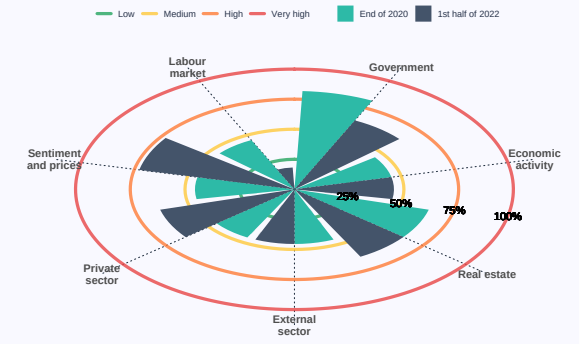
Over the past few years, global progress has been made as regards the understanding and consequently identification, evaluation and monitoring of systemic risks of the financial sector. However, in order to prevent the identified risks in time, and to mitigate the effect of their materialisation, an appropriate set of instruments and tools, i.e. policies aimed at ensuring the stability of the system as a whole, called *macroprudential policies* had to be developed. Therefore, in the European Union (EU), bodies with macroprudential powers and mandates 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 the initial phase of macroprudential capacity development was primarily focused on the banking sector, the growing share and importance of the non-banking part of the financial system create structural changes and require 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 intensifying, creating the need for a holistic approach, which views the system as an inseparable whole and which primarily involves monitoring and addressing vulnerabilities in a cross-sectoral, but also cross-border context.

Hanfa continuously supervises and monitors systemic risk exposure of the financial services sector and regularly publishes the conclusions of its process of identifying, analysing and assessing risk exposure in the publication *Macroprudential Risk Scanner.* While that publication focuses on horizontal exposures of the entire financial services sector to particular risks, such as market, interest rate or currency risk, the annual publication *Financial Stability* offers a detailed analysis of vertical developments and risks in individual segments of the financial services sector, that is, the industries of insurance, leasing, factoring, investment and pension funds, as well as financial markets, and provides an assessment of their exposure (and contribution) to systemic risks. Analysis and assessment of risks in each of these segments are viewed in the context of international and domestic macroeconomic, monetary and financial developments. The publication also contains an assessment of the overall exposure of the entire financial services sector to systemic risks, both those that are of

short-term, i.e. cyclical nature, as well as long-term, structural risks. The publication also provides the results of stress testing of the financial services sector under highly unlikely but plausible macroeconomic and financial shocks. In this way, the publication *Financial Stability* provides a comprehensive and systematic insight into the risks to which the domestic financial services sector is exposed, analyses their nature and character in order to take timely and adequate macroprudential actions to prevent the materialisation of such risks and deterioration of the stability of the domestic financial system and to strengthen the system's resistance to shocks.

# 2 Macroeconomic environment

Figure 1 Rapid price growth is currently the major risk in the macroeconomic environment
Systemic risk score for the macroeconomic environment, in %




Source: Hanfa

**The strong economic rebound in 2021 remained overshadowed by significant inflationary pressures, which were further amplified by geopolitical tensions from early 2022. Notwithstanding the ongoing positive developments in the labour market and favourable financing conditions, the private sector may face debt servicing difficulties in the forthcoming period, particularly in case of continued price increases paired with a surge in financing costs and the materialisation of the risk of slower economic growth. The mounting risk of stagflation in the uncertain geopolitical environment accentuates cyclical systemic risks in the domestic financial services sector which, despite certain structural vulnerabilities (high concentration of exposures and relatively low liquidity of the capital market), has sufficient liquidity and capital buffers to absorb potential systemic shocks in the near future.**

## Strong economic rebound paired with rapid price growth

**Much like the year before, 2021 was characterised by the uncertainty related to the pandemic and its direct and indirect repercussions. At the beginning of 2022, the escalation of geopolitical tensions in Eastern Europe pushed the subdued pandemic (Figure 3) into the background (at least temporarily), while the energy crisis and accelerated price growth came to the forefront.** The outbreak of the war in Ukraine and the rise in geopolitical risks in February this year (Figure 2) had a detrimental effect on the perception of the global post-pandemic economic recovery, whose overall consequences may be assessed with difficulty even six months into the conflict as they primarily depend on the duration and method of conflict resolution. Up to early September 2022, seven sanction packages covering different areas[1] were imposed against Russia and Belarus, which will definitely retard the initial V-shaped recovery of the global economy (Figure 4).

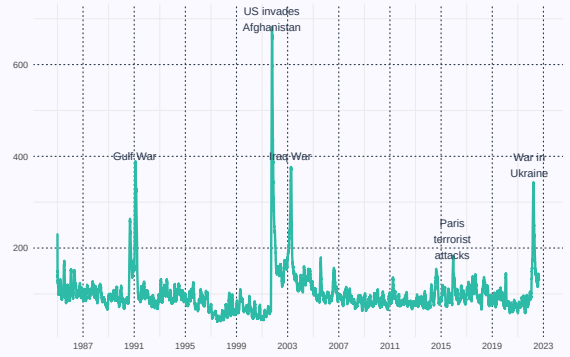
**Despite the uncertain epidemiological situation and sharp fluctuations in the number of newly infected persons over the year, the domestic economy fully recovered in 2021 from the shocks induced by the coronavirus crisis, exceeding the pre-pandemic levels of 2019[2].** The annual rate of GDP growth reached a record-high of 10.2% in 2021, with the largest contribution coming from net exports, which rose by 89%, primarily thanks to very good tourism performance. Personal consumption, the largest component of GDP, recorded a two-digit annual increase of 10.0% in 2021, supported by favourable trends in the labour market and the easing of COVID-19 restrictions. Following the closure of the negative gap in 2021, the economy continued to rise in the first half of 2022, albeit at slightly slower rates than in the period before due to the waning of the base effect. The real GDP growth of 7.4% in the first half of 2022 was a result of all its components, primarily personal consumption,

[1] The measures include sanctions on individuals and entities, economic sanctions, restrictions on media, and diplomatic measures; for a detailed description, see the following link.

[2] At the end of 2021, real GDP was 1.3% higher than in 2019.

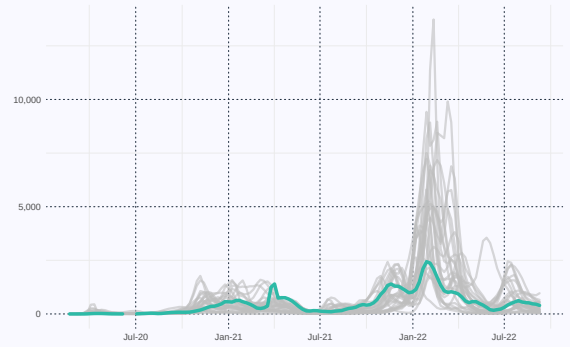
which mirrored favourable labour market conditions and gross investments, boosted also by the absorption of the funds from the Next Generation EU programme.

Figure 2 Escalation of geopolitical tensions in early 2022
Geopolitical Risk Index



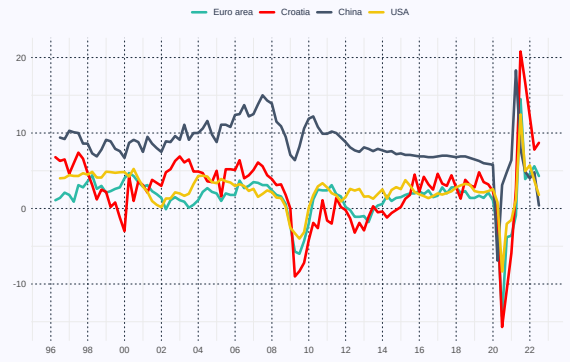

Source: Caldara, Dario and Matteo Iacoviello, "Measuring Geopolitical Risk," working paper, Board of Governors of the Federal Reserve, November 2021

Figure 3 Pandemic peaked in early 2022
14-day cumulative number of COVID-19 cases per 100,000 inhabitants



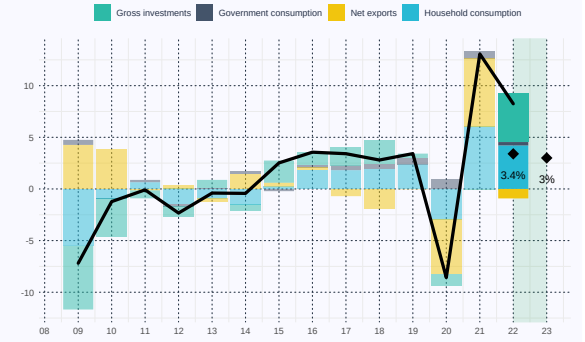

Note: The lines in the chart show indicator movements for individual EU countries, while the highlighted line shows indicator movements for Croatia.
Sources: ECDC, Our World in Data

Figure 4 Economic surge in 2021 closed the negative gap caused by the coronavirus crisis
Real GDP growth rate (annual rate of change, in %)




Sources: Eurostat, OECD, St. Louis FED

Figure 5 Consumption and net exports - main determinants of the strong economic growth
Real GDP growth rate (annual rate of change, in %) and contributions to growth (percentage points)




Note: The shaded area, dots and numbers show real GDP growth projections of the European Commission. Data for 2022 indicates the rate of change in GDP in the first half of 2022 relative to the same period of the preceding year.
Sources: Eurostat, European Commission (DG-ECFIN)

## Inflation gains momentum

The inflation outlook changed drastically following the escalation of geopolitical tensions in February 2021, with the risks of higher and more persistent inflation soaring. Price growth in Croatia picked up from 2021 to 2022 due to further supply-side disruptions caused by the energy crisis, the pandemic containment measures in China as well as partial revisions of inflation expectations by economic agents. As a result, inflation reached a historical high of 12.3% in July (Figure 6). While all components of the consumer basket added to the increase (Figures 7 and 8), the key generators of growth were the prices of food and energy, which account for as much as 40% of the domestic consumer basket[3] (Figure 7).

The price dynamics in the period under review was influenced by several factors, which led to an upward revision of inflation projections for 2022 in comparison to the projections from late 2021 (Figure 6)[4]. One of the factors behind the sharp increase in the general price level was the sudden surge in the prices of energy, in particular oil, the prices of which were twice as high in late May 2022 as before the pandemic.[5] More specifically, after the initial price slump and the mismatch between oil supply and demand during the 2020 lockdown, global demand

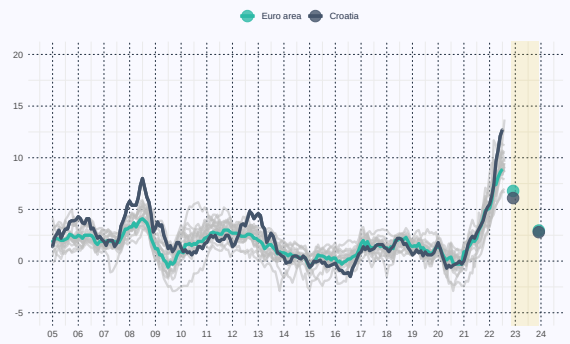
[3] Food and energy prices make up, on average, 23% of the EU c onsumer basket in 2022.

[4] In late April, the euro area inflation rate stood at 7.4%, hitting a historical high. At the same time, in contrast with the European Commission's winter forecast of February 2022, which projected the inflation rate of 3.5%, the most recent projection published in July foresees an annual inflation rate of 7.6% in 2022.

[5] The Brent crude oil price per barrel grew by 85% from the end of 2019 to the end of May 2022.

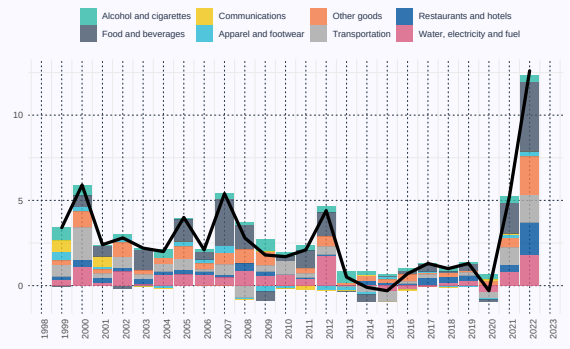
strengthened in 2021 amid limited supply, in line with the economic recovery (Figure 9). However, energy prices not only normalised in 2021, but also continued to trend up beyond the pre-crisis levels. The outbreak of the war in Europe and the imposition of sanctions against Russia, one of the major oil exporters and energy suppliers to the EU,[6] have reinforced price pressures and exacerbated the energy crisis. The situation is expected to peak towards the end of 2022, particularly if Russian energy supply comes to an abrupt stop in conditions of insufficient natural gas supplies, bearing in mind that in late 2020 as much as 39% of European imports of natural gas came from Russia.

Figure 6 Spike in the general price level is of a global character
HICP - annual rate of change, in %




Note: The grey highlighted lines show indicator movements for individual EU countries. The chart shows median expectation values. The highlighted area indicates projected values.
Sources: ECB (Survey of Professional Forecasters), Eurostat, CNB

Figure 7 Historically high inflation rates driven by a broad-based increase in prices
Contributions of individual goods categories to the total inflation rate, in percentage points



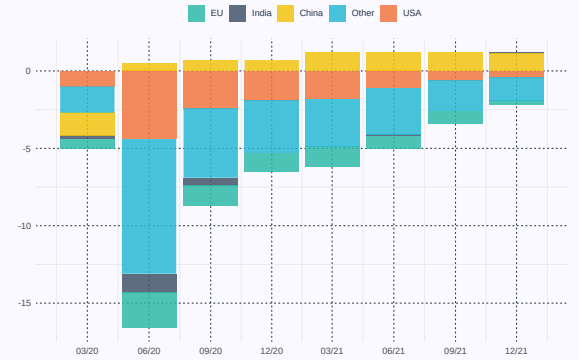

Note: Other goods include the following categories: furniture, education, health and recreation and culture. Data for 2022 refers to the first eight months.
Source: Eurostat

In addition to energy products, Russia is an important exporter of other raw materials and food. For this reason, food prices skyrocketed worldwide owing to the war-induced slump in cereals exports, as well as the increase in food producer prices due to higher prices of inputs such as energy and fertilisers, as well as more frequent natural disasters. In particular, the Food Price Index, which is a measure of the monthly change in international prices of a basket of food commodities, was almost 40% higher in late July 2022 than at the end of 2019.

Figure 8 Price growth seen in almost all components of the consumer basket led by transportation and food


Source: Eurostat

Figure 9 Recovery in global oil demand among the factors behind rapid price growth
Change in oil demand from 2019, in million barrels per day



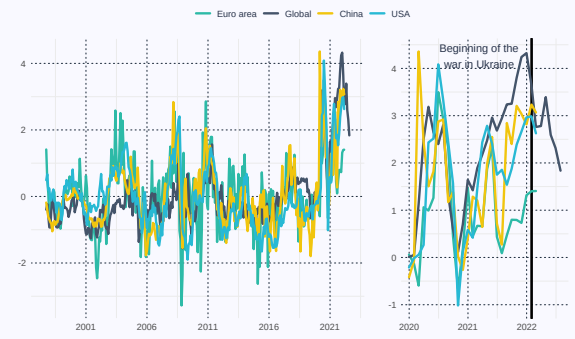

Source: International Energy Agency (IEA)

The faster increase in inflation was also fuelled by the lingering disruptions in global production and transport chains in 2022 (Figure 10), associated with varying epidemiological measures, labour shortages in the transport industry and the rising prices of energy and raw materials. In conditions of low supplies, this gave an upward push to production costs. Though producer price dynamics is partly reflected in consumer prices, the persistent gap between them will continue to exert upward pressures on consumer prices in the forthcoming period (Figure 11). Therefore, it is likely that fiscal

[6] In late 2020, 47% of imports of solid fossil fuels, 23% of imports of oil and refined petroleum products and 39% of imports of natural gas to the EU came from Russia.

support to slow down and mitigate the spillover from producer prices to consumer prices will be stepped up. In mid-February 2022, the Croatian government presented the first package of measures, amounting to HRK 4.8bn, to mitigate the rise in energy prices for households, non-financial corporations and socially vulnerable groups. The measures restrained the increase in electricity and gas prices and, as of 1 April, reduced the VAT rate on gas and many food products, introduced subsidies on household gas prices and fixed the prices of refined petroleum products on several occasions. The second package of measures, worth HRK 21bn, was adopted at the beginning of September to protect households and the economy from price increases.

Figure 10 Global supply chains under additional pressure driven by mounting geopolitical tensions
Global Supply Chain Pressure Index




Source: Gianluca Benigno, Julian di Giovanni, Jan J. J. Groen, and Adam I. Noble, "Global Supply Chain Pressure Index: March 2022 Update" Federal Reserve Bank of New York Liberty Street Economics

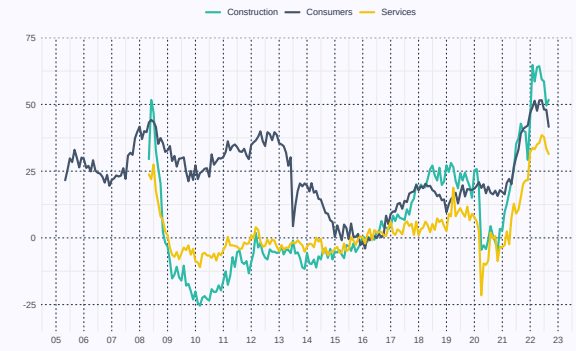
Figure 11 Gap between producer and consumer prices will continue to exert upward pressures on consumer prices
Annual rates of change in producer and consumer prices, in %


Sources: Eurostat, St. Louis FED

Finally, inflation expectations, which have become more entrenched in the meantime, might give a stronger upward push to inflation and make its control more difficult for central banks, particularly should the normalisation of monetary conditions be perceived as belated or too weak. Furthermore, in response to purchasing power weakened by inflation, employees, who are empowered by low unemployment and labour market shortages, might contribute to the inflation spiral by using the union's negotiation leverage. However, this will largely depend on union power in individual EU Member States, which has generally been on the wane over the last decades. For example, union membership in Germany has fallen by more than a half in the last thirty years, dropping from 36% in 1990 to only 16% in late 2019.

By contrast, purchasing power, which has been sharply reduced by persistent inflation, combined with the associated increase in financing costs and the debt repayment burden brought on by tightened monetary policies, might change consumer decisions and postpone investments, which would impede economic activity in the upcoming period. The extent to which an economic slowdown might contain inflation through the demand side will depend on the parallel decrease in inflationary pressures on the supply side, critically influenced by the evolution of the energy situation.

Figure 12 Short-term inflation expectations of consumers and companies at high levels
Index of expected price changes in the forthcoming period, in %




Note: Expectations of construction and service companies for the next 3 months and consumer expectations for the next 12 months.
Source: Eurostat

## Private sector in anticipation of an interest rate hike

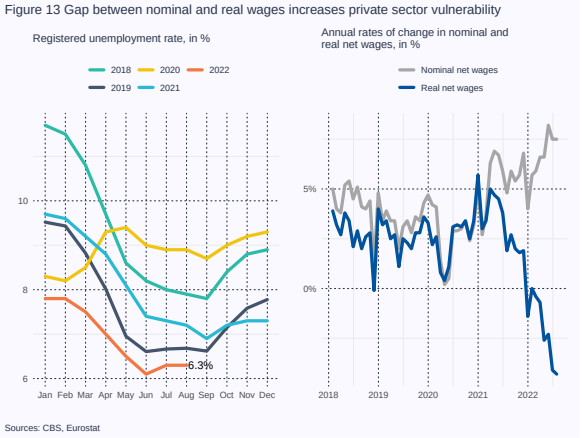
As favourable trends in the labour market continued during 2021 amid rapid economic recovery, many government measures to support the economy were phased out. The year ended with the unemployment rate at 7.3%, or 0.5 pp less than at the end of the pre-pandemic 2019

and as much as 2 pp less than in 2020, with improvements in labour market resilience also evident in the fall of the number of fixed-term employment agreements[7] (Figure 14). Unemployment has declined steadily over 2022 so far, in line with the usual seasonal patterns during peak tourist season, with its dynamics unperturbed even by the geopolitical turbulence. A more flexible labour import regime[8] in 2021 failed to alleviate the pressures on the domestic labour market (demand for labour measured by the OVI[9] in late May 2022 exceeded pre-pandemic demand by a large margin, Figure 14). Therefore, even without strong union pressures, it is uncertain whether domestic employers will succeed in maintaining nominal wages at current levels in conditions of the increasing gap between nominal and real wages, which is reflected in soaring inflation (Figure 13). More specifically, net wages recorded nominal annual growth of 7.5% at the end of June 2022, but dropped by 4.1% in real terms in the same period.

**Though the aggregate level of private sector indebtedness dropped to pre-pandemic levels on the wave of economic growth (Figure 15), the likely tightening of financing conditions in 2022 and 2023, coupled with the rise in the general costs of living and doing business, will burden the financial position of households and corporations, in particular those with variable rate loans.**

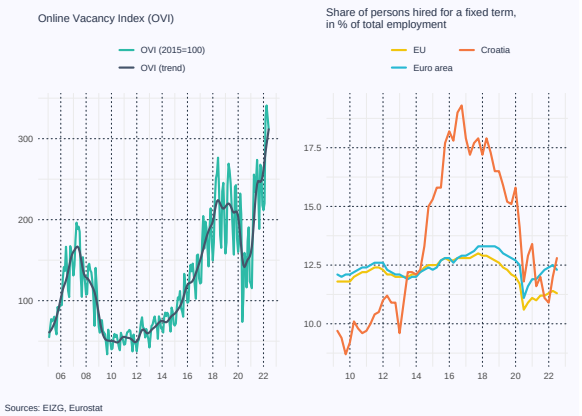
The decline in household living standards, together with the deterioration on the income side due to lower real income, will be exacerbated by the heavier debt burden resulting from the tightening of global financing conditions and the consequent increase in interest rates (more information in Chapter 3 Financial markets). While household exposure to interest rate risk has dropped by almost a half in the last six years, as much as 38% of households had loans with variable interest rates at end-March 2022, while another 7% had loans with interest rates fixed for up to three years (Figure 16). As a result, interest rate risk is currently the greatest vulnerability of the household sector, particularly bearing in mind interest margins on private sector loans, which are still higher in Croatia than in comparable regions (Figure 15).

Figure 13 Gap between nominal and real wages increases private sector vulnerability




Sources: CBS, Eurostat

Figure 14 Demand for labour continues to grow




Sources: EIZG, Eurostat

Credit risk of the non-financial corporate sector remained at very low levels in 2021, so that almost all forms of government support were phased out. The number of domestic insolvent entities levelled off in 2021 and dropped further by the end of July 2022 (by 8.8% from the end

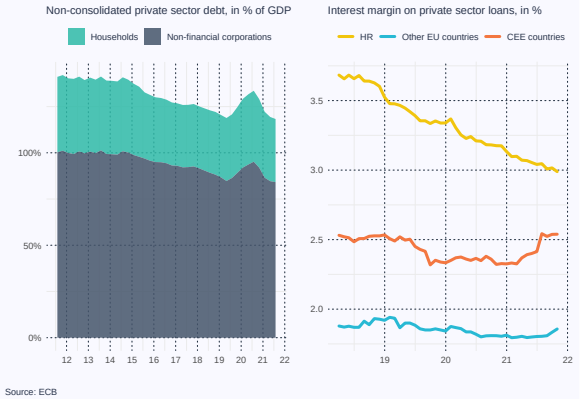
[7] Over the last two years, their share decreased by as much as 4.9 pp, falling to the European average after eight years.

[8] Aliens Act, Official Gazette, No 133/2020

[9] The Online Vacancy Index (OVI) is a monthly index of online job advertisements developed by the Institute of Economics, Zagreb. It is developed by means of simple enumeration of single new job advertisements whose application deadlines end within the same month for which the index is being calculated. Given that advertisements published by only one web portal are taken into account, the number of job advertisements is expressed as an index (with the base year being 2015).

of 2021). The total debt of these entities decreased by as much as HRK 1.0bn from the end of 2020 to the end of July 2021, to 5.2bn. Along with the reduction of the debt of insolvent corporations, a decrease was seen in aggregate relative indebtedness of the entire sector of non-financial corporations,[10] mostly due to the rapid economic growth, with other performance indicators also improving (Figure 17). In late 2021, the debt coefficient stood at 55%, return on assets was 3.8%, up 1.9 pp from the year before and up 1.1 pp from the pre-pandemic year 2019. Also, the high liquidity[11] of the sector was maintained during the reviewed period thanks to fiscal support measures. However, notwithstanding the normalisation of business activity and improvement of aggregate indicators, some corporations remained vulnerable, particularly those with a high leverage, from sectors severely hit by the coronavirus crisis or directly affected by new difficulties in global supply chains and increasing shortages of labour. Similar to households, interest rate risk of the sector is pronounced due to a large share of variable interest rate loans (around 40%). The same is true of refinancing risk which, however, should not be reflected in any major increase in credit risk in the short run.

Figure 15 Relatively high interest margin on private sector loans will adversely affect future repayments in the scenario of interest rate increases




Source: ECB

Figure 16 Announced increase in interest rates will have a direct effect on more than one third of households


Note: Credit card debt and overdraft facilities are not included.
Source: CNB

Figure 17 Stable performance of non-financial corporations

Key performance indicators of non-financial corporations


Source: Fina

## Public finances under the influence of inflation and financing costs

**While price increases replenish the state budget through the tax channel, rising budget needs spurred by higher inflation-driven expenses and fiscal policy adjustments to alleviate price shocks to the private sector, along with more expensive new borrowing, might slow down the improvements of fiscal indicators seen last year.**

The normalisation of the economic functioning owing to the gradual relaxation and the final lifting of COVID-19 restrictions in tandem with strong economic activity led to an improvement in public sector debt indicators in 2021. This was despite the parallel 4.5% annual increase in public debt to raise the funds needed to finance larger expenditures stemming from the measures to support the economy, servicing of health sector arrears and costs of public sector wages. Total general government debt stood at

[10] At end-March 2022, non-financial corporate debt amounted to 84% of GDP, down by 10 pp from the end of 2020.

[11] The current liquidity coefficient stood at 124% at the end of 2021.

79.6% of GDP at end-2021, down by 7.7 percentage points from 2020, thus resuming its downward path (Figure 18). On the wave of economic growth, this indicator continued to decrease in early 2022, falling to 77.3% of GDP at the end of the first quarter. The breakdown of domestic public debt by creditor residency and maturity was not much different in late 2021 than aggregate indicators for the entire EU (Figure 19). As expected, the greatest difference is evident in the currency structure; however, when Croatia joins the euro area at the beginning of 2023, currency risk will be almost completely eliminated. More specifically, according to the Convergence Report of the European Central Bank published in early June 2022, Croatia is within the reference values of the convergence criteria, the same as according to the European Commission's Convergence Report 2022, which concluded that Croatia is ready to adopt the euro on 1 January 2023.

Along with public debt, the general government deficit was also reduced in relative terms, to 2.9% of GDP at the end of 2021, or almost twice as low as at the end of 2020, when it stood at 7.9%. Similar trends continued during the first quarter of 2022, when the deficit was cut further, to 2.2%. The perceptible reduction in the government deficit was largely due to tax revenues which were larger than in 2020 owing to the relaxation of epidemiological measures and the consequent greater mobility of consumers, as well as the growth in the general price level. In addition to the said tax channel, price growth provided a boost to general government revenues through the channel of contributions thanks to the steady employment levels and nominal wage growth (Figure 13). On the other hand, expenditures also grew in 2021, particularly those categorised as grants[12] (they increased by a high 30% from the end of 2020 to the end of 2021).

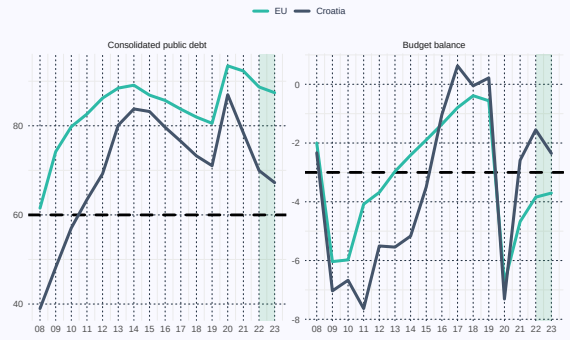
Pressures on budget expenditures are expected to continue in the forthcoming period, particularly bearing in mind expected adjustments of wages and pensions to inflation growth, and the probable growth in fiscal expenditures aimed at containing price increases. Government financing needs in 2022 are estimated at 16% of GDP. Interest expenses are projected to decrease as the costs of refinancing should remain below the average cost of maturing debt, despite the fact that borrowing costs will rise in the future because of growing interest rates. The disbursement of EU funds might provide some relief to public finances in the medium term if fund absorption reaches the allocated amount. However, in view of Croatia's rapid economic rebound from the COVID-19 crisis, under the updated key for the distribution of grants among EU Member States, the European Commission has reduced the amount earmarked for Croatia within the Recovery and Resilience Facility (to around EUR 5.5bn from an expected EUR 6.3bn).

Fiscal policy makers and market investors are currently less focused on structural, and more focused on short-term cyclical indicators, particularly the yields on government bonds, which in 2022 responded strongly to the announced tightening of monetary policy and the escalation of the war in Ukraine. The expected investor flight to perceived safer investments is evident in the divergence between the yields of some groups of countries, in particular euro area and non-euro area Member States. Yields on long-term Croatian government bonds rose by 1.9 pp in the first eight months of 2022, reaching 2.2% at end-August (Figure 20) and being approximately in the middle between the yields of euro area and

[12] Grants are current or capital transfers to international organisations and foreign governments and within the general government (to the budgets of local and regional self-government units and extrabudgetary users). As regards grants within the general government, which account for the largest portion of that expenditure group, funds are transferred from expenditures of the government budget pursuant to law.

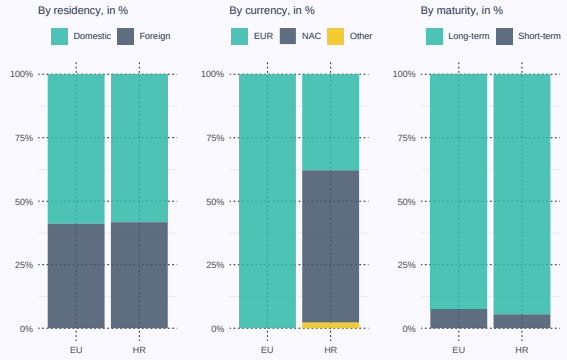
non-euro area countries[13]. Such dynamics of domestic yields, paired with the mentioned global triggers of rising inflation and the Russian-Ukrainian conflict, partly reflect investor perception that Croatia is a relatively stable debtor, particularly bearing in mind the forthcoming Croatia's accession to the euro area, which investors have already incorporated in required debt yields. This might lower the relative growth in yields in the near future, which is expected to follow the increase in ECB benchmark interest rates. Croatia's upcoming accession to the euro area is also mirrored in the fact that all three major rating agencies have assigned an investment-grade rating to Croatia (Figure 25 in Chapter 3 Financial markets).

Figure 18 Recovery of public finances driven by economic growth
Indicators of the indebtedness and financial position of the general government, in % of nominal GDP



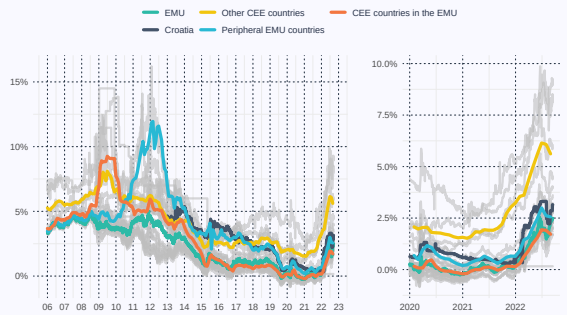

Note: The highlighted area indicates projected values. The highlighted levels indicate the levels of public debt and the budget balance defined under the Maastricht Treaty.
Source: European Commission (DG-ECFIN)

Figure 19 Long-term instruments predominate in the structure of domestic public debt, which somewhat retards the impact of interest rate growth on public finances




Note: Short-term debt is debt maturing within a year and long-term debt is debt maturing in more than a year.
Source: Eurostat

Figure 20 Growing yields on government bonds spurred by the rise in risk-free interest rates, as well as the spike in the risk premium
Yields on long-term government bonds, in %

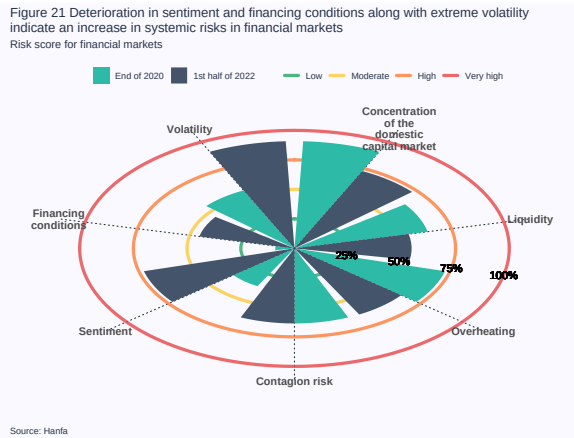



Note: The grey lines show indicator movements for individual EU countries. CEE countries are: BG, CZ, EE, HU, LV, LT, PL, RO, SK and SI. EMU denotes the euro area, and CEE countries in the EMU are: EE, LT, LV, SI and SK. Peripheral EMU countries are: EL, ES, IE, IT and PT.
Source: Eurostat

[13] The spread between yields of CEE countries that are inside the euro area and those outside that area stood at 4.2 pp in late July 2022.

# 3 Financial markets

Figure 21 Deterioration in sentiment and financing conditions along with extreme volatility indicate an increase in systemic risks in financial markets




Source: Hanfa

The 2021 rebound in global financial markets came to a halt in early 2022 in anticipation of monetary tightening, while market sentiment was further exacerbated by the Russian aggression against Ukraine in mid-February. The high volatility driven by the uncertain macroeconomic and geopolitical environment had a negative effect on investor sentiment and financial market valuations, which was further amplified by the monetary tightening on both sides of the Atlantic. Amid the pandemic and the lingering tensions in supply chains, the hike in interest rates threatened the global dynamics of economic recovery in light of the sensitivity of heavily indebted corporate and general government sectors' financing to changes in benchmark interest rates and potential leaps in the currently subdued global risk premium.

## Monetary environment and financing conditions

Central banks of major global economies continued to pursue an accommodative monetary policy in 2021, gradually reducing the quantitative easing later in the year in response to mounting inflationary pressures. Given the surge in geopolitical risks in Eastern Europe and mounting inflationary pressures in the first half of 2022, central banks changed their position on the transient nature of inflation and decided to tighten sharply their monetary policy stance by the end of 2022 and increase benchmark interest rates, thereby risking the emergence of recession.

The US Federal Open Market Committee began raising its benchmark interest rates by 25 basis points as early as March 2022, and increased them further in the months that followed[14] setting the target range at 2.25%-2.50% in late August.[15] According to expectations of the members of the US Federal Open Market Committee, the benchmark interest rate that may help decelerate inflationary pressures and contain aggregate demand should exceed 3% by the end of 2022. In addition, the FED decided to launch the process of quantitative tightening by ceasing to reinvest maturing principal in the bond market (Figure 22). The announcements regarding the normalisation of the ECB's monetary policy were postponed for the second half of 2022 and were less indicative, bearing in mind the heterogeneity of macroeconomic situations in member states and the prevailing attitude that inflation developments in the euro area are not as anchored as on the other side of the Atlantic. Price hikes in the euro area were mostly perceived as consequences of supply-side shocks and heavy European dependence on Russian energy products. This is in contrast with the US, where aggregate demand upheld by substantial fiscal and monetary incentives exerts upward pressures on prices. Another aggravating circumstance of restrictive monetary policy are uneven fiscal positions across EU countries, which make some countries

[14] The benchmark interest rate was lifted by 50 basis points in May and by another 75 basis points in June, the largest one-off hike since 1994, which was followed by another 75 basis point increase in late July.

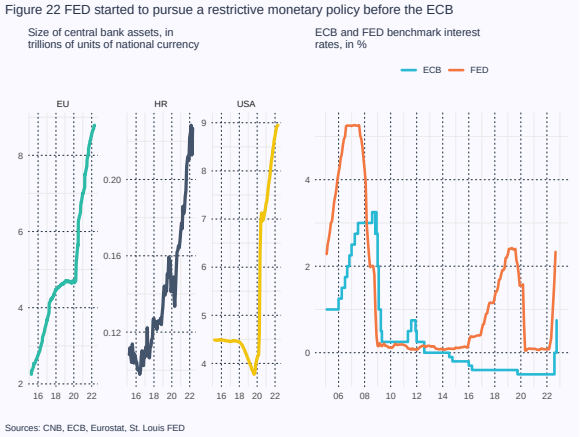
[15] The Federal Funds Rate is the rate of interest at which deposit institutions lend to each other their own excess reserves; it moves within the Federal Funds Target Rate, which is set as a range by the Federal Open Market Committee.

much more sensitive to changes in interest rates due to the high level of accumulated public debt.

However, as inflation dynamics gained momentum in Europe, in addition to discontinuing the pandemic emergency purchase programme (PEPP) at the end of March 2022, in July, for the first time in eleven years, the ECB raised its reference interest rate by 50 basis points, which was more than initially announced.[16] It also announced further monetary tightening in view of the risk that high inflation becomes entrenched in expectations. Though net purchases under the asset purchase programme were also discontinued, reinvesting the principal payments from maturing bonds will continue in order to support liquidity in the bond market.

This marked the end of the years-long period of low and even negative interest rates. In the context of heavily indebted private and public sectors worldwide, which may experience difficulties in debt repayment in the forthcoming period, and with dwindling profitability and postponed investments, the likelihood of a recession has increased.

Figure 22 FED started to pursue a restrictive monetary policy before the ECB




**The shift in monetary policy driven by persistent inflationary pressures, the war in Ukraine and the rising risk of economic slowdown triggered a hike in the global risk premium, sparking also a spike in yields on government bonds worldwide in the first half of 2022 (Figure 23).** The yield on the ten-year German government bond stood at 1.08% at the beginning of July 2022, returning to its 2014 level. Yields grew not only on account of the expected increase in risk-free benchmark rates, but the rising risk aversion of investors in conditions of heightened uncertainty also significantly differentiated borrowing costs for individual EU countries because of different risk perception. The yields on long-term government bonds of the Republic of Croatia reached 3.31% in early July 2022 (the level last seen in 2016), which was still 0.73 pp below the average for peer Central and Eastern European countries, reflecting the certainty of Croatia's accession to the euro area.

The future dynamics and intensity of interest rate growth will primarily depend on inflationary pressures and economic growth projections, followed by fiscal fundamentals, which have deteriorated dramatically on a global scale as a result of dealing with the consequences of the coronavirus crisis on the real economy as well as investor risk perception of individual countries. Croatia thus entered the period of interest rate hikes pressured by a relatively high public debt level of 79.8% of GDP at the end of 2021, but with a relatively favourable position of the budget, which in 2021 recorded a somewhat smaller deficit than the EU average[17] (Figure 24).

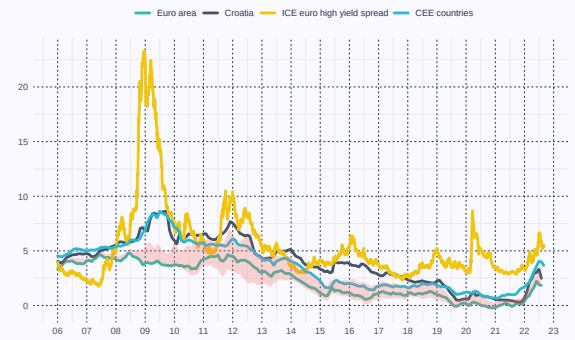
**Looking ahead, financing conditions will also be influenced by the maintenance of investment grade credit rating**, which mirrors the assessment of relatively stable public finance and macroeconomic developments. Fitch's upgrading of Croatia's investment rating from BBB– to BBB at end-2021 was confirmed by S&P in March and Moody's in July, which is attributable to the formal closure of the process of euro area accession. For the first time ever, Croatian bonds are currently inside the

[16] In early September, the ECB again raised its benchmark interest rates by 75 basis points, with the interest rate on the main refinancing operations coming to 1.25%.

[17] At the end of 2021, Croatia's budget deficit stood at 3% of GDP, which is 1.6 pp below the EU average.

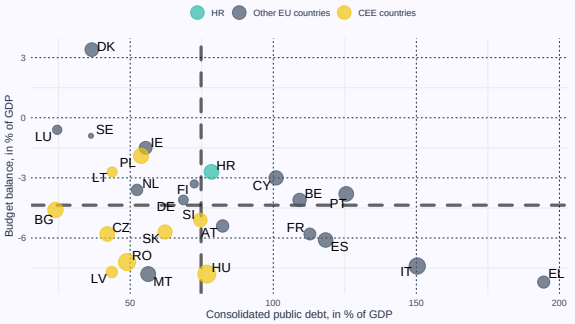
investment-grade category according to all three leading agencies. Despite the upgrading, Croatia is still in the lower half of the EU countries according to this criterion, which might result in a higher degree of investor risk perception in response to unfavourable macroeconomic developments (Figure 25).

Figure 23 Rising risk premium on government bonds with lower investment grades
Yields on long-term government bonds, in %



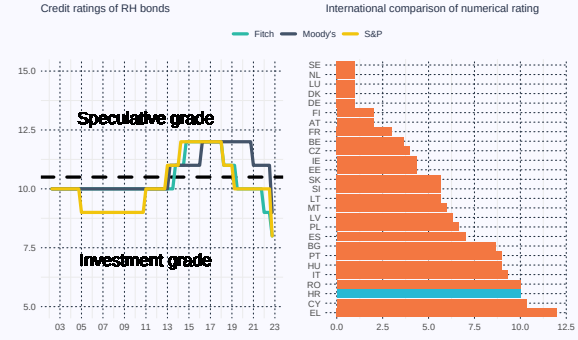

Note: The ICE euro high yield spread denotes the yield spread between the index of European below-investment grade corporate bonds and treasury bills. The red area indicates the interquartile range of yields of EU countries.
Sources: Bloomberg, Eurostat, St. Louis FED

Figure 24 Public finances face interest rate increases burdened by relatively high debt levels, despite the favourable financial position of the general government
Main fiscal indicators of EU countries at the end of 2021




Note: The size of a dot indicates the level of interest expenditures of the general government in % of 2021 GDP.The lines in the chart show average values at the end of 2021.
Source: Eurostat

Figure 25 Maintenance of the investment grade rating amid rising yields
Numerical rating for the Republic of Croatia and comparison with other EU countries

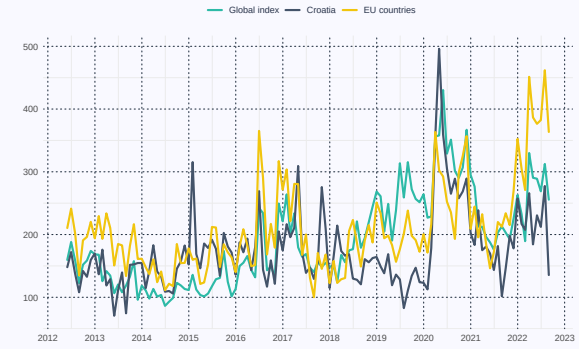



Note: The quantification is based on ECB credit rating mapping key, additionally expanded by information on the expected credit rating development trends.The numerical rating is calculated as the average of the ratings by the three agencies on 30 June 2022, where a higher value indicates a higher country risk.
Source: CNB, Trading Economics

## Investor sentiment

Global uncertainty in financial markets has been on the rise since mid-2021, when inflationary pressures mounted and expectations of global monetary policy tightening started to prevail amid the spread of the new coronavirus strain (Figure 26). Uncertainty remained elevated in 2022 due to the beginning of the war in Ukraine, imposition of economic sanctions against Russia and the beginning of the interest rate hike. It was particularly pronounced in Europe because of its close trade and energy relations with Russia and Ukraine, so that in mid-May it was at its highest level in the past decade. Though elevated since mid-2021, uncertainty in Croatia is lower than at the time of the initial pandemic shock in 2020.

Figure 26 Economic uncertainty on the rise since early 2022, particularly in Europe
Economic policy uncertainty index




Note: Indicator for the EU shows the average indicator value for Italy, Germany and France.
Source: Economic policy uncertainty

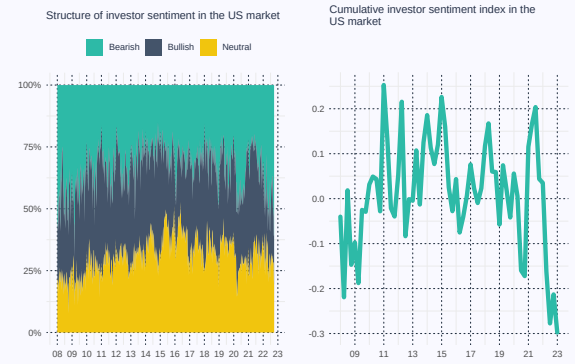
The growing uncertainty has moved investors from bullish sentiment supported by abundant liquidity in 2020 and 2021 into bearish sentiment in response to the monetary policy tightening, the war situation in Ukraine and deteriorated expectations regarding real trends in the upcoming period. As a result, the global investor risk aversion towards risky assets soared, leading to divergent yields in bond markets, a dive in the value of growing technological companies and investor flight into defensive stocks, the strengthening of reserve currencies and a broad correction in the speculative cryptocurrency market in the first half of 2021. The US sentiment index plunged to the levels lower even than those during the global financial crisis (Figure 27).

The poor sentiment in the US market affected European investors as well, weighing also on the sentiment in the domestic financial market. Domestic investment sentiment went down in

2021 and continued to do so in 2022 (Figure 28). In light of subdued global sentiment and elevated uncertainty, expectations and investment propensity of investors in the domestic and other markets will in future depend on the adjustment of non-financial corporations to higher input costs, bearing in mind the approaching winter period and higher interest rates, which will push down corporate margins and earnings. The inability to transfer higher input prices and interest expenses on consumers may adversely affect the labour market, materialisation of corporate sector credit risk and potential recession, which would depress investor sentiment even more. Such trends may be further exacerbated by new waves of the coronavirus spread and supply chain problems, additionally complicated by the coronavirus zero-tolerance policy pursued by China in early 2022.

Against a backdrop of persistently high global uncertainty, market participants are expected to continue revising their interest rate and inflation expectations, which suggests that the period of elevated volatility in financial markets might continue until the final normalisation of the monetary, macroeconomic and geopolitical environment.

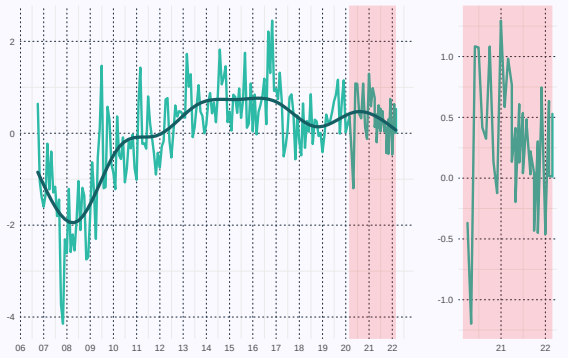
Figure 27 Noticeable drop in investor optimism in response to interest rate growth




Note: The total investor sentiment index in the US market was estimated by summing up the relative shares of bearish and bullish investors, which were assigned numerical values of -1 and 1, respectively.
Sources: American Association of Individual Investors (AAII), Hanfa

Figure 28 Continued fall in investor sentiment in the domestic market in 2022

Investor sentiment index in the domestic capital market



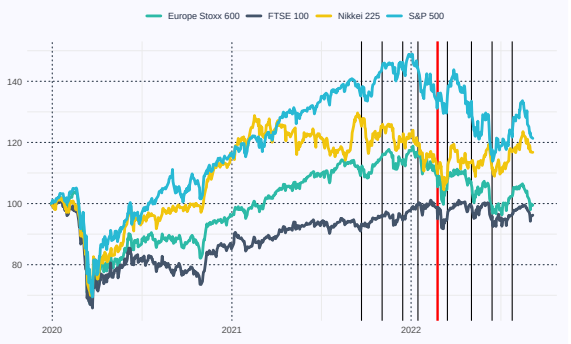

Note: The highlighted area indicates the crisis period that started on 20 February 2020.
Sources: Bloomberg, Google, Hanfa, ZSE

## Valuations and volatility in financial markets

The sharp economic rebound combined with monetary and fiscal measures led to a V-shaped recovery in valuations on global financial markets, which was reversed in early 2022 by a sharp deterioration in investor sentiment and a spike in market volatility due to monetary tightening and higher geopolitical risk (Figure 29). The dynamic recovery in valuations from the second half of 2020, spurred by exceptionally expansive monetary and fiscal policies, picked up momentum in 2021 thanks to robust macroeconomic trends, which were unaffected by occasional new epidemiological measures associated with new coronavirus strains. Valuations in most markets were strong in late 2021, much above the pre-crisis levels; over that year, the domestic stock market fully made up for the losses from the onset of the coronavirus crisis (Figure 30).

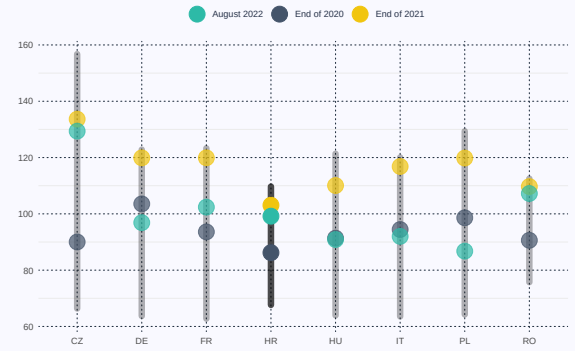
Figure 29 Positive trends in 2021 came to a stop in 2022 due to unfavourable monetary and geopolitical conditions

Global stock indices, 100 = 30 December 2019




Note: Black vertical lines indicate the dates of FED meetings, while the red line indicates the beginning of the war in Ukraine.
Source: EOD Historical Data

Figure 30 Valuation corrections in 2022 almost completely wiped out the 2021 growth
Value of leading stock indices in selected EU countries, 100 = 30 December 2019

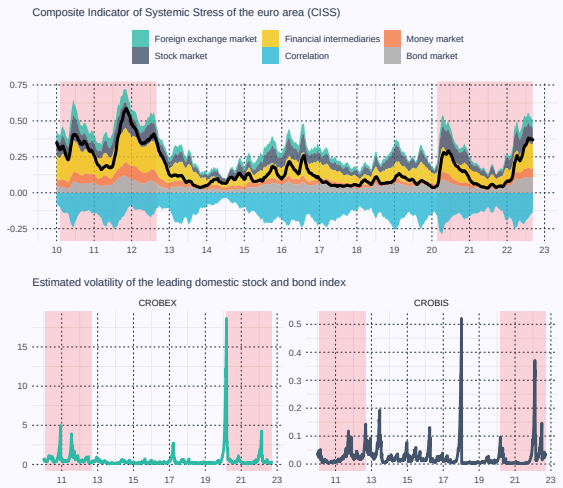



Note: Vertical lines indicate the range of values recorded from the end of 2019 to the end of August 2022.
Source: EOD Historical Data

The year 2021 was also characterised by growing macroeconomic uncertainty, first evident in the rapid growth in consumer prices, mostly stemming from supply-side factors (supply chain disruptions, soaring energy prices, labour shortages in essential activities) and, starting from early 2022, increasingly prominent demand-side factors (changes in inflation expectations, growth in the nominal wage level). The announced sharp shifts in the monetary policy of major central banks were mirrored in higher volatility in late 2021; growth first decelerated in November and December, while occasional price corrections were seen as of the beginning of 2022. The 1.3% drop in the CROBEX index in the first eight months of 2022 was smaller than the fall in comparable markets, with domestic market valuations being 20.6% higher in late August 2022 than at the end of 2020.

The beginning of 2022 was marked by mounting geopolitical tensions in February and the imposition of economic sanctions in the months that followed, which raised systemic stress in financial markets to the highest levels since 2011 and the European debt crisis (Figure 31). Following the emergence of the new coronavirus strain and the partial lockdown in China, which weakened the global recovery and reinforced inflationary pressures (more information in Chapter 2 Macroeconomic environment), the hawkish rhetoric of central banks in March 2022 turned into specific monetary tightening measures in the form of increases in benchmark interest rates and the narrowing of the scope of unconventional monetary policy measures. Financial market investors responded vigorously to the simultaneous tightening of financing conditions and deterioration in macroeconomic indicators by adjusting their portfolios to new conditions. Though the Croatian economy is not directly exposed to Russia and Ukraine, the described developments pushed up volatility in international financial markets, which spilled over to the domestic capital market in March 2022 (Figure 31).

Figure 31 Systemic stress in euro area financial markets in mid-2022 rose to the highest levels since 2011 and the European debt crisis



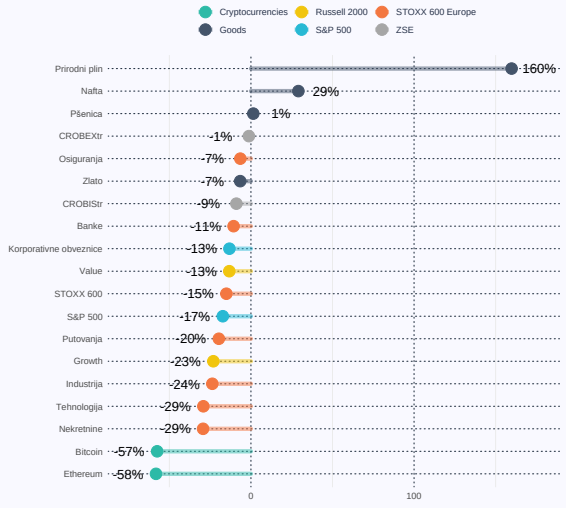

Note: The chart shows the seven-day moving average of the value of the index and its components. Marked areas indicate crisis periods in European financial markets. The volatility has been estimated by using the EWMA mode (exponentially weighted moving average) and applying a smoothing parameter of 0.94.
Sources: ECB, Hanfa, ZSE

As the rise in interest rates has a stronger impact on fixed-cash flow instruments through the effect of the present value decrease due to the increase in the risk-free discount rate, the domestic bond market responded more strongly than the stock market to rising systemic stress. After jumping several times in the second quarter, volatility in the domestic bond and stock markets decreased over the summer months, but remained elevated amid high uncertainty regarding the future inflation path and the pace of financial conditions tightening, as well as potential upward pressures on the global risk premium. Owing to the increase in yields to maturity, the price of Croatian government bonds dropped sharply in the first eight months of 2022 (–8.9%), with the CROBIS index falling to 171.43 in late August, the lowest level since June 2018 (Figure

32). In the same period, corporate bonds[18] in the US market recorded an even larger decrease of 13% in 2022 due to implicit credit risk growth (Figure 32). As the tightening of monetary conditions and the consequent increase in benchmark interest rates will likely continue, and bearing in mind the fact that the global risk premium has remained subdued so far, there are increased risks that bond investments may lose even more value in the short run, both in the international and the domestic markets. Such risks may be alleviated by Croatia's accession to the euro area at the beginning of 2023 as well as the gradual issuance of new bonds adapted to changed financing conditions over the medium term.

**The co-occurrence of unfavourable trends in 2022 adversely affected investment conditions, which had a disproportionate negative impact on some financial asset classes, particularly in segments of relatively risky and perceivably overvalued securities.** More specifically, cryptocurrencies, which are characterised by an inherently higher risk and potentially greater overvaluation, recorded the largest contraction in the first eight months of 2022, losing as much as 60% in value from the end of 2021. Perception of relatively high overvaluation also led to devaluation of stocks in the real estate and technology sectors, which contracted by almost 30% in that period. The surge in energy prices and further pressures on supply chains weakened the prospects for stocks in the transport and industry sectors, which dipped more than 20%. In addition to profitability of bond investments, the interest rate hike had a negative impact on the valuations of growth companies and technological companies in general as their past growth was based on prospects for high long-term returns, while their present value has been considerably downgraded due to higher discount rates. On the other hand, financial institutions, in particular banks and insurance companies (whose profitability is boosted by interest rate increases), recorded a relatively smaller devaluation of 13% and 7%, respectively. Investments in gold, which has traditionally been considered a hedge against inflation, also lost 7% in 2022, calling into question the conventional perception of investors.

Figure 32 Heterogeneous impact of deteriorated investment conditions
Change in index values from the end of 2021 to the end of August 2022, in %




Sources: EOD Historical Data, ZSE

**Despite these corrections, valuations in some markets were still very high in late August 2022, well above their long-term averages.** There are no signs of overvaluation in the domestic stock market and the European stock markets in general. However, substantial overvaluation of stocks in the US market (Figure 33) raises the probability of future price corrections, with possible repercussions on valuations in markets perceived as less overvalued.

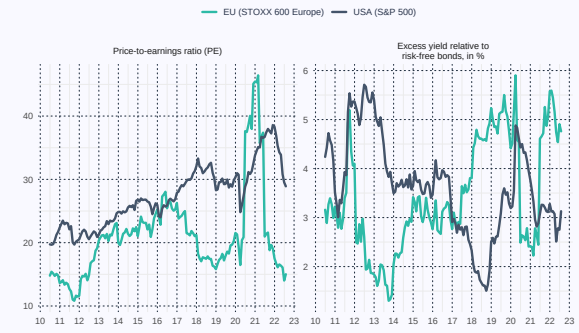
As global stock markets rose sharply in 2021 on the back of the post-pandemic global economic recovery, the Federal Open Market Committee retained its initial support measures introduced at the onset of the pandemic. In March 2022, the Committee started to lift benchmark interest rates and raised them again in June. As these increases were mild and in line with expectations, global stock markets responded by recovering briefly after each Committee

[18] The general corporate bond index in the US market refers to S&P 500 Bond Index Total.

meeting (Figure 29). International stock markets plummeted at the onset of the geopolitical escalation in Eastern Europe. The main reason for fragility of global stock markets were policy changes of the Federal Open Market Committee. As the pandemic gained momentum, the FED introduced emergency policies to stabilise the economy, which also encouraged the purchase of stocks and other risky assets. The shift happened in 2022, when the FED resorted to harsher monetary policy, considerably changing the investment environment. The war in Ukraine caused additional stress in international financial markets; combined with very high valuations of financial assets, this has raised the probability of future price corrections in global financial markets. The high degree of stock overvaluation in the US market and the normalisation of the FED's monetary policy are the reasons behind relatively low excess yields, whereas excess yields in the European market are the outcome of relatively lower stock overvaluation as well as the ECB's decision to postpone the rise in benchmark interest rates, increasing the appeal of stocks.

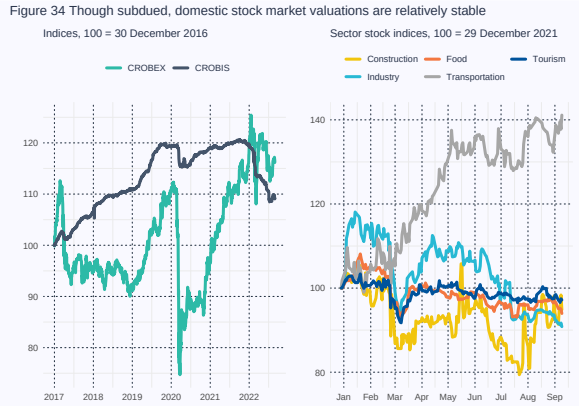
The deterioration in the investment environment also affected the domestic market, which had relatively stable valuations in the first eight months of 2022 when compared with peer markets. This suggests that investors in the domestic stock market believe that market valuations are not considerably overvalued given the situation and expect that the general increase in corporate operating costs would not have major repercussions on their business in the future. An important contribution to stable domestic market valuations is also made by institutional investors, who have sufficient liquidity for counter-cyclical action by investing in perceivably undervalued securities. Notwithstanding significant fluctuations in 2022, most sectoral indices in the Zagreb Stock Exchange dropped mildly in the first eight months of 2022, from –1.9% (construction) to –6.4% (industry). In the same period, stocks in the transport sector gained as much as 34.8% due to good business performance, which was also boosted by rising freight rates in the first half of the year. These developments suggest that, despite the still strong macroeconomic indicators and a historically good tourist season, investors are cautious when it comes to sustainability of such trends in the future.

Figure 33 US stock market valuations remain much below the long-term average
Valuation indicators for the US and European stock markets




Note: The cyclically adjusted price-to-earnings ratio shows how many times a stock's value is higher than the average ten-year earnings a company generates per stock, where a higher value indicates a relative overvaluation compared with the fundamentals, or the added value a company generates.
Sources: Bloomberg, Eurostat, Robert J. Shiller

Figure 34 Though subdued, domestic stock market valuations are relatively stable



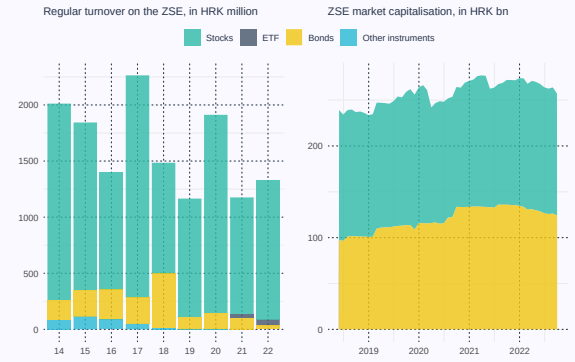

Source: ZSE

## Market liquidity and concentration

Elevated market volatility was also reflected in larger regular turnover in the domestic capital market, which reached HRK 1.33bn in the first eight months of 2022, up 13% from the same period of the year before (Figure 35). Stocks accounted for 93.5% of the 2022 turnover to date, while two ETFs accounted for 3.8%. This shows that, though accounting for only 0.02% of the total market capitalisation at end-August 2022, these funds provide an additional source to market liquidity, which remains at very low levels despite a slight increase (turnover in 2021 amounted to only 0.9% of total market

valuation). Market capitalisation has not changed much in 2022 so far (it fell by 2.9% from the end of 2021), standing at HRK 263.8bn at end-August, or 57.0% of gross domestic product. While the number of issuers decreased to 96[19], the share of equity securities in the total market capitalisation grew by 1.3 percentage points, primarily due to a relatively sharp decline in the value of debt securities in the domestic market.

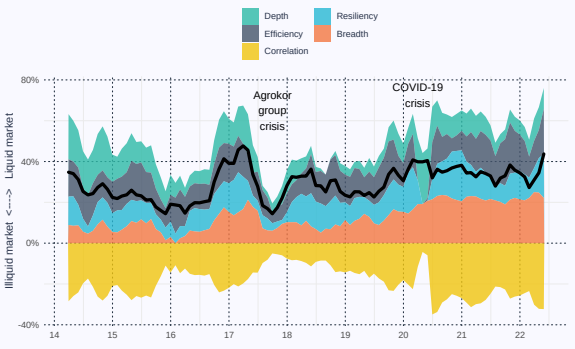
Figure 35 Growth in regular turnover in the domestic capital market amid elevated volatility




Note: Data on the regular turnover refer to the first eight months of each given year.
Sources: Hanfa, ZSE

Figure 36 Stock market liquidity preserved, but with very high trade concentration

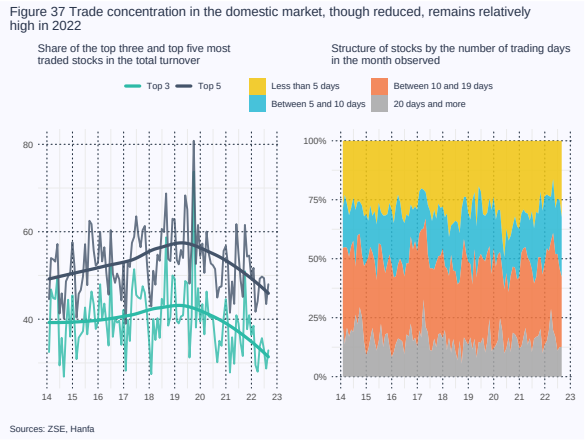
Stock market liquidity index (TILDA), in %




Note: The value of the TILDA indicator of 100% indicates a completely liquid market, while the value of 0% indicates a completely illiquid market.
Source: Hanfa

Together with relatively low activity levels, an important structural characteristic of the domestic capital market is its low liquidity, the growth of which temporarily stopped in 2022, after several years (Figure 36). The composite stock market liquidity index, TILDA (more information in the publication Macroprudential risk scanner, No 6) shows that the liquidity of the domestic stock market recovered after briefly slumping in February and March (Figure 36). This led to a significant improvement in market breadth and resilience indicators, showing that securities prices remained stable despite subdued trading volume. Having dipped in February 2022, the efficiency indicator rebounded afterwards, also reflecting market stabilisation following the initial shock and beginning of the war in Ukraine.

Figure 37 Trade concentration in the domestic market, though reduced, remains relatively high in 2022



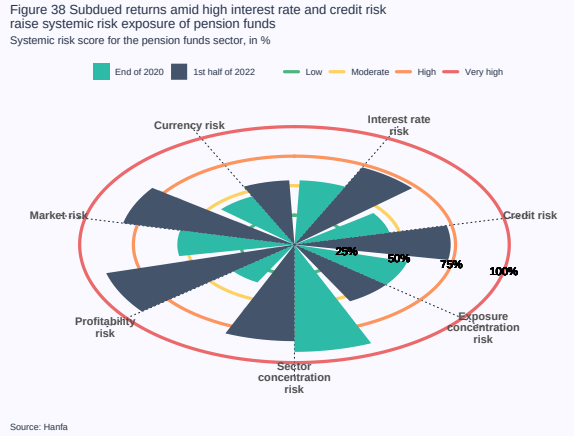

Sources: ZSE, Hanfa

Notwithstanding the improved liquidity in the active part of the market, one of the main structural challenges of the domestic capital market is relatively high trade concentration. Almost half of total trading in August 2022 related to only five stocks, while almost a third was accounted for by only three stocks. Though these shares decreased from previous years (Figure 37), they still point to relatively high trade concentration in the domestic stock market. Relatively low activity of a significant part of the market is also evident in the number of stocks traded for less than five days in a month, which averaged more than 18 in the first eight months of 2022. In the same period, only 12 stocks were on average traded on almost a daily basis, that is, more than 20 days in any given month (Figure 37). Low activity and high trade concentration in the domestic market increase market vulnerability to cyclical systemic shocks, which is particularly pronounced in the current challenging financial and macroeconomic conditions that may continue in the coming period. Even though the domestic capital market does not show signs of cyclical vulnerability associated with overvaluation and is not directly

[19] At the end of 2021, 98 issuers were active.

exposed to economies under sanctions from the beginning of the year, its integration in international markets and unfavourable structural characteristics make it exposed to increased systemic risk in the context of future disturbances in financial markets.

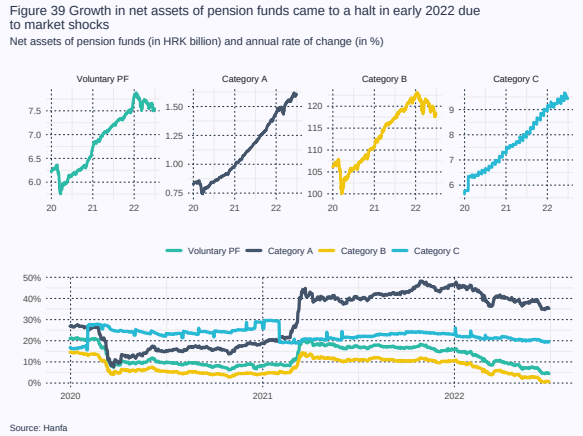
# 4 Pension funds

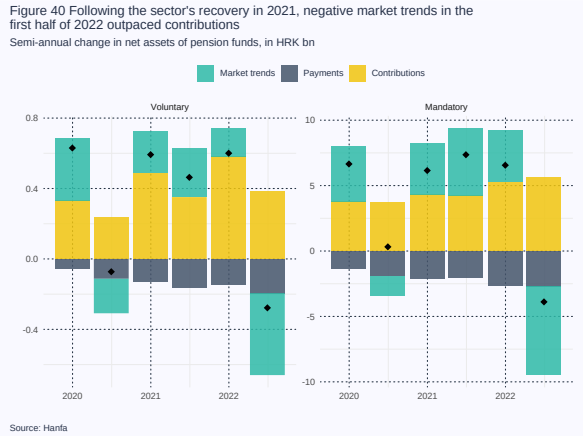



With positive investor sentiment and abundant liquidity in 2021 spilling over into price increases in global stock and bond markets, as well as the domestic stock exchange, mandatory pension funds made an above average annual return of 7.0% in 2021. The beginning of 2022 saw elevated macroeconomic uncertainty and geopolitical tensions, which dramatically worsened financial market conditions, so that returns of pension funds entered the negative territory in 2022. As this is related to cyclical materialisation of market and interest rate risks, while long-term structural risks to which the pension system is exposed through investment policy, such as investment concentration and currency risks, have been decreasing, profitability should recover in the medium term. Looking ahead, it is likely that profitability will be more than before influenced by investment strategy of individual funds and active search for yields through investment diversification by asset classes, issuers and currencies.

## Key cyclical trends

Stable net payments paired with positive market trends in 2021 contributed to the 11.7% annual increase in net assets of pension funds, which amounted to HRK 140.8bn (Figure 39). Net assets of mandatory pension funds rose by HRK 15.0bn (growing annually by 11.9%), while much smaller voluntary pension funds recorded a rise in net assets of HRK 1.1bn or 15.8%. However, elevated uncertainty in the macroeconomic environment and in financial markets (more information in Chapters 2 Macroeconomic environment and 3 Financial markets) brought this growth to an end in early 2022, with the situation being further exacerbated by the Russian invasion of Ukraine. As a result, net assets of pension funds dropped by HRK 4.2bn in the first half of 2022. This was above all due to negative market trends triggered by price corrections of the bulk of the (stock and bond) portfolio, which were larger in the first half of 2022 than at the onset of the coronavirus crisis, that is, the first half of 2020 (Figure 40).




The fall in pension fund assets driven by adverse market developments in 2022 to date was cushioned by net inflows. As a result, net assets of pension funds stood at HRK 136.6bn at the end of June 2022, down by 3.0% from the end

of 2021. While negative market trends affected net assets of all categories of mandatory pension funds, category B funds were hit the most. From the beginning of 2022, net assets of category A, B and C funds decreased by 1.5%, 2.5% and 0.01%, respectively. Apart from unfavourable market trends, net assets of category B funds also dropped due to larger outflows triggered by the legally prescribed transition of members to C funds. On the other hand, the market effect offset the inflows of funds from category B to category C assets. As the pension system is maturing, the forthcoming period will see a growing number of retirements from the second pillar, which will also make the current strategy of generating relatively high returns more difficult. Strategy modification through greater diversification by asset classes will thus be necessary to achieve satisfactory returns, particularly bearing in mind that Croatia's accession to the euro area will further reduce returns on government bonds, the dominant asset class of pension funds.

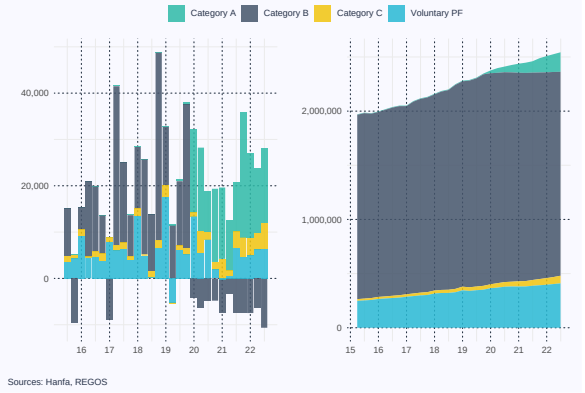
The number of pension fund members rose by 70.5 thousand in 2021, of which 53.8 thousand new members joined mandatory pension funds[20], and the remaining 16.7 thousand became members of voluntary pension funds (Figure 41). The importance of voluntary pension funds continued to rise in 2022 as their membership exceeded 409 thousand at end-June, an increase of 3.2% or 12.6 thousand from the end of 2021. These trends mostly reflect the sustained favourable conditions in the labour market, but the full potential of voluntary pension savings has not yet been achieved, particularly bearing in mind all government incentives for both employers and employees, and the relative flexibility of that form of pension savings in terms of accumulation and payments.

**With assets amounting to 30.8% of GDP in late June 2022, pension funds continued to predominate in the financial services sector.**

**The systemic importance of pension funds arises not only from their size, but also from the specific role they play in the domestic market as institutional investors with a long-term investment strategy and stable cash flows.** These specific aspects of pension funds' business may have a stabilising effect on the entire financial market and other financial institutions (banks, insurance companies, etc.) participating in that market if their actions are countercyclical in a way that they rebalance their portfolios in line with long-term strategic investment allocation by particular asset classes.

Figure 41 Number of pension fund members reached 2.5 million

Number of members and quarterly change in membership, by pension fund category




Sources: Hanfa, REGOS

## Structural characteristics and risks

**Management of pension system assets in the second and third pillar is highly concentrated as the assets are managed by only five pension companies[21], but it shows a clear downward trend, particularly in the segment of voluntary pension savings** (Figure 42). The pan-European Personal Pension Product (hereinafter: PEPP), as an alternative to voluntary pension savings, has the potential to enhance competition in the market for voluntary pension savings through a broader range of products as well as financial institutions providing them (among others, asset management companies, insurance companies,

[20] The number of category A and C fund members grew by 66.8 thousand and 12.7 thousand, respectively, while the number in the most numerous category B decreased by 25.7 thousand.

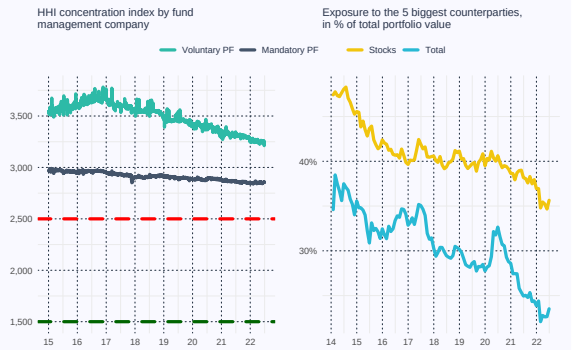
[21] Five pension companies managed 40 pension funds with total assets of HRK 136.6bn at the end of June 2022.

banks and institutions for occupational retirement provision[22]).

**In 2021, pension companies continued to diversify investments across asset classes by actively raising exposure to stocks and investment funds. Along with a hike in their prices, this reduced the share of bonds in the asset structure of mandatory pension funds.** Looking at all mandatory pension funds, the share of bond investments in net assets was reduced by 9.4 pp from the end of 2019, to 58.1% of total investments in late June 2022 (Figure 43), with more conservative category B and C funds cutting their bond investments by half in comparison to the regulatory minimum, while category A funds reduced their bond investments to the regulatory minimum (Figure 44). The outbreak of the pandemic triggered a change in investment policies of mandatory pension funds in terms of strategic allocation of funds across asset classes. Room for further reallocation of funds from bonds to stocks and other investments is thus much smaller than two years ago[23] and is limited by current legal provisions on limits, so the continued investment reallocation will depend on future changes in investment limits and restrictions.

**The process of further diversification of pension fund investments that could have a stabilising effect in case of market disruptions may, however, continue at the level of individual investors** in view of the fact that a third of the stock portfolio was accounted for by only five stocks at the end of June (Figure 36). However, it is necessary that the offer of permitted investment opportunities, that is, issuers with adequate quality, is in alignment with investment potential of pension funds, which is expected to increase with the introduction of the euro and elimination of currency restrictions.

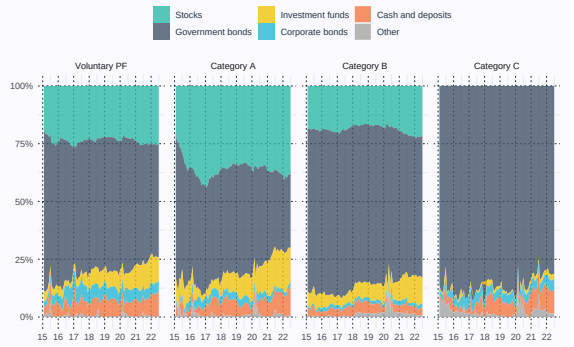
Figure 42 High market and investment concentration of the pension funds sector further reduced




Note: According to the classification made by the US Department of Justice, markets with an HHI of less than 1,500 are considered competitive, while markets with an HHI exceeding 2,500 are considered highly concentrated.
Source: Hanfa

Figure 43 Continued favourable trend in investments in stocks and investment fund units

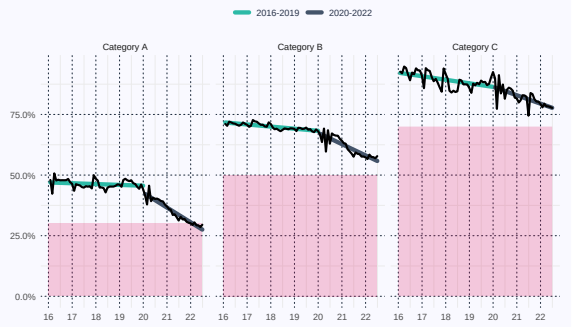
Structure of pension funds investments by type of investment, in % of total assets




Source: Hanfa

Figure 44 Share of government bonds in pension fund portfolios close to legal restrictions

Exposure to RH bonds, in % of fund net assets




Note: The highlighted area indicates legal restrictions on the minimum exposure to RH bonds in accordance with the provisions of the Act on Mandatory Pension Funds.
Source: Hanfa

**Introduction of the euro in 2023 will result in additional flexibilisation of investment opportunities and create potential for further diversification, as it will implicitly remove the limits related to currency mismatch of assets and**

[22] Conditions for applying for registration of a PEPP are defined in Article 6 of Regulation (EU) 2019/1238 of the European Parliament and of the Council of 20 June 2019 on a pan-European Personal Pension Product (PEPP).

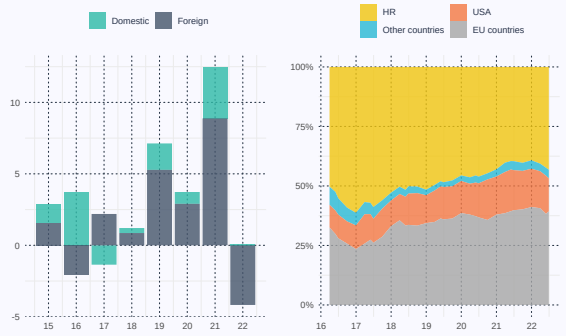
[23] At the end of June 2002, the remaining amount for asset reallocation from bonds to other investments reached HRK 15.6bn or 12% of the NAV of mandatory pension funds.

liabilities in that currency.[24] Apart from eliminating exchange rate costs, this will make room for the restructuring of pension funds' portfolios as euro investments will no longer be subject to any restrictions, while around 20.0% of the NAV[25] will be available for new foreign currency investments. Therefore, bearing in mind the limitations of the domestic stock market in the context of overall and individual legal restrictions on exposures of mandatory pension funds, it is certain that the process of portfolio diversification by issuer domicile (54.1% of the growth in stock investments in 2021 was made in foreign markets, Figure 45) will continue and likely gain momentum, which implies sustained intensification of foreign investments and further international financial integration of pension funds (stock investments in EU markets reached 48.1% of total investments in stocks and investment funds at end-2021, surpassing domestic exposures by a small margin).

**Geographic and currency diversification of investments reduces concentration risk, that is exposure to market risk that may arise in the national financial market, but it also expands the sources of possible market instabilities.** After falling to pre-crisis levels in 2021, market risks rose slightly in early 2022, driven by monetary, macroeconomic and geopolitical pressures, which increased volatility and pushed down the prices of financial assets (more information in Chapter 3 Financial markets). However, as portfolio diversification is greater than before the pandemic year of 2020, portfolio market risk faced by pension funds has been kept at moderate, much lower levels than in 2020 (Figure 46).

Figure 45 Most investments in stocks and investment funds are related to domestic exposures, while foreign exposures have recently become more prominent

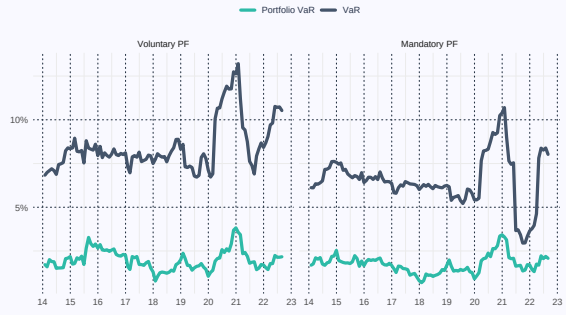
Annual change and structure of pension fund investments in stocks and investment funds, in HRK bn and %




Note: Data for 2022 refers to the first six months.
Source: Hanfa

Figure 46 Growing investment dispersion reduced the rise in pension fund exposure to market risks in the first half of 2022

Assessed loss on investment in stocks and investment funds under an adverse scenario with probability of materialisation of 5%, in % of assets




Note: The green line indicates the estimated portfolio risk value, while the blue line indicates the risk value of individual exposures estimated on the basis of weekly returns during a one-year moving window.
Sources: EOD Historical Data, Hanfa, ZSE

Figure 47 Portfolios of the funds with relatively longer maturity more affected by the interest rate hike

Yields to maturity and duration of the bond portfolio of pension funds, in % and years


Note: The risk premium indicator shows the yield spread between the bond portfolio of pension funds and bonds with a very high credit rating (AAA) from euro area countries of the same maturity. The marked area indicates the interquartile range of yields to maturity of individual funds in the sample. Analysis of the relation between duration and yield change excludes bonds measured at amortised cost.
Sources: Bloomberg, Hanfa

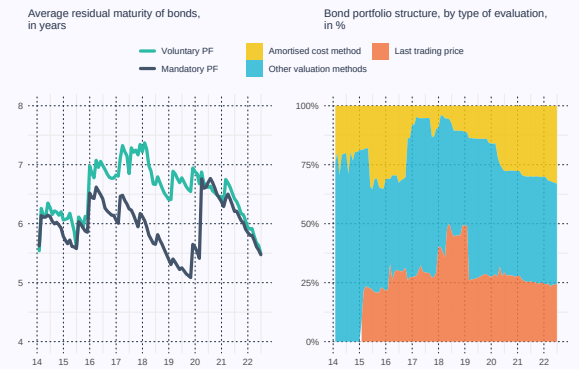
**Pension funds' exposure to interest rate risk, which is one of the key risks in their operations because of the predominance of bond investments and their long-term investment strategy, has been reduced considerably in the last two years.** From the beginning of 2020 to the

[24] Under Article 129 of the Act on Mandatory Pension Funds (Official Gazette, No 19/2014, 93/2015, 64/2018, 115/2018 and 58/2020), the maximum permitted net open foreign currency position (difference between assets and liabilities denominated in foreign currency) may amount to 60% of net assets of category A funds, 40% of category B funds and 10% of category C funds.

[25] This is an estimate of the decrease in the net open foreign currency position of mandatory pension funds if euro were to be introduced as the official currency in Croatia at the end of June 2022.

end of June 2022, mandatory and voluntary pension funds reduced the maturity of their bond portfolios by 1.3 years and 1.4 years, respectively, so that the average modified duration of bond portfolios came to 4.2 years.

Figure 48 Despite the decrease in residual maturity of bonds, monetary tightening increases interest rate risk exposure of the sector




Sources: Bloomberg, Hanfa

**Notwithstanding the maturity reduction and the fact that as much as a third of the pension funds' bond portfolio is valued at amortised cost, where short-term market fluctuations do not affect bond values, the rise in interest rates sharply depreciated the value of funds' assets in 2022.** The average yield to maturity of bonds in the pension fund portfolios leaped from 0.54% in late 2021 to 2.66% at end-June 2022, which, bearing in mind the bond portfolio duration of 4.2 years, diminished its value by approximately 5.9% or HRK 5.5bn (Figure 47). This happened despite the maintenance of the risk premium at historical lows and reflected the global rise in benchmark interest rates. In view of the announced further lifting of risk-free rates in the second half of 2022, the value of assets and returns of pension funds will crucially depend on the maintenance of Croatia's risk premium at very low levels, which should be aided by the country's approaching entry to the euro area.

## Returns

**Positive market developments in 2021 backed by the still low interest rates and abundant liquidity gave a strong boost to the unit prices of all pension funds.** The average weighted annual return of mandatory pension funds stood at 7.00% at year-end (growing by 6.0 pp from 2020), which was 1.0 pp above the several-year average.

**All three categories of mandatory pension funds recorded positive returns; however, category A funds, which have higher risk appetite, saw record high annual returns as stock values grew much more than bond values in the global markets.** The average nominal annual return of category A funds reached a high 13.5% (6.9 pp above the several-year average[26]), category B funds made 7.4% (1.9 pp above the several-year average) while the return of category C funds, which are least prone to risks, was only slightly positive, at 0.4% (Figure 50). Voluntary pension funds also made high returns, averaging 6.7% (2.6 pp above the several-year average).

**Unfavourable macroeconomic and geopolitical conditions in 2022 had a negative impact on almost all stock and bond markets in terms of high volatility and the sharpest price corrections in several years. As a result, returns of pension funds plummeted in the first half of 2022,** ranging from –2.7 % to –10.1%[27] (Figure 49).

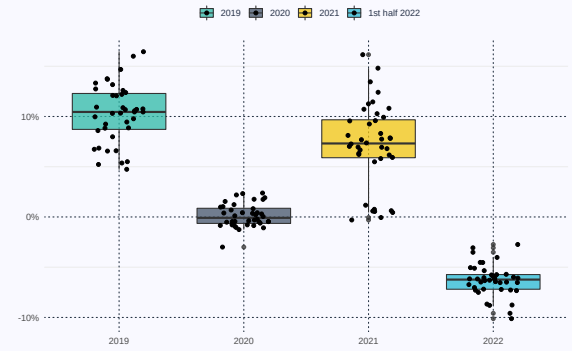
The negative effect was more evident in asset classes with fixed cash flows (bonds), through a direct discounting effect at higher risk-free interest rates, which grew globally in response to inflation. The economic impact of interest rate hikes in terms of higher financing costs and the performance of stock market companies is evident with a delay, particularly in defensive sectors and economies. It should be noted that the structural low liquidity in the domestic stock market in 2022 acted as a buffer to the spillover of foreign market shocks, which is why price corrections of domestic stocks were much smaller (CROBEXtr dropped by 3.4%) than those

[26] The several-year average means the average for the period from 31 January 2014 to 31 December 2020.

[27] From the beginning of the year to June 2022, returns of category A, B and C mandatory pension funds stood at –5.1%, –5.0% and –4.8%, respectively. In the same period, voluntary pension funds recorded a return of –5.6%.

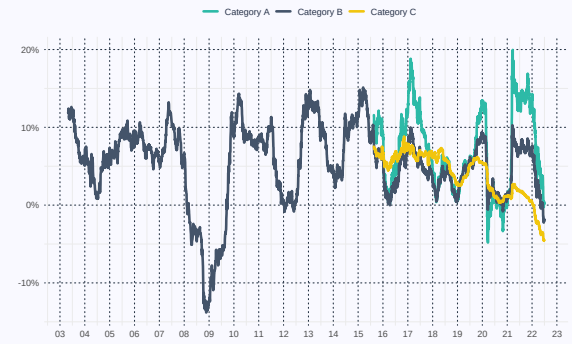
in the major global stock exchanges (S&P index fell by 1.1%). As a result, pension funds investing more in stocks, which performed better both in the positive 2021 and in the negative 2022, made better returns than category B and C funds, which are more risk averse and conservative.

Figure 49 Profitability of the pension funds sector affected by market shocks
Distribution of returns by individual fund, in %




Note: Return is the percentage change in the value of units in the period under review.
Source: Hanfa

Figure 50 Following a sharp recovery in 2021, the first half of 2022 was marked by the fall in profitability of all categories of mandatory pension funds
Annual returns of MIREX indices, in %

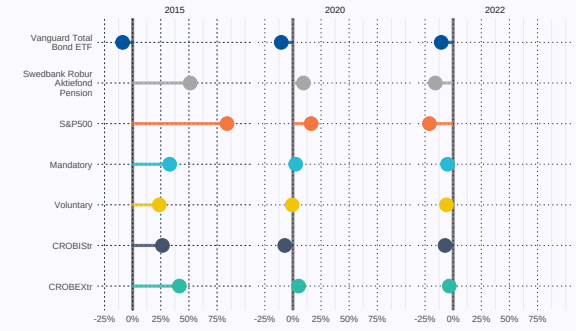



Source: Hanfa

As pension funds are long-term investors, their performance should be viewed in relative terms, that is, compared with alternative investment classes or over long time horizons (Figure 52). For example, from the beginning of 2015 to end-June 2022, mandatory and voluntary pension funds made a cumulative return of 32.9% and 23.7%, respectively, whereas the value of their units dropped by 5.0% and 5.9%, respectively in 2022 to date (Figure 51).

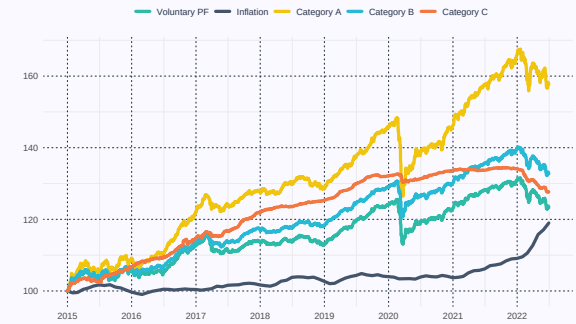
Average returns seen in the period before 2019 are hardly attainable in the future without changes to investments policies and larger diversification, that is, internationalisation of investments. The profit potential of domestic bond investments will not be restored in entirety, notwithstanding the likely further rise in benchmark interest rates, which will, despite the short-term negative effect on the value of bond investments, provide a boost to interest yields on new bond investments in the medium run, partly reducing reinvestment risk of pension funds (more than 30.0% of bond issues mature by the end of 2024, with the average coupon of around 5.0%, Figure 53).

Figure 51 Though subdued in 2022, unit values of domestic pension funds remain relatively stable
Cumulative yield from the beginning of the observed year to end-June 2022



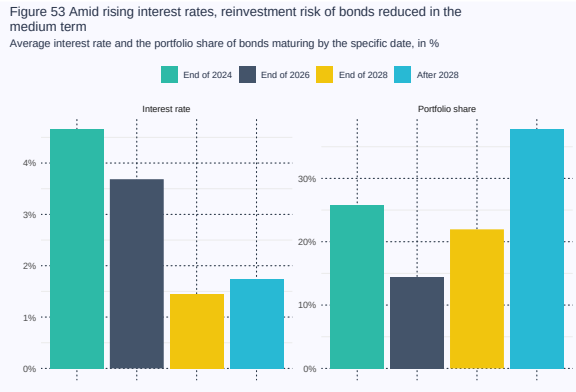

Note: Presentation of yields of individual categories of pension funds shows asset-weighted average yields of individual funds in the period under review.
Sources: EOD Historical Data, Hanfa, St. Louis FED

Figure 52 Over the last seven years, pension funds increased unit values of their members by 1.4 times
Unit value indices of pension funds, 31 December 2014 = 100




Note: The value of presented indices is estimated on the basis of changes in unit values of individual voluntary funds, where the contribution of particular fund to the index construction process is its net value on the date observed.
Sources: Hanfa, Eurostat

Figure 53 Amid rising interest rates, reinvestment risk of bonds reduced in the medium term
Average interest rate and the portfolio share of bonds maturing by the specific date, in %



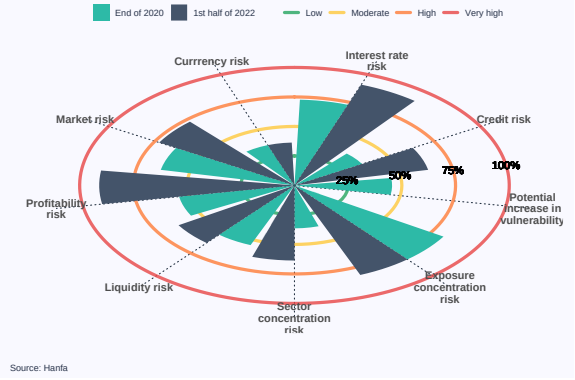

Note: End of 2026 refers to bonds maturing after 2024 and up to the end of 2026, while end of 2028 refers to bonds maturing after 2026 and up to the end of 2028.
Source: Hanfa

The process of diversification and pension funds' attempts to make higher returns by turning to more risky investments and foreign markets has lasted for the past two years. The strength of its

**continuance will depend on possible future changes to the legislative framework as regards investment restrictions.** While this increases exposure of the domestic pension system to the sources of market, interest rate and credit risk exposure, it may also have a stabilising effect if the degree of diversification is adequate (and without global systemic shocks such as the pandemic) and may expand room for pension companies to increase their market share through enhanced market competition (by separating realised returns from the market average).

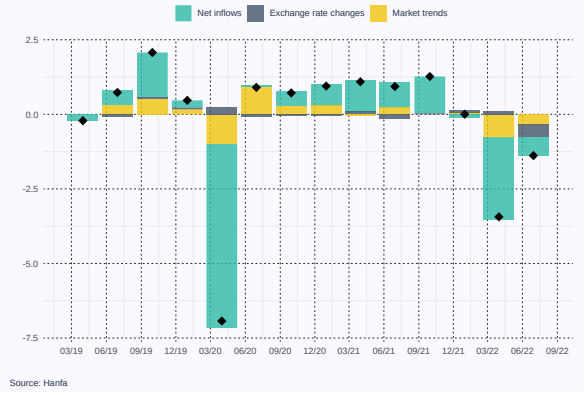
# 5 Investment funds

Figure 54 Unstable market situation and partly anticipated increase in interest rate risk threaten the profitability of domestic investment funds
Systemic risk score for the investment funds sector, in %



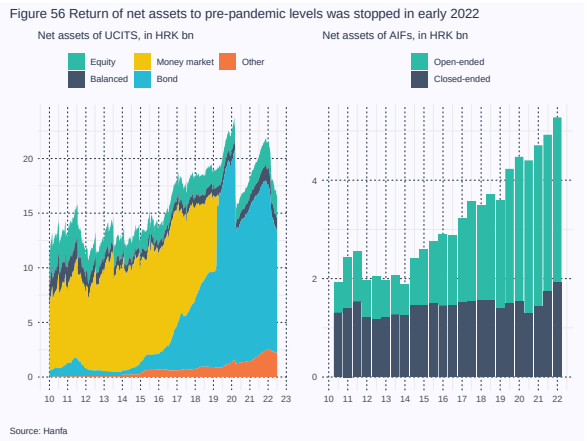

Source: Hanfa

Figure 55 Net assets of UCITS again subdued by significant net outflows
Quarterly change in net assets of funds, in HRK bn




Source: Hanfa

Figure 56 Return of net assets to pre-pandemic levels was stopped in early 2022




Source: Hanfa

The recovery and return of the domestic fund industry to pre-pandemic levels was interrupted by the emergence of new instability and uncertainty in early 2022, which triggered a new flurry of investors' demands for repurchase and renewed liquidity pressures, which were, however, successfully buffered. In 2021, funds reduced their structural vulnerabilities to some extent, mostly investment concentration and interest rate risk exposure, by shortening investment duration. However, the certainty of a further increase in the ECB's key interest rate, which has already been partly incorporated in the prices of debt instruments, along with the impact of a possible recession on market risk of stock valuations, might keep returns on fund investments in the negative territory in the rest of 2022 and in 2023.

## Key cyclical trends

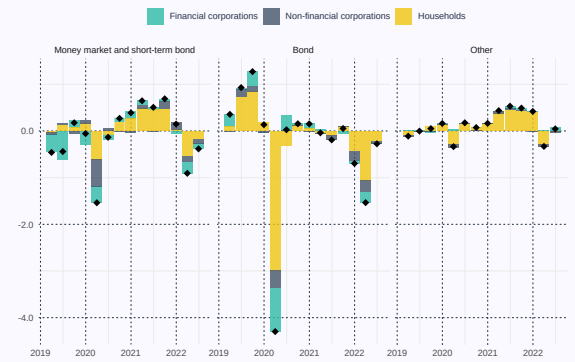
After the very turbulent 2020, investment funds made favourable business results in terms of higher valuations in financial markets and the prevailing optimistic investment sentiment. Net inflows to UCITS stood at HRK 3.4bn in 2021, with the largest share (HRK 1.1bn) going to bond UCITS. Along with the surge in investment value, this gave an upward push to total net assets of UCITS, of 16.6% on an annual level, which came to HRK 26.7bn at the end of 2021.

The steady return of net assets to pre-pandemic levels came to a halt in late 2021 with the new pandemic wave and deterioration of investment sentiment associated with the expected monetary policy tightening by major central banks (more information in Chapter 3 Financial markets). Price corrections in financial markets were amplified due to the beginning of the war in Ukraine as well as intensified growth in prices, which reached a high 12.1% in June, threatening real developments in the second half of the year (more information in Chapter 2 Macroeconomic environment). The growth in macroeconomic and geopolitical uncertainty undermined domestic investor sentiment, so that in the first six months of 2022, investors withdrew HRK 3.4bn or 15.8% of UCITS net assets from the end of 2021 (Figure 55). Coupled with price corrections on the assets side, this lowered net assets of UCITS by HRK 4.8bn (22.4%),

completely offsetting the positive trends from the preceding year (Figure 56).

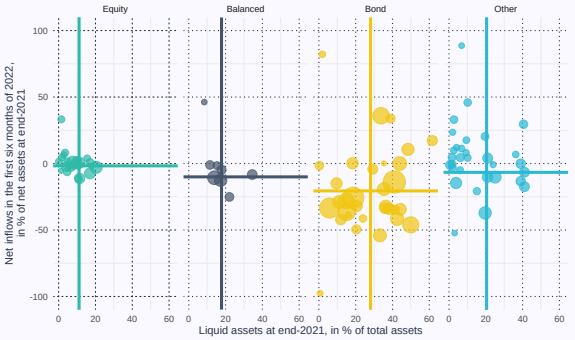
**Though the flurry of investors towards UCITS caused by recent instability was weaker than at the time of the first pandemic wave in early 2020, the prolonged period of net outflows has put their liquidity position under pressure.** Just as at the beginning of the coronavirus crisis, direction of cash flows is foremost dictated by the most represented investor category, that is, households.

Figure 57 Bond funds recorded most outflows, particularly in the household sector
Quarterly net flows to UCITS, in HRK bn




Source: Hanfa

Figure 58 Outflows most prominent in the category of bond funds, which are also characterised by higher asset liquidity
Ratio of outflow size in the first two quarters of 2022 to liquidity of individual fund at period beginning

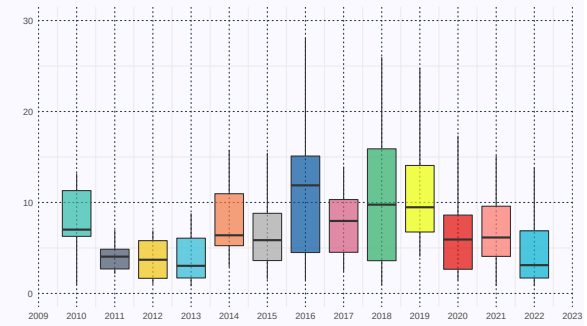



Note: The highlighted lines indicate the values of observed indicators at the level of the whole category of investment UCITS. The size of a dot indicates the size of a fund measured in terms of net assets at end-2021.
Source: Hanfa

**Domestic investors are traditionally most interested in bond funds, which are subject to the heaviest pressures in stress conditions (Figure 57) as such investments are often used as an alternative to bank deposits, that is, they act as liquid buffers in stress periods.** As a result, these funds are disproportionately more affected by sudden distortions and elevated uncertainty, such as the pandemic escalation or the beginning of the war in Ukraine.

This is why bond funds have comparatively higher levels of liquid assets in their portfolios (Figure 58), which enables them to absorb relatively stronger liquidity shocks and ensures smooth payments and sector stability in periods of elevated systemic stress. Their liquidity reserves are usually several times greater than average cumulated monthly demands for repurchase of units (Figure 59).

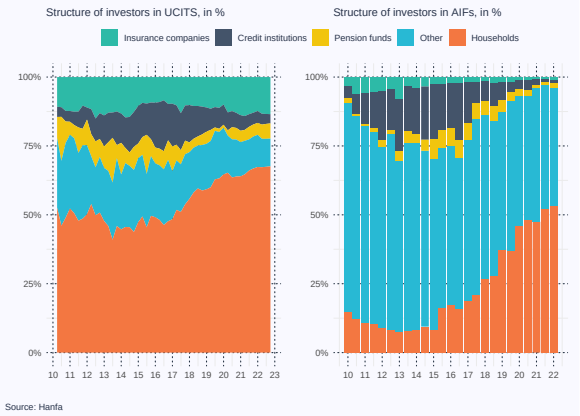
Figure 59 Liquidity reserves of bond funds exceed cumulated monthly gross outflows by several folds
Distribution of liquidity indicators of bond UCITS




Note: The liquidity indicator is presented as the ratio of highly liquid assets to average cumulative monthly outflows in the year observed. Highly liquid assets are cash, deposits and money market instruments on the last day of the year observed. The most recent data refers to the first half of 2022.
Source: Hanfa

**Households, which are traditionally the most represented category of UCITS investors (holding 67.4% of their total net value at the end of June 2022), have in recent years become predominant in the liabilities of alternative investment funds as well (Figure 60).** At the end of 2021, the household sector held 52.6% of net assets of alternative investment funds, which is a several-fold increase from 8.5% at the end of June 2015. Most of the increase of the household sector's share in the assets of alternative investment funds related to experienced investors and not retail investors. Retail investors may invest only in AIFs with public offering, while the mentioned growth relates to AIFs with private offering, that is, AIFs whose units are distributed exclusively to experienced natural persons or other institutional investors. Regardless of the above, investment decisions of households determine cash flows of investment funds, particularly during crisis periods, thus affecting the nature of liquidity risk.

Figure 60 Growing interest of the household sector for investing in investment funds



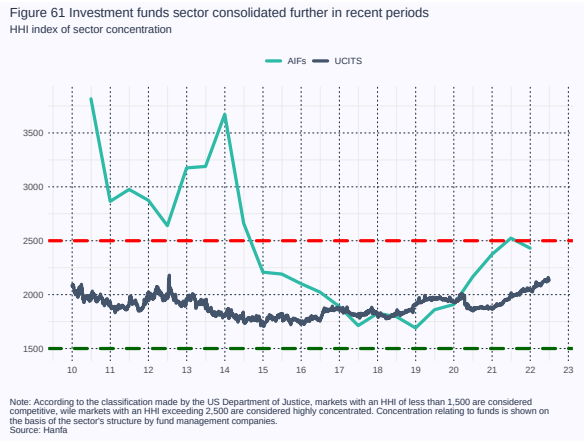

Source: Hanfa

## Structural characteristics and risks

**The expansion of the offer in the market of investment funds continued in 2021 and early 2022, particularly in the segment of investment opportunities associated with sustainability objectives.** In addition to the new regulatory framework regarding sustainability,[28] investors have been gradually offered an option to invest in investment funds with green and sustainable strategies, in the first instance, in the form of new feeder UCITS. However, the forthcoming full implementation of the new regulatory framework will enable funds to secure their precise position as regards adjustment to green and sustainable objectives by clearly deciding whether and to what extent will they contribute to the transition to a sustainable economy by their investment strategies and policies.

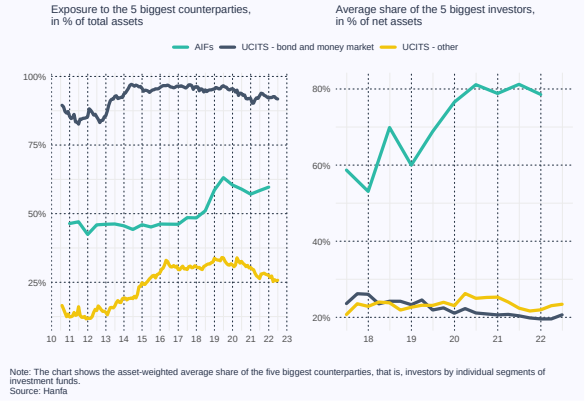
**However, the expansion of the offer as regards investment strategies runs parallel to the process of slow consolidation in the domestic investment funds sector (Figure 61).** The challenging and uncertain recent period, which was characterised by two significant investor rushes and price corrections, resulted in a smaller number of active investment funds as well management companies in the domestic market. The number of active funds and management companies fell by one and two, respectively, in the period from the end of 2019 (pre-pandemic) to the end of June 2022.

Figure 61 Investment funds sector consolidated further in recent periods




Note: According to the classification made by the US Department of Justice, markets with an HHI of less than 1,500 are considered competitive, wile markets with an HHI exceeding 2,500 are considered highly concentrated. Concentration relating to funds is shown on the basis of the sector's structure by fund management companies.
Source: Hanfa

Figure 62 High investment concentration highlights potential idiosyncratic risks in the most represented counterparties




Note: The chart shows the asset-weighted average share of the five biggest counterparties, that is, investors by individual segments of investment funds.
Source: Hanfa

**As the number of management companies decreased, asset management concentration in UCITS and alternative investment funds increased.**[29] The growing cumulation of funds' net assets in a smaller number of the biggest management companies is particularly evident in the segment of alternative investment funds, where the three biggest companies managed 76.9% of total net assets at the end of 2021. Notwithstanding the slight consolidation, the sector of investment funds has remained relatively competitive, while the expansion of the offer to include new ESG feeder funds, the first

[28] 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. For more information on sustainable financing, see Hanfa's website (link).

[29] Though management companies may manage investment funds from both groups (UCITS and AIFs), some companies manage funds from only one group. The fall in the number of companies managing UCITS does not necessarily imply their dissolution; it may mean that a company ceased to manage UCITS but continued to manage alternative investment fund(s). Also, the rise in the number of AIF management companies does not necessarily imply an establishment of a new company. Companies, though active in the register, that do not manage any active fund are not here included in active companies.

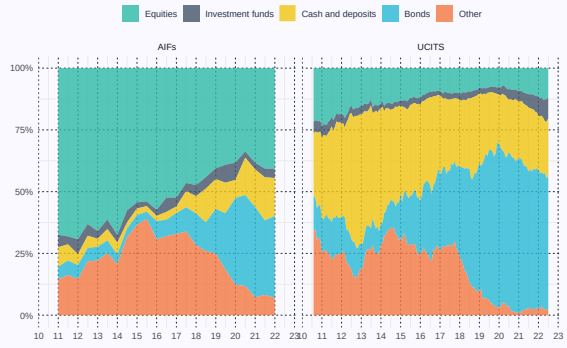
ETF and the investment fund for crypto assets has created new investment opportunities as well as new potential risks for investors.

**Notwithstanding a marked shift towards foreign markets, investment concentration of UCITS by individual asset classes as well as issuers has remained relatively high (Figure 62).** At the end of June 2022, bonds accounted for 54.1% of their total assets (Figure 63), which is nevertheless 11.8 pp less than at the end of 2019. The high indirect interconnectedness of the financial services sector in terms of investment concentration in a small number of issuers may amplify potential materialisation of initial non-systemic risk and, acting through the contagion effect, turn it into a systemic disturbance (more information in Box 2 Risks arising from the interconnection of the financial services sector and the public sector in the publication Macroprudential Risk Scanner, No 3). While the investment structure of alternative investment funds by investment classes has become more dispersed in recent years, with focus on more conservative investment classes[30], the risks that may arise from high investment concentration are further accentuated by highly-concentrated liabilities (at the end of 2021, the average share of the five biggest investors in net assets of alternative investment funds came to 51.3%), which is why some alternative investment funds, depending on the terms of investors' exit from the fund, may be in a position to close their investments at non-market terms, particularly investments that are not listed in public markets.

**A reorientation of the funds' investment focus to foreign markets, mostly those in the EU, has become increasingly evident in the past two years, in both the stock and bond segments of the portfolios, because of the greater need for portfolio diversification in search of competitive yields.** At end-June 2022, UCITS foreign investment came to 32.5% of total investments, growing by a high 41.5% from the end of 2019, while the same investments of alternative investment funds almost doubled in the same period (growing by 89.1%), so that their share amounted to 40.6% of total AIF investments at the end of 2021 (Figure 64).

Figure 63 Investments in government bonds account for the largest share of UCITS investments at the end of June 2022

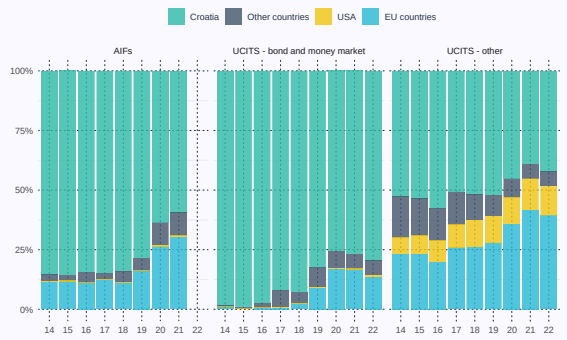
Structure of UCITS investments by type of investment, in % of total assets




Source: Hanfa

Figure 64 Growth in cross-border exposures through investments in securities from other EU countries

Value of UCITS investments by residency, in HRK bn




Note: The most recent data for UCITS refers to the end of June 2022.
Source: Hanfa

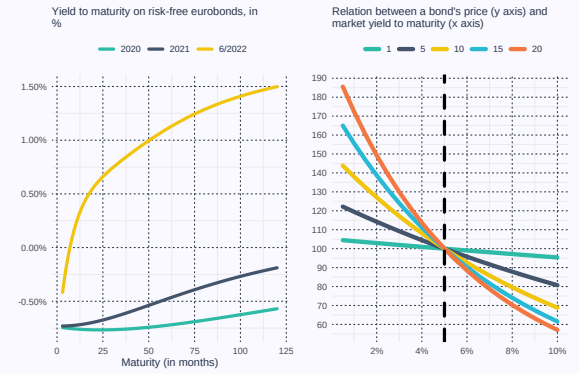
**In view of the large portion of bonds in their total assets, UCITS are highly exposed to direct interest rate risk.**[31] With monetary tightening in the most relevant financial markets and soaring prices of financial instruments, there is increasing risk of interest rate changes, which also directly affects the prices of all debt securities. Through the discounting effect, interest rate hikes affect disproportionately more bonds with longer maturity, with cash flows further in the future (Figure 65 – right). In order to mitigate exposure

[30] The disinvestment process of economic cooperation funds (ECFs), which began in 2017, influenced the total asset structure of alternative investment funds by significantly reducing investments in units of limited liability companies (included in category "other" in Figure 63).

[31] Bonds accounted for 54.1% of total assets of UCITS at the end of June 2022 and 33.1% of total assets of alternative investment funds at the end 2021.

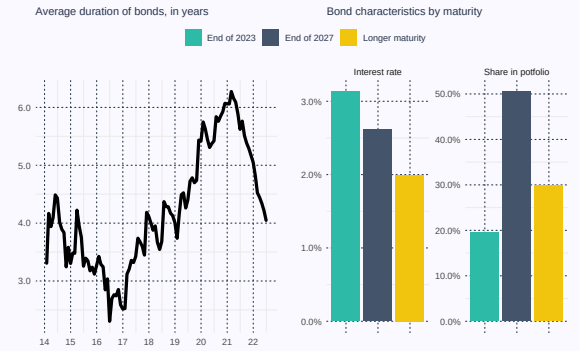
to the increasing risk of interest rate hikes, in 2021 and the first half of 2022, UCITS reduced the extended maturity of their bond portfolio from the periods of low yields, when maturity was extended by as much as 2.9 years, to the maturity that is more characteristic for long-term investments (from the end of 2016 to the end of 2019). The modified duration of the UCITS bond portfolio was 4 years at the end of June 2022 (Figure 66).

Figure 65 Bonds with longer maturities respond more strongly to changes in financing conditions




Note: The chart shows bonds with principal amount of 100 and a 5% coupon payable on a semi-annual basis.
Sources: Eurostat, Hanfa

Figure 66 Amid interest rate increases, interest rate risk grows in the short run, while refinancing risk decreases

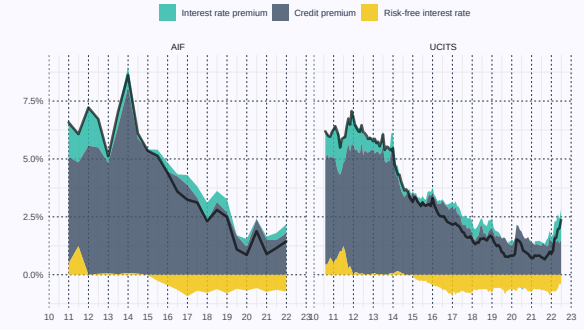



Note: End of 2023 refers to bonds maturing up to 2023, end of 2027 refers to bonds maturing up to the end of 2027, while longer maturity refers to bonds maturing after 2027.
Source: Hanfa

Notwithstanding the adjustment of the bond component of the portfolio, the required yield to maturity[32] has been rising since end-2021 as market perception changed in line with expectations, which is evident exactly in the rise of the interest rate premium (Figure 67) as well as the move of the yield curve for risk-free eurobonds, that is, the rise in risk-free interest rate (Figure 65 – left).

**The room for growth in the yield to maturity of the bond portfolio of domestic investment funds is created by the still relatively subdued credit risk premium, which continues to linger at historical lows.** Market perception of the credit risk pertaining to the bond portfolio of domestic UCITS is largely determined by the credit rating of the domestic government sector, which further improved following the official confirmation of Croatia's accession to the euro area. Notwithstanding the positive trends, potential leaps in the global risk premium in the forthcoming period might have a negative impact on the market perception of credit risk, though this effect will certainly be smaller than it would have been if Croatia remained outside the euro area.

Figure 67 Recent increase in yields to maturity of investment funds' bond portfolio triggered a rise in the interest rate risk premium
Estimate of individual components of yield to maturity




Note: The black line shows the weighted yield to maturity on the bond portfolio of investment funds. The data for alternative investment funds are semi-annual.
Sources: Eurostat, Hanfa

**By reducing maturity, investment funds have also lowered reinvestment risks bearing in mind that a fifth of the bond portfolio matures in 2023, and as much as 50% matures by the end of 2027 (Figure 65).** It is likely that bond investments may be reinvested at higher interest rates upon maturity, which would compensate some of the losses seen in early 2022.

Accession to the euro area will significantly mitigate currency risk as it mostly arises from the

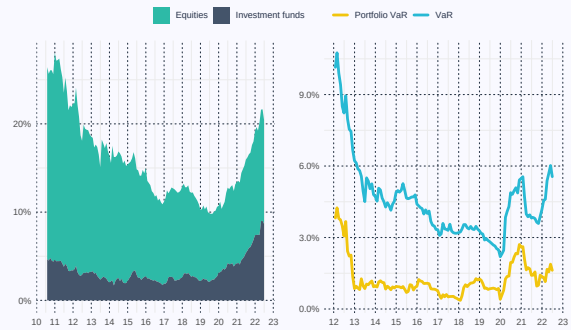
[32] The yield to maturity on bonds, which moves in the opposite direction from bonds' market prices, is an important market indicator which provides insight into general financing conditions, that is, the level of interest rates, as well as the risk perception of bond issuers (more information in Box 1 Do domestic institutional investors display procyclical investment behaviour? In the publication Macroprudential Risk Scanner, No 7).

euro denomination of unit prices or high euroisation of the domestic funds' portfolio (Figure 68). While domestic UCITS have partly offset market risks (Figure 69) through portfolio diversification, these risks remain elevated in view of the rising inflation and expected further tightening of monetary policy, as well as the possible increase in corporate sector credit risk.

Figure 68 Accession to the euro area will significantly reduce currency risk
Open currency position of UCITS in currencies other than the fund's currency, in % of net assets


Note: In the presentation of the net open currency position, securities with a currency clause are treated as kuna securities. The chart shows an estimate of the open currency position after conversion based on the portfolio structure at the end of June 2022.
Source: Hanfa

Figure 69 Surge in market risk in the first half of 2022 mitigated by portfolio diversification
Estimated loss on UCITS investments in equities and investment funds under an adverse scenario with probability of materialisation of 5%, in % of assets

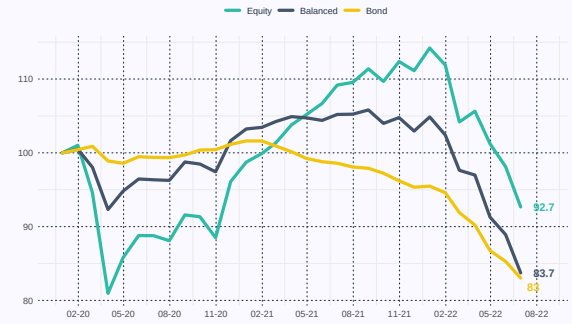



Note: The yellow line indicates the estimated portfolio risk value, while the blue line indicates the risk value of individual exposures, estimated on the basis of weekly returns during a one-year moving window.
Source: Hanfa

## Returns

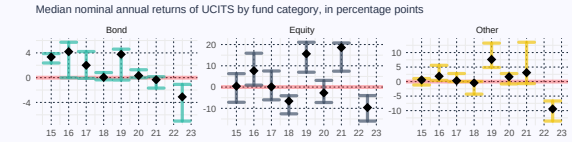
In conditions of the rapid increase in the general price level from the beginning of 2020 to mid-2022, equity, balanced and bond UCITS recorded negative returns (Figures 70 and 71). The possibility of further, even sharper, price corrections in financial markets will continue to be present because of the uncertainty awaiting in the second half of 2022 as regards energy supply, its impact on production and consumption, as well as the overall economic activity, combined with price increases and the tightening of financing conditions. Along with structural vulnerabilities of domestic funds, such as concentration and relatively long-term duration of investments, this will continue to exert pressure on funds' returns, which have so far reflected negative global trends (Figure 71).

Figure 70 Current growth rates of the general price level threaten the profitability of domestic investment funds
Index of real values of UCITS units by type of fund, 100 = 31 December 2019

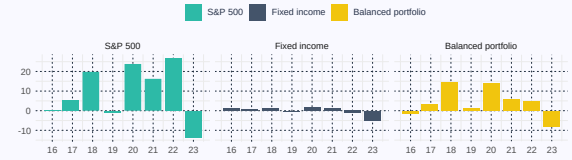



Note: The value of the index of the individual category represents the net asset-weighted value of units in individual funds in the sample rescaled to the beginning date.
Source: Hanfa

Figure 71 Investment funds made competitive nominal returns in preceding periods, but current market instability significantly subdues their profitability
Median nominal annual returns of UCITS by fund category, in percentage points



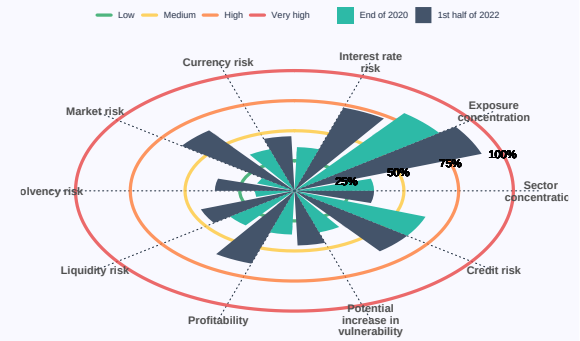

Annual rates of change in benchmark market indices, in percentage points




Note: The line marks in the upper chart indicate the interquartile range of returns of individual funds in the sample. The most recent data refer to the period from the beginning of 2022 to the end of June. Fixed income is the value of the index Bloomberg Euro Aggregate Treasury 3-5 Year, while the balanced portfolio is the value of the index Bloomberg US Dynamic Balance Index II.
Sources: Bloomberg, Hanfa

# 6 Insurance companies

Figure 72 Vulnerabilities of insurance companies higher than in the pre-pandemic period




Source: Hanfa

The insurance sector recorded positive trends in terms of larger premium income and profitability in 2021. The continued positive trends in the insurance segment in the first half of 2022 were overshadowed by valuation corrections in financial markets, which had a negative effect on comprehensive income of insurance companies, particularly in the life insurance segment. Credit risk faced by insurance companies remained moderate thanks to the traditionally high exposure to the government sector, whose rating is at its twenty-year peak in the wake of accession to the euro area. Introduction of the euro will considerably lower currency risk exposure and solvency capital requirements, but it will simultaneously reduce own funds due to the transition to a lower euro discount curve. The companies' solvency position will therefore be slightly reduced, but still at levels that enable stable operation of the insurance sector in the periods to come.

## Key cyclical trends

The performance of the insurance sector continued to improve in 2021, with premium income rising annually by 11.7% and even life insurance business recording almost double-digit growth (9.4%). The recovery of life insurance followed the 13.7% plunge in premium income in 2020, which is still subdued (Figure 73). The share of life insurance in total premium income of insurance companies edged down from 2020 (24.8%), remaining much lower than the European average of 56%[33], which suggests that additional efforts are needed to raise the awareness about the importance and benefits of life insurance, which is in Croatia predominantly tied to the banking sector and its credit cycles.

Figure 73 Growth in gross written premium in non-life insurance business continues into 2022

Annual gross written premium, in HRK bn


Note: The most recent data refers to the end of July 2022.
Source: Hanfa

Strong lending activity in 2021 provided a boost to premium income and the number of life insurance policies, which are largely contracted through the banking channel as collateral for loans, in turn exposing the insurance sector to banking sector's risks. The same trend continued into 2022, with traditional life insurance recording a 6.1% rise in gross written premium in the first half of the year, while premiums on unit-linked contracts soared by 36.7% from the end of 2021 (Figure 75), when global financial markets saw record-high valuations and price spikes, which increased the attractiveness of life insurance contracts with an investment component. Despite elevated market uncertainty due to rising geopolitical and inflationary pressures, if vigorous housing credit activity continues (and economic growth rates

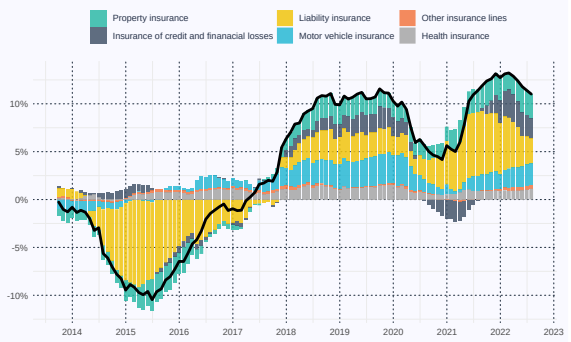
[33] The data refers to the aggregate structure of premiums in EEA countries in 2021.

remain the same), life insurance premium is expected to continue to rise.

The several-year growth in non-life insurance premium income picked up more speed (12.4%), particularly in the segment of credit insurance (43.6%). This was predominantly due to heightened uncertainty and financial instability after the onset of the coronavirus crisis, as well as the ongoing years-long trend of market penetration of this product, which is associated with enhanced bank lending. The share of that type of insurance in total non-life insurance premiums grew to 4.2% at the end of 2021. In terms of the share in total non-life insurance premiums, an important contribution came from property insurance, where insurance against fire and elementary disasters as well as other property insurance account for dominant shares. The earthquakes in Zagreb and the Sisak-Moslavina County in 2020 and growing expenses of increasingly frequent natural disasters have stimulated the growth in property insurance premium as contracts for these types of insurance last for several years (they are usually concluded for a period of five years). Along with the rise in property insurance premium, a strong contribution in the segment of non-life insurance traditionally comes from motor vehicle liability insurance (hereinafter: car insurance) and road vehicle insurance (hereinafter: casco), which rose at double-digit rates in 2021 (Figure 74). The growing number of vehicles on roads and changes to car insurance prices are the main reasons behind the growth in gross written premium in that insurance segment.

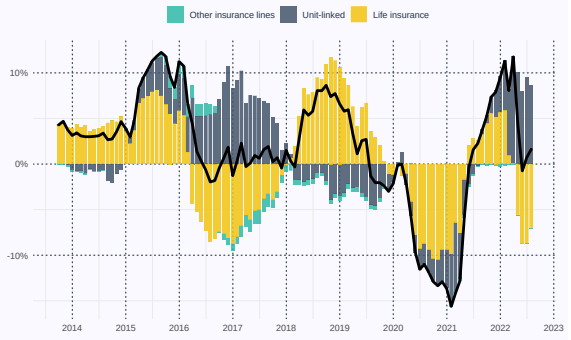
Premium growth was paired with the rise in settled claims (11.7%), which amounted to HRK 7.3bn at the end of 2021. The growth in claims settled in life insurance business (of 7.7% a year) was due to portfolio maturing and regular expiry of contracts (Figure 76), the trends which continued from previous periods.

Figure 74 Along with the traditionally dominant car insurance, credit and financial loss insurance became a more relevant determinant of the recovery in non-life insurance premium in early 2022
Annual change in gross written premium of non-life insurance, in %



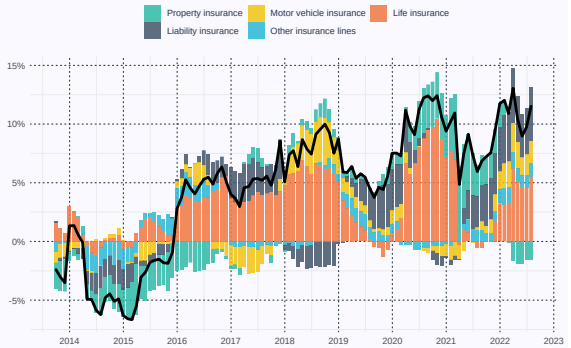

Note: The most recent data refers to July 2022.
Source: Hanfa

Figure 75 Gross written premium in life insurance business remained subdued relative to pre-pandemic levels
Annual change in gross written premium of life insurance, in %




Note: The most recent data refers to July 2022.
Source: Hanfa

Figure 76 Growth in payments of claims in 2022 driven by car and life insurance
Annual change in payment of claims, in %




Note: The most recent data refers to July 2022.
Source: Hanfa

The increase in claims settled in non-life insurance business evident in the first half of 2021 continued in the rest of the year, resulting in a 14.6% growth on an annual level (data for 2022 indicate a fall in payments for settled claims). The largest contribution to the rise in claims is associated with car insurance, both due to the rise in the number of claims settled (12.0%) and the rise in the prices of spare parts, which picked up even more in 2022. The amount of claims for insurance against fire and elementary disasters continued to rise in 2021, but with a

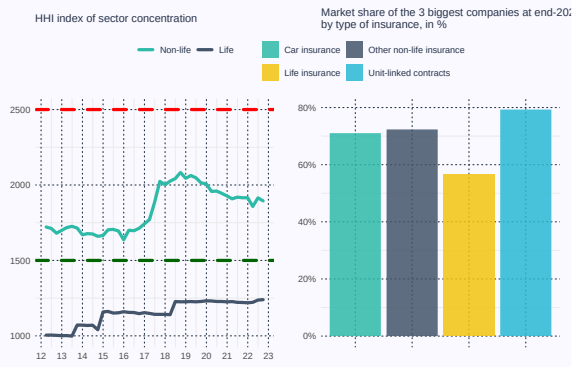
clear downward trend in the number of reported claims. With most insurance claims for the 2020 earthquakes being settled, the future dynamics of the number and amounts of claims will largely depend on the frequency and severity of natural disasters, which, unfortunately, have become more frequent, increasing the importance of this insurance segment. This is confirmed by numerous government interventions, either through subsidies for insurance premiums or compensation for part of the damage.

## Structural characteristics and risks

**While the domestic insurance sector is relatively competitive at the whole market level, its individual segments are highly concentrated, so that some companies are systemically important in terms of offered insurance lines.** High concentration in terms of the market share is particularly evident in motor vehicle liability insurance as the three biggest companies hold 71% of total insurance premium for that type of insurance, which, in turn, makes one fourth of total premium income of all companies. This share amounts to 56.6% in the life insurance segment and to nearly 80.0% in unit-linked contracts (Figure 77). These three types of insurance together accounted for 48.8% of total gross written premium of the sector in 2021.

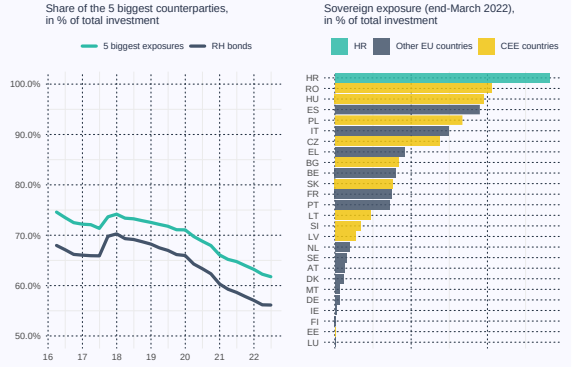
**The concentration of the investment portfolio of insurance companies by investment classes and issuers is still high despite diversification towards equity investments and increased focus on corporate bond issues.** The level of exposure to the five biggest issuers (61.4% of total investments) largely depends on the level of exposure to Croatian government bonds as the dominant investment type, which stood at 56.1% at the end of June 2022 (Figure 78). The reduction in the share of domestic government bonds in the portfolio of insurance companies by almost 4 pp ran parallel to the rise in the share of corporate bonds (of 1.0 pp, to 4.6% of total investments) and stocks (of 1.0 pp, to 9.6% of total investments).

Figure 77 Sector concentration remains moderate



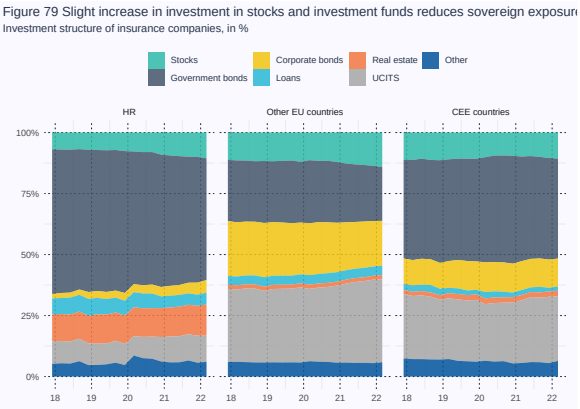

Note: According to the classification made by the US Department of Justice, markets with an HHI of less than 1,500 are considered competitive, while markets with an HHI exceeding 2,500 are considered highly concentrated.
Source: Hanfa

Figure 78 Exposure concentration risk at high levels despite the recent increase in portfolio concentration




Sources: ESB, Hanfa

Figure 79 Slight increase in investment in stocks and investment funds reduces sovereign exposure



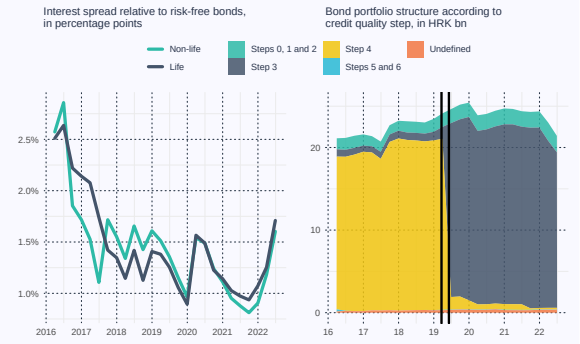

Source: EIOPA

Real estate investments grew by 0.4 pp in 2021, reaching 7.7% of total assets of insurance companies. Though not dominant, real estate investments are a very important investment category from the standpoint of stability as their procyclicality and potential overvaluation in a setting of tightening financing conditions may exacerbate existing market risks, which, in case of their materialisation, may have a negative impact on property values and capitalisation of insurance companies (more information in Box Financial services market as the source of

systemic risks, in the publication Macroprudential Risk Scanner, No 2).

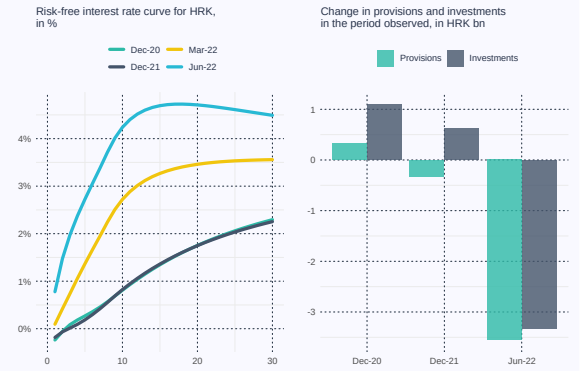
**Credit risk to which Croatian insurance companies are exposed has remained at moderate levels (Figure 80), bearing in mind "traditionally" high exposure to the government sector, whose rating, on the eve of the accession to the euro area, is at its twenty-year peak.** However, the current favourable credit perception is susceptible to change in case of any sudden deterioration in the global risk premium amid heightened global economic and geopolitical uncertainty, which may have a destabilising effect on financial markets as well as the domestic insurance sector.

Figure 80 After a temporary spike in early 2020, credit risk premium returned to very low levels




Note: The chart shows the yield to maturity spread of the bond portfolio relative to the highest rated euro area bonds of the same maturity. The vertical lines indicate the dates when credit rating agencies Fitch and S&P upgraded their credit ratings on RH bonds.
Sources: Bloomberg, Eurostat, Hanfa

Figure 81 Growth in interest and discount rates strongly influences the decrease in the value of insurers' assets and liabilities




Sources: EIOPA, Hanfa

**Along with credit risk, a high share of government bond investments exposes the insurance sector to interest rate risk, which materialised to some extent with the monetary tightening in 2022.** The shift in the monetary policy of central banks in terms of the rise in benchmark interest rates (for the first time after more than 15 years) in response to rapid inflation, triggered a spike in the risk-free interest rate curve (Figure 81). The jump in yields on government bonds had a negative effect on the value of insurance companies' investments. Investments in government bonds dropped by as much as 12.9% from the end of 2021 to the end of June 2022. This effect would have been even more severe if insurance companies had not reduced the duration of their bond investments in 2021 and 2022 (Figure 82). The simultaneous effect on insurance companies' liabilities in terms of the larger discount factor was much milder, as liabilities decreased by 7.8% from the end of 2021, which draws attention to the overall negative net effect of the interest rate increase on companies' balance sheets.

**While insurance companies have shortened the duration of their investments since 2020, the recent interest rate hike increased their exposure to interest rate risk. However, the interest rate spike does not have the same effect on the life and non-life insurance segments.** In contrast with most financial institutions, the operations of life insurance companies are positively correlated with interest rate increases. This is mainly because life insurance companies largely invest premiums of insured persons in long-term government bonds (maturity of their liabilities was only 2.9 years longer than the maturity of their assets in late June 2022 (Figure 82)), so that the change in interest rates as the discount factor of cash flows equally affects both sides of their balance sheets. In addition, interest rate growth in the medium run provides a boost to interest income of life insurance companies through higher bond coupons, but only in conditions of positive real interest rates.

On the other hand, inflationary pressures and interest rate growth in the short run have a negative effect on the balance sheet of non-life insurance companies as their assets have longer maturity than liabilities. This is why these companies may expect a relatively smaller reduction in costs associated with lower claims, or even their increase because of higher costs of

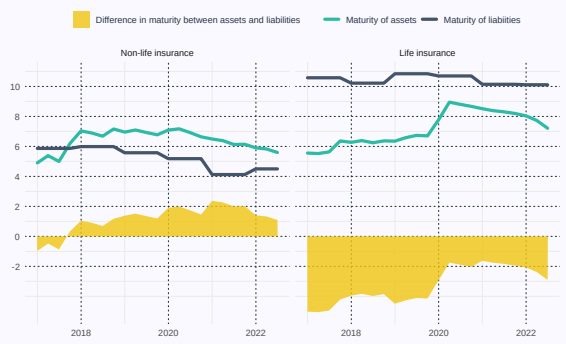
repairs and spare parts, relative to the reduction in the value of their bond investments.

A scenario projecting prolonged high inflation and low (or even negative) economic growth may materialise in case the current elevated inflationary pressures, geopolitical instability and pandemic-induced disruptions in global supply chains continue. However, current analyses suggest that even in case of a systemic shock and perceptible growth in yields on long-term government bonds, insurance companies' exposure to interest rate risk would remain tolerable in terms of capital stability, as the surplus of assets over liabilities at the system level would stay at levels that ensure stability and are much above the regulatory minimum, even after accounting for the negative effect that the transition to the euro and the associated reference discount curve will have on the companies' solvency position (more information in Chapter 9 Stress testing).

**As with other financial institutions, the main benefit of euro adoption for insurance companies will be a significant decrease in their exposure to currency risk, which will be reflected in lower solvency capital requirements.** More specifically, in the course of 2021, the net open foreign currency position widened slightly from the end of 2020, to around 7.4% of net assets (Figure 83). This risk will be significantly reduced once Croatia joins the euro area as a large portion of foreign currency assets and liabilities of insurance companies is denominated in the euro (48.2% at the end of 2021). In addition to a reduction in capital requirements for interest rate risk as well as differential and concentration risks, this will result in a lower total solvency capital requirement (SCR ratio) as companies will simultaneously have to discount their liabilities at a lower risk-free curve for the euro, which will also reduce their own funds.

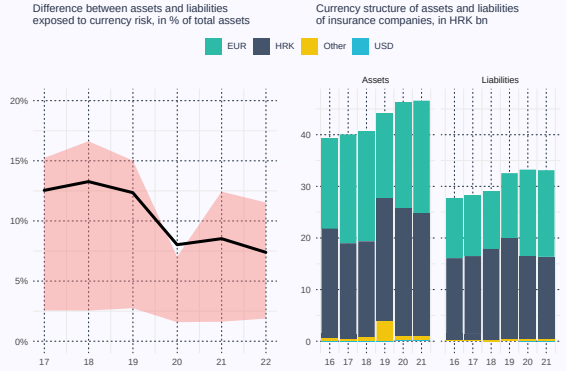
**In a setting of low interest rates, and as a result of the search for yields, liquidity at the sector level has been steadily decreasing, not only through reduction in exposure to domestic debt instruments, but also due to larger investments in less liquid instruments.** The median liquid asset ratio of insurance companies stood at 65.1% at end-2021, falling to 61.7% at end-June 2022. Though insurance companies in Croatia are more liquid at the system level than the European average, the share of liquid assets of some Croatian companies is below 30%, which makes them vulnerable to potential liquidity pressures (Figure 84).

Figure 82 Insurance sector exposure to interest rate risk decreases in proportion to the decrease in maturity mismatch in the balance sheet
Indicators of residual maturity of assets and liabilities of insurance companies, in years



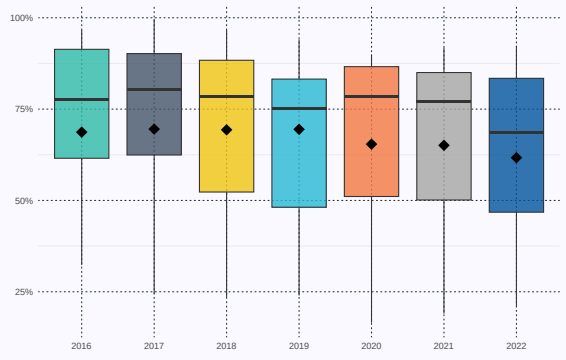

Note: The chart shows the maturity of asset items with defined maturity, that is, bonds, loans and structured securities.
Source: Hanfa

Figure 83 Currency risk exposure has remained relatively lower than in the pre-crisis period
Difference between assets and liabilities exposed to currency risk, in % of total assets
Currency structure of assets and liabilities of insurance companies, in HRK bn




Note: The marked area indicates the interquartile range of indicators per individual company.
Source: Hanfa

Figure 84 High liquidity strengthens insurers' resilience to potential short-term shocks
Liquid assets to total assets ratio, in %

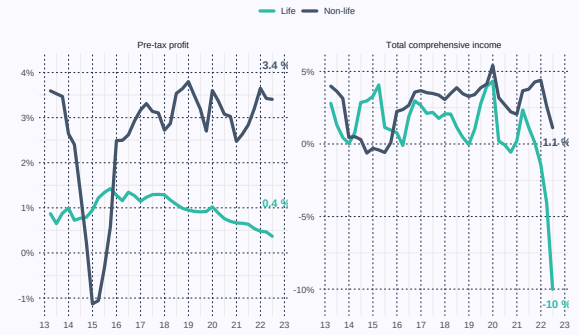



Note: The dots indicate the indicator value for the entire system. Data for 2022 shows the situation at the end of June.
Source: Hanfa

## Profitability and capitalisation

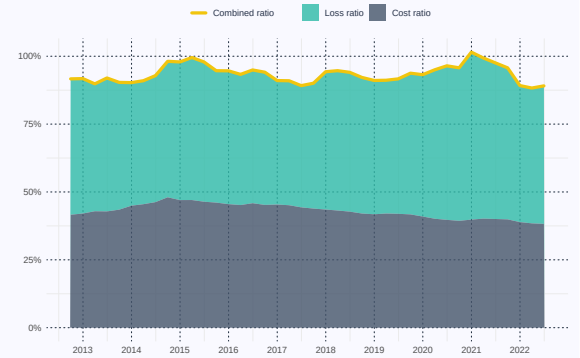
**Following the 2020 drop in profitability in both segments, 2021 was characterised by the rise in profitability of non-life insurance companies and the stagnation in the life insurance segment.** Persistently low interest rates in 2021 kept the profitability of life insurance companies at historical lows, with return on average assets of only 0.5%, the lowest in the past nine years (Figure 85). On the other hand, the recovery in profitability of the non-life insurance segment began in early 2021 and continued throughout the rest of the year, so that profitability hit a ten-year high (return on average assets of 3.7%).

Figure 85 Unfavourable market trends strongly affected total comprehensive income, particularly in the life insurance segment
Return on average assets, in %




Note: The figures show the value of the profitability indicators of insurance companies at the end of June 2022.
Source: Hanfa

Figure 86 Sharp decrease in the combined ratio as a result of the fall in the loss ratio
Combined gross ratio for non-life insurance, in % of earned premiums




Source: Hanfa

Profitability growth was mostly driven by the ongoing increase in insurance premiums (annual increase of 12.4%) and the annual growth in investment income of 12.5%. The slower rise in claims in the non-life insurance segment relative to the premium income led to a perceptible drop in the gross combined ratio, which stood at only 89.2% at the end of the year. The downward trend persisted through to end-June 2022 (Figure 86), with no major changes seen in other profitability indicators in either segments of insurance business relative to the end of 2021. However, completely different trends may occur if current inflationary pressures and geopolitical instability become entrenched.

**Interest rate increases triggered by rising inflation reduced comprehensive income of insurance companies, primarily due to the reduction in the value of available-for-sale assets of HRK 2.9bn in the first half of 2022, of which as much as 78% was accounted for by life insurance. With potential further tightening of financing conditions, the impact on the profitability of insurance companies might become even more perceptible in the coming period.** In the medium term, interest rate growth has a positive effect on life insurance companies, particularly because it increases the appeal of insurance policies and potentially increases premiums, as well as investment income, which was significantly subdued in a setting of low interest rates. However, the short-term impact of interest rate growth has a detrimental effect on comprehensive income of life insurance companies as it reduces assets valued at market prices, based on which the annual return on average assets amounted to a high –10% at end-June 2022. On the other hand, the profitability of non-life insurance companies depends more on operating profitability based on premium income than on investment income. Although their operations were also affected by adverse market developments, companies engaged in non-life insurance recorded only a slightly negative comprehensive income of HRK –93.4m in the first half of 2022.

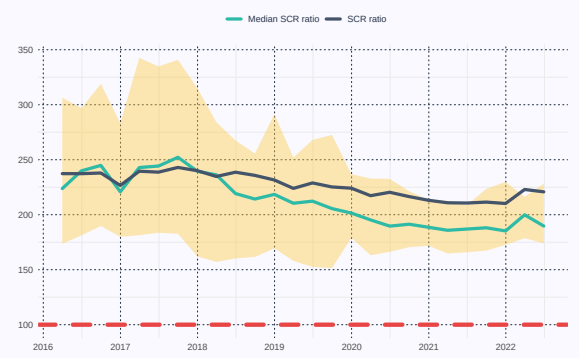
**Though the downward trajectory of the insurance sector capitalisation continued in 2021, capital buffers are still at high levels and ensure that stability of the overall insurance sector is not jeopardised on aggregate level by the accession to the euro area and transition to a lower yield curve, which will further erode solvency.** In 2021, the rise in capital requirements exceeded the

increase in own funds, so the SCR ratio dropped by 3 pp on an annual level, less than in the year before (Figure 87). The SCR ratio at the system level remained at a high 211.6%.

The normalisation of monetary conditions and interest rate growth in 2022 pushed discount curves higher and raised the SCR ratio by as much as 10.9 pp, to 222.5% at the end of June. Namely, the increase in discount interest rates (risk-free rate, RFR) reduced the value of insurance companies' liabilities, which offset the drop in the value of their investments and raised own funds and the SCR ratio (Figure 88). More precisely, total liabilities were reduced by HRK 2.6bn (7.8%), while total value on the asset side of the balance sheet dropped by HRK 2.3bn (5.0%).

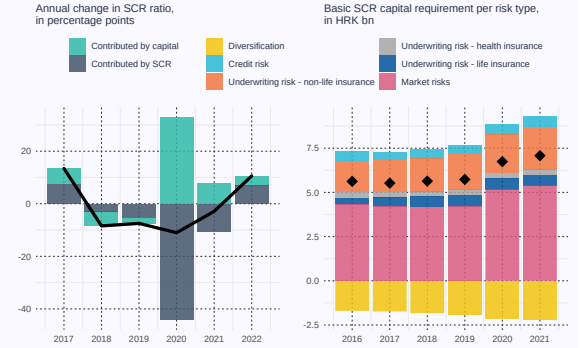
The recent improvement in the insurance sector capitalisation is particularly important in view of significant structural changes that will take place in early 2023. Euro introduction will have negative consequences on the SCR ratio, particularly for life insurance companies. The changeover to the euro as the official currency will lead to a reduction in both own funds and the SCR (primarily of the most represented market risk module). As own funds are expected to fall more, sector capitalisation will be slightly reduced in the final run. Results of the analysis of euro adoption point to a relatively minor impact on the SCR ratio of composite and non-life insurance companies, while the fall in the SCR ratio for life insurance companies might exceed 30 pp at the market level. More specifically, life insurance companies are characterised by longer maturity of their liabilities, while their technical provisions will grow comparatively more with the introduction of the euro risk-free rate, which will implicitly lower their own funds and ultimately the SCR ratio.

Figure 87 Solvency of insurance companies still well above the regulatory minimum
Total and median SCR ratio, in %




Note: The marked area indicates the interquartile range of SCR ratio per company.
Source: Hanfa

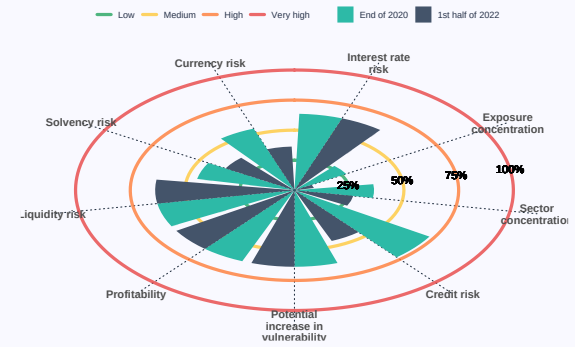
Figure 88 Through the decrease in the insurers' balance sheet, the rise in interest rates increases the capitalisation indicator in the first half of 2022




Note: The highlighted line on the left-hand side shows the percentage change in the SCR ratio. Data for 2022 refers to the first half of the year. The highlighted mark on the right-hand side indicates the net value of basic SCR capital requirement.
Source: Hanfa

# 7 Leasing companies

Figure 89 Profitability of leasing companies under increased pressure of credit risk
Systemic risk score for the leasing companies sector, in %



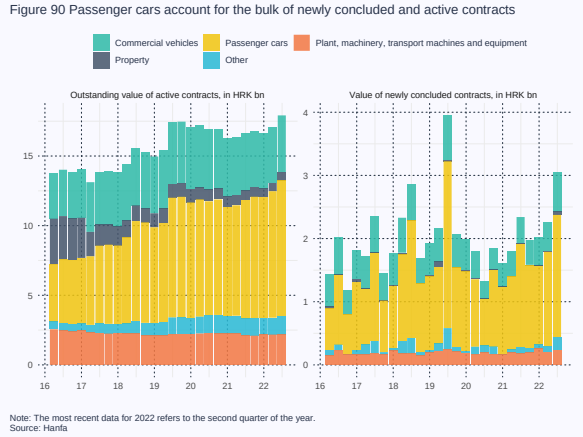

Source: Hanfa

Following the pandemic year of 2020 and the measures that leasing companies took to alleviate the economic consequences of the pandemic for their clients, the volume and profitability of the leasing business rebounded in 2021 and 2022. This was due to the very good performance of the tourism sector, to which a large share of leasing contracts is directly or indirectly attached. As a result, credit risk exposure was significantly reduced. However, against the background of rising interest rates, the net interest margin and profitability of leasing companies might come under some pressure in view of the significant maturity mismatch between their assets and liabilities.

## Key cyclical trends

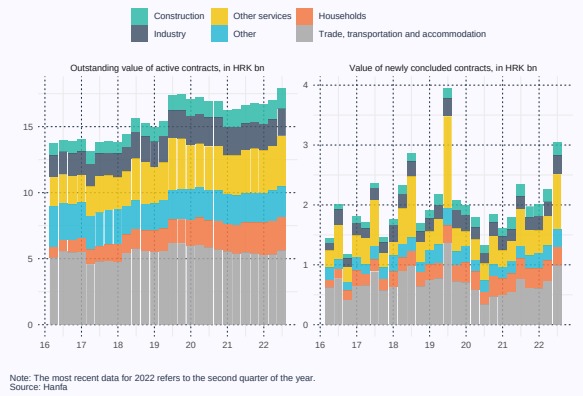
Having been strongly affected by the pandemic year of 2020, the operations of leasing companies recovered in 2021, particularly with regard to new business deals, almost returning to pre-pandemic levels. The negative effect of the lockdown on the corporate sector was bridged by the measures and recommendations to mitigate the negative consequences of extreme events, which covered leasing operations as well. Partial absorption of the shock ensured the timely performance of a large number of contracts in the following year and a relatively rapid recovery of leasing companies' operations and profitability. Total assets of leasing companies stood at HRK 21.6bn at the end of the second quarter of 2022, growing by 8.9% from the end of 2020, thus returning to pre-pandemic levels. At the same time, the value of active contracts grew by 10.3% from the end of 2020 to the end of June 2022.

Figure 90 Passenger cars account for the bulk of newly concluded and active contracts




Note: The most recent data for 2022 refers to the second quarter of the year.
Source: Hanfa

Figure 91 Most active and new contracts are associated with tourism activities

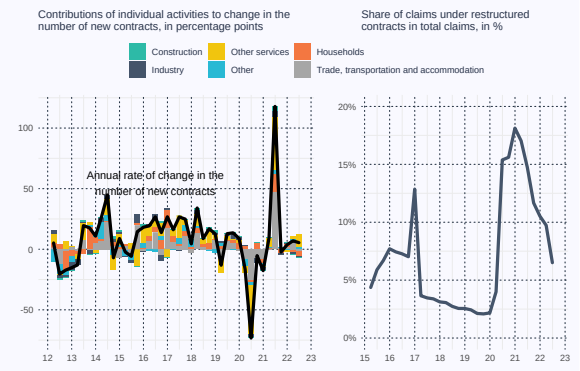



Note: The most recent data for 2022 refers to the second quarter of the year.
Source: Hanfa

The 2022 recovery in the leasing market was accompanied by an increase in the number and value of new contracts, a decrease in the number of active rescheduled contracts, as well as a reduction in claims under restructured contracts. The rapid increase in newly concluded contracts began in late June 2021 and continued into early 2022. At the end of June 2022, the annual rate of growth in the number of new contracts was almost 5.5%, while the growth in their value was even higher, 30.2%, because of the significant rise in the prices of vehicles, which are the predominant type of leased assets. The growth was mostly generated in the finance lease

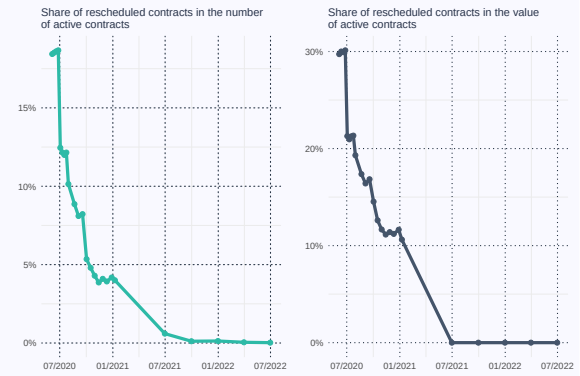
segment (the number of contracts and their value rose by 7.8% and 34.8%, respectively, from June 2021), while the operating lease segment rose slightly from June 2021 (the number of contracts and their value rose by 0.8% and 4.7%, respectively). The increase was most evident in the purchase of vehicles (83.4% of the value of newly concluded contracts), wherein most financing went for vehicles for tourism and tourism-related services[34] (renting vehicles and vessels and transport of passengers), reflecting the recovery in tourism activities after 2020.

Figure 92 Rapid growth in newly concluded contracts and a fall in restructured contracts




Note: The most recent data for 2022 refers to the second quarter of the year.
Source: Hanfa

Figure 93 Rescheduled contracts returned to low levels after the easing of the pandemic




Note: The most recent data refers to the end of June 2022.
Source: Hanfa

The improvement was evident not only in the larger number and value of new contracts, but also in an even smaller demand for the restructuring of existing contracts and the reduction in the number and value of active rescheduled contracts (Figures 92 and 93). As the share of rescheduled contracts in the total number and value of active contracts fell by more than 98% from the end of 2020 to mid-2022, these contracts dropped to below 1%, reflecting the smaller need of clients for the easing of the payment burden amid robust economic growth.

The surge in prices from mid-2021 to the end of June 2022 did not much affect the business of leasing companies as it did not diminish the demand for lease finance, with credit risk indicators remaining at very low levels. This was supported by the successful tourist season and the robust economic rebound in general, which, nevertheless, failed to impede the rise in input costs by the end of June 2022. However, indirect inflation effects on the operations of leasing companies through the rise in interest rates might in future be mirrored in the business volume and profitability as some clients may have difficulties in timely servicing of their increasing obligations, and in the reduction of the current interest margin.

## Structural characteristics and risks

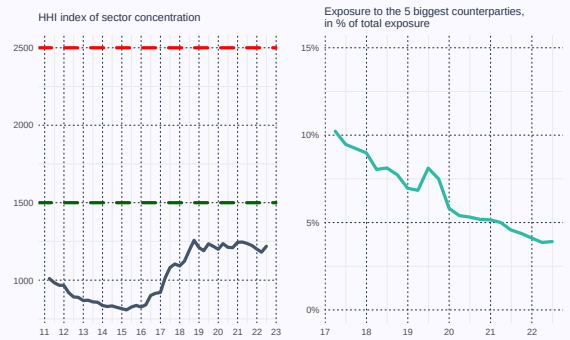
**The measures that leasing companies took with respect to their clients to alleviate the economic consequences of the lockdown and the slump in activity in 2020, particularly in transport of passengers, reduced their profitability but did not threaten their business continuity.** The number of leasing companies remained the same from 2020 to 2021 so that, bearing in mind their relatively stable market shares, concentration in the leasing market is not significant.

**As their portfolio is relatively concentrated in tourism activities, the performance indicators of leasing companies improved amid economic growth and robust tourist demand.** While concentration of exposures by lessees has been low and decreasing (the five biggest clients accounted for only 4.11% and 3.91% of total exposures in late 2021 and June 2022, respectively), leasing operations are relatively concentrated by economic activity of the lessee (trade, transportation and accommodation combined account for 31.4% of the portfolio).

[34] The number of newly concluded contracts associated with tourism activities (trade, transportation and accommodation) came to 30% of the total number and 32% of the value of new contracts from 1 January to 30 June 2022.

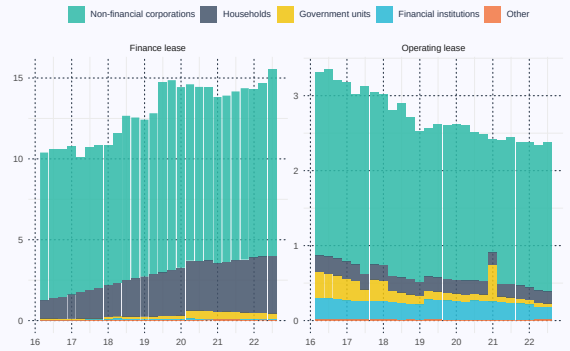
This structural characteristic of the portfolio gives rise to significant dependence and correlation of leasing operations with cyclical movements in the tourism sector, as evident in the "bad" 2020 and "good" 2021.

Figure 94 Sector concentration and exposure of leasing companies at low levels




Note: According to the classification made by the US Department of Justice, markets with an HHI of less than 1,500 are considered competitive, while markets with an HHI exceeding 2,500 are considered highly concentrated. Concentration relating to funds is shown on the basis of fund management companies. Data for 2022 refers to the second quarter of the year.
Source: Hanfa

Figure 95 Operations of leasing companies exposed to high credit risk in the corporate sector
Structure of active contracts by sector and leasing type, in HRK bn




Note: The most recent data for 2022 refers to the second quarter of the year.
Source: Hanfa

Figure 96 Perceptible connection between tourism sector performance and the value of new leasing contracts


Sources: CBS, Hanfa

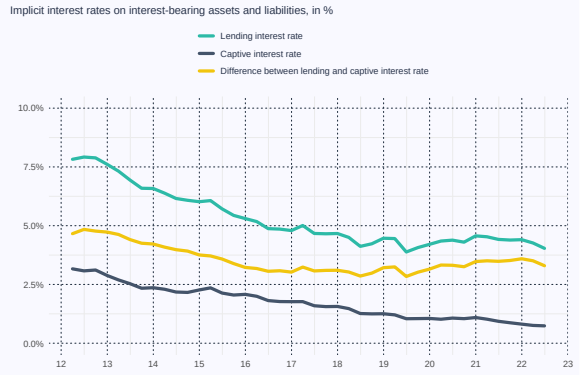
**In view of the emerging rise in benchmark interest rates and tighter financing conditions, the most significant risks which leasing companies will face in the forthcoming period are interest rate risk and, to a lesser extent, interest rate-induced credit risk, the materialisation of which might dampen the profitability of the leasing business.** The increase in benchmark interest rates might push up the financing costs for leasing companies, steadily decreasing since 2015, and widen their interest margin (Figure 97). The relative stability of funding sources, as evident in a large share of intragroup financing (90.4% of total funding sources of leasing companies at end-2021 were parent bank loans), paired with fixed interest rates, might briefly compensate for some of the rise in interest expenses. This stability is additionally supported in the context of the relatively fixed interest rate structure of all placements on the asset side of the leasing companies' balance sheet, where 70.3% of total placements at end-2021 were granted with a fixed interest rate (Figure 98). Such interest rate structure of placements limits the possibility of materialisation of interest rate-induced credit risk, as most placements with variable interest rates are linked to EURIBOR with a possibility of interest rate change within a relatively short period of 3 months.

**Credit risk, to which leasing companies were exposed due to the pandemic lockdown and disruption of normal business activities of some lessees, was significantly reduced in 2021.** Non-performing receivables amounted to 2.7% of the total at the end of 2021, down by 2 pp from the pre-crisis period (Figure 99). With expiry of the measures and supervisory recommendations regarding approval of moratoriums[35] to clients previously classified as regular payers and their continued regular payments, the coverage of non-performing placements by provisions returned to relatively high pre-crisis levels in late 2021. This coverage dropped in early 2022 due to lower provisions for existing non-performing contracts and a mild growth in such contracts (by

[35] Hanfa issued additional recommendations to leasing companies to ease leasing payments. (link)

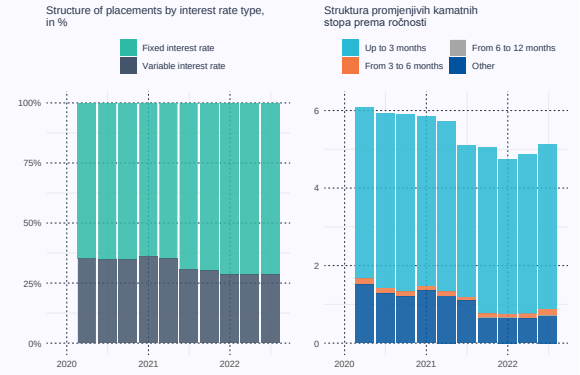
8.8%) from the end of 2021. Nevertheless, the coverage of non-performing placements of leasing companies was at a high 70.7% in late June.

Figure 97 Interest rates currently at stable levels



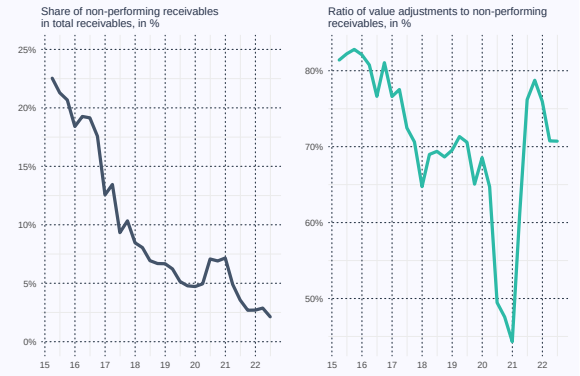

Note: The most recent data refers to the end of June 2022.
Source: Hanfa

Figure 98 Leasing companies highly exposed to interest rate changes




Note: The most recent data refers to the end of June 2022.
Source: Hanfa

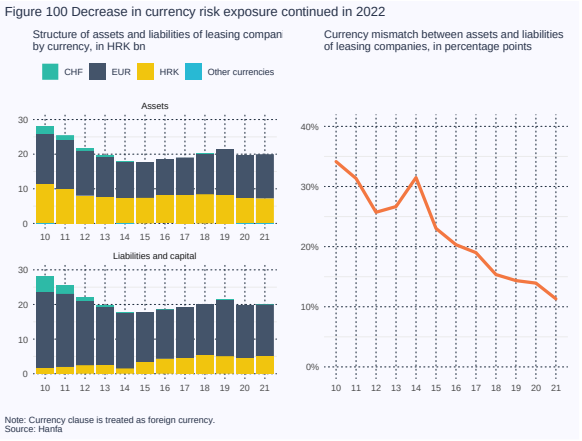
Figure 99 Downward trend in credit risk of leasing companies came to a halt in late 2021




Note: The most recent data for 2022 refers to the end of June.
Source: Hanfa

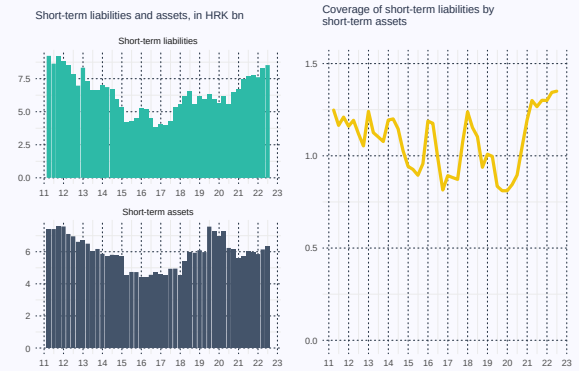
Currency risk exposure of leasing companies has been low and steadily decreasing. With the introduction of the euro as the official currency at the beginning of 2023, this risk will be almost completely eliminated as the euro is the only currency other than the kuna that is present in the balance sheets of leasing companies (Figure 100. Currency mismatch between assets and liabilities of leasing companies at the end of 2021 was at its ten-year low (11.3%).

Figure 100 Decrease in currency risk exposure continued in 2022




Note: Currency clause is treated as foreign currency.
Source: Hanfa

Figure 101 Liquidity of leasing companies weakened during the pandemic




Note: The most recent data refers to the end of June 2022.
Source: Hanfa

While the longer residual maturity of assets than liabilities exposes leasing companies to liquidity risk, this risk is not significant in view of the relative stability of leasing companies' credit obligations that predominate in their liabilities. What matters more is that the maturity mismatch between assets and liabilities amid growing financing costs and predominance of fixed interest rates in leasing contracts gives more prominence to interest rate risk of leasing companies. It is likely that the maturity of liabilities will be further shortened in the forthcoming period in view of persistently high uncertainty regarding inflation dynamics and the associated monetary policy response. Assets with medium-term maturity, from 1 to 3 years, accounted for 40% of total assets in late 2021, while liabilities maturing in a year accounted for almost the same share of the liability side. This is also evident in the current liquidity ratio, which grew mildly in 2020,

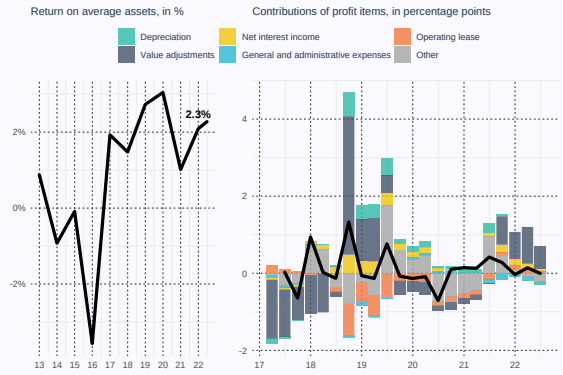
suggesting a slight increase in liquidity risk in leasing companies' balance sheets.

## Profitability and capitalisation

Though profitability of leasing companies recovered thanks to the economic rebound in 2021 and the first half of 2022, it remained below pre-crises levels. Any further growth in profitability is limited by the current interest rate and maturity structure of their balance sheets. Amid rising interest rates, profitability may decrease in the short run even in absence of credit risk materialisation. The growing volume of new leasing business in 2021 and timely performance of the contracts covered by moratoriums in the pandemic 2020 raised the return on average assets of leasing companies by 1.1 pp at the end of 2021 from the year before. Profitability continued to rise in the first half of 2022 owing to reduced value adjustments and rising net interest income and operating lease income. As a result, return on average assets was 2.3% at the end of June 2022 (Figure 102).

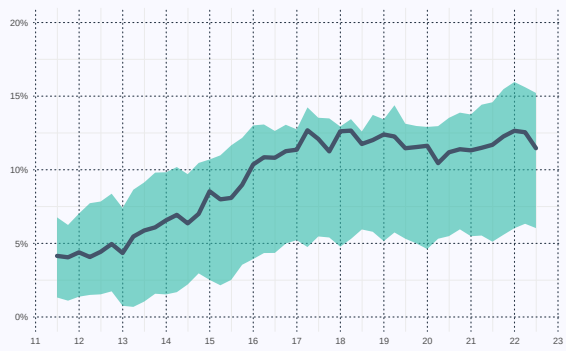
Favourable business performance in 2021 gave a further boost to capitalisation of leasing companies measured as the ratio of capital and reserves to total assets, which came to 12.6% at the end of 2021. As assets grew sharply in the first half of 2022, capitalisation edged down, to 11.5% at end-June, which is 0.2 pp below the pre-crisis level at the end of 2019. The recent increase in capital stocks also ensures the stability of leasing companies, even in case of a highly unlikely macroeconomic shock that would adversely affect their operations (more information in Chapter 9 Stress testing).

Figure 102 Profitability of leasing companies decreased after the outbreak of the pandemic




Note: The highlighted figure indicates return on average assets in June 2022.
Source: Hanfa

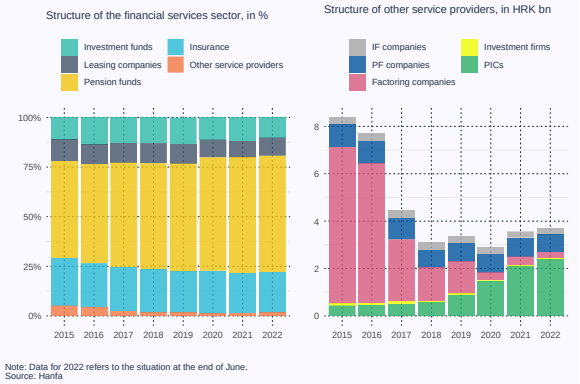
Figure 103 Capitalisation of leasing companies preserved during the pandemic




Note: The marked area indicates the interquartile range of capital and reserves to assets per individual company.
The most recent data for 2022 refers to the end of June.
Source: Hanfa

# 8 Other financial service providers

Figure 104 Assets of other financial service providers continue to account for less than 2% of total assets of the financial services sector at the end of the second quarter of 2022




Note: Data for 2022 refers to the situation at the end of June.
Source: Hanfa

**The structure of the financial services sector remained relatively unchanged in 2021 and 2022, with continued and increasing dominance of pension funds.[36] While modest in terms of size (1.6% of assets of the financial services sector at end June 2022), the role and stability of other financial service providers are important for the smooth functioning of the overall financial services sector and the financial system in general.**

## Key cyclical trends

Pension fund management companies account for up to 0.3% of assets of the financial services sector, but are responsible for the establishment of pension funds and management of their assets, which exceeded HRK 142bn at the end of August 2022, or almost 31% of GDP. Pension insurance companies, which account for 1.0% of assets of the financial services sector, have an indispensable role in disbursing pension payments within the framework of both mandatory and voluntary pension insurance based on individual capitalised savings. Also important are investment fund management companies, investment firms and factoring companies, all of which perform specific and irreplaceable functions in the domestic financial system[37] (Figure 104).

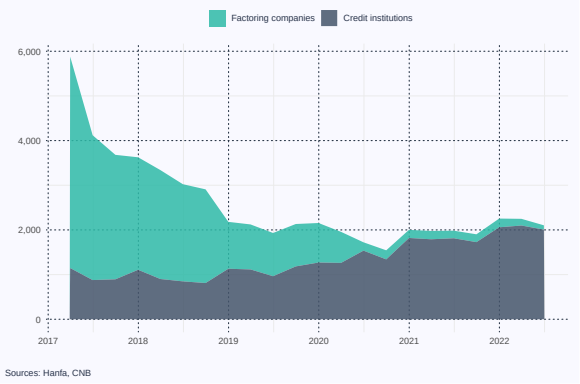
Market concentration of other financial service providers was very high in almost all industries at the end of June 2022 due to the high degree of specialisation of some industries in which only a few companies are active (Figure 109). Looking ahead, other financial service providers will certainly become more significant, mostly due to increasingly large inflows to pension insurance companies driven by the growth in the number of beneficiaries, the assets of which rose by HRK 633.6m in 2021 alone (44.0%).

The number of factoring companies in operation (four) remained the same from 2021 to the first half of 2022, but their assets continued to fall and were 27.6% lower than at the end of 2020, standing at HRK 235.5m. This was due to smaller demand for factoring products by non-financial corporations, which reduced the scope of their business and the number of active companies, as well as the transfer of some factoring activities directly to credit institutions. Total receivables from factoring transactions in credit institutions steadily grew in 2021 and the first half of 2022 (reaching HRK 2.0bn at end-June 2022), so that total receivables from factoring transactions in the domestic financial system remained at the several-year average of around HRK 2bn (Figure 105). As regards the portfolio structure of factoring companies, classic factoring, accounting for 82.0%, continued to be the dominant type of receivables at the end of June 2022 (Figure 106).

[36] Assets of pension funds accounted for 58.6% of total assets of the financial services sector at the end of the second quarter of 2022, which, together with insurance companies, investment funds and leasing companies, amounted to 98.4% of assets of the financial services sector.

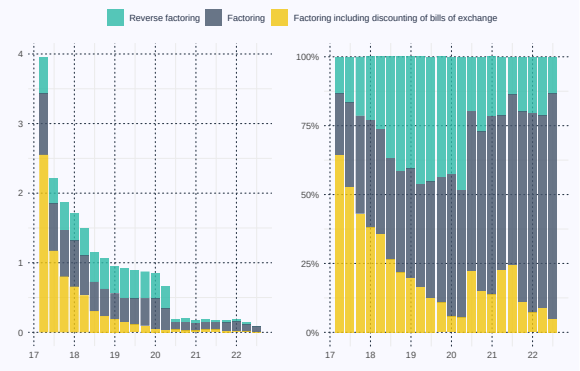
[37] More information on the role of particular categories of financial service providers can be found at Hanfa website for consumers.

Figure 105 Continued growth in receivables from factoring transactions in credit institutions




Sources: Hanfa, CNB

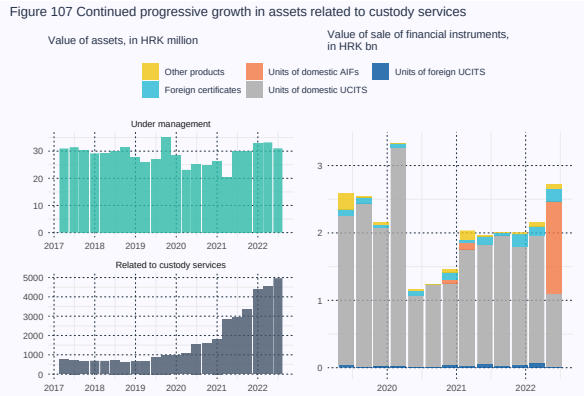
Figure 106 Structure of factoring companies' operations did not change much in 2022




Source: Hanfa

Five investment firms were in operation at the end of June 2022, which is two less than at the end of 2020. Nevertheless, the value of assets held by investment firms grew steadily as the volume of operations was larger in 2021, which was a very good year for financial markets. As regards intermediation in the sale of financial instruments, the predominant activity of sale of units in domestic UCITS (87.4% of total sale at the end of March 2022) was exceeded by the sale of units in domestic AIFs[38], accounting for 50.5% of total sale at the end of June 2022. It should be noted that this was due to a single, specific and rare transaction, and not a result of any permanent change in the distribution structure of fund units. The amount of assets related to custody services continued to rise sharply, reaching HRK 5.0bn at the end of June 2022 (growing by 172.4% from the end of 2020). Nevertheless, credit institutions continued to provide the majority of custody services (Figure 107).

Figure 107 Continued progressive growth in assets related to custody services




Note: The value of sale of units of domestic AIFs relates to one payment by a single client.
Source: Hanfa

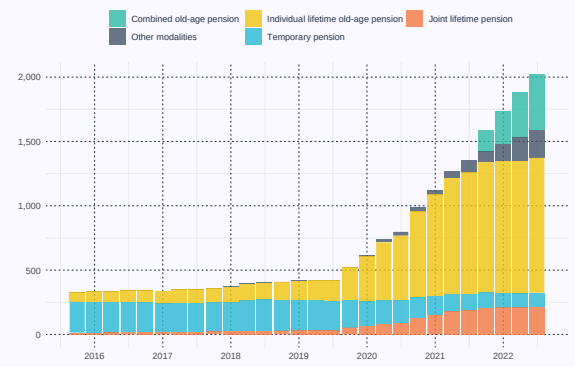
A new pension insurance company started to operate in 2021, which enhanced competition in the market after more than 20 years of the multi-pillar pension system, providing beneficiaries a wider set of available pension payment programmes within the framework of mandatory and voluntary pension insurance. The 2019 legislative changes to the pension system[39], which provided the option of choosing between the two systems for receiving pension benefits (pension only from the 1st pillar or a combined pension from both mandatory pillars of pension insurance) and which extended the payment of pension supplements to pensions paid from both systems, have increased the appeal for combined pensions. This was reflected in the increased number of such pensions' beneficiaries and accelerated flows of beneficiaries' funds from pension funds to pension insurance companies. As a result, pension insurance companies saw rapid growth in technical provisions, which stood at HRK 2.0bn at the end of June 2022, growing by 79.6% from the end of 2020 (Figure 108). The rising importance of combined pensions is also evident in the structure of technical provisions as only two years after the legislative changes, technical provisions for these pensions account for a high 21.2% of PICs total technical provisions and are second only to technical provisions for

[38] The value of sale of units in domestic AIFs relates to a single payment by one client.

[39] Act on Amendments to the Pension Insurance Act (Official Gazette, No 115/18).

individual lifetime old-age pensions, which accounted for 51.9% of total PICs technical provisions at the end of June 2022.

Figure 108 Inflows of funds to pension insurance companies grow steadily
Balance of technical provisions by type of insurance programme, in HRK million




Source: Hanfa

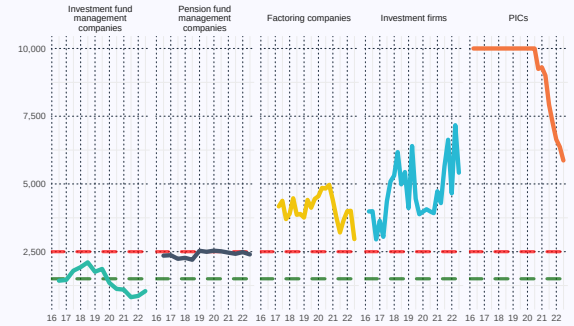
## Structural characteristics and risks

**There is relatively high concentration in the segment of providers of specific financial services, though it has been decreasing in some segments.**

The establishment of the second PIC in 2021 significantly reduced concentration in pension payments from mandatory pension insurance (Figure 109), with the legislative changes having the same effect regarding payments of voluntary pensions. At the same time, concentration in the segment of investment fund management companies is moderate due to the larger number of companies (23 at the end of 2022) and the relatively even distribution of their assets. The rise in concentration among investment funds in 2021 and the first half of 2022 was mostly driven by additional accumulation of net assets in the largest investment company in the market.

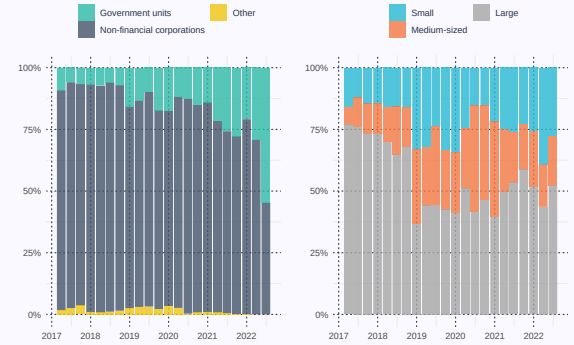
Factoring companies regularly deal with non-financial corporations, which exposes them to the potential materialisation of credit risk in their balance sheets. Such receivables accounted for 45.3% of total placements at the end of June 2022. Within total receivables, 47.7% were accounted for by small and medium-sized enterprises (Figure 110), which in historical terms proved to be more vulnerable amid tighter financing conditions. At the end of June 2022, the bulk of placements, as much as 82.0%, went to classic factoring, 98.8% of which was with recourse,[40] and focused mostly on short-term financing with maturity up to 3 or 6 months[41]. While this reduces the credit risk exposure of factoring companies, this risk should not be overlooked in the current environment of rising operating costs of non-financial corporations.

Figure 109 Market concentration of almost all other financial service providers at very high levels
Herfindahl–Hirschman Index (HHI)




Note: According to the classification made by the US Department of Justice, markets with an HHI of less than 1,500 are considered competitive, while markets with an HHI exceeding 2,500 are considered highly concentrated.
Source: Hanfa

Figure 110 Decrease in large exposure of the factoring sector to non-financial corporations
Structure of factoring companies' receivables by sector (left) and size of counterparty (right)




Source: Hanfa

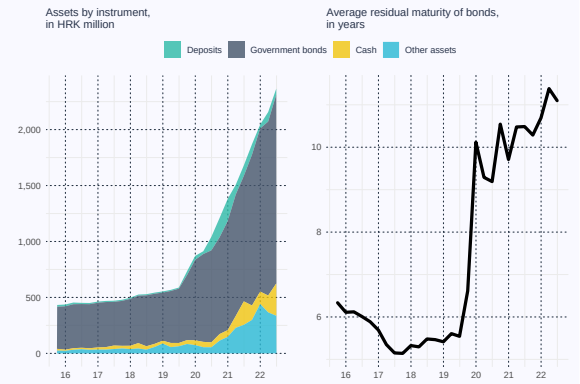
Interest rate risk is the most significant systemic risk in the segment of pension insurance companies as 71.3% of their total portfolio at the end of June 2022 was accounted for by government bonds with average residual maturity of 11.1 year (Figure 111). Under the current scenario of a general rise in interest rates, PICs are in the short term faced with a

[40] Recourse factoring is a factoring business in which the vendor guarantees the factoring service provider for the customer's obligation (Factoring Act, Official Gazette, No 94/2014, Article 10(1)).

[41] Financing with maturity up to 3 or 6 months accounted for 94.6% of total receivables at the end of June 2022.

growing risk of loss due to the fall in the value of bonds in their portfolio. At the same time, the higher inflation on the liability side associated with the legal adjustment of pensions ultimately raises technical provisions of PICs and puts their capitalisation under additional pressure. The growth in technical provisions is partially offset by the growth in risk-free interest rates, which reduces the present value of future liabilities of PICs, that is, the value of technical provisions. The net effect of these influence channels of recent macroeconomic developments on the value of PICs technical provisions will depend on the dynamics of the general price level and risk-free interest rates in the forthcoming period.

Figure 111 Interest rate growth has a significant impact on the value of PICs assets

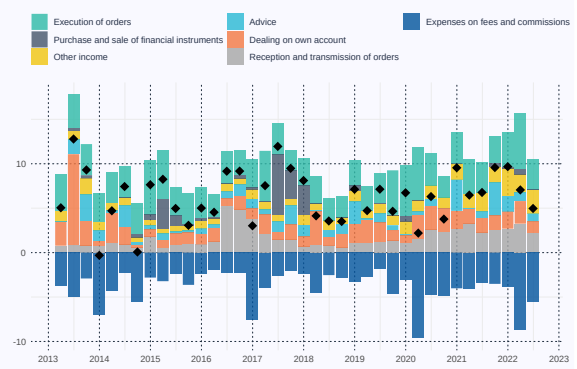



Source: Hanfa

As the bulk of their income comes from execution, reception and transmission of orders, investment firms are highly exposed to market risk and investor sentiment (Figure 112). Pension and investment fund management companies are also exposed to these risks as asset management fees are the dominant source of their income and they depend on the asset net value. While outflows from pension funds are legally prescribed, investment fund management companies are more affected by the materialisation of market risks as these risks may reduce investment fund profitability through net outflows (more information in Box 1 UCITS liquidity risk). This is particularly relevant in the current situation of negative market yields and larger net outflows (more information in Chapter 5 Investment funds).

Figure 112 Situation in the capital market reflected in operations of investment companies

Net income of investment firms by type of activity, in HRK million




Source: Hanfa

## Profitability and solvency

Investment fund management companies again recorded high profitability (return on assets stood at 31.7% in late June 2022), fuelled by positive market trends and the consequent increase in funds' assets (more information in Chapter 5 Investment funds) under their management (a 14.6% increase in income from management fees in 2021 from December 2020). The same factors influenced pension fund management companies (return on assets stood at 24.6% in June 2022), ending the previous downward trend (Figure 113). This reversal was mostly the outcome of an 8.2% larger income from management fees in 2021 relative to December 2020. This income was boosted by the growth in assets managed by pension companies (at the end of June 2022, they stood at around HRK 136bn, 8.6% more than at the end of 2020) as the legally prescribed fee was reduced (by 16%, i.e. from initial 0.388% in 2019 to 0.284% in 2021)[42].

The 5.9% annual fall in profit before tax of the factoring sector in 2021 did not much affect the sector profitability, which has hovered at above 2% since the second quarter of 2021 (Figure 113).

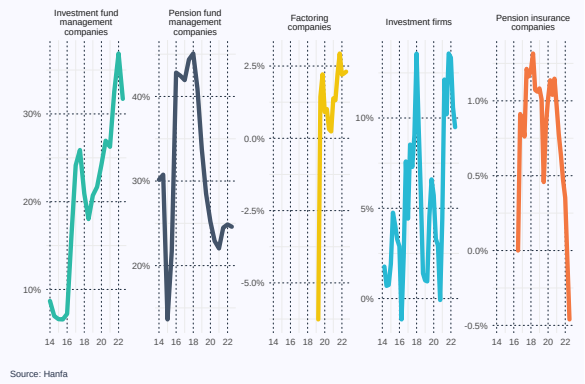
Return on average assets of pension insurance companies steadily decreased throughout 2021,

[42] Act on Amendments to the Pension Insurance Act (Official Gazette, No 115/1208).

coming to 0.5% in June 2022. This was the outcome of the fall in gross profit, which was 43.4% lower at the end of 2021 than a year earlier. As a new pension insurance company started to operate in 2021, which is reflected in its financial performance for that year, this also contributed to the fall in profitability of pension insurance companies. Gross profit continued to slide in the second quarter of 2022, which saw a loss of HRK 13.4m, bringing the return on average assets to –0.5% (Figure 113). Risk of loss that might result from a decrease in the value of portfolio bonds due to potential interest rate increases, as well as the possible growth in technical provisions associated with recent inflation movements, put additional pressure on future profitability of PICs. This also accentuates the importance of maintaining an adequate level of system solvency (Figure 114), which might be threatened in conditions of further interest rate hikes.

Figure 113 Profitability of almost all other financial service providers larger than at end-2020

Return on average assets, in %




Source: Hanfa

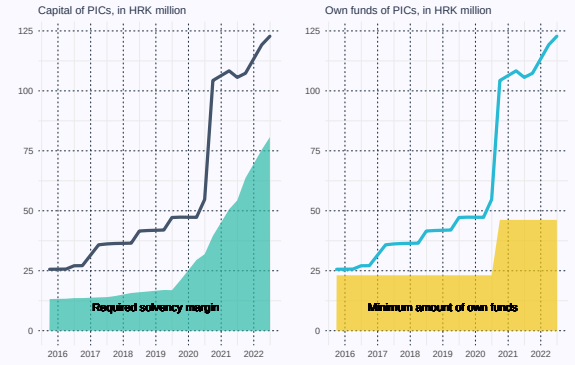
In the year 2021, which was very successful in terms of financial market returns, investment firms recorded the highest-ever profitability (13.3%) thanks to larger income from investment services. In the second quarter of 2022, return on average assets dropped to 9.5% due to a spike in total sector assets based on the sale of debt securities and lower income in the first half of 2022 relative to the year before. However, it was still more than twice higher than the return of 4.4% at the end of 2020. Nevertheless, the capital adequacy ratio in the sector of investment firms is still high and much above the regulatory minimum, which makes investment firms capable of absorbing potential systemic shocks.

With the entry into force of Regulation on the prudential requirements of investment firms[43] (IFR) and Directive on the prudential supervision of investment firms (IFD)[44], changes were made to the calculation of the own funds requirements and the capital ratios, in effect as of September 2021 (Figure 115), replacing the former framework originally designed for banks. The Regulation aims to better reflect the nature, scale and complexity of the activities of investment firms and to provide more proportionate rules for investment firms, allowing them to better hedge against risks. One of the key aspects of the new regulatory framework is that it ensures simpler and better calibrated own funds requirements for investment firms. Under the IFR and the IFD, investment firms are classified into four classes, of which two, which include most EU investment firms, will be subject to the rules of the new framework for prudential requirements, with the exception of the largest and systemically interconnected investment firms. In terms of their relatively small size, all investment firms in Croatia are subject to the rules of the new framework for prudential requirements. In addition to changes regarding own funds requirements, the IFR and the IFD also introduce changes regarding concentration risk, liquidity risk, reporting requirements, internal governance, transparency, the risk management system and the remuneration system.

[43] Regulation (EU) 2019/2033 of the European Parliament and of the Council of 27 November 2019 on the prudential requirements of investment firms and amending Regulations (EU) No 1093/ 2010, (EU) No 575/ 2013, (EU) No 600/ 2014 and (EU) No 806/2014 (OJ L 314)

[44] Directive (EU) 2019/2034 of the European Parliament and of the Council of 27 November 2019 on the prudential supervision of investment firms and amending Directives 2002/87/EC, 2009/65/EC, 2011/61/EU, 2013/36/EU, 2014/59/EU and 2014/65/EU (OJ L 314)

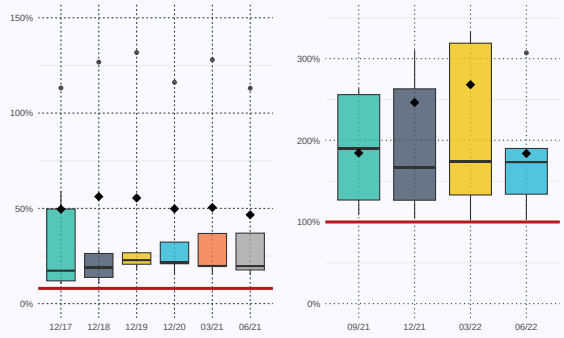
Figure 114 Capital adequacy of pension insurance companies still at satisfactory levels




Note: Under the Act on Pension Insurance Companies (Official Gazette, No 115/2018), PICs are required to meet all separate capitalisation requirements prescribed in the Act.
Source: Hanfa

Figure 115 Capitalisation levels of investment firms remain strong in 2022

Total capital ratio of investment firms, in % of risk weighted assets



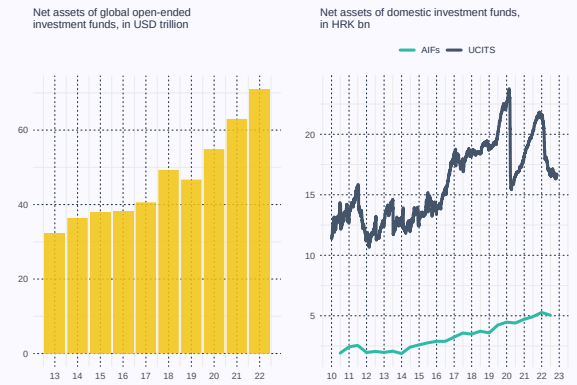

Note: The highlighted mark indicates the total capital ratio of the system. The highlighted horizontal line indicates the minimum total capital ratio. Regulation (EU) 2019/2033 on the prudential requirements of investment firms, which changed the method of expressing the total capital ratio and the minimum total capital ratio, applies from September 2021.
Source: Hanfa

# Box 1 UCITS liquidity risk

## Introduction

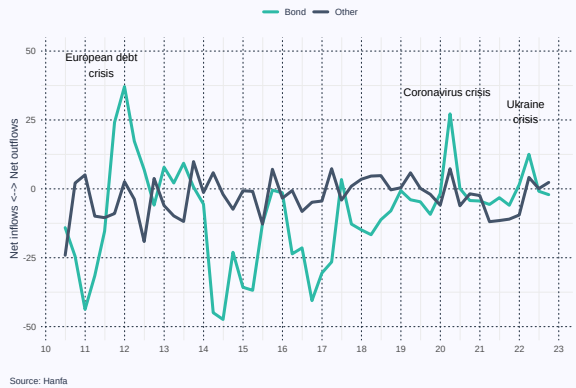
At the end of June 2022, assets managed by investment funds stood at HRK 21.9bn or 4.7% of GDP, which (in terms of size) made them the third most important component of the domestic financial services sector, second only to after pension funds and insurance companies. The importance of investment funds for the financial system also stems from their influence on securities prices, as they actively participate in financial markets and thereby boost the liquidity in the domestic capital market, but also from their potential role in the propagation and, in extreme situations, amplification of systemic shocks.

Figure 1 Significance of investment funds has grown several fold in the last decade




Investment funds have recently become a more attractive form of collective investment because of their simplicity and a wide offer that provides investors with investment options with different risk profiles (Figure 1). The global value of the funds managed by open-ended investment funds more than doubled from the end of 2012 to the end of 2021, rising from USD 32.3 trillion to USD 71.1 trillion, reaching 73.8% of global GDP. At the same time, the value of funds managed by domestic investment funds grew by 83.2%, largely thanks to the flows from natural persons, which accounted for 64.7% of total funds invested in domestic investment funds. However, their openness and easily accessible funds, which are usually disbursed within a few working days following a request for redemption, are the source of their most significant risk – liquidity risk. Moreover, international institutions list liquidity risk and the risk of fire sales, and their consequent impact on securities prices, among the most important sources of systemic risk in the sector of investment funds[45].

Figure 2 Inflows and outflows relatively stable except during several episodes of stress
Quarterly net outflows from UCITS, in % of net assets at the end of the previous period




Two recent episodes of sudden and significant outflows from the investment funds sector (Figure 2) highlighted the need for a deeper understanding of potential consequences of the materialisation of liquidity risk in the investment funds sector for the stability of the financial services sector. This comprises two key steps: 1) understanding external (macroeconomic and financial) and idiosyncratic (fund specific characteristics) causes of outflows; and 2) understanding the impact of large outflows on the prices of securities in investment funds' portfolios through a possible asset sale effect. There is plenty of research demonstrating the first mover advantage,[46] which in a scenario of

[45] Office of Financial Research, 2013; IMF, 2015.

[46] The first mover advantage is a competitive advantage of investors who, in case of swift reaction and liquidation of units, may

an adverse external shock results in large outflows from investment funds (Qi, Goldstein and Jiang, 2010; Falato, Goldstein and Ali, 2020). Coval and Stafford (2007) empirically proved that concentrated sales of investment fund units exert significant price pressures in equity markets, often resulting in transaction prices far from fundamental value.

The inclusion of liquidity risk in the stress testing methodology has been recognised as an indispensable element in assessing the stability of the investment funds sector. For example, in its recommendations, the FSB advises regulators to introduce liquidity risk stress testing at individual fund level to support fund management and prevent the emergence of systemic risks in the sector (FSB, 2017). Soon afterwards, the ESRB recommended to the ESMA to develop guidelines for liquidity-stress testing of investment funds (ESRB, 2018), which became applicable to money market funds in late 2019 (ESMA, 2019), and to UCITS and AIFs in late September 2020 (ESMA, 2020).

In addition to microprudential purposes of stability assessment at individual fund level, stress testing is an important analytical tool for macroprudential policy implementation. This is why Hanfa in 2020 further broadened its set of macroprudential analytical tools to include macroeconomic stress testing of the financial services sector (more information in Box 1 Simulation of the effects of the coronavirus crisis on the stability of the financial services sector in the publication Macroprudential Risk Scanner, No 4). The first stress test iteration focused on the resilience of investment funds to external shocks and assumed a static balance sheet. However, this was changed in the last iteration of the stress testing exercise, which included an assessment of dynamic outflows and the consequent additional impact on the securities prices and introduced other improvements (more information in Chapter 9 Stress testing).

## Methodology

As the models for assessing liquidity risk in the sector are components of the stress testing exercise, in addition to the theoretical assumptions, they must satisfy the operational assumptions for the stress testing methodological framework. In other words, the structure of the models used is partly determined by a set of indicators simulated in a macroeconomic stress scenario, as well as the length of the simulation horizon of 6 quarters. Because of their open-ended nature, UCITS are in the focus of the liquidity risk assessment, which observes quarterly data for the period from end-June 2011 to end-June 2022 and covers several episodes of significant systemic outflows from the sector (Figure 2). Applied was the usual procedure of excluding outliers[47] for inflows and outflows,[48] so as to clear the sample from fund raising episodes of new funds and episodes of fund liquidation.

The methodology for assessing liquidity risk in the investment funds sector comprises two steps that are separately assessed in the model (Figure 3). The first step assesses the size of outflows that funds may experience depending on particular macroeconomic and financial circumstances, as well as idiosyncratic characteristics that expose them (more or less) to the risk of sudden and large outflows. In the second step, assessed is the relation between observed outflows and changes in the value of a fund's assets, while controlling for the impact of exogenous factors and taking into account some characteristics of the fund. It should be noted that presented shocks, notwithstanding the outlined theoretical sequential presentation, occur simultaneously throughout the period of a

(at least theoretically) avoid significant losses in an adverse scenario. While such response may diminish individual losses for investors, it has an unfavourable effect on investments of other investors and fund stability in general.

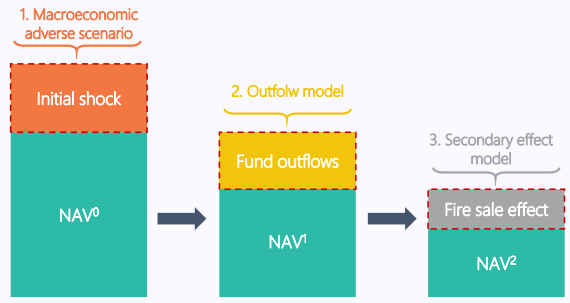
[47] This step excluded 3.43% of observations.

[48] Excluded were observations of inflows and outflows exceeding 50% of a fund's net assets in the quarter observed.

systemic shock, with shocks partly complementing and reinforcing each other.

Figure 3 Schematic of the dynamics of the shocks to which investment funds are exposed in the adverse stress scenario

Development in an investment fund's net assets under the adverse scenario of external shocks, fund outflows and secondary effects on the value of its assets




Source: Hanfa

In the first step, the outflow model is analysed by using a panel regression with fixed effects on a sample of 98 UCITS that operated for more than 3 years in the period under review, which gives a total of 2,432 observations. The relation is formally presented as follows:

$$y_t^i = \alpha^i + \beta * x_t^i + \gamma * z_t + \varepsilon_t^i,$$

where $y_t^i$ is the dependent variable for a fund's outflows $i$ in the reviewed quarter $t$, expressed as a percentage of net assets from the end of the preceding quarter, $x_t^i$ is the vector of idiosyncratic variables that reflect certain characteristics of the fund, $z_t$ is the vector of macroeconomic variables that reflect the financial environment of the sector, and $\varepsilon_t^i$ is the estimated model error. The panel regression allows simultaneous testing of the impact of both macroeconomic and idiosyncratic variables, that is, the impact of a fund's particular characteristics on net outflows, while controlling for the relation for all unobserved characteristics of the fund comprised in member $\alpha^i$. A static panel regression (without autocorrelation member) is selected because the model is used for stress testing purposes with a very short simulation horizon, and because of the nature of outflows themselves, which occur suddenly and are of very short duration. Also used is an assumption that developments in the UCITS sector do not affect macroeconomic variables that appear in the model without a lag, while all idiosyncratic variables are lagged for one quarter to avoid the problem of endogeneity. To address the problem of multicollinearity among independent variables, highly correlated variables are used in separate specifications.

The following macroeconomic variables are used in different model specifications: 1) *financial market stress indicator*, which is approximated by movements in the composite indicator of systemic stress in European bond markets;[49] 2) quarterly *change in yields on long-term government bonds of the Republic of Croatia*; and 3) the *real annual rate of change in Croatian GDP*. The first two variables approximate general conditions in financial markets that are reflected in market uncertainty and financing conditions, while the real rate of change in GDP approximates the macroeconomic environment.

Based on economic theory and available data, the following idiosyncratic variables at individual fund level were used in particular model specifications: 1) *a fund's three-year average return*, where a negative correlation is expected as many authors demonstrated a strong negative correlation between a fund's net outflows and its performance; 2) *a fund's fees* expressed as a percentage of net assets, as fees (exit and management fees) may influence investors' decision to withdraw funds, where the direction of the relation is not uniform and depends on the structure and amount of fees; 3) *investor concentration* expressed as a percentage of the five biggest investors – positive correlation is expected as numerous empirical research show that investor concentration positively affects the probability of significant outflows during crisis episodes; 4) *share of natural persons* in investor structure – relation is also expected to be positive as research on equity investments shows that retail

[49] More information on the indicator is available at the following link.

investors exhibit greater risk aversion and stronger tendency to withdraw funds in a crisis; 5) *bond fund* – dummy variable used to investigate whether investors in bond funds display fundamentally different behaviour from others during crisis episodes; expected is a positive coefficient value as bond funds recorded relatively larger outflows during past crisis episodes; 6) *share of liquid assets*, which should have a negative effect on outflows as a high liquidity level protects the fund from a scenario of asset sale at below market prices; 7) *a fund's size* (expressed as logarithmic value of a fund's net assets), which should be negatively correlated with outflows as relatively large funds often have a wider investor base and are perceived as more stable than smaller funds; 8) *return volatility* as indicator of a fund's riskiness, which should, assuming equal risk aversion of all investors, have a positive correlation with outflows.

Table 1 Overview of the estimate results for diferent models of fund outflows from UCITS

| | Model 1 | | Model 2 | | Model 3 | | Model 4 | |
|---|---|---|---|---|---|---|---|---|
| | Coefficients | P-value and significance | Coefficients | P-value and significance | Coefficients | P-value and significance | Coefficients | P-value and significance |
| **Macroeconomic variable** | | | | | | | | |
| Stess in financial markets | 49.556 | 0(***) | 75.421 | 0(***) | 46.585 | 0,0001(***) | 40.344 | 0,0006(***) |
| Quarterly rate of change in returns | 2.924 | 0(***) | | | 2.863 | 0(***) | 3.142 | 0(***) |
| Real change of GDP | | | 0.077 | 0,0711(.) | | | | |
| **Idiosynctatic variables** | | | | | | | | |
| Three-year fund return | -1.616 | 0(***) | -1.931 | 0(***) | -1.865 | 0(***) | -1.884 | 0(***) |
| Fund fees | | | 0.469 | 0,4994() | | | | |
| Investor concentration | 0.391 | 0,0005(***) | 0.360 | 0,0014(**) | 0.285 | 0,0164(*) | 0.366 | 0,0011(**) |
| Share of natural persons | | | | | -0.041 | 0,0605(.) | | |
| Bond fund (dummy variable) | -0.335 | 0,7453() | | | | | | |
| Share of liquid assets | | | | | | | 0.010 | 0,5616() |
| Fund size | | | 2.873 | 0(***) | 2.878 | 0(***) | 2.691 | 0(***) |
| Three-year volatility of returns | | | | | | | -0.320 | 0,0329(*) |
| **General model characteristics** | | | | | | | | |
| Number of funds | 98 | | 98 | | 98 | | 98 | |
| Number of observations | 2432 | | 2432 | | 2432 | | 2432 | |
| $R^2$ | 5.351% | | 6.564% | | 7.459% | | 7.523% | |
| Adjusted $R^2$ | 1.206% | | 2.430% | | 3.365% | | 3.390% | |
| F statistics | 26.3346 | | 27.2580 | | 31.2745 | | 27.0447 | |
| P-value of F-statistics | 0.00000 | | 0.00000 | | 0.00000 | | 0.00000 | |

Note: p < 0.1; * p < 0.05; ** p < 0.01; *** p < 0.001
Source: Hanfa

## Results

The results of the estimated models are given below. In all presented relations, investors react strongly to changes in macroeconomic variables, with the strongest response to the growing stress in financial markets and the tightening of financing conditions, as evident in the quarterly change in government bond yields. A strong response to interest rate changes is expected, mostly due to the sector's large exposure to long-term debt instruments. The assessed response was also perceptible in early 2022, when investors reacted to the rise in benchmark interest rates (more information in Chapter 5 Investment funds). The relation between the real rate of change in GDP and outflows is only marginally significant and has an opposite sign than expected, mostly due to the fact that macroeconomic variables lag after financial variables, as markets and investors respond to economic news much faster than reflected in official data. Observed relations again point to a strong impact of a fund's historical results on net outflows, where funds that recorded higher returns in the previous three years record smaller net outflows on average, that is, inflows to such funds exceed outflows. The example of domestic UCITS once again confirms the results of many papers that empirically showed the convex relation between returns and expected net inflows, which may

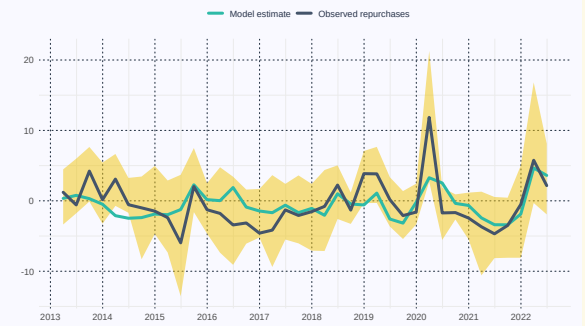
lead to procyclical behaviour of fund managers and give rise to systemic risks in the sector. The procyclical assumption of credit and interest rate risks by domestic UCITS, at least in relation to the bond portfolio, was not observed at system level in the recent past period (more information in Box 1 Do domestic institutional investors display procyclical investment behaviour? In the publication Macroprudential Risk Scanner, No 7).

The concentration of investors is also an important determinant of net outflows, where more concentrated funds are under greater pressure of potential significant outflows, which is again in line with economic theory and numerous empirical results. Other fund characteristics that significantly influence net outflows are the fund's size and previous volatility, which display opposite signs than expected. These results are specific for the domestic UCITS sector, where relatively big and, in terms of returns, stable bond funds recorded disproportionately large outflows during crisis episodes. Such trends may be associated with high risk aversion of bond fund investors, as well as their increased needs during the crisis episodes for the liquidity stored in bond funds. The specific systemic position of money market and short-term bond funds arising from their size and vulnerability to sudden outflows was also recognised by the ESRB, which in late 2021 issued the Recommendation on reform of money market funds (ESRB/2021/9) to address liquidity risk. The Recommendation aims to improve EU legislation to ensure, among other things, the incorporation of new liquidity management tools in the constitutional documents of funds, reduction of liquidity transformation of money market funds and enhancement of monitoring and stress testing.

Other characteristics of funds (fees, share of physical obligations in investor structure, liquidity) did not prove as significant predictors of future outflows. These results do not exclude the possibility that the listed fund characteristics affect investor decisions, but they do not display consistent and statistically relevant results for the observed sample, characterised by significant volatility of the dependent variable.[50]

Figure 4 Net outflows from investment UCITS characterised by significant volatility across funds and over time

Overview of average observed outflows and corresponding model estimates, in % of net assets




Note: The chart shows the model estimate of net outflows on example of Model 1 given in Table 1. The highlighted area indicates the interquartile range of net outflows from individual funds in the quarter observed.
Source: Hanfa

## Secondary effect on fund returns and implications for financial stability

Estimated outflows are a normal part of the business of investment funds which, in situations of sufficient liquidity of funds and capital markets, should not produce secondary effects for the financial market. In other words, if net outflows are not systemically significant and if market liquidity, together with liquidity of the funds themselves, is sufficient, they should not affect portfolio securities' prices through the asset sale process, and consequently the fund's unit prices. However, systemic stress episodes, such as at the beginning of the coronavirus crisis, may give an additional blow to prices.

To check the existence and intensity of this impact, estimated in the second step was a simple linear regression between quarterly returns, that is, a change in a fund's unit prices and observed net outflows, controlled for market developments.

[50] The relatively high volatility of outflows is reflected also in R2 statistics and adjusted R2, which have relatively low values even for panel regressions. However, this is understandable in view of the sudden nature of net outflows from investment funds.

The control variable is the *quarterly benchmark return,*[51] which approximates all market effects on the returns of the observed fund that are, due to portfolio similarity, largely consistent for all funds in the observed category. This variable incorporates market response to a fire sale of the funds facing outflows, that is, part of the secondary effects of fund outflows, which are the same for all funds in the market, regardless of whether they are faced with outflows or not, and whether or not they respond to outflows by asset sale.

Also, an additional variable used in the model are individual fund's outflows, used to measure the impact of outflow size on the returns of those funds that, under the implicit assumption, had to respond by asset sale. Other idiosyncratic characteristics of funds were not taken into account, and a simple linear regression was used in this step, with all funds being treated equally. As this step puts emphasis on potential negative effects of net outflows on prices, the sample is limited only to the quarters in which net outflows were recorded, while again implementing the usual procedure of excluding outliers.

Table 2 Overview of estimate results for the secondary effect of outflows on the value of UCITS portfolio

| | Model 1 (whole sample) | | Model 2 (bond funds) | | Model 3 (other funds) | |
|---|---|---|---|---|---|---|
| | Coefficients | P-value and significance | Coefficients | P-value and significance | Coefficients | P-value and significance |
| Free member | -0.108 | 0.2962() | 0.219 | 0.1561() | -0.149 | 0.2142() |
| Benchmark return | 0.950 | 0(***) | 0.681 | 0(***) | 0.957 | 0(***) |
| Net outflows | **-0.043** | 0.0194(*) | **-0.057** | 0.0276(*) | **-0.044** | 0.0411(*) |
| **General model characteristics** | | | | | | |
| Number of observations | 1951 | | 327 | | 1624 | |
| $R^2$ | 63.03% | | 30.08% | | 64.27% | |
| Adjusted $R^2$ | 62.99% | | 29.65% | | 64.22% | |
| F statistics | 1661.00 | | 69.69 | | 1458.00 | |
| P-value of F-statistics | 0.00000 | | 0.00000 | | 0.00000 | |

Note: p < 0.1; * p < 0.05; ** p < 0.01; *** p < 0.001
Source: Hanfa

The results indicate the presence of the secondary effect of net outflows on the prices of securities in the UCITS portfolio, that is, their returns, where a net outflow of 1% of the total value of the fund's net assets exerts further downward pressure of 4.3 basis points on the fund's return, with a price decrease that is already incorporated in the benchmark correction, that is, market response that affects all funds exposed to such assets. The size of the effect does not differ significantly between bond funds and other funds, despite the fact that bond funds have historically recorded more significant outflows. On the other hand, their portfolios comprise relatively more liquid assets, which were additionally supported by central banks' market operations in the extreme situation at the beginning of the coronavirus crisis.

While the estimated secondary effects of net outflows do not, on average, suggest a systemically significant loss of value in portfolios of domestic UCITS, which under the implicit assumption respond to outflows, account should also be taken of the fact that in past crisis episodes some funds recorded quarterly outflows exceeding 30% of their net assets, so that the total value loss, i.e. the fall in unit prices, may be material.

Not to be overlooked are technical limitations of the employed approach. They are reflected in the fact that the total secondary effect of funds' outflows on their returns in stress conditions is also incorporated in the impact of the reduced benchmark that affects all financial institutions exposed to a particular asset class (through asset fire sales) and the impact of the size of individual fund's net outflows, which cannot be comprehensively expressed in this approach. Furthermore, the observed relation does not enable isolation of the fact that over a one-quarter horizon, part of the initial liquidity shock is compensated by later payments of fresh funds. Also worth mentioning is the non-linear character of systemic episodes in which observed outflow effects synchronise and potentially complement each other, and which are underestimated in the employed estimate of the average outflow effect on prices.

[51] The benchmark for a specific category of UCITS (bond, equity, balanced, money market, feeder and others) makes the aggregate return of the category to which a fund belongs.

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# Box 2 Systemic cyber risk

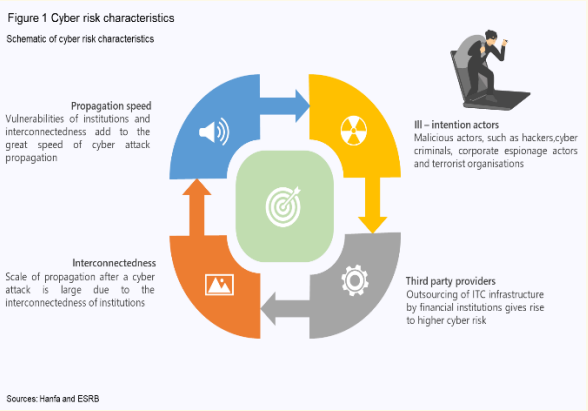
## Systemic cyber threats and financial stability

During recent decades, the global financial system has become more digitalised and interconnected. For its functioning, the real economy requires the financial system to perform a range of key economic functions reliably: deposit taking and lending, general financing services, payment services, securities trading and related settlement services. In the performance of these key functions, the financial system has come to rely critically on robust information and communication technology (hereinafter: ICT) and the confidentiality, integrity and availability of data and systems. In view of all of the above, there is greater danger of cyber incidents as an increasingly important source of operational risk, with a possible systemic effect.

Cyber risk is characterised by key features that, when combined, differentiate it from other sources of operational risk: the speed and scale of its propagation arising from interconnectedness of various information systems. As a result, incidents can spread across sectors and beyond geographical borders, including to entities which are not the primary target. Malicious cyber incidents are becoming more persistent and prevalent, illustrating the high level of sophistication and coordination that threat actors are able to achieve (Figure 1). The ESRB has developed an analytical framework to investigate whether and how cyber risk could create systemic risks for financial stability (ESRB, 2020). The conceptual model has four phases: 1) the context, that is the circumstances under which a cyber incident[52] arises; 2) the shock, that is idiosyncratic difficulties of technical nature and disrupted business processes; 3) amplification, that is the propagation and spread of the initial shock through the system resulting in the loss of confidence and integrity of the financial system; and 4) systemic event, the point when the system is no longer able to perform business processes, which presents a direct threat to financial stability. The key element in the evolution of an idiosyncratic cyber incident into a systemic crisis is the public trust in the financial system.

Figure 1 Cyber risk characteristics

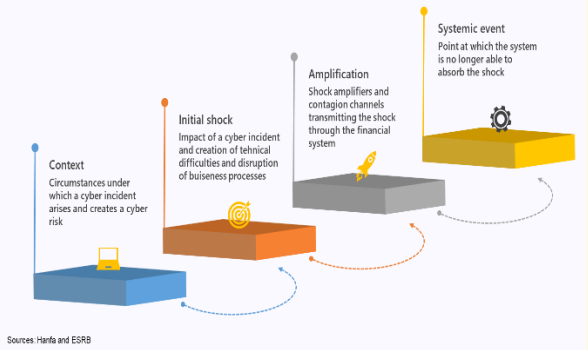
Schematic of cyber risk characteristics




Sources: Hanfa and ESRB

Figure 2 Roadmap of the conceptual systemic cyber risk model

Schematic of four development phases from cyber incident to systemic event



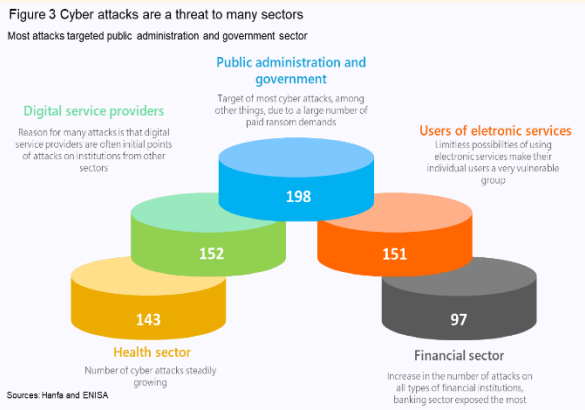

Sources: Hanfa and ESRB

[52] This mostly refers to cyber attacks such as: phishing (attacks where attackers falsely identify themselves in order to steal confidential information of service users), ransomware (attacks where attackers demand users to pay a ransom in order to regain access to digital services), and DDoS (Distributed Denial of Service – congestion of the network by malicious content leading to a temporary disruption of service).

## Cyber incidents are a threat to many institutions and sectors

The rapid process of digitalisation and widespread changes in work patterns (from the beginning of 2020, 40% of workers in the EU have transitioned to remote work[53]), which emerged in response to the coronavirus pandemic, created new opportunities for cyber attacks. The European Union Agency for Cybersecurity (hereinafter: ENISA) reported on 230,000 new attacks using malicious software in the period from January 2019 to April 2020, while Europol estimate of the threat of serious and organised cyber-crime in 2021 pointed to a spike in the number of attacks on government institutions and large firms. Most attacks are targeting EU institutions and bodies as well as the key infrastructure of an EU member state. According to ENISA data, in the period from April 2020 to July 2021, most attacks in the EU targeted bodies and institutions in the following sectors: government and public administration, digital service providers, users of internet services, health care and the financial sector.

Figure 3 Cyber attacks are a threat to many sectors




The government and public administration sector holds a wide array of sensitive information, making it a highly sought target for cyber attacks. Government agencies' data is attractive to hackers because its interwoven systems contain vast amounts of information from citizens and firms that are linked through a variety of platforms. In addition to this, the public sector's information systems and technology are rapidly growing, with amounts of stored data also increasing. As data storage becomes more complex (cloud data storage), the governments face the challenge of developing security technology to keep up with increasingly more numerous and serious attacks. Financial institutions are leading targets of cyber attacks. Banks, as well as other financial institutions, are seen as money factories, offering attack actors several means of making profits, through either extortion, theft or fraud. This is why almost 90% of all attacks on financial institutions are driven by financial motives.

Cyber attacks[54] are usually not targeted at a specific sector, but in most instances affect multiple sectors. In many instances, a cyber attack starts in one of the key ICT systems used across several sectors, with a low level of cybersecurity. Most cyber attacks make use of the differences in cybersecurity maturity across sectors, which is usually proportionate to their popularity. This is also one of the reasons why a large number of incidents targeted government and public administration (large variety of ICT systems) and digital service providers. It may be reasonably assumed that the latter will also be subject to many cyber threats in the future as they provide horizontal services to many sectors and are interconnected across sectors.

## Regulatory activities and perception regarding cyber risk

International and national regulatory authorities have increasingly focused on cyber risk. While the individual efforts of institutions to manage cyber risk have evolved in tandem with ICT developments, coordinated regulatory efforts have only taken place in more recent years. The borderless nature of cyber risk makes coordination at an international level particularly

[53] Source: ENISA

[54] A list of significant cyber incidents since 2006 on a global level may be found at the CSIS (Center for Strategic and International Studies) website.

important. In 2017, the ESRB established the European Systemic Cyber Group (hereinafter: ESCG) to form a view on systemic cyber risks in the EU. The ESCG's mandate requested the group to examine cybersecurity vulnerabilities and their potential impact on financial stability. Cyber risk has also received attention from ESMA[55], EIOPA[56] and ESA[57] (hereinafter: European Supervisory Authorities), which published risk-impact analyses about capital and insurance markets in the EU. As cyber threats in capital markets may lead to system failures and inability to monitor trading, it is important to set up a stable crisis management system. Insurance firms are targets of cyber attacks as they possess vast amounts of confidential information on insured persons, which makes a stable security system indispensable.

In early 2022, the ESRB published a Recommendation for the establishment of a pan-European systemic cyber incident coordination framework (hereinafter: EU-SCICF). The objective of the EU-SCICF is to increase the level of preparedness of EU financial authorities by defining a more effective response to cyber incidents, so that the exchange of information between the subjects of cyber attacks and competent regulatory institutions is sufficiently efficient and swift to prevent contagion risk. The second objective of the EU-SCICF is to bridge any coordination and communication gaps between the financial regulatory authorities themselves and with other sectors and other key actors at international level and EU regulatory institutions.

The EU-CICF is the first, very much needed, step towards what is envisaged under the Digital Operational Resilience Act (hereinafter: DORA). The DORA is the standard for ICT risk management published by the European Commission in 2020. With its macroprudential focus, the EU-SCICF may help in addressing potential cyber deficiencies by complementing the guidelines proposed by the DORA. As the DORA focuses mostly on individual institutions, the EU-SCICF would complement its recommendations by its macroprudential approach. The DORA aims at ensuring that all participants in the financial system have the necessary protection measures to mitigate cyber attacks. Under the proposed legislation, companies will have to ensure that they are able to withstand all kinds of ICT-related disruptions and threats. The guidelines also introduce the supervisory framework for key third-party providers, such as cloud service providers.

## Expectations for the coming years

The described activities of the European Commission and European Supervisory Authorities[58] in the field of ICT regulation and cybersecurity are essential for secure digital transformation and a higher level of cyber resilience of European financial institutions. Under the proposed DORA Regulation, the European Commission addresses the crucial issues and goes beyond existing structures in order to lead the way towards the future sustainability of the European financial system. In the years to come, all competent regulatory authorities across the EU financial system will designate a single point of contact in case of cyber incidents, which would then forward incident notifications to European Supervisory Authorities. This single point of contact has yet

[55] „ESMA SUPERVISION TO FOCUS ON DATA, BREXIT AND CYBERSECURITY IN 2019", ESMA, 2019

[56] "Understanding Cyber Insurance – A Structured Dialogue with Insurance Companies", EIOPA, 2018

[57] "Joint Advice of the European Supervisory Authorities to the European Commission on the costs and benefits of developing a coherent cyber resilience testing framework for significant market participants and infrastructures within the whole EU financial sector", ESA, 2019

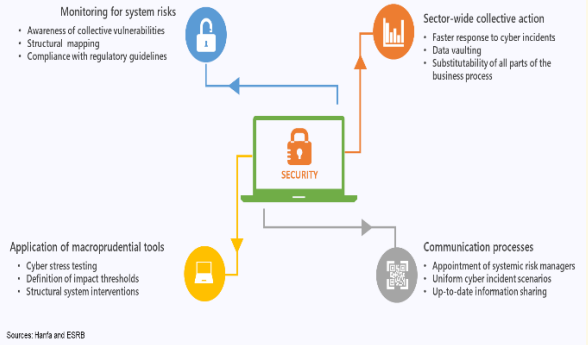
[58] European Supervisory Authorities – ESMA, EBA and EIOPA

to be designated. Under the NIS Directive[59] (transposed into the Croatian legislation by the Act on Cybersecurity of Key Service Providers and Digital Service Providers[60]), this would be the Office of the National Security Council. The list of points of contact will facilitate the development of the pan-European systemic framework, so that, once the EU-SCICF is established, points of contact and the ESRB will be notified of any major cyber incident. The purpose of points of contact is to establish a measure to mitigate contagion risk as a catalyst for turning a single cyber incident into a systemic event (Figure 2). In order for the EU-SCICF to become fully operational, it is necessary to ensure adequate resources at the level of all system participants and eliminate possible legal impediments that might prevent EU financial bodies to exchange information and adopt the EU-SCICF.

However, in addition to the establishment and operational functioning of the EU-SCICF system, it is necessary to continue developing macroprudential tools to identify and mitigate systemic risk arising from cyber attacks (Figure 4). Therefore, regulatory financial institutions should in the coming years review their resilience to cyber incidents, including cases when incidents occur in institutions that are procedurally close and ICT infrastructure providers. However, apart from testing that financial institutions should carry out in their own systems, macroprudential regulators should examine resilience to cyber incidents at the level of the overall financial system. This is why in 2022 the ESRB will develop systemic cyber resilience stress tests for the EU financial system.

Figure 4 Macroprudential tools to mitigate systemic cyber risk

Schematic of key components of macroprudential tools for system security




Sources: Harfa and ESRB

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[59] Directive (EU) 2016/1148 of the European Parliament and of the Council of 6 July 2016 concerning measures for a high common level of security of network and information systems across the Union, OJ L 194

[60] Official Gazette, No 64/2018

# 9 Stress testing

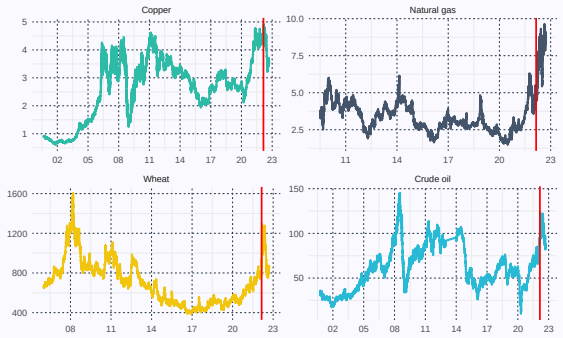
Despite the subsiding of the coronavirus pandemic, economic policy makers did not get breathing room because of the escalation of geopolitical tensions in February 2022, which overnight changed the perception of the post-COVID recovery characterised by inflation. Stress testing has been particularly challenging in the recent period of heightened uncertainty, with projections driven largely by the progress of the armed and energy conflict. Nevertheless, it is also important when examining whether the capacity of the financial services sector is sufficient to absorb potential new shocks. Results of the stress testing exercise suggest that in the adverse scenario, which assumes a prolonged period of high inflation coupled with anaemic or, more likely, negative economic growth, the aggregate resilience of the overall financial services sector would remain satisfactory, though profitability of some parts of the system might be severely threatened.

## Introduction

Following the challenging two-year period marked by the health and economic uncertainty induced by the coronavirus pandemic, in mid-February 2022, the focus suddenly shifted to a potential new source of systemic risk: the Russian-Ukrainian conflict, which changed overnight the economic recovery prospects and amplified existing challenges to restrain rapid price growth (more information in Chapter 2 Macroeconomic environment). One of the likely outcomes of the conflict, that will definitely affect the global economy, is energy crisis, which is already evident in the recent surge in the prices of energy as well as other goods (Figure 116) and their lower availability. The final amplitudes of price increases cannot be easily predicted and depend on a number of factors, the most important being the evolution and outcome of the geopolitical situation and the related impact of sanctions imposed on Russia and Belarus. Similar to last year, the starting point of this year's stress testing exercise is somewhat stressful, with the last year's approach of "stress testing during a period of stress" being again applicable.

Figure 116 Escalation of the geopolitical situation in Eastern Europe led to disruptions in commodity market prices

Prices of various commodities, in USD




Note: The red line indicates the date of the beginning of the Russian invasion on Ukraine.
Source: EOD Historical Data

## Characteristics of the simulation

Hanfa conducts stress testing of the financial services sector on an annual basis in order continuously to monitor changes in systemic risks and the ability of the financial services sector to withstand unexpected losses that systemic risk materialisation could generate and thus threaten system stability. The starting point of the new iteration of the exercise is the data for the end of the first half of 2022, while the horizon remained unchanged, with simulations in both the baseline and the adverse scenario covering developments in main macroeconomic indicators as well as key performance indicators for the financial services sector in the next six quarters, that is to the end of 2023. The main technical change from the last year's approach is that the existing framework[61] has been complemented by new models for the sectors of leasing, insurance and investment funds in order

[61] The existing framework follows the concept described in Box 1 Simulation of the effects of the coronavirus crisis on the stability of the financial services sector in the publication Macroprudential Risk Scanner, No 4.

to estimate as precisely as possible the propagation of initially calibrated shocks through the system and their impact on performance indicators for the financial services sector.

In the past stress testing exercises, the leasing sector was not included in simulations as the operation of leasing companies in the past two years has been characterised by rescheduling of existing contracts to ease leasing payments to lessees[62] amid pandemic conditions. For this reason, the inclusion of the leasing sector in stress testing would be very complex at the time of "non-standard" operations. Therefore, after almost all rescheduled contracts expired[63], this part of the financial services sector was integrated in the exercise by means of the satellite profitability model. A regression analysis of panel data with fixed effects was used for this purpose[64] in order to take into account potential differences in the business models of particular companies and to ensure a relatively satisfactory transmission of simulated macro shocks to their profits. The model shows satisfactory performance from the standpoint of the macroeconomic stress testing focused on aggregate sector indicators and their changes in the baseline and adverse scenarios. In the model, the profit of a leasing company[65] depends on the structure of its portfolio[66], the macroeconomic situation described in terms of the annual GDP growth rate, and the interest margin, that is, the difference between the lending and the captive interest rate[67]. The model was complemented by the model estimates of the ratio of non-performing receivables and value adjustments[68], which completed the simulation of leasing companies' profitability.

The other technical change from the last year's testing is the broadening of the set of indicators used to monitor the operations of insurance companies. Information on the change in assets of insurance companies and estimate of the excess of assets over liabilities in the baseline and the adverse scenarios was complemented by estimated profits in the simulation horizon, where income for the group of life and non-life insurance lines was modelled separately in view of the different nature of their business. In technical terms, similar as for leasing companies, employed was a panel regression with fixed effects. The analysis showed that, along with the autoregressive component, the macroeconomic situation was, as expected, significant for estimating future net income[69].

Finally, this simulation also includes the issue of investment funds' liquidity, which is unavoidable in any crisis episode. This is why this issue receives greater attention in this year's iteration of the stress testing exercise, as described in detail in Box 1 UCITS liquidity risk.

[62] For more information on the business operations of leasing companies in the first year of the coronavirus crisis, see Box 1 Business operations of leasing companies during the coronavirus crisis, in the publication Macroprudential Risk Scanner, No 5.

[63] Only 0.7% of all approved rescheduled contracts were active at the end of June 2022.

[64] In this model individual effects for each leasing company are directly included as fixed parameters through free variable members.

[65] The dependent variable in the model is pre-tax profit net of value adjustments, expressed as a percentage of assets. To improve the model's performance, outliers for which the dependent variable is higher than 150% or lower than –150% were excluded from the data series.

[66] The portfolio structure was included in the model by means of the share of finance lease receivables in the total receivables portfolio.

[67] The lending interest rate is calculated as the ratio of interest income to claims, while the captive interest rate is estimated as the ratio of interest expenses to liabilities of leasing companies.

[68] A panel regression with fixed effects was used to estimate the share of non-performing receivables that in the model depends on the autoregressive component with a three month lag, as the deterioration in the quality of claims happens with a time lag, on the GDP growth rate and on the interest margin. Similar to this, value adjustments are calculated in the correlation with the autoregressive component with a four quarter lag, change in the share of non-performing receivables in total receivables and the GDP growth rate lagged by two quarters.

[69] Macroeconomic conditions in the life insurance model are described in terms of the unemployment rate, while the real GDP growth rate is used in the non-life insurance model.

## Baseline scenario

The prospects for a robust economic recovery from the health crisis, which hit most economies worldwide in early 2020 and was unprecedented in recent human history in terms of its characteristics and spreading speed, have changed overnight with the escalation of tensions in Eastern Europe, while economic processes (such as inflation growth), formerly perceived as short-lasting, turned into medium-term issues. The period of low interest rates of recent years is gradually coming to an end, with stagflation becoming a threat for economies in the medium term. In the setting of high uncertainty, the range of possible realisations of this year's baseline scenario is much broader. As the present crisis is more complex than the one in 2008, error probability is now much higher than in more stable periods.

The baseline scenario assumes that there will be no new global shocks that might threaten the expected pace of recovery, and that markets have already incorporated into their expectations most consequences of the geopolitical conflict. Under that scenario, domestic economy should continue to recover in the rest of 2022 and in 2023, albeit at a slower pace than in 2021. By the end of 2022, real annual GDP growth should reach 4.8%, while a growth of 4.2% is projected for 2023 (Table 1).

In the conditions of relatively solid growth, the focus will be on lowering the inflation rate in the medium term as inflation is expected to remain elevated in the short run (by the end of the year), reaching 15.9% at end-2022, and to grow more slowly in the year ahead[70]. Under the baseline scenario, global energy markets should become stable and conditions in global agriculture markets should be normalised by the end of the year. Among other things, these are the necessary preconditions for restraining both global as well as domestic inflation.

As the easing of inflationary pressures would have a positive impact on other macroeconomic indicators, which would remain on a relatively stable recovery path, the baseline scenario assumes that the unemployment rate would stay low while nominal gross wages would continue to drift upwards. Though the upward pressures on wages driven by soaring inflation have already been observed, the baseline scenario assumes that an inflation spiral will not occur, that is, the secondary effects of rising inflation on wages are not estimated.

Bearing in mind the shift in the monetary policy of leading central banks (more information in Chapter 3 Financial markets), interest rates are expected to grow through to the end of the simulation period. However, this growth should stay moderate through to the end of 2023 and should not go beyond 2.0 pp and 3.2 pp for short-term and long-term interest rates, respectively.

The uncertain environment will affect both residential real estate demand and prices. The two-digit growth of the latter, seen in the first quarter of 2022, should decelerate by the end of the simulation horizon, though no reversal of this trend is indicated in the baseline scenario. Once Croatia joins the euro area in early 2023, its real estate market will become even more attractive to foreign investors, and foreign demand might rise, while domestic demand will be restrained by lower real income of households and growing interest rates. In such conditions, residential real estate prices are expected to grow by 12.7% in 2022 and by a slightly more moderate 9.2% in 2023.

Fiscal indicators are expected to improve steadily in the remainder of 2022 and in 2023, primarily due to larger tax revenues resulting from higher prices and expected economic growth. However, any significant recovery will be limited by the expenditure side of the budget, burdened by the costs of the new measures to

[70] The inflation rate projected for end-2023 is 9.0%.

mitigate price increases and the expected fresh rise in new borrowing costs. The absolute indicator of government debt is projected to grow in the simulation horizon, while the relative debt-to-GDP ratio should fall to 69.6% and 63.7% by the end of 2022 and 2023, respectively. The budget deficit is not expected to grow rapidly and it might reach 1.7% of GDP in 2022 and 3% of GDP in 2023. The period ahead will be particularly challenging for fiscal policy makers because of the shifts in the monetary policy of leading central banks and the consequent rise in yields, but the pressure on domestic public finances will be somewhat eased by Croatia's accession to the euro area on 1 January 2023 (more information in Chapter 2 Macroeconomic environment).

The risks to the baseline scenario are tilted to the downside and its realisation will depend mostly on global developments, particularly the outcome of the geopolitical situation and the related potential further exacerbation of the energy crisis.

## Adverse scenario

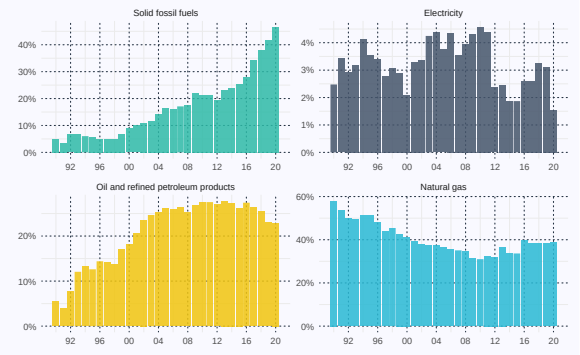
The initial shock of this year's adverse scenario, the materialisation of which might have systemic consequences, is the deepening of the energy crisis triggered by the ongoing Russian and Ukrainian conflict and the further deterioration in geopolitical relations between Russia and the EU, which would lead to new problems in supply chains and prevent the curtailment of inflation. This would imply significant volatility in the prices of energy products, as well as their insufficiency for the smooth functioning of energy-importing economies, particularly those in Europe. More specifically, due to their geographic proximity and trade relations with Russia and Ukraine, EU countries are significantly exposed to the conflict between the two countries (Figure 117). In this regard, among big euro area countries, Germany and Italy, Croatia's most important trading partners, are the most dependent on Russian gas (Figure 118) and cannot easily replace that energy source in the short run[71]. Recent research[72] shows that substitution elasticity is low in the short period, but rises in proportion to the length of the time horizon. Therefore, the magnitude of economic losses depends primarily on the time frame for adjustments to be made. Therefore, any significant reduction in energy imports from Russia to levels insufficient for the continued smooth functioning of the economy would severely and rapidly affect almost all euro area macroeconomic indicators, above all prices and economic activity, while new supply-side instability would limit the effect of monetary policy to ease inflation.

Under that scenario, monetary actions should be faster and more vigorous than anticipated, which, together with other disruptions, would drive economies to a recession, particularly peripheral economies with significant structural vulnerabilities. Amid such uncertainty, inflation might continue on its upward path through to the end of the simulation horizon because initially simulated cost-push inflation factors coupled with demand-pull inflation factors would reinforce inflation growth, together with the inflation spiral, which would probably emerge. Such developments would ultimately result in higher and more persistent inflation rates, with adverse effects on personal consumption and investment. Global price dynamics would be mirrored in domestic inflation, which would reach 18.6% in late 2022 and stay elevated at 11.9% in 2023.

[71] In mid-May 2022, the European Commission adopted REPowerEU, a plan to secure European independence from Russian fossil fuels much before 2030 in the context of the Russian invasion of Ukraine.

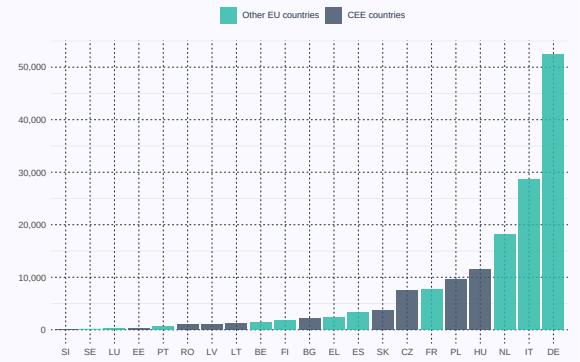
[72] See Bachmann R., Baqaee D., Bayer C., Kuhn M., Löschel A., Moll B., Peichl A., Pittel K. and Schularick M. (2022). `What if? The Economic Effects for Germany of a Stop of Energy Imports from Russia', ECONtribute Policy Brief, No 28/2022

Figure 117 Before the conflict outbreak, Russia was an important energy supplier to the European Union
EU imports of various energy products from Russia, in % of total imports




Source: Eurostat

Figure 118 Germany and Italy lead the way in natural gas imports from Russia
Natural gas imports from Russia in 2020, by country, in millions of cubic meters




Source: Eurostat

Without inflation stabilisation in the medium term, economic activity would be further stifled, while the expected new contraction of the euro area economy would significantly worsen recovery prospects for the domestic economy, which would in simulated stress conditions record stagnation in 2022 and a severe contraction of –6.1% in 2023. Together with the sharp GDP fall, the beginning of another recession and high inflation rates, the spillover effect of foreign shocks in combination with domestic structural vulnerabilities would also adversely affect other macroeconomic indicators, so that the unemployment rate would grow by 1.3 pp by the end of 2023, with sluggish growth in nominal wages.

Weaker economic prospects and tightened financing conditions would also lead to corrections of real estate prices, particularly in economies with large imbalances and significant market overvaluation. Under the adverse scenario, real estate prices in Croatia would fall by 0.9% in 2023, which would put an end to the massive growth of almost 40% in the last six years.

The simulated recession conditions would inevitably have a negative impact on public finances, where the degree of deterioration would depend on individual starting positions as the budgets of some countries are still burdened by the measures to support the economy in response to the pandemic and/or measures to alleviate inflation. By the end of the simulation horizon, domestic debt would come to 75.2% of GDP, while the deficit would worsen further, to –8.4% at the end of 2023.

With the blow to revenues caused by the drop in aggregate income that would not be offset by inflation-driven larger tax inflows, public finances would be additionally burdened by larger interest expenses as yields on long-term government bonds would rise under the adverse scenario, to 5.8% by the end of 2023.

The sharp tightening of financing conditions in the short period would cause significant financial stress: the rapid increase in volatility and adjustment of financial assets' prices which, in combination with other negative macroeconomic trends, would have a major deteriorating impact on the overall financial system.

**Table 1 Macroeconomic scenario**

Overview of the assessed values of key macroeconomic variables and shocks used in financial markets

| | | | | | | | Baseline scenario | | Adverse scenario | |
|---|---|---|---|---|---|---|---|---|---|---|
| Indicator | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | 2022 | 2023 |
| Gross domestic product (annual growth rate) | 4.6 | 2.9 | 2.8 | 3.0 | -7.4 | 9.7 | 4.8 | 4.2 | 0.7 | -6.1 |
| Inflation (in %) | 0.7 | 1.3 | 1.0 | 1.3 | -0.3 | 5.2 | 15.9 | 9.0 | 18.6 | 11.9 |
| Unemployment rate (in % of active population) | 12.6 | 9.8 | 7.4 | 6.2 | 8.6 | 6.6 | 5.8 | 5.0 | 6.3 | 7.9 |
| Gross wages (annual nominal growth rate) | 1.7 | 2.8 | 5.2 | 4.8 | 3.7 | 4.6 | 3.0 | 1.9 | 3.3 | 2.1 |
| Real estate prices (annual growth rate) | 0.8 | 7.6 | 4.7 | 10.0 | 6.4 | 9.1 | 12.7 | 9.2 | 9.3 | -0.9 |
| Public debt level (in % of GDP) | 79.8 | 76.7 | 73.3 | 71.1 | 87.3 | 79.8 | 69.6 | 63.7 | 71.6 | 75.2 |
| General government balance (in % of GDP) | -0.9 | 0.8 | 0.0 | 0.2 | -7.3 | -2.9 | -1.7 | -3.0 | -2.8 | -8.4 |
| Yield on government bonds (in %) | 3.0 | 2.5 | 2.0 | 0.6 | 0.6 | 0.4 | 3.3 | 3.8 | 3.7 | 5.8 |
| Bank loans to real sector (annual growth rate) | 0.0 | 1.2 | 0.0 | 2.3 | 1.1 | 1.2 | 7.2 | 5.1 | 6.5 | 2.3 |
| Short-term interest rates (in %) | 6.7 | 6.1 | 5.8 | 5.3 | 5.0 | 4.5 | 5.2 | 6.5 | 5.6 | 8.0 |
| Long-term interest rates (in %) | 5.5 | 4.6 | 4.7 | 4.0 | 3.8 | 2.4 | 3.9 | 5.6 | 4.2 | 7.0 |
| Stock market shock (VaR level) | | | | | | | 30.0 | 40.0 | 2.5 | 1.0 |
| Investment fund market shock (VaR level) | | | | | | | 30.0 | 40.0 | 2.5 | 1.0 |
| Exchange rate shock (VaR level) | | | | | | | 50.0 | 60.0 | 75.0 | 90.0 |

Note: VaR indicates Value-at-Risk, i.e. the level of shock selected from the historical distribution of the variable observed.

Source: Hanfa

## Results of the stress testing exercise

The described instabilities from the beginning of 2022 (and their direct and indirect consequences) determined the movements in real and financial fundamentals affecting the operations of the financial services sector. For this reason, their complete absorption is not foreseen by the end of this year under the baseline scenario, even in absence of new shocks. Total assets of the financial services sector[73] are projected to fall by 3.8% from the end of 2021 to the end of 2022, mostly due to the significant decrease in net assets of investment funds in the first half of 2022, while (net) assets of all financial service providers should recover and rise annually by 5.4% in 2023.

In spite of the fall in net assets of pension funds in the first half of the year (of HRK 4.2bn, due to market developments), the baseline scenario projects a partial recovery by the end of the year (Figure 119), so that net assets of pension funds might be only 0.7% smaller at the end of the challenging 2022 than in 2021 and then resume a stable upward trend in 2023.[74] In view of projected favourable trends in the labour market throughout the simulation horizon (Table 1), the main generator of the expected rise in net assets of pension funds are stable net payments (Figure 121). Together with net assets, the exceptionally uncertain first half of 2022 influenced the decrease in their returns (more information in Chapter 4 Pension funds). This is why the baseline scenario does not expect their full recovery by the end of 2022, while in 2023, returns should go back to the positive territory, but remain subdued (below 2%, Figure 120).

Above-average net outflows from investment funds in the first half of 2022, which were driven by greater caution on the part of investors amid heightened macroeconomic and geopolitical uncertainty, reversed the positive trend from 2021 (more information in Chapter 5 Investment funds). Their net assets are projected to decrease further in the remainder of the year, albeit at a much slower pace (by 3.1% from the end of the first half of 2022). The baseline scenario, which assumes no new shocks, projects that net assets would partly recover (an increase of 4.3% on an annual basis) in 2023 thanks to positive net payments, but remain below the end-2021 level. In addition to lower net assets, investment funds are likely to record negative returns at the end of 2022 (ranging from –4.2% for equity funds to –0.6% for bond funds), while their partial recovery is expected in 2023 (returns

[73] Including insurance companies, pension funds and investment funds, which account for 90% of the domestic financial services sector.

[74] Net assets of pension funds are projected to be 4.8% larger at the end of 2023 than their projected value at the end of 2022.

in the range from 0.4% for bond funds to 5.5% for equity funds).

Together with pension and investment funds, the assets of insurance companies and alternative investment funds follow a similar dynamics in the baseline scenario, that is, they fall in 2022 and grow in 2023. Despite the expected aggregate effect of a marginal decrease in assets in the two-year period under review[75], the profitability of these sectors should not change significantly[76]. Return on assets of insurance companies at the end of 2023 is expected to be at the level of the long-term average from 2016 to 2021 and stand at 2%.

Along the same lines, the baseline scenario does not foresee any significant changes of the main performance indicators of leasing companies (Figure 121), the sector which is this year for the first time included in the stress testing exercise. While the return on assets and capital-to-assets ratio of leasing companies should be at the long-term average[77] in late 2023, the portfolio quality should continue to improve steadily on the wave of economic growth and better macroeconomic conditions.

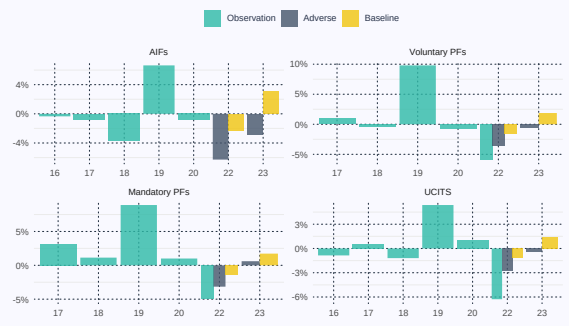
Figure 119 Heterogeneous impact of stress conditions on assets of the financial services sector

Decomposition of the relative change in assets of the sectors in different scenarios, in %


Note: Taking account of the availability of data, the change in assets at end-2022 relates to the end of June for pension funds, UCITS and insurance companies, and to the end of 2021 for AIFs.
Source: Hanfa

Figure 120 Returns of funds under the adverse scenario proportionate to the assumed level of risk

Returns of pension and investment funds in simulated scenarios, in %




Note: Taking account of the availability of data, the values for 2022 for pension funds and UCITS, as well as insurance companies show observed returns in the first half of the year and estimates of returns in the second half of the year, while the values for AIFs show estimated returns for the whole 2022.
Source: Hanfa

Figure 121 Simulated stress would reduce the profitability of insurance and leasing companies

Return on assets of insurance and leasing companies, in %


Source: Hanfa

In the simulated adverse scenario, unfavourable trends in the macroeconomic environment in tandem with elevated stress in financial markets would put a stop to the increase in (net) assets of the financial services sector, which would fall by 4.4% from the end of 2021 to the end of 2023. Among the sectors covered in the exercise, pension funds alone would record a rise in net assets in the simulation horizon as net inflows would partially compensate for simulated market corrections in financial asset prices. Nevertheless, the simulated stress would inevitably affect the price of their units and returns, which would dip into the negative territory at the end of the first year of the simulation horizon and hold steady at end-2023 (Figure 120).

[75] In the baseline scenario, the assets of insurance companies and AIFs are projected to fall by 0.2% and 0.6%, respectively, from 2021 to 2023.

[76] Returns of AIFs stand at –2.3% and 3.0% at the end of 2022 and 2023, respectively, under the baseline scenario.

[77] Average return on assets of leasing companies stood at 2.0% from 2017 to 2021, while the capital-to-assets ratio stood at 16.4%.

The simulated stress scenario would exert a much stronger impact on UCITS, which have already been weakened by the large outflows in the first half of 2022, as their net assets would fall by 11.6% from June 2022 to the end of 2023 in case the described shocks emerge. More specifically, negative market trends and elevated uncertainty would reduce net assets by another HRK 2 bn, pushing them below the level seen in March 2020, after the initial blow of the coronavirus crisis. In such stress conditions, all categories of investment funds would have negative returns, which would persist through to the end of 2023 (Figure 120). However, a much more important and long-lasting impact on the profitability of the fund industry than the simulated energy crisis would be made by any sustained deterioration in the sentiment of domestic investors, which are already conservative because of frequent crisis episodes and severe market turbulence in the past.

Projected developments in the assets and returns of AIFs in the adverse scenario do not differ much from those observed for investment funds: their assets would fall by 6.4% in 2022 and by another 3.1% in 2023, mostly due to corrections in equity and bond markets.

In the first year of stress, deteriorated market conditions would be mirrored in the assets of insurance companies, which would fall by 8.5% over the simulation horizon[78]. The decrease under the adverse scenario would mostly reflect higher yields on domestic government bonds, the dominant category in the portfolio of insurance companies, whereas the contribution of changes in unit prices of investment funds and unfavourable trends in the real estate market would be slightly smaller (Figure 119). The crisis conditions would severely affect profitability indicators of insurance companies as well (Figure 121). Simulated shocks would have a slightly smaller impact on leasing companies, although their profitability in terms of return on assets would drop by 1.2 pp over the simulation horizon. Together with diminished profit, the credit portfolio quality of leasing companies would worsen. However, as the process of portfolio deterioration is of a longer-term nature (it takes a longer time both to deteriorate and to improve), this exercise, which covers six quarters, cannot fully estimate the stress impact on credit risk growth.

## Conclusion

The challenging macroeconomic and financial environment that marked the first half of 2022 somewhat hindered the calibration of initial shocks in this year's stress testing exercise as initial values of some (macroeconomic) indicators are already at the very edge of the distribution (e.g. inflation rate). Therefore, it is particularly challenging to satisfy the condition for an adverse scenario to be "highly unlikely but plausible". The adverse scenario used in this exercise is much more pessimistic than that of last year[79] and has a much higher probability. On the other hand, the projected developments described in the baseline scenario that would influence the performance of the financial services sector are exposed to negative risks and will strongly depend on the evolution of the health and geopolitical situation as well as policy effectiveness in the stabilisation of price growth.

The results of the stress testing exercise indicate that a potential new crisis episode would strongly affect all analysed segments of the financial services sector, diminishing their assets and profitability and increasing systemic risks in the sector as a whole. Bearing in mind the assumptions of the applied methodological framework, the results also indicate that, should the adverse scenario materialise (or any of its parts), the aggregate sector resilience would remain satisfactory, although profitability might be threatened in some parts of the system, in particular for entities whose performance is

[78] The annual rate of change in the assets of insurance companies would be –4.3% at end-2022 and rise to 4.4% by the end of 2023.

[79] See Table 1 Macroeconomic scenario in chapter 9 Stress testing in the publication Financial Stability, No 1.

currently hampered by elevated uncertainty. Geopolitical developments, successful containment of inflation and the absence/emergence of energy crisis will largely determine the level of stress in the upcoming period, which will also affect the performance of the financial services sector because of its propagation through the macroeconomic and financial environment.

## List of abbreviations

AIF – alternative investment fund
GDP – gross domestic product
CSIS – Center for Strategic and International Studies
CHF – Swiss franc
DDoS – Distributed Denial of Service
DORA – Digital Operational Resilience Act
ECDC – European Centre for Disease Prevention and Control
EEA – European Economic Area
EIOPA – European Insurance and Occupational Pensions Authority
EMU – Economic and Monetary Union
ENISA – European Union Agency for Cybersecurity
ESA – European Supervisory Authorities
ECB – European Central Bank
ESCG – European Systemic Cyber Group
ESMA – European Securities and Markets Authority
ESRB – European Systemic Risk Board
ETF – exchange-traded fund
EU – European Union
EU-SCICF – European Systemic Cyber Incident Coordination Framework
EUR – euro
FED – Federal Reserve System
ECFs – Economic Cooperation Funds
FSB – Financial Stability Board
Hanfa – Croatian Financial Services Supervisory Agency
CNB – Croatian National Bank
HRK – Croatian kuna
IEA – International Energy Agency
IF – investment fund
IFD – Investment Fund Directive
IFR – Investment Fund Regulation
ICT – Information and Communication Technology
PF – pension fund
IMF – International Monetary Fund
m – million
bn – billion
PIC – pension insurance company
NAV – net asset value
OVI – Online Vacancy Index
pp – percentage point
PEPP – Pan-European Personal Pension Product
REGOS – Central Registry of Affiliates
ROA – return on assets
SCR – solvency capital requirement
CEE – Central and Eastern Europe
TILDA – composite stock market liquidity index
UCITS – undertakings for collective investment in transferable securities
USD – US dollar
ZSE – Zagreb Stock Exchange
Country codes: AT – Austria; BE – Belgium; BG – Bulgaria; CY – Cyprus; CH – Switzerland; CZ – Czech Republic; DE – Germany; DK – Denmark; EE – Estonia; EL – Greece; ES – Spain; FR – France; GB – Great Britain; HR – Croatia; HU – Hungary; IE – Ireland; IT – Italy; IS – Island; LI – Lichtenstein; LT – Lithuania; LU – Luxembourg; LV – Latvia; MK – Macedonia; MT – Malta; NL – Netherlands; NO – Norway; PT – Portugal; PL – Poland; RO – Romania; USA – United States of

America; SE – Sweden; SI – Slovenia; SK – Slovakia; UK – United Kingdom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