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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*.

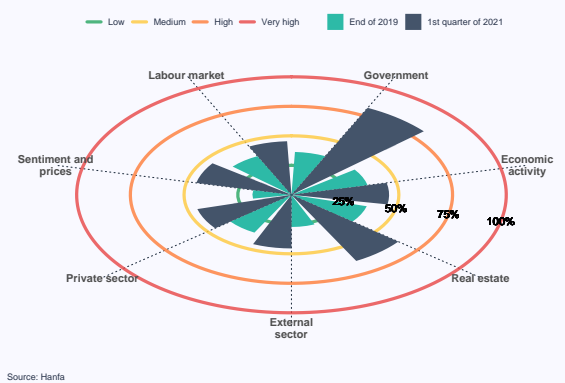
Over the past few years, global progress has been made as regards the understanding and consequently identification, evaluation and monitoring of systemic risks of the financial sector. However, in order to prevent the identified risks in time, and to mitigate the effect of their materialisation, an 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 those that are 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 Uncertainties related to price trends and public finance sustainability pose the greatest risks to economic recovery following the 2020 contraction
Systemic risk score for the macroeconomic environment, in %



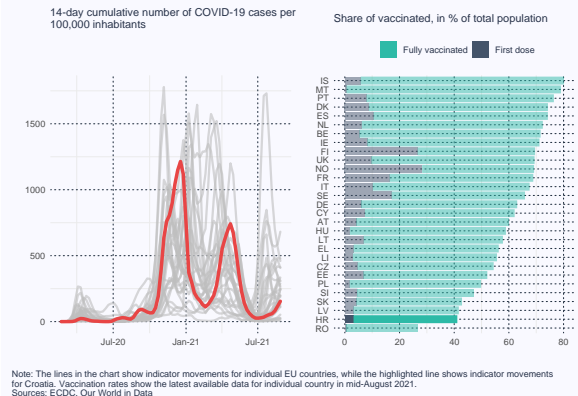
In view of the favourable epidemiological situation in parts of the second and third quarters of 2021, tourism revenues might exceed expectations and support the projected V-shaped recovery of overall domestic economic activity. However, the projection is subject to significant negative risks associated with relatively low vaccination rates at the beginning of the fourth pandemic wave, rising global inflationary pressures, the still uncertain long-term impact of the coronavirus crisis on part of the corporate sector and, in particular, the shifting market perception of credit risk of the heavily indebted public sector which, together with the possible tightening of global financing conditions, might threaten the sustainability of public and private debt and impede economic activity.

Strong economic growth in 2021 and 2022

In late 2020, the second wave of the pandemic hit hard most EU countries, including Croatia. Though the second wave was strong in health-related terms (Figure 2), its economic impact was much less intense than that of the first wave. This was due to relatively less stringent epidemiological measures (Figure 5) than in spring 2020. In addition, economic agents were better prepared for the second wave as they

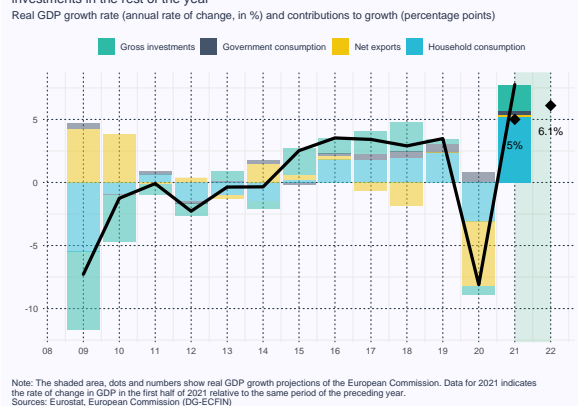
adapted to some extent to new business conditions giving priority to physical distancing, whereas the implemented economic support measures partly absorbed the economic impact of another epidemiological deterioration.

Figure 2 New wave of the pandemic and vaccination dynamics are the main determinants of recovery in the short run



Note: The lines in the chart show indicator movements for individual EU countries, while the highlighted line shows indicator movements for Croatia. Vaccination rates show the latest available data for individual country in mid-August 2021. Sources: ECDC, Our World in Data

Figure 3 Expected economic recovery influenced by movements in services exports and investments in the rest of the year

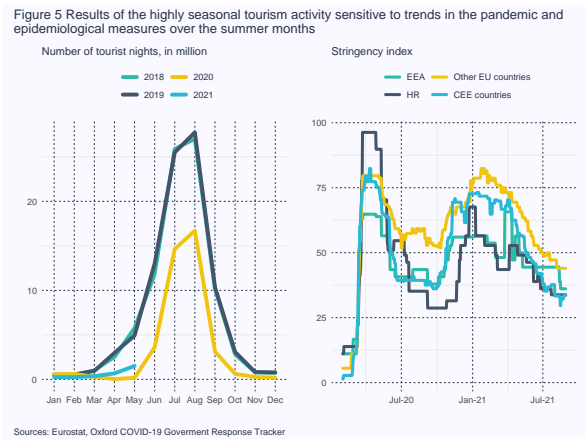


Note: The shaded area, dots and numbers show real GDP growth projections of the European Commission. Data for 2021 indicates the rate of change in GDP in the first half of 2021 relative to the same period of the preceding year. Sources: Eurostat, European Commission (DG-ECFIN)

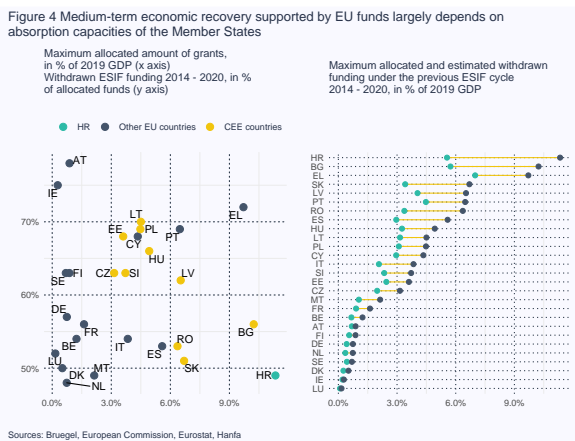
Real domestic economic activity dropped by 8.03% in 2020 from the previous year (Figure 3), which was the sharpest contraction in the last 30 years, though relatively smaller than anticipated in initial official projections at the beginning of the pandemic. The heavy reliance on the tourism industry directly hit by the pandemic was reflected in the strongest decrease in the net exports component, particularly services, in the GDP structure. Personal consumption also plummeted (by 6.2% on an annual basis) in the

context of limited mobility and consumption opportunities.

The beginning of the vaccination rollout for the general population in 2021 helped to accelerate the relative normalisation of economic processes and the gradual recovery of gross value added generated by the domestic economy. As a result, overall real economic activity returned to pre-crisis levels in the first half of 2021¹, growing by 7.9% compared to the same period of 2020 (Figure 3). The recovery was spurred mostly by the rebound of personal consumption as well as the rise in gross investments and government consumption, which remained positive even in 2020. Positive expectations regarding economic growth in 2021 and 2022² (Figure 3) reflect the base effect of the 2020 economic contraction and expectations regarding long-term structural changes in economic flows and growth determinants, which are expected to be catalysed by the National Recovery and Resilience Plan financed by the European recovery plan.



Under the Recovery and Resilience Facility, which is at the heart of the EU’s programme to support the post-pandemic economic recovery and which includes both loans and grants, EUR 6.3bn in grants was allocated to Croatia, to be used for specific purposes by 2026. In addition, Croatia may use the option to borrow up to EUR 3.67bn³ through the EU’s joint borrowing scheme. The said amount of grants accounts for as much as 11.6% of pre-crisis GDP, which makes Croatia the largest recipient among Member States in terms of the size of its economy (Figure 4). However, the achievement of the full potential of this financial programme and its transposition to economic growth requires improvements in project and allocation capacities, which proved to be insufficiently effective in the past. For this reason, the risk of failure to absorb the entire amount allocated to Croatia may have a significant effect in terms of lower economic growth than projected for that period. Croatia will also have to show (political) perseverance in the implementation of the reforms planned under the National Reform Programme, some of which were incorporated in the letter of intent to enter the European Exchange Rate Mechanism (ERM II).



¹ Real GDP was only 0.3% lower in the first half of 2021 than in the same period of 2019.

² Domestic and foreign macroeconomic forecasters expect that real GDP growth will range from 4.7% to 6.8% in 2021 and slow

down slightly to 4.4-5.9% in 2022 (sources: CNB, RBA, EC, EBRD, IMF).

³ Up to 6.9% of 2019 GDP.

Expected economic recovery subject to many risks

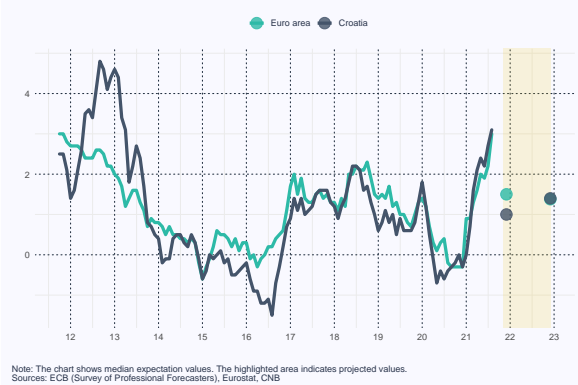
The first data indicate that tourist season results exceeded expectations, which supports positive projections for growth and an imminent exit from recession, although the recovery remains subject to pronounced risks, particularly in the medium term.

The favourable epidemiological situation over the summer months (Figure 5) helped to move the beginning of the fourth pandemic wave to autumn and enabled the generation of much larger tourism revenues than last year. However, the relatively **low and slowly-growing vaccination rate** of domestic population, of only 41%, which ranks Croatia among the last EU Member States (Figure 2), coupled with the spread of new virus strains, might somewhat decelerate economic growth in the rest of the year and continue to burden directly the state budget through possible further implementation of support measures. Nevertheless, such effects are not expected to be as strong as in 2020 and will directly depend on the pace of vaccination in the future.

Growing inflationary pressures driven by revived demand as well as numerous supply-side shocks combined with highly expansionary monetary policies of central banks might also be a drag to (strong) real economic growth. Annual growth rates of both domestic and foreign prices surpassed 2% in late July 2021, the highest inflation rate in Croatia since 2013 (Figure 6). This increase was spurred by all major components of the consumer basket, particularly the prices of energy and transportation, which were pushed up by economic recovery (Figures 7 and 8). The categories of food and beverages and service activities also saw a marked increase in prices. The growth in food prices was partly associated with disruptions in foreign trade and lower supply, the latter being the outcome of smaller yields due to adverse weather conditions

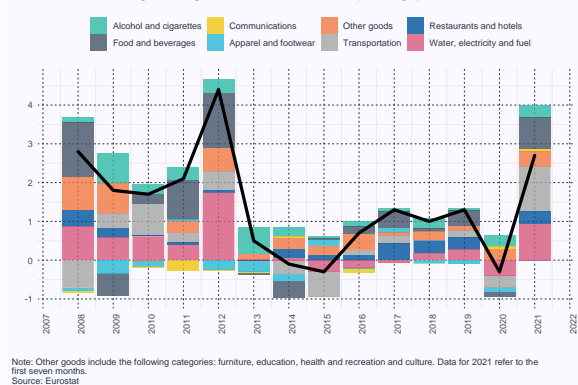
resulting from **climate changes**, the risk of which will have long-term implications for the level and structure of economic growth with probable (short-term) transition costs.

Figure 6 In spite of the largest hike in prices since 2013, prevailing expectations foresee price stability in the rest of the year
HICP - annual rate of change, in %



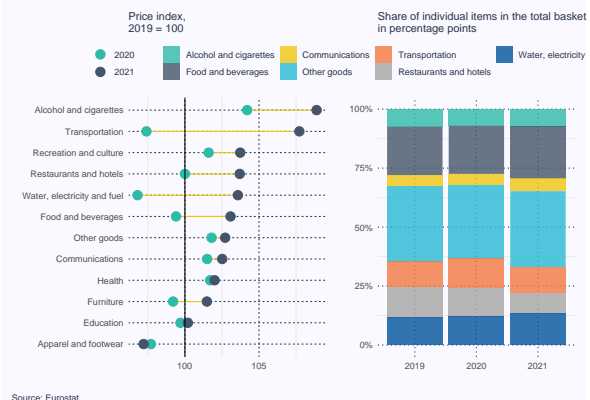
Note: The chart shows median expectation values. The highlighted area indicates projected values. Sources: ECB (Survey of Professional Forecasters), Eurostat, CNB

Figure 7 The rebound in prices driven by input price increases, mostly prices of energy products and transportation
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 2021 refer to the first seven months. Source: Eurostat

Figure 8 Base effect is evident in only a few goods whose value decrease in 2020 was offset in the first seven months of 2021

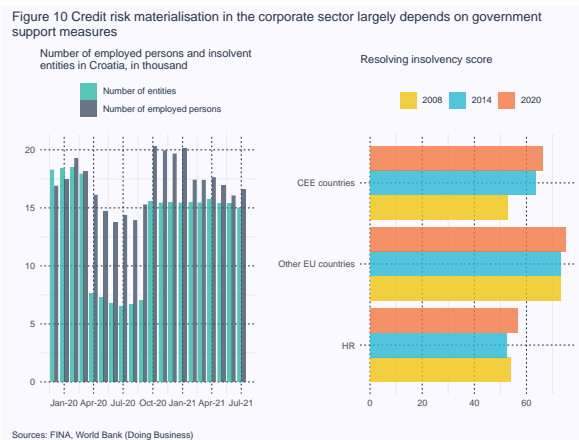
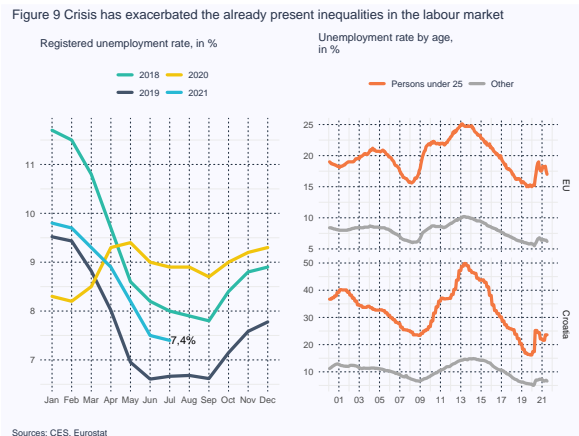


Source: Eurostat

While current global expectations suggest that the price increase is of a temporary nature and that it will not impede economic growth in the long run, a prolonged period of elevated inflation is a likely possibility if supply-side shocks

prove to be more complex, which would intensify growing stagflation fears and expectations, and the likelihood of their materialisation. This scenario would trigger a powerful global systemic shock with negative consequences on real economic trends and financial markets, also affecting the stability of the domestic financial services sector (more information in Chapter [9 Stress testing](#)).

unemployment in the domestic labour market (the registered unemployment rate stood at 7.4% at end-July 2021, down by 1.5 percentage points from a year before, Figure 9), and the dissolution of enterprises dealing in activities hit the longest and most severely by epidemiological measures restraining their operations. However, the measures also led to an **increase in labour market inequality⁴** and aided the survival of some segments of the corporate sector that might not be able to adapt to post-pandemic conditions even after the normalisation of business activity. While profits of non-financial corporations dropped by one-third in 2020 (HRK 20.5bn) from the year before, there was no significant increase in private sector credit risk, which usually occurs in crisis periods. At end-July 2021, the number of insolvent entities was even lower than immediately before the onset of the crisis (Figure 10). This might weigh down the future economic recovery, depending on the currently uncertain materialisation of credit risk. In addition to the normalisation of economic activities, which have already exceeded expectations in 2021, corporate sector solvency will in the forthcoming period lean on the appropriate dynamics and intensity of lifting of support measures, whereas the mid-term recovery will depend largely on the strengthening of institutional capacities and the framework for insolvency resolution.



Government measures to support the economy, which were adopted at the onset of the coronavirus crisis and extended in some form and scope through to 2021, enabled the part of the private sector directly affected by the crisis to bridge the lockdown period and the subsequent period of limited operations and prevented significant materialisation of credit risk. The measures helped to prevent a surge in

Along with the uncertainty regarding long-term prospects for profitability and solvency of some parts of the corporate sector, which, regardless of support measures, will depend on their agility in adjusting to altered business circumstances in the post-pandemic period (new supply chains, distribution and sales channels, growing input costs, changed consumer habits and preferences, etc.), the persistently **high debt levels of the corporate sector** will put pressure on their operations. While total debt of the domestic

⁴ Young workers are disproportionately more affected by the crisis as the unemployment rate for persons under 25 (which was twice as high as that for other workers even before the crisis) grew by 6

pp from end-June 2019 to end-June 2021, while the change for other workers was only 0.5 pp in the same period.

private sector⁵ decreased by 13 pp from end-2019 to the end of the first quarter of 2021 (Figure 11), to 134.6% of GDP⁶, the interest burden remained high. In view of the high share of variable interest rates, this amplifies **the risk of potential changes in the currently subdued risk premium** and the associated increase in interest expenses on existing debt.

Therefore, **the maintenance of the country's risk perception** and avoidance of intensive snowball risk in the next period will be crucial for safeguarding the **stability of the public sector, that is, the fiscal position**. This is particularly challenging because of the pandemic-driven increases in both fiscal deficits (7.4% of GDP in 2020) and public debt, with the latter being expected to stabilise at 83% of GDP by the end of 2022 according to official projections (Figure 12). The application of the general escape clause from the fiscal rules under the Stability and Growth Pact was extended to the end of 2022, allowing Member States to provide fiscal support to the economy without being subject to the Excessive Deficit Procedure⁷. This will definitely contribute to the maintenance of the investment grade credit rating and long-term yields at low levels in the following year.

In addition to influencing general borrowing costs and macroeconomic indicators, the market perception of government debt is also important because of the highly elevated direct exposure of the financial services sector to government debt in terms of investment in long-term government securities. While providing a boost to profitability through higher coupon yields on new bonds, a potential jump in the risk premium and a sudden increase in yields would significantly diminish the value of existing bond portfolios of pension and

investment funds, as well as capitalisation levels of insurance companies (more information in Chapter 9 [Stress testing](#)).

Figure 11 Increase in household and non-financial corporate indebtedness partly mitigated by the continued downward trend in interest rates

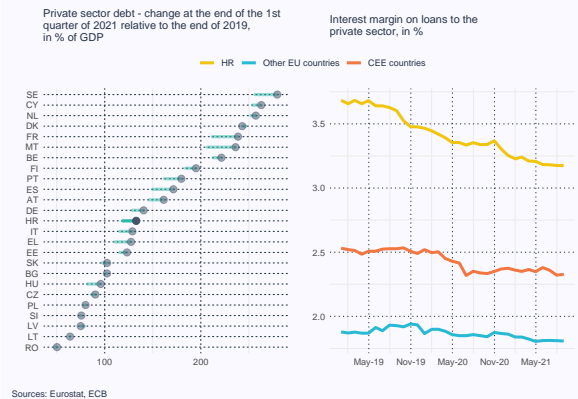


Figure 12 Reduction of the budget deficit to Maastricht levels not likely before 2023

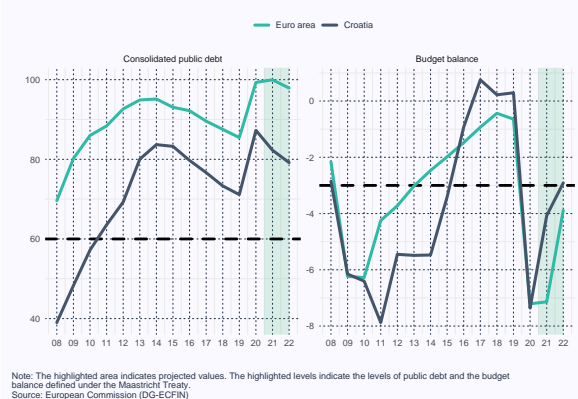
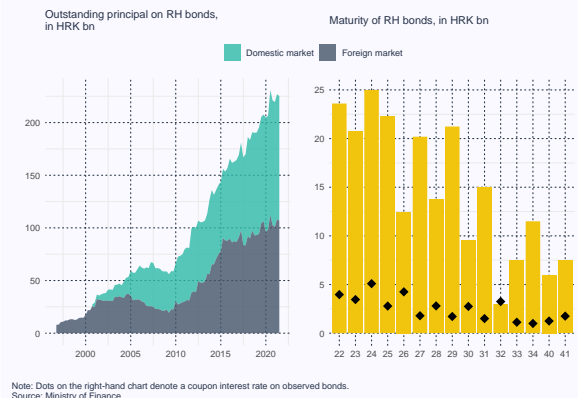


Figure 13 Considerable debt refinancing needs in the upcoming years in a setting of (continued) historically low interest rates



⁵ Under the [ESA 2010 sector classification](#), private sector implies the household and non-financial corporations sectors.

⁶ The major portion of the debt decrease (10 pp) was a direct consequence of the GDP fall, i.e. the base effect.

⁷ For more information on the Excessive Deficit Procedure, see [European Commission website](#).

Box 1 Risk matrix: a new tool for monitoring the evolution of systemic risks

The great financial crisis revealed many vulnerabilities of financial systems and demonstrated the importance of introducing a new dimension of regulatory action. Along with the existing microprudential supervisory framework, the establishment of the European Systemic Risk Board in late 2010 provided a foundation for macroprudential supervision of the European financial system. The primary objective of macroprudential actions is preservation of the stability of the overall financial system and the related identification and monitoring of systemic risks so as to reduce the likelihood and limit the impact of their materialisation. A whole set of macroprudential tools, metrics and instruments has been designed for that purpose over the last decade.

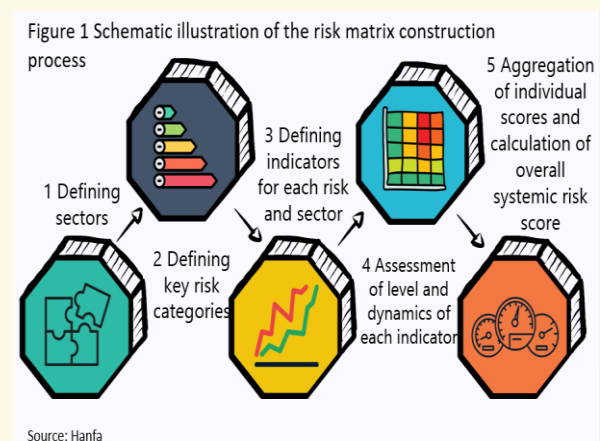
As the systemic risk measurement and detection are very complex processes, the implementation of effective macroprudential policy requires the use of a wide set of different approaches and methods. Stress testing is one of the most prominent tools, which has been often used in recent years and whose methodologies are continuously being developed. Its purpose is to identify vulnerabilities of the financial system based on projected trends in the system's fundamentals in stressful circumstances. In 2020, Hanfa began to carry out macroeconomic (the so-called top down)⁸ stress testing of the financial services sector, which has been steadily improved.

While this exercise aims at assessing system resilience in stressful conditions, the current stage of the real and financial cycle that

determines the level of systemic risk is analysed within the methodological concept of a risk matrix. A risk matrix or a risk dashboard involves a systemic monitoring of a number of indicators that are used to assess systemic risk, that is, to identify its source, location and nature. Based on a wide set of data, this analytical approach identifies key vulnerabilities and potential transmission channels through which shocks may spread throughout the entire system. Such information is essential for timely response of macroprudential policy makers. Nevertheless, it should be noted that the purpose of this tool is not to predict future events and/or form expectations about the forthcoming period, but to provide an overview of current risks in the entire system or some of its parts.

Methodological approach to constructing a Hanfa's risk matrix

Construction of a risk matrix is a complex process comprising a number of mutually connected steps (Figure 1).



⁸ See Box 1 Simulation of the effects of the coronavirus crisis on the stability of the financial services sector in [Macroprudential Risk Scanner No 4](#).

1) The first step is allocation of a system segment for which systemic risk is measured. The risk matrix constructed for the purpose of monitoring exposure to systemic risks of the financial services sector consists of a total of 101 indicators broken down by segments: insurance companies, investment funds, pension funds, leasing companies and other financial service providers, which include factoring companies, investment firms, investment fund management companies, pension fund management companies and pension insurance companies. The assessment also includes developments in the macroeconomic environment and on financial markets as well as fiscal indicators, as they all together represent the environment in which the financial services sector operates.

2) Key risk categories to be analysed for each defined area or sector are defined in the second step. The constructed risk matrix aims at assessing the risk categories that are most often mentioned in professional literature⁹ and the categories that are specific for Croatia (e.g. currency risk), as follows: market risk, liquidity risk, interest rate risk, credit risk, solvency risk, profitability risk, sector concentration risk, exposure concentration risk, currency risk, risk of a potential increase in vulnerability and contagion risk.

Due to their specifics, the risks arising from the international and domestic macroeconomic and financial environment are defined differently from the risks of the financial services sector. Macroeconomic and country-specific vulnerabilities are assessed according to the following categories: economic activity, government, private sector, real estate market, external sector, labour market, sentiment and prices, whereas financial markets are assessed in terms of market volatility, sentiment, degree of

market overheating, financing conditions, market liquidity and concentration risk.

3) Risk indicators, i.e. one or several indicators that best quantify particular risk, are defined in the third step for each risk category. It should be noted that the risk matrix is a tool that needs to be continuously developed and supplemented so as to better assess current system vulnerabilities. For this reason, the initial set of observed indicators is most often supplemented and/or redefined over time.

4) The final score for each proposed indicator is based on two assessments, which make up the fourth step of the process: assessment of the level and assessment of dynamics. The proposed risk matrix comprises four levels of risk exposure: low, medium, high and very high, and three dynamics assessments: risk is falling steady or growing (Figure 2). Three thresholds are defined for each risk indicator so as to make an unambiguous functional correlation between indicator values and risk levels. The methods used to define such thresholds are most often extracted from historical distributions of indicators, the values of these indicators for CEE, euro area and/or EU countries, though regulatory standards or expert judgement may also be used. Events that are not easily measured or evident from current data, but that may influence the final score, are also taken into account in determining both scores for each indicator. For this reason, an important element of the final score of exposure to particular risk and expert judgement by analysts is based on monitoring a much wider set of information than presented in data alone.

5) In the final step, after assigning a score to each indicator, results are aggregated to a single score; first for each of the seven sectors and for two risk dimensions (short and long term)¹⁰ and

⁹ See, for example, [EIOPA Risk Dashboard](#).

¹⁰ The aggregate score for each sector and risk dimension is calculated as the share of the sum of assigned scores in the total

largest possible sum of scores, so that an increase in score for an individual sector indicates an increase in sector risk.

then four scores in total are derived from aggregate scores: for the financial services sector and the macroeconomic sector, the government sector and financial markets in the long- and short-term.

Figure 2 Set of possible scores for each indicator

RISK LEVEL SCORES	DYNAMICS SCORE		
	Falling risk (0)	Steady risk (1)	Growing risk (2)
Low risk exposure (0)	0	1	2
Moderate risk exposure (1)	3	4	5
High risk exposure (2)	6	7	8
Very high risk exposure (3)	9	10	11

Source: Hanfa

Certain limitations of this approach have to be kept in mind when interpreting risk matrix results. The lack of sufficiently long time series that would capture both the upward and the downward phase of the real and financial cycles significantly impedes the determination of thresholds between risk levels as well as score definition. Another major problem is the lack of high quality quantitative data for monitoring specific types of risk, such as operational risks, which is why such risks are currently not covered in the framework. Therefore, the defined methodological concept will be supplemented and changed depending on availability of new data and detection of new risk types and sources. Climate risk is one of the risks that international regulators intend to integrate into their current systems for monitoring systemic risk. In addition, a possible intensification of investment in new specific types of assets, such as crypto assets, would require the extension of the current risk matrix framework.

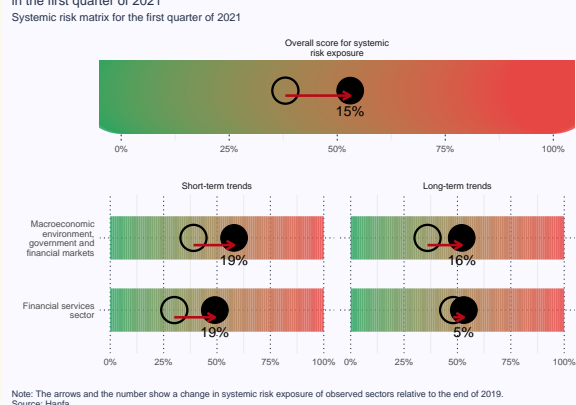
Assessment of systemic risk exposure of the financial services sector for the first quarter of 2021

The overall systemic risk exposure of the financial services sector was assessed as moderate in the first quarter of 2021 (Figure 3), but was higher than in late 2019 (by 15%).¹¹

The rise in systemic risk exposure in 2020 and 2021 has mostly been driven by assessed higher vulnerabilities in the macroeconomic environment, worsened fiscal indicators and perceived greater uncertainty and volatility in financial markets, both in the short (cyclical disruptions) and in the long run (structural vulnerabilities).

While the increase in overall exposure to systemic risks in that period was only to a small extent due to the rise in risk in the financial services sector itself, the significant increase in short-term risks, which were assessed as moderate, was driven by growing liquidity risks and, in particular, sector profitability. At the same time, despite the crisis circumstances, structural vulnerabilities of the financial services sector did not change much, partly due to intensive regulatory measures.

Figure 3 Overall systemic risk exposure of the financial services sector assessed as moderate in the first quarter of 2021



Note: The arrows and the number show a change in systemic risk exposure of observed sectors relative to the end of 2019.
Source: Hanfa

¹¹ To somewhat test the sensitivity of the proposed methodological framework for creating the risk matrix, scores were given for the last available data (mostly 31 March 2021) and just before the onset

of the coronavirus crisis (31 December 2021). Quarterly updates of systemic risk indicators and scores were planned for subsequent iterations.

A) Macroeconomic, sovereign and financial market risks

The largest contribution to the assessed elevated level of risk arising from macroeconomic and financial developments came from the sharp economic contraction triggered by the coronavirus pandemic. In view of its large exposure to the tourism sector, Croatia is one of the EU countries that have been most severely affected by the economic impact of the pandemic. Real GDP growth rates remained negative at the end of the first quarter of 2021 (-0.7%) despite the partial recovery, which will in future, as before, primarily depend on the successful containment of the coronavirus. Apart from the largest ever corrections to GDP, the pandemic has made a strong negative impact on fiscal indicators, despite the fact that Croatia was better prepared for the coronavirus crisis than for the 2008 financial crisis. Much-needed measures to support the economy coupled with smaller revenues and larger expenditures were mostly reflected in the general government deficit of 7.4% of GDP and the rise in public debt, to 88.7% of GDP in late 2020. At the same time, the risks associated with the labour market did not materialise to any great extent, largely thanks to job preservation grants paid in activities hit by the coronavirus crisis. This postponed and partly offset the crisis impact on the labour market. Nevertheless, while aggregate indicators show only a marginal increase in labour market risks, the most vulnerable groups, that is, young people and persons hired for a fixed term, are probably in a less favourable position than in 2019 (Figure 9 in Chapter [2 Macroeconomic environment](#)).

As with the labour market, the crisis has not yet had a major impact on the real estate market. Notwithstanding the pandemic circumstances and physical distancing, residential real estate prices grew steadily in the observed one-year period, by an average rate of 8.6% a year. The number of purchase and sale transactions

edged down slightly in that period, while the high segmentation and heterogeneous geographical increase continued to characterise the real estate market.

The sudden systemic shock triggered by the coronavirus pandemic in March 2020 also had a strong effect on financial markets, which at the time recorded the sharpest ever fall in valuations. However, following initial corrections, the rest of the year was characterised by intensified market activity that continued into early 2021, reinforced by positive information, first about vaccine discovery and then about the beginning of its rollout. As markets respond promptly to new information about the virus's spread, vaccination dynamics, relaxation/tightening of epidemiological measures and related economic growth projections, the risk of short-term market volatilities remains elevated, which, in addition to lingering structural vulnerabilities of the domestic capital market (such as low liquidity and high trade concentration) keeps the overall risk score for that part of the system at an elevated level.

B) Risks in the financial services sector

Exposures to short-term systemic risks arising from operations of the financial services sector were assessed as moderate in the first quarter of 2021, but substantially higher than in late 2019, while structural vulnerabilities held steady at a slightly elevated level.

Among the segments of the financial services sector, the initial blow of the coronavirus crisis affected mostly investment funds, for which overall systemic risk exposure was assessed as slightly elevated. As the pandemic escalated, UCITS experienced a significant materialisation of liquidity risk because of availability of their units to investors; nevertheless, net payments and operations of investment funds stabilised in the remaining part of the year. The rise in both the short-term and overall risk score for

investment funds was mostly fuelled by profitability risk because of market developments and maintenance of market interest rates at low levels. Profitability challenges are also reflected in heightened structural vulnerabilities through the growth in exposure to interest rate risk driven by extended maturity of investments and sharpened sensitivity to the market perception of credit risk.

Overall systemic risk exposure of pension funds, which was assessed as moderate, is a reflection of low, albeit increasing, exposure to short-term cyclical fluctuations and larger exposure to structural vulnerabilities. The profitability of pension funds decreased, reflecting pandemic effects in the form of pronounced market corrections and volatilities in 2020, but it remained in the positive territory. Its recovery in the first quarter of 2021 resulted in low short-term exposure to systemic risks, though much higher than in 2019. Structural characteristics of the pension system expose pension funds to elevated systemic risk in the long run mostly because of the high concentration of their investment in bonds, which, notwithstanding some long-term stabilisation advantages, exposes them to interest rate risk. In view of inflationary developments and large debt of the private and public sectors, this risk is becoming increasingly more pronounced.

In contrast with investment and pension funds, unfavourable effects of the pandemic and devastating earthquakes have so far had only a limited impact on the insurance sector. As a result, systemic risk exposure of insurance companies remained relatively moderate in 2020 and 2021. As with the funds, there is pronounced profitability risk in the short term, which is the consequence of the challenging environment of low interest rates and the fall in premium income in the life insurance segment, while structural vulnerabilities are reflected in a concentrated investment portfolio and associated credit risk, that is, its market

perception, because of large private and public sector debt. Notwithstanding a very direct and powerful impact of the pandemic on leasing companies, mostly through the decreased volume of operations and lower inflows from new and existing contracts (due to moratoriums), systemic risk exposure was assessed as moderate. However, the exposure might increase since the possibility of credit risk materialisation in some parts of the corporate sector, though much smaller than during the pandemic escalation, cannot be completely ruled out once the moratoriums expire.

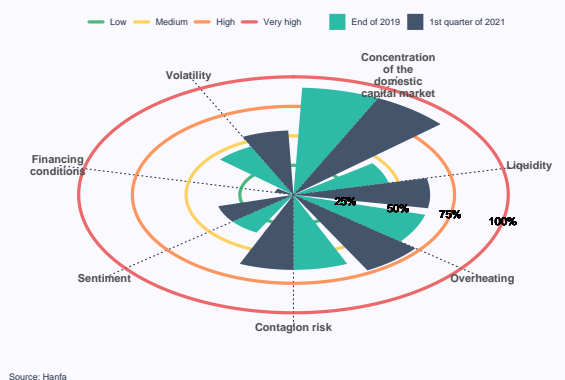
Conclusion

A risk matrix is an important analytical tool of macroprudential policy, which provides a summary overview of the most important vulnerabilities of the system under review. By developing this tool, Hanfa has enhanced and broadened its currently available set of tools for managing systemic risks in the financial services sector, which has to be improved and supplemented on a regular basis.

Assessments for the first quarter of 2021 show that overall systemic risk exposure of the financial services sector remained at a moderate level, though it rose substantially in 2020 and the observed period of 2021. The increase was driven by macroeconomic fundamentals weakened by the pandemic and elevated levels of uncertainty and volatility in overheated global financial markets. Structural indicators of the operation of the financial services sector have held steady at a slightly elevated level, reflecting mostly a high degree of concentration of investment by all entities included in the sector. Bearing in mind low yields and market corrections in 2020, weak profitability prospects for several years are reflected in growing short-term exposures to systemic risks and place emphasis on structural instability in terms of extended investment maturity (interest rate risk) and exposure to the market perception of credit risk.

3 Financial markets

Figure 14 Substantial trade concentration amid very optimistic investor sentiment points to domestic market vulnerability to possible corrections
Risk score for financial markets

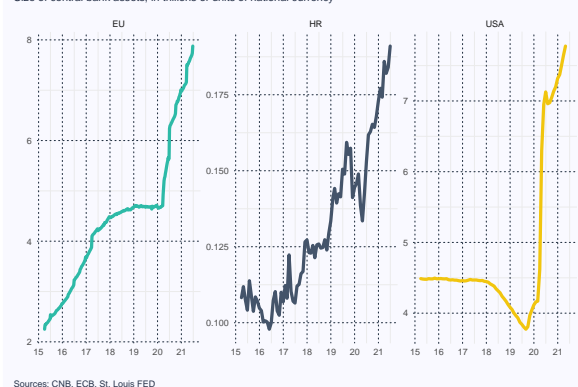


The 2021 recovery of global financial markets followed the beginning of the global vaccination rollout and easing of uncertainty about future pandemic developments, giving a boost to investor sentiment. Nevertheless, risks in financial markets remain elevated (Figure 14). Record high stock market valuations, which may be misaligned with economic fundamentals, emphasize the risk of possible sudden and strong price corrections, particularly in some rapidly growing segments of the stock market. This risk is even more pronounced bearing in mind growing inflationary pressures, which might trigger a correction in interest rates and rearrangement of investment portfolios in favour of asset classes, such as cyclical stocks, that are "better protected" from inflation than growing stocks and bonds. The maintenance of currently favourable financing terms is particularly important for stabilisation of the highly indebted fiscal position as well as the private sector, whose debt servicing difficulties might impede the current pace of economic recovery.

Monetary environment and financing conditions

To counter the economic impact of the almost simultaneous lockdown of economies across the world, governments stretched their fiscal positions to a significant extent in the first half of 2020. Central banks provided an impetus to public debt growth through expansion (in Croatia, launching) of government securities repurchase programmes and **maintenance of favourable financing conditions** on the back of historically low interest rates (Figures 15 and 16).

Figure 15 Strong growth in central bank assets due to expansionary monetary policy measures in response to the coronavirus crisis
Size of central bank assets, in trillions of units of national currency



In the period from the declaration of the pandemic to December 2020, the ECB introduced a temporary asset purchase programme amounting to more than EUR 1,850bn (16.3% of GDP) within the pandemic emergency purchase programme (PEPP)¹² scheduled to last until June 2021 (Figure 16). Also planned was reinvestment of the principal payments from maturing securities purchased under the PEPP until at least the end of 2023. Ample financial system liquidity is also reflected in the fact that only 71% of the envelope for the PEPP programme was exhausted by mid-August 2021.

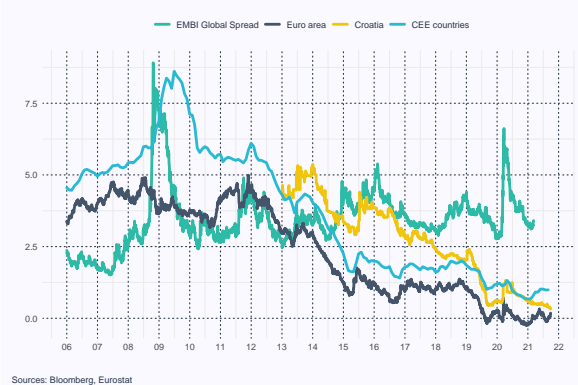
Pandemic circumstances motivated the CNB, just like most other central banks, to expand monetary actions so as to include a programme

¹² More information on the ECB's pandemic emergency purchase programme may be found at the following [link](#).

of direct repurchase of government bonds, not just from banks but also from other institutional investors. These actions secured liquidity, thus stabilising the domestic bond market following the initial disruption triggered by the pandemic outbreak. As a result, government debt yields, having surged briefly, returned to historical lows (Figure 17), which ultimately also contributed to stabilisation of the state treasury. All this was also reflected in the maintenance of generally favourable financing conditions in the domestic market, as evident from the financial conditions index, which bottomed out in the first quarter of 2021 (Figure 18). This was also supported by the maintenance of Croatia’s credit rating at investment grade, with the positive effect on the security perception of the government sector, despite the substantial and growing public debt and exacerbation of structural vulnerabilities of the domestic economy, which have been catalysed by the pandemic (more information in Chapter 2 [Macroeconomic environment](#)).

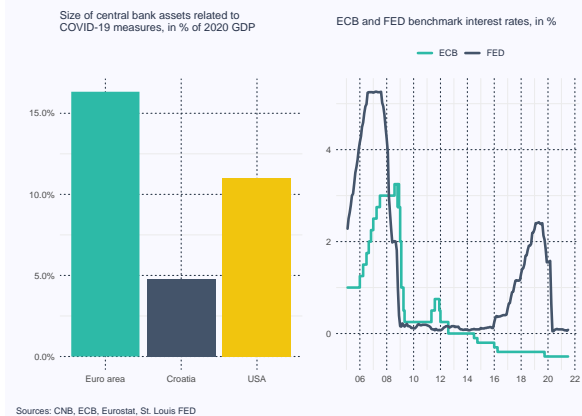
the financial sector, which might be a drag on economic growth. Sectors/countries with substantial structural vulnerabilities might be hit disproportionately hard by potential fragmentation of international financial markets in conditions of growing risk premiums. In the context of the domestic financial services sector, this particularly refers to perceived credit risk of the heavily indebted domestic public sector and the non-financial corporations sector, whose current credit risk has been mitigated by government support measures in force.

Figure 17 Slight increase in yields in 2021 in a setting of diminished investor demand has not affected domestic bonds



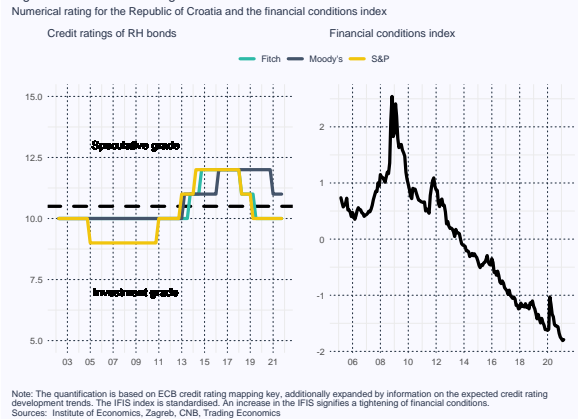
Sources: Bloomberg, Eurostat

Figure 16 Monetary conditions have remained relaxed in 2021



Sources: CNB, ECB, Eurostat, St. Louis FED

Figure 18 Relaxed financing conditions continued into 2021



Note: The quantification is based on ECB credit rating mapping key, additionally expanded by information on the expected credit rating development trends. The FIC index is standardised. An increase in the FIC signifies a tightening of financial conditions. Sources: Institute of Economics, Zagreb, CNB, Trading Economics

The preservation of favourable repayment conditions for the largest ever public and private debt will be particularly important for the post-pandemic economic recovery. However, **mounting inflation and related concerns** that arose in 2021 **have increased medium-term risks associated with the tightening of global financing conditions and given prominence to credit risk** in

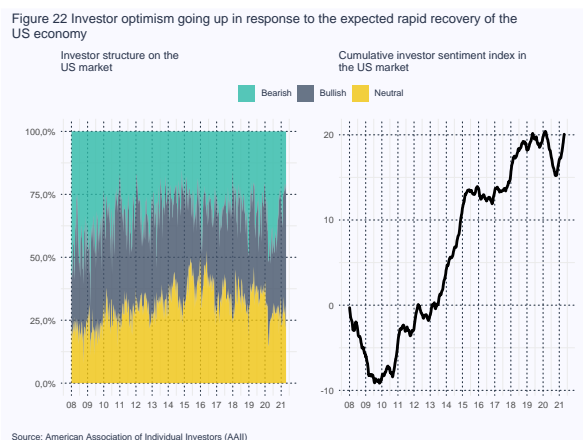
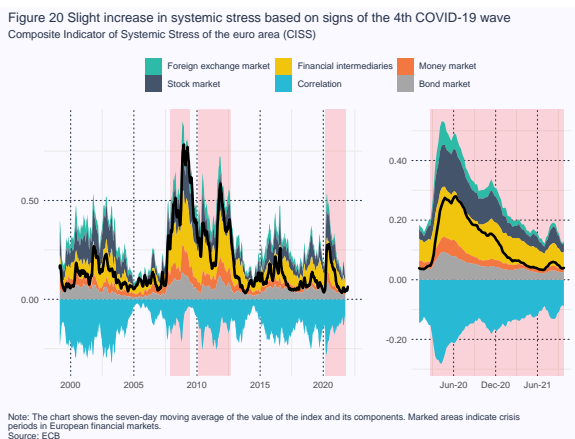
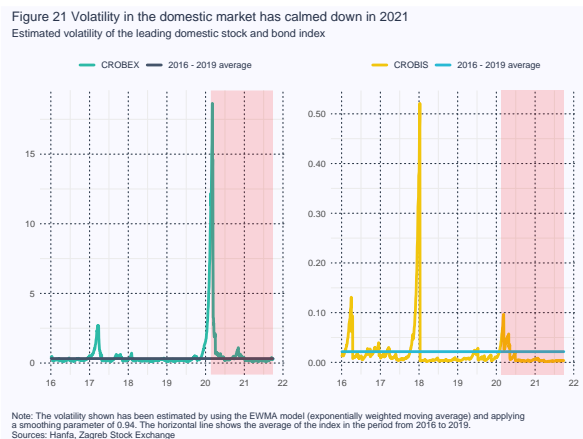
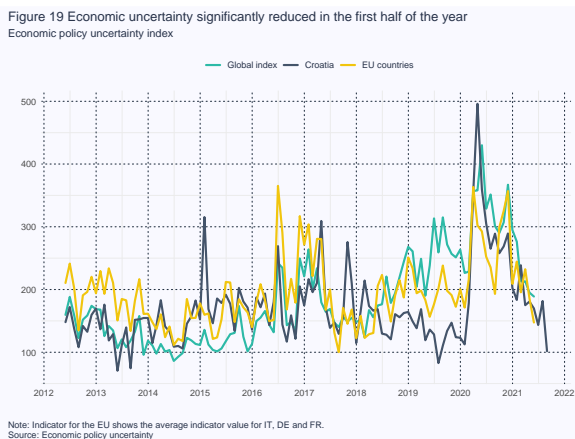
Investor sentiment

The vaccine rollout and the pick-up in economic growth in the first part of 2021, coupled with diminished geopolitical risks¹³, reduced the level of economic uncertainty (Figure 19). **Systemic**

¹³ Conclusion of the US presidential elections and of the agreement between the EU and the United Kingdom in late 2020 marked the beginning of rapid growth in valuations in global financial markets.

stress in financial markets was thus brought back to pre-crisis levels in the second quarter of 2021, as evident in historically high valuations in financial markets (Figure 20). Volatility in the domestic stock and bond markets also remained subdued in the first half of 2021 (Figure 21). It stayed at low levels in July and August 2021, despite the mild growth in systemic stress in international markets associated with the slower vaccination process and emergence of signs of the fourth wave of the pandemic (Figure 20).

that are, to some extent, of speculative nature. After a period of bearish investor sentiment in the first part of 2020, a **bullish sentiment prevailed in financial markets** by mid-2021, when valuations in global financial markets surpassed pre-pandemic levels (Figure 22). Following a temporary erosion in 2020, investor sentiment in the domestic market also rebounded (Figure 23), reaching in mid-2021 the highest level since the great financial crisis.



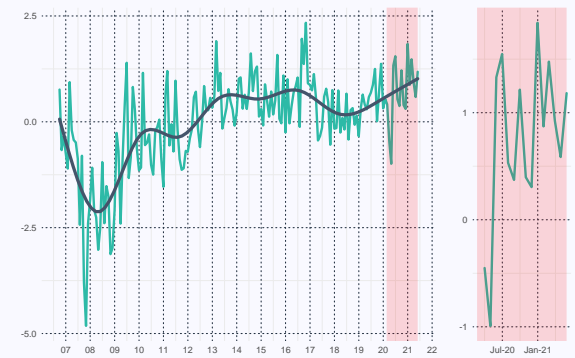
Ample system liquidity gave an important contribution to market stabilisation together with some anti-pandemic measures (such as helicopter money¹⁴), also affecting capital markets and some alternative markets (e.g. crypto-currency markets) through investments

Relatively low uncertainty compared with the period when the pandemic started may indicate risk underestimation, particularly bearing in mind the emergence of new, more resilient virus strains that, in combination with relatively low vaccination rates, may threaten the expected global economic recovery. Market uncertainty is

¹⁴ This is a kind of monetary incentive to the economy where the central bank distributes direct cash grants that help finance fiscal transfers.

further aggravated by unknown solvency levels in corporate sector segments relying strongly on government support, the withdrawal of which may lead to a system-wide increase in the number of bankruptcies of non-financial corporations.

Figure 23 Stable recovery of investor sentiment in the domestic market in the first half of 2021
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, Harifa, ZSE

digital approaches to financial markets against the backdrop of ample liquidity and cheap money enhanced the participation and engagement of retail investors, with digital technologies and social networks also increasing economically unconditional transactions (herding behaviour¹⁵). On the other hand, enterprises engaged in activities severely affected by epidemiological measures (such as travel, tourism as well as the financial sector) have been much slower in compensating for pandemic-driven losses of value. However, the relative increase in earnings of these cyclical segments of the economy, when compared to technological companies, improved significantly with the economic recovery in 2021 and even surpassed investor expectations, as evident in more dynamic growth of these companies' value in financial markets.

Valuations and volatility in financial markets

The economic recovery backed by monetary and fiscal measures, abundance of cheap money and expansive investor sentiment pushed valuations in global markets up to unprecedented levels, driving risk premium lower. However, the dynamics and level of financial market valuations relative to fundamentals give rise to **concerns associated with the risk of price bubbles**, as suggested by the highest ever price-to-earnings ratios (Figure 24).

Figure 24 Record high valuations in financial markets reducing returns on assumed risks

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

The rebound in valuations following the pandemic outbreak was most prominent in the segment of technological growth stocks (Figure 25). Among other things, this was also the consequence of changed consumer habits during the economic shutdown (such as online shopping), as well as virtual business and work that accelerated the digitalisation of everyday life, which was ultimately also evident in market valuations (Figure 26). More specifically, new

Figure 25 Scale-up companies growing faster despite increased volatility associated with inflation uncertainty

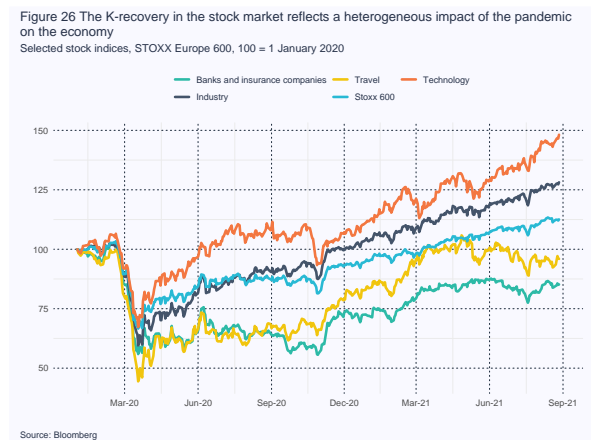
Index, 100 = 31 December 2019



Source: St. Louis FED

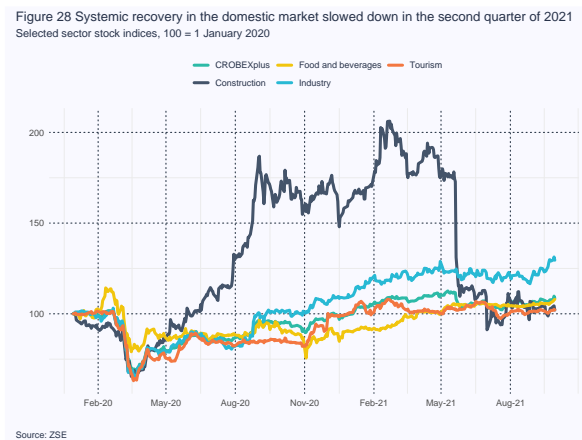
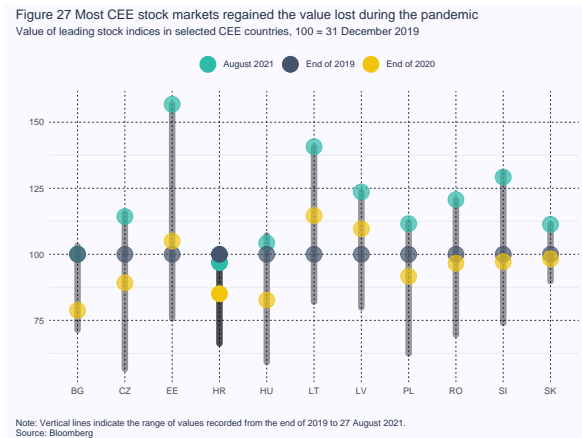
¹⁵ One of the most prominent examples was that of GameStop stocks.

As inflationary expectations are an important determinant of investment strategies of global financial market investors, **inflationary trends may trigger a deterioration in investor sentiment and cause significant and sudden market corrections**. For this reason, a stronger and longer than expected price increase might be reflected in investor decisions and portfolio rearrangement for the purpose of hedging against inflation (by investing in cyclical or value stocks). A sharp increase in prices reduces the real value of fixed cash flows, particularly flows with significant maturity, which might trigger a price correction in bond investments and in the part of the stock market (in particular, growth stocks). The risk of a sudden and destabilising price correction is even more pronounced in view of soaring private and public sector debt, which suggests that investors might lose confidence in public debt sustainability should macroeconomic recovery fall short of expectations.



Due to the high integration of international markets, almost all stock markets of CEE countries saw a pick-up in price growth in the first half of 2021, which compensated for value losses at the beginning of the pandemic (Figure 27). Valuations in the domestic stock market have recovered more slowly than in comparable stock markets in CEE countries, reflecting structural characteristics of the Croatian market, which is relatively shallow and less liquid. This was reinforced by fears about the outcome of

this year's tourist season, which is why the tourism sector index has been relatively stagnant in 2021 (Figure 28). The growth in other sector indices has been relatively heterogeneous, but stable since the beginning of the year. More pronounced volatility of the construction index was due to the financial restructuring of one of the index components and was not of a systemic nature.

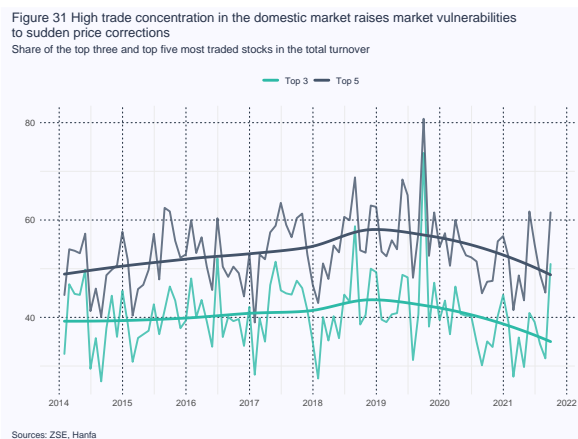
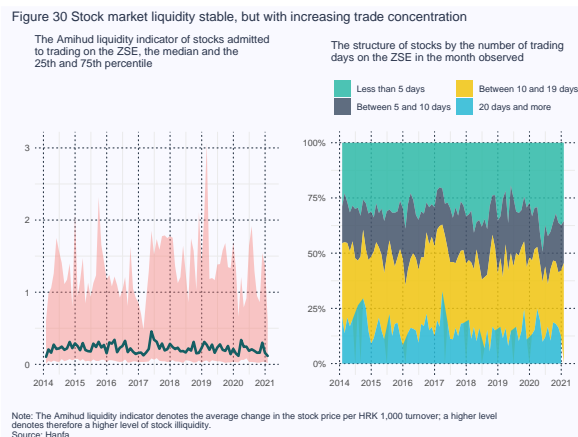
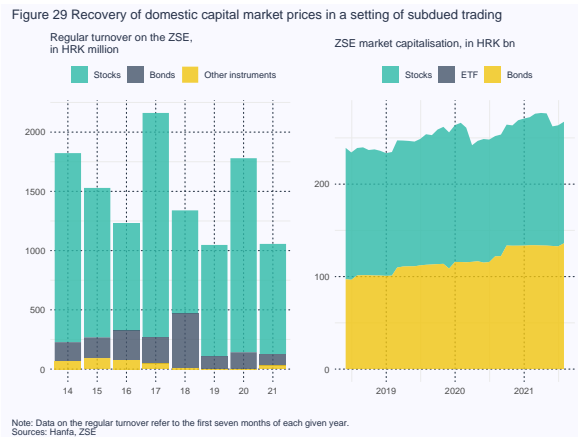


Market liquidity and concentration

One of the structural characteristics of the domestic capital market, that is, its comparatively low liquidity, has not changed much over 2020 and 2021, remaining one of its greatest vulnerabilities. Traditionally very low liquidity of the bond market came to the fore at the beginning of the pandemic, when larger purchases of fund units by some investors put prices under short-term pressures. These pressures were ultimately mitigated by the

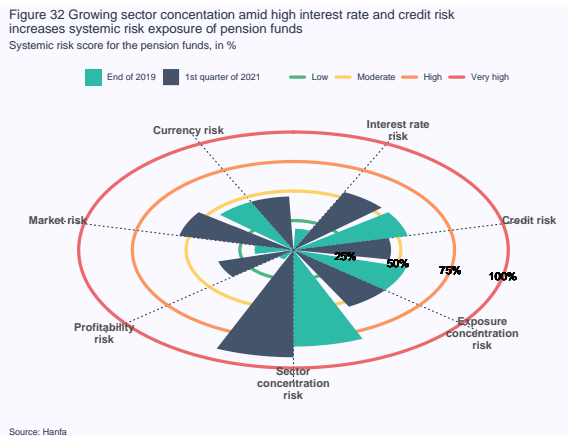
central bank’s demand for bonds in the secondary bond market. As permanent participation of the central bank in this market is not part of the standard monetary policy toolkit, potential **liquidity problems will continue to exert pressure on investment portfolios of institutional investors**. This is the reason why funds, in particular, investment funds, have in 2021 increasingly directed their bond investments towards markets that offer higher liquidity levels for comparable returns (more information in Chapter [5 Investment funds](#)).

Liquidity in the domestic stock market also poses substantial risk as almost a third of listed stocks are traded for less than five days in a month (Figure 30). The upward trend in illiquidity is also reflected in high and growing trade concentration as more than 50% of the total turnover in stocks relates to trading in instruments of only five issuers (Figure 31). Bearing in mind that the largest number of stock issues in the domestic market cannot be characterised as liquid and the fact that investment policies of domestic institutional investors have so far been mostly oriented towards the domestic market, investment risks at the level of the entire financial services sector are not diversified, but are instead concentrated¹⁶.



¹⁶ This does not refer to individual investment portfolios of domestic institutional investors.

4 Pension funds

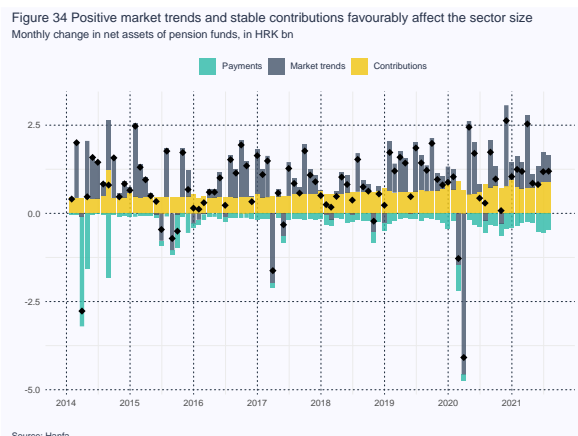
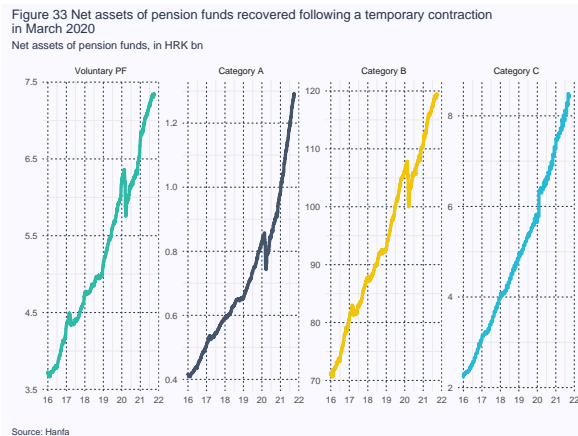


The relative stability of pension funds as long-term and comparatively conservative investors somewhat cushioned the turbulent market developments in 2020. Sluggish investment opportunities for generation of competitive returns were reflected in changed allocation of fund assets through the rise in risky and cross-border investments. This trend is expected to continue in the forthcoming periods, particularly once Croatia joins the euro area, which will further integrate the domestic financial system into international financial markets. While pension funds have enhanced their investment diversification by investing more in domestic and foreign stocks, the bond portion of their portfolios continued to be highly exposed to possible revaluations in case of interest rate changes as such investments have longer maturities.

Key cyclical trends

Notwithstanding positive net payments amounting to HRK 1.1bn, adverse market developments in the first quarter of 2020, which were driven by the elevated uncertainty due to pandemic escalation, reduced net assets of mandatory pension funds, which were HRK 4.3bn or 3.5% smaller than at end-2019. However, not all fund categories were equally affected by stress circumstances. Net assets of category A funds decreased more (7.5%) in the first quarter of 2020 than those of category B

funds (4.3%) because of higher investment risks arising from larger shares of stocks and investment fund units in total investments (Figure 37), whereas assets of the most conservative category C funds went up by a high 11.6%, mostly due to positive net payments in the period under review. While payments edged down as employers were relieved from paying contributions on job preservation grants, net inflows offset part of market corrections in financial asset prices, so that net assets of all categories of mandatory pension funds recovered to pre-crisis levels as early as the second quarter (Figures 33 and 34).



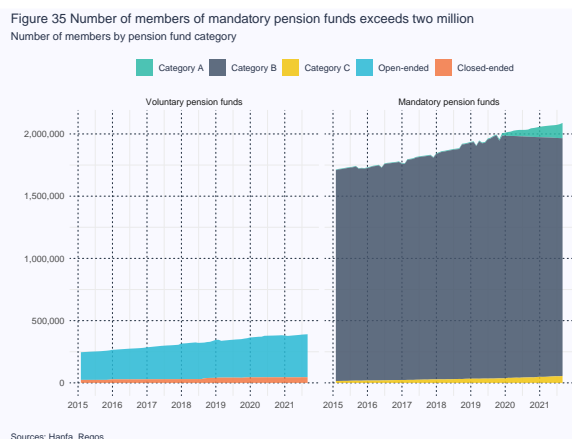
As conditions in financial markets improved, the upward movement in net assets of all categories of mandatory pension funds continued in the rest of 2020 and into 2021. The recovery in financial market valuations in the second half of 2020 was also stimulated by expansionary counter-cyclical measures of monetary and fiscal

policies, as well as the upturn in investor sentiment (more information in Chapter 3 [Financial markets](#)). By the end of July 2021, net assets of mandatory pension funds rose to HRK 127.6bn, up 13.3% from the end of 2019 (Figure 33).

With assets amounting to 34.3% of GDP¹⁷, mandatory pension funds predominate in the financial services sector and are systemically important for financial system stability. The systemic importance of pension funds is also illustrated by the fact that at end-July 2021, there were more than 2 million insured persons that at some point of time contributed to the system of mandatory pension insurance (Figure 35). In terms of membership structure, the share of persons insured with category A funds has been growing due to legislative changes ([Official Gazette, No 115/2018](#)) providing that all new entrants to the labour market who fail to select a mandatory pension fund category on their own¹⁸ are automatically classified into category A funds because in the long run they may take on higher risk levels that are characteristic for that category. As almost 20 years have passed since the introduction of individual capitalised pension savings, the share of category C fund members also grew, with many more pensioners expected to exit the 2nd pension pillar over the next five years.

In addition to the increase in the number of persons insured within the 2nd pension pillar due to regulations, the number of persons insured within the voluntary pension insurance system also grew, reaching 387.7 thousand at end June 2021. The annual rate of growth in the number of voluntary pension fund members, which was above 7% in pre-crisis years, slowed down to 4.3% in 2020, reflecting negative labour market trends, i.e. a slowdown in new hirings (more information in Chapter 2 [Macroeconomic](#)

[developments](#)). The growth in the number of insured persons is coupled with the rise in average payments allocated to that pillar. As a result, and notwithstanding unfavourable market conditions in the first part of 2021, net assets of voluntary pension funds grew by 16.7% in 2020 and the first seven months of 2021 relative to the end of 2019, standing at HRK 7.26bn at the end of July 2021 (Figure 33).



Structural characteristics and risks

Concentration risk in the sector of mandatory pension funds is extremely **high** as only four pension companies manage a total of 12 mandatory pension funds (Figure 36). Three of these companies are also licensed to manage voluntary pension funds. This risk is even more pronounced at the level of the overall pension system based on capitalised savings, as evident from the fact that there is one company that manages only mandatory pension funds, while another manages only voluntary pension funds. In addition to the obvious importance of ensuring stable operations of management companies, the high degree of management concentration (around HRK 135bn is managed by only five companies) may also have negative implications for investment strategies and decisions in terms of procyclical and potentially destabilising decisions to purchase/sell the same

¹⁷ The data refers to net assets at the end of July 2021 in terms of 2020 GDP.

¹⁸ More than 95% of new insured persons are being automatically allocated by REGOS each month, that is, all those who fail to select a fund themselves.

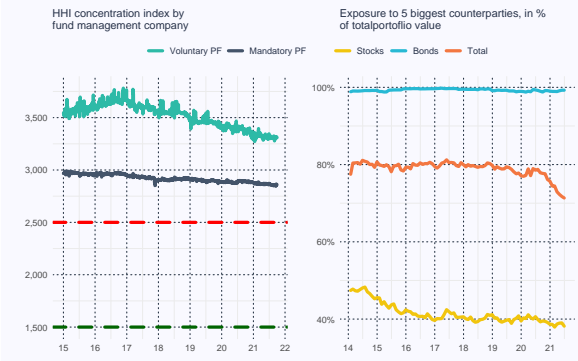
class of assets or the same financial instrument at some point in time, particularly if those decisions are not based on economic fundamentals. Furthermore, in relatively underdeveloped capital markets, such as the domestic market, the highly concentrated management of assets amounting to almost 50% of the total market capitalisation may have systemic implications, both for particular securities and for the market as a whole by influencing volatility, prices and investor sentiment in spite of regulatory restrictions¹⁹.

The investment structure of pension funds is also highly concentrated, with government bonds being the dominant asset class (accounting for 62.1% of total investments at end-July 2021), in particular domestic bonds (Figure 37). Legal limitations have had a major impact on the current **high degree of investment concentration**, particularly at the level of an individual asset class. However, it is noteworthy that management companies have not steadily and actively implemented investment diversification by individual issuers as well as asset classes or investment domicile. This is evident in the relatively high concentration of the stock portfolio, where the five largest exposures account for as much as 38% of the stock portfolio (Figure 36).

This is also due to comparatively large returns on domestic government bonds in recent years, particularly bearing in mind the level of assumed risks (Figure 39). Inflationary pressures have pushed government debt yield curves slightly higher in 2021 than in 2020 (Figure 75 in Chapter 6 [Insurance companies](#)). Nevertheless, interest rates continued to be much lower than in the past, so that **reinvestment risk remained pronounced** in view of the fact that slightly less than 10% of bond investments by pension funds with an average coupon of around 5% falls due

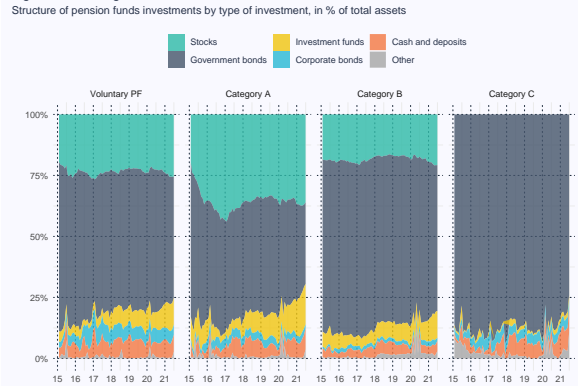
by the end of 2022. This prompted a more active search for satisfactory yields through increased allocation of pension fund assets in more risky investments such as stocks and investment fund units.

Figure 36 Very high concentration is one of the sector's key structural challenges



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 the sector's structure by fund management companies. Source: Hestia

Figure 37 Growing investments in stocks and investment fund units



Source: Hestia

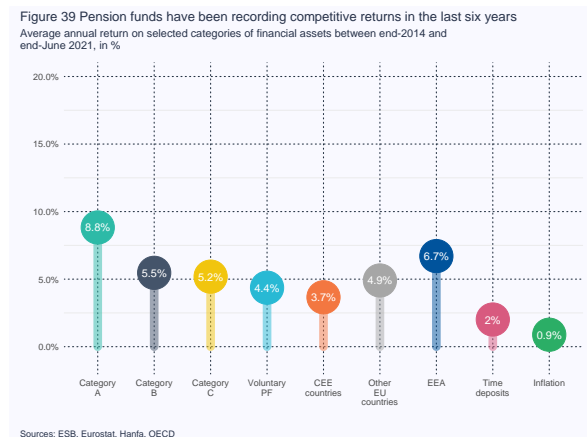
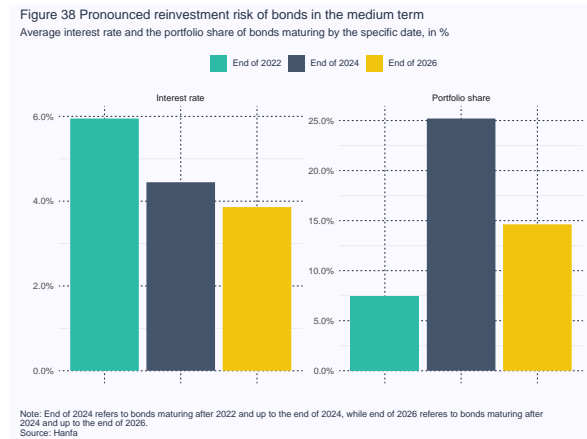
Along with larger diversification by asset classes, noticeable was greater investment dispersion by issuer domicile (the value of foreign investment in pension fund portfolios was 25% higher at end-June 2021 than in the same period of 2020) which, apart from obvious advantages of long-term reduction in overall risk exposure, exposes pension funds to short-term trends and volatility in foreign markets.

The increase in foreign (mostly European) exposure of pension funds is expected to continue in the upcoming period in view of the modification in the ECB's inflation target, as well

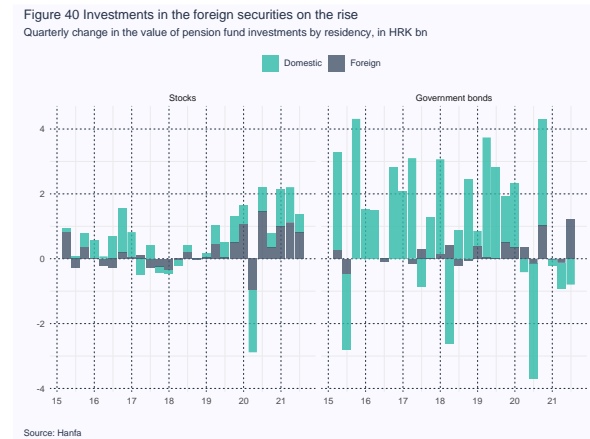
¹⁹ Regulation (EU) No 596/2014 of the European Parliament and of the Council of 16 April 2014 on market abuse (market abuse regulation)

as the maintenance of the existing policy of benchmark interest rates and the planned forthcoming adoption of the euro as the official currency in Croatia, which will eliminate regulatory restrictions on currency risk exposure of pension funds for all euro-denominated investments.

shutdown and contraction, coupled with expanded government consumption, have again put the issue of (perception of) public debt sustainability into the spotlight (more information in Chapter [2 Macroeconomic developments](#)).



The recent widening of investment dispersion has **reduced pension fund exposure to market risks**, which, following a leap in 2020, returned to pre-crisis levels in mid-2021 (Figure 41). Nevertheless, the **high concentration of domestic bond investments exposes pension funds to credit risk**, that is, the risk that issuers of debt securities might be unable to meet their liabilities. Though this risk is smaller in real terms when the issuer is the domestic government in view of the possibility to monetise fiscal deficit and debt, the perception of country credit risk may definitely have a strong impact on the value of funds' assets through the interest rate channel. The outbreak of the coronavirus pandemic and the consequent economic



The preservation of investor confidence in public debt sustainability over the medium term (Figure 42) was aided by CNB's monetary policy actions involving the purchase of government bonds, and the maintenance of investment grade credit rating (Figure 18 in Chapter [3 Financial markets](#)). Public debt sustainability is expected to remain on the radar of the investment community in the upcoming period in view of the pronounced inflationary trends worldwide, which put to the test current monetary positions of central banks and mechanisms for managing inflationary expectations.

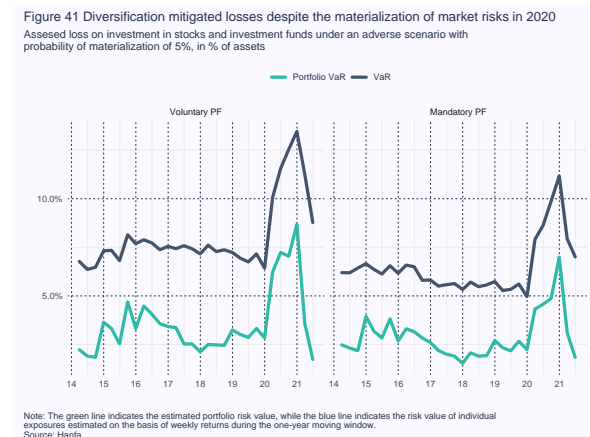


Figure 42 Perceived market premium for credit risk at historical lows
Interest spread of the bond portfolio of pension funds relative to risk-free bonds, in percentage points

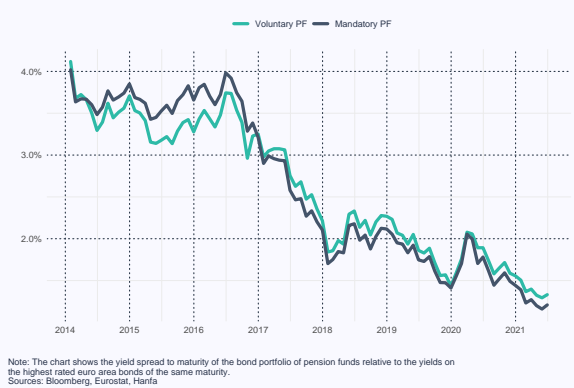
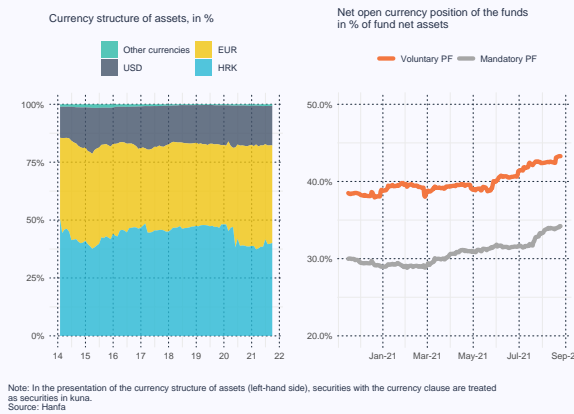


Figure 43 Increased maturity raises interest rate risk exposure



Figure 44 Currency structure of assets makes funds sensitive to exchange rate changes



Bearing in mind their long-term investment perspective, the immanent **exposure of pension funds to interest rate changes is very high**. Furthermore, institutional investors, including pension funds, have in recent years responded to low yields by extending investment maturity, thus staying on the longer and thereby higher end of the yield curve. The average weighted number of years to maturity of the bond portfolio of pension funds grew from 5 to 6.2 years from the beginning of 2020 to end-July 2021 (Figure 43). Extended maturity of the

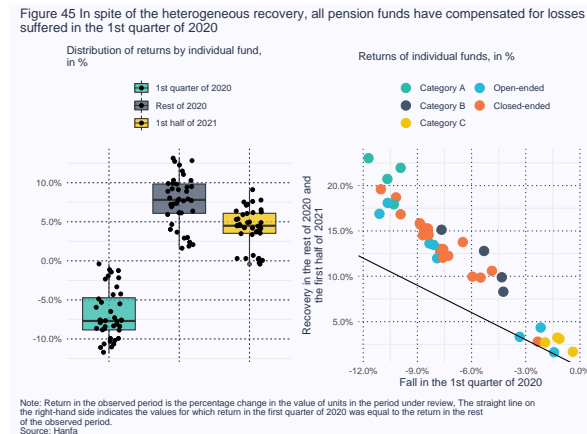
pension funds bond portfolio also raises the **risk of portfolio (re)valuation** in case of surges in inflation-driven benchmark interest rates or the risk premium in the context of growing public debt, as three quarters of the portfolio is currently evaluated according to market prices.

The larger allocation of funds to foreign market financial instruments has slightly **increased pension funds' exposure to currency risk** in 2021 due to the growth in euro-denominated assets (Figure 44). The average open net currency position of pension funds stood at 33.6% at the end of July 2021, which was slightly below the legally set limits. The planned forthcoming adoption of the euro will certainly eliminate a substantial portion of the relatively high exposure to currency risk. In the meantime, the possibility of this risk materialisation is minimised by the agreed relative stability of the kuna during Croatia's participation in the ERM II,

Returns

Unfavourable market developments in the first part of 2020 reduced unit prices of all pension funds (from -11.7% to -0.4%), with pronounced diversification in terms of their investment risk (Figure 45). Category A funds recorded the sharpest downturn in returns, and were followed by voluntary funds, which are more influenced by stock market trends. Bond and stock markets stabilised and investor sentiment recovered with the introduction of monetary and fiscal support measures, which was also reflected in higher prices of financial instruments in the remainder of 2020 and the first half of 2021. As a result, **all three categories of mandatory pension funds ended the period under review with positive returns, preserving the value of their members' assets** (Figure 46). Category A mandatory pension funds generated an annual return of 0.43% in 2020, while categories B and C recorded returns of 0.94% and 1.15%, respectively. Open-ended voluntary pension funds made a return of 0.61%, while only closed-

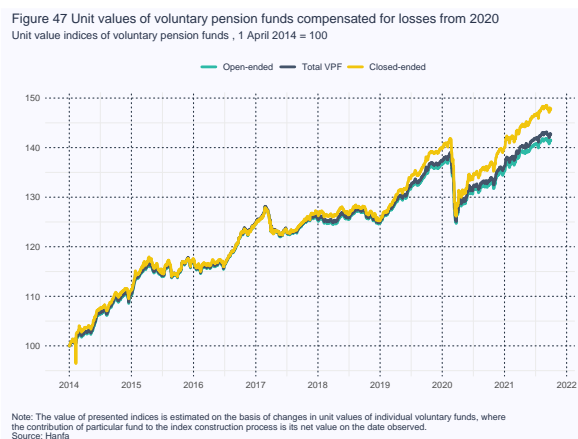
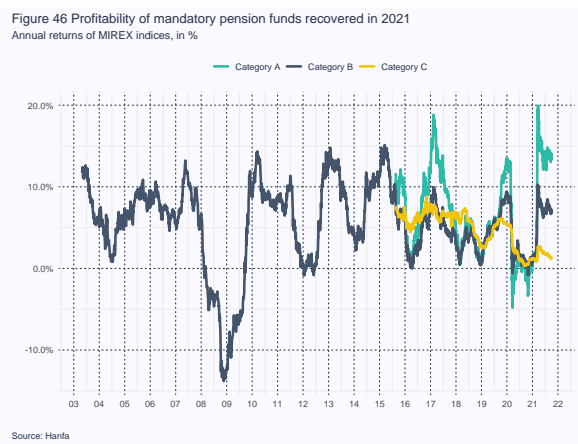
ended voluntary pension funds made a negative annual return, of -5.70%.



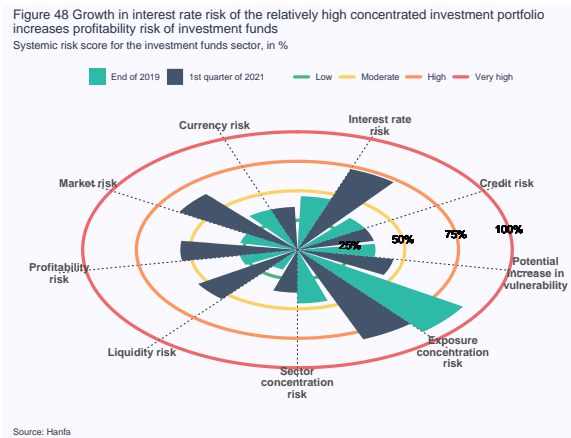
Notwithstanding some fluctuations at the beginning of 2021, which were associated with mounting inflationary pressures, financial market stock prices have steadily moved up in 2021, with the annual increase in the Mirex index of category A mandatory pension funds standing at 14.4% at the end of July 2021. Stock market trends also gave a boost to the value of units in voluntary pension funds, which was 11.8% higher at the end of July 2021 than in the same period of the previous year (Figure 47).

The generation of relatively high returns based on very conservative investment strategies (in terms of assumed risks) in conditions of low interest rates, will no longer be possible, particularly following Croatia's accession to the euro area, even if risk premiums for domestic bonds increase. Therefore, dispersion of pension funds' investments by asset classes is expected to grow further, with larger demand for foreign investment. In view of the very high global valuations, which give prominence to risks of

sudden corrections, particularly at times of increases in the general price level and questionable stability of the post-pandemic economic recovery, returns of pension funds will in future depend more on investor sentiment in global financial markets. However, the value of units in pension funds should remain stable even in case of materialisation of the highly unlikely but plausible scenario of another price correction in financial markets, triggered by a sudden spike in interest rates (more information in Chapter 9 Stress testing).



5 Investment funds



The systemic disturbance in the form of liquidity pressures on investment funds was stabilised in the first part of 2020 by the timely activation of macroprudential policy tools and the swift restoration of investor sentiment. However, exposure to market risks remained elevated in comparison to the pre-pandemic period, so that materialisation of these risks, depending on the further progress of the pandemic and economic recovery, might reduce the profitability of the fund industry in 2021 as well. In the segment of bond funds this is also amplified by the several-year increase in maturity, i.e. growth in interest rate risk exposure, particularly bearing in mind the predominant focus on domestic government bond issues.

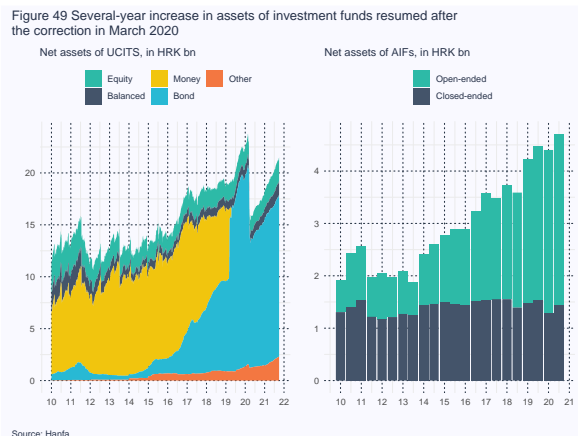
Key cyclical trends

Investment funds were hardest hit by systemic shocks from the first quarter of 2020, which affected most global financial markets, including the domestic market. Escalation of the pandemic pushed global economic uncertainty to the levels last seen during the great global financial crisis, while investor sentiment plummeted (more information in Chapter 3 [Financial markets](#)). In view of limitless and immediate possibilities to redeem units offered by UCITS, the growing propensity of investors to hold cash,

led to the largest ever outflow of funds in a very short period.

From the first days of the pandemic to the end of April 2020, investors withdrew a total of HRK 7.3bn from UCITS, which was 30.7% of net value of UCITS assets as at 20 February 2020, i.e. the day marked as the beginning of the health crisis in Europe (Figure 50). The bulk of the net outflows was recorded by bond funds, which in the preceding period had the largest net inflows and are the predominant category of UCITS (accounting for 73% of total net assets of UCITS at the end of July 2021).

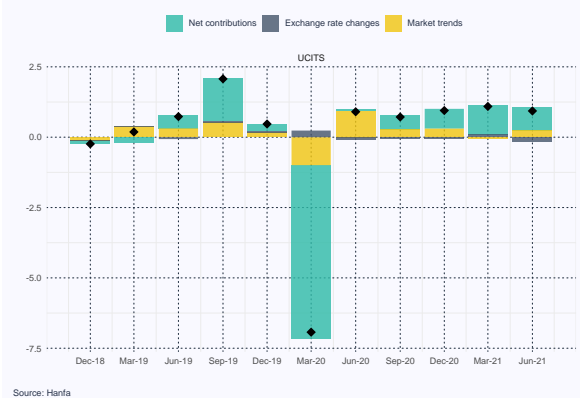
While other categories of UCITS also saw withdrawals of investor funds, the major portion of the decrease in net assets of equity funds in that period was caused by negative market trends, that is, price corrections in stock markets. The reduction in net assets of balanced funds was equally due to unfavourable market trends and investors' net outflows.



In such exceptional circumstances, UCITS managed to meet all their obligations to investors in a timely fashion, thanks to liquidity reserves and revived demand in the government bond market, spurred by central bank interventions. In the same period, relatively more risky alternative investment funds (AIFs) did not record major liquidity pressures, so that the

stable upward trend in their net assets, which began in 2014, continued even in the turbulent 2020 (Figure 49). At the end of 2020, the net assets managed by AIFs stood at HRK 4.7bn, growing by 5.2% from the end of 2019.

Figure 50 Return of investors in UCITS marked the end of 2020 and early 2021
Quarterly change in net assets of funds, in HRK bn



The reversal of such trends began as early as April 2020. In line with improved investor sentiment in the rest of the year and notwithstanding the lingering uncertainty surrounding the progress of the pandemic, net assets of UCITS rose steadily, with robust recovery continuing in 2021 as well. Driven by positive market trends and restored investor confidence, as reflected in positive net inflows in that period (Figure 50), net assets of UCITS reached HRK 20.7bn at end-July 2021, but were, nevertheless, 8.2% lower than at the end of 2019 (Figure 49).

UCITS and AIFs continued to expand their offer in the domestic market in 2020 and 2021 by establishing the first fund for investing in crypto assets, the first exchange-traded fund (ETF) and the first environmental, social and governance (ESG) fund. As the household sector is traditionally the dominant investor in UCITS and, in recent periods, also an increasingly important investor in AIFs (Figure 51), consumer protection and timely education of investment services users have gained importance in the process of protecting users and, indirectly, the financial system.

Structural characteristics and risks

Notwithstanding the consolidation of the UCITS sector in terms of net assets and the number of funds in 2020 and 2021 (112 UCITS were operating at end-June 2021, 3 less than at the end of 2019), the sector structure remained almost unchanged (Figure 52). As a result, **the concentration level in the UCITS sector remained moderate**. The number of alternative investment funds grew in the same period (by five) and there were 39 funds operating at the end of 2020. Nevertheless, concentration has been increasing in the AIF segment due to the growing accumulation of net assets in some management companies.

Figure 51 Growing interest of the household sector for investing in investment funds

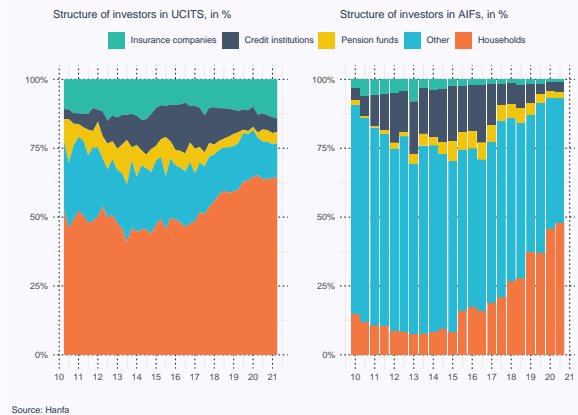


Figure 52 Increasing variety of products offered, particularly in the segment of alternative investment funds

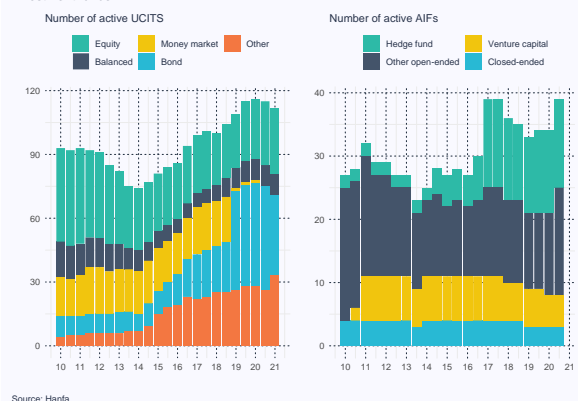
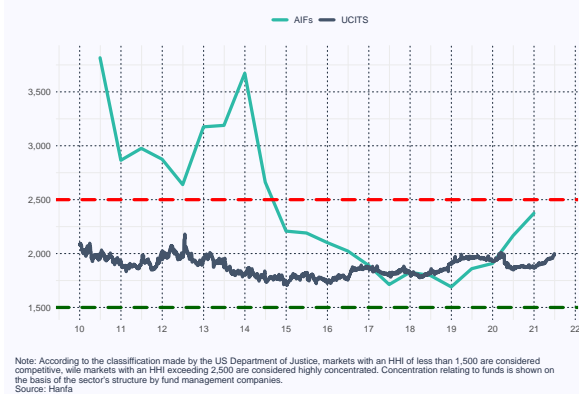


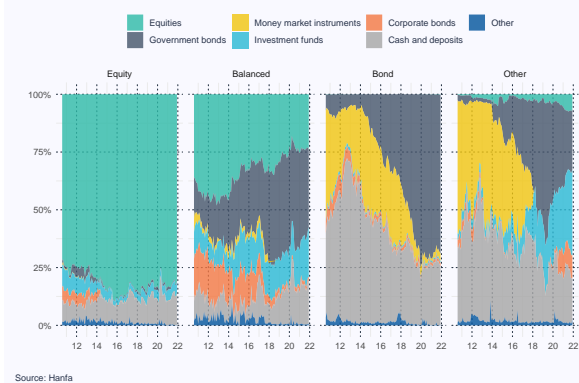
Figure 53 Moderate sector concentration, with a slight trend towards consolidation
HHI index of sector concentration



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 the sector's structure by fund management companies.
Source: Hanfa

Figure 54 In addition to relatively high reserves of liquid assets, management strategy determines the structure of UCITS investments

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

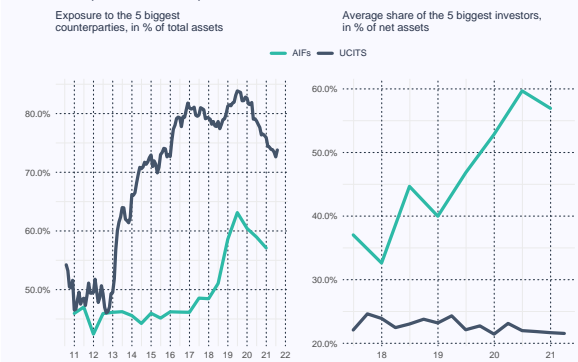


Source: Hanfa

The share of particular asset classes in the structure of UCITS investments is determined by the fund type (Figure 54) and, therefore, poses no concentration risk. However, **concentration of investment fund investments at the level of individual issuers is extremely high, particularly in the bond segment** because of investments in the most represented domestic government bonds. Exposure of UCITS to the five biggest counterparties accounted for a high 71.3% of total investments²⁰ (Figure 55) at the end of June 2021, a large share of which related to exposure to the government (bonds accounted for 64.1% of UCITS investments, 66.3% of which were exposures to the Republic of Croatia). **The high degree of investment concentration exposes funds to credit risk**, that is, the influence of the market perception of that risk on valuations. This risk is particularly relevant against a background

of growing public debt (more information in Chapter 2 [Macroeconomic environment](#)).

Figure 55 High investment concentration highlights potential idiosyncratic risks in the most represented counterparties



Note: The chart shows the asset-weighted average share of the 5 biggest investors by individual fund.
Source: Hanfa

Figure 56 Market perception of credit risk at historical lows

Market estimate of credit risk of the UCITS bond portfolio, in %

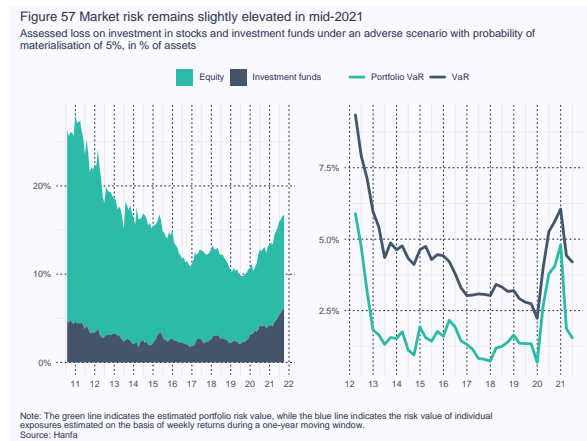


Note: The risk premium indicator shows the yield spread between the bond portfolio of UCITS and bonds with a very high credit rating (AAA) from euro area countries of the same maturity. The marked area indicates interquartile range of yield to maturity of individual funds in the sample.
Sources: Bloomberg, Hanfa

While the market's perception of credit risk is at historical lows (Figure 56), private and public debt expansion is larger than ever. As economic recovery picks up pace and inflation increases, any possible tightening of financing conditions would threaten the prospects for timely debt repayment. However, even if interest rates remain at current low levels, changes in credit risk perception in terms of the country's risk premium may significantly reduce the value of bond investments. Investor confidence in public debt sustainability over the forthcoming period will thus strongly influence the value of funds' portfolios and will be modified based on the perceived balance between sustainable economic recovery and financing conditions

²⁰ This data refers to the part of assets consisting of bonds, stocks, money market instruments and units in investment funds.

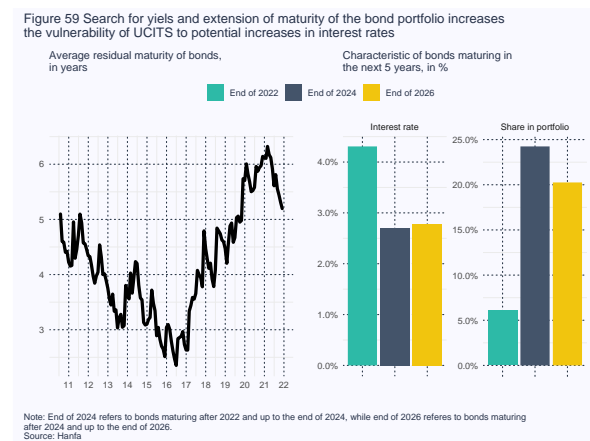
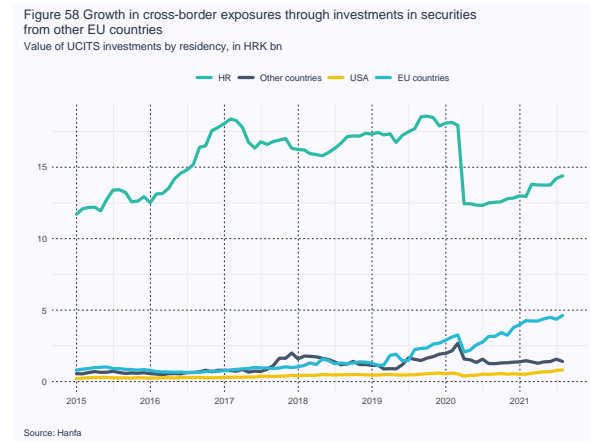
amid mounting inflationary pressures (i.e. snowball risk²¹).



In contrast with bond investments, stock investments of investment funds are much less concentrated (the five most represented issues accounted for 14.9% of the total stock portfolio at end-2020). This is also supported by the upward trend of (foreign) investments with higher liquidity. Portfolio diversification driven by anticipated further growth in foreign investments (Figure 58) diminishes the degree of investment concentration, but it also increases funds' exposure to market risks, which are particularly prominent in current conditions of historically high valuations (Figure 57).

The period of low returns is also reflected in the greater allocation of UCITS assets in long term debt instruments. The average weighted number of years to maturity of a UCITS bond portfolio has increased several fold over the last four years, coming to 5.3 years, which is in the maturity band characteristic for domestic pension funds as typical long-term institutional investors (Figure 59). The sharp increase in the maturity of a UCITS bond portfolio places additional emphasis on interest rate risk in a scenario with possible changes in interest rates and the resultant drop in the value of bond investments. As there are no signs of any imminent significant change in the direction of

the monetary policies pursued by leading central banks, maturity is expected to grow further in the forthcoming period in order to maximise profitability, which means that the large interest rate risk exposure of investment funds might become one of the major sources of disruptions.

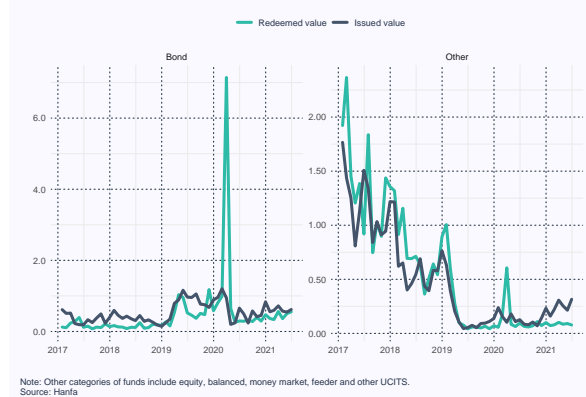


In addition to concentration of assets, concentration of liabilities by investor type is also relatively high, exposing funds to potential liquidity shocks. Retail investors, which are the most important category of UCITS investors, were the drivers of cash flows in 2020 in both directions: out of funds in the initial phase of the pandemic characterised by heightened uncertainty, and towards the funds during the stabilisation phase in the second half of 2020. Domestic retail investors are mostly reluctant to take risks, which is illustrated by the fact that bond funds are the predominant category of

²¹ This is the risk that arises from an unfavourable ratio between interest rates paid on debts and the growth rate of income used to service those debts.

UCITS in the market and that such investments are largely used as a more profitable alternative to bank deposits. In view of these characteristics, investors in UCITS are more prone to group behaviour based on behavioural determinants, which gave rise to liquidity pressures on bond funds in April 2020. This risk was further exacerbated in alternative investment funds, which recorded comparatively higher levels of investor concentration than UCITS (Figure 55).

Figure 60 Beginning of the crisis was marked by large withdrawals of units in bond UCITS
Redeemed values vs. issued values of UCITS in the month observed, in HRK bn



A flurry of investors who wished to redeem²² in the first quarter of 2020 was seen mostly in bond funds (Figure 60). In normal conditions, the share of highly liquid assets in total assets of bond funds is sufficiently large to cover average cumulative monthly redemptions (Figure 62). However, the emergence of a systemic shock, that is, the phenomenon of continuous demands for repurchase of units that were several times larger than both usual demands and the formed liquidity buffers prompted bond funds to turn into cash even less liquid asset classes. The funds secured the fulfilment of their obligations arising from demands for redemption by selling HRK 4.6bn of their bond portfolio, of which HRK 1.9bn (42.8%) was sold directly to the central bank (accounting for 15.5% of total central bank placements associated with the purchase of bonds within fine-tuning operations in that period).

²² Domestic UCITS are obliged under law to repurchase units from investors within seven days of receipt of such demand.

²³ Currency risk exposure of investment funds is assessed as the net open currency position in all currencies different from the

Figure 61 Relatively high liquidity reserves of domestic UCITS have grown further after the onset of the coronavirus crisis
Highly liquid assets by type of instrument, in % of total assets

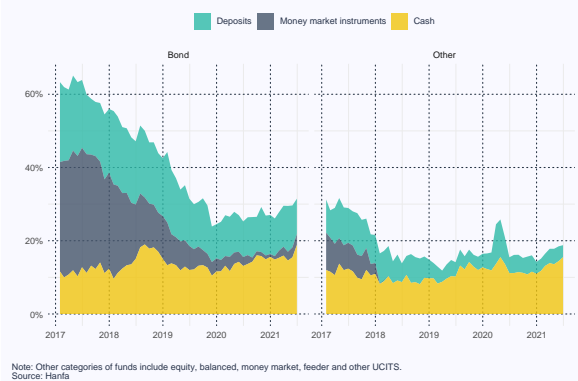
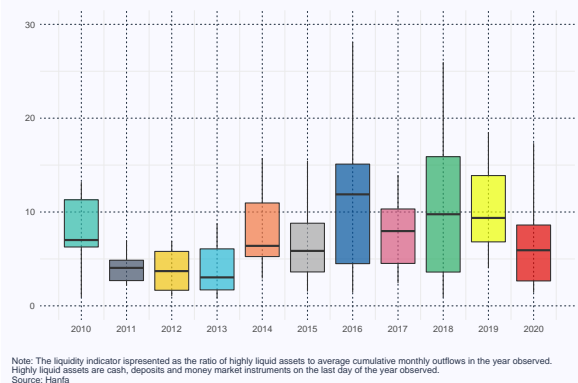


Figure 62 Historical data show that in normal conditions liquidity reserves of bond funds exceed cumulated monthly gross outflows by several folds
Distribution of liquidity indicator of bond UCITS

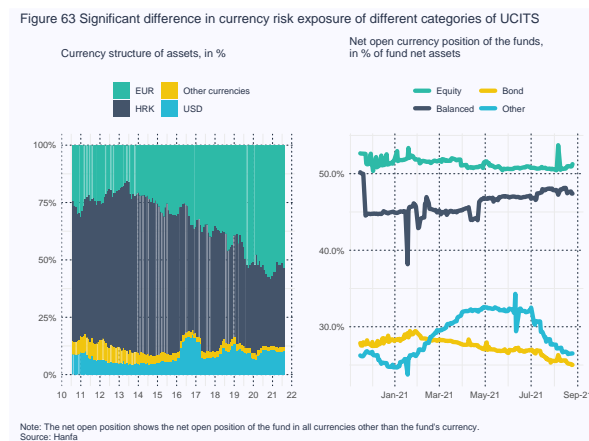


The liquid-to-total-assets ratio of UCITS has steadily decreased in recent years (Figure 61) as a consequence of doing business in a low interest rate environment, which motivated fund managers to allocate assets into more risky and less liquid classes. However, liquidity pressures in early 2020, reversed this trend, so that the share of liquid assets, in particular money in accounts, has been growing since March 2020. The liquid-to-total-assets ratio of UCITS, which stood at 23.1% in late 2019, grew by 3.8 pp by the end of July 2021.

Investment fund exposure to currency risk²³ is high, with the net open currency position ranging from 26.3% to 50.7%, depending on the UCITS category. The currency structure of assets is predominated by investments in euro, which have been growing for several years and are

fund's currency, where foreign currency-denominated exposure with a currency clause is not treated as foreign currency exposure.

expected to continue to increase in the forthcoming period on the back of the upward trend in foreign investments. Nevertheless, such **high exposure to currency risk will be much reduced after the anticipated adoption of the euro** as the official currency, which is planned in the following two years at the earliest. In the meantime, as the exchange rate is expected to remain stable in the period preceding the euro adoption, the likelihood of materialisation of this risk is relatively low.



Returns

Despite the systemic shock in the first quarter of 2020, **the returns of almost all categories of UCITS turned positive by the end of the year.** Bond funds, the most represented funds with respect to size of their net assets, concluded 2020 with a positive return of 0.9%, which is much lower than their long-term average (by 1.5 pp). Downward pressures on the prices of bond fund units might continue in 2021 in view of the greater focus of investors on inflationary trends and associated monetary policy actions (Figure 65).

Negative average annual returns were recorded only by equity funds, which ended the year with returns of -1.5% and again recorded the steady increase in the higher volatility of unit prices compared with other UCITS. Nevertheless, thanks to favourable trends in stock markets, which continued into 2021, unit prices of equity funds were given a strong boost amid historically

high valuations and were 12.9 pp higher at end-July 2021 than at end-2019 (Figure 64). This offset the 25 pp contraction in unit values at the beginning of the crisis, with competitive returns also being recorded in comparison with the preceding years.

Significant heterogeneity of realised returns by particular UCITS categories will also characterise the upcoming period, mostly owing to their idiosyncratic characteristics and investment policies, which may somewhat adjust to inflationary expectations in the context of current upward trends in more risky and foreign investments. Furthermore, returns of investment funds and profitability of other entities in the financial services sector will lean strongly on (through the risk premium) the maintenance of optimism and positive trends in market sentiment, which will depend on macroeconomic developments and the evolution of the epidemiological situation. Bearing in mind the present valuation levels, any change in the currently very sensitive sentiment might lead to significant price corrections in financial markets and materialisation of the still elevated market risks (more information in Chapter 9 [Stress testing](#)).

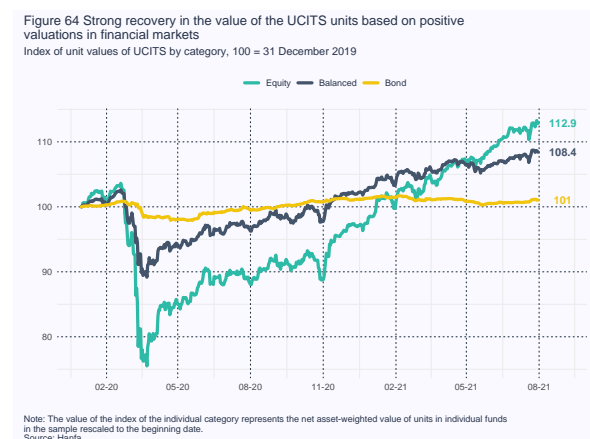
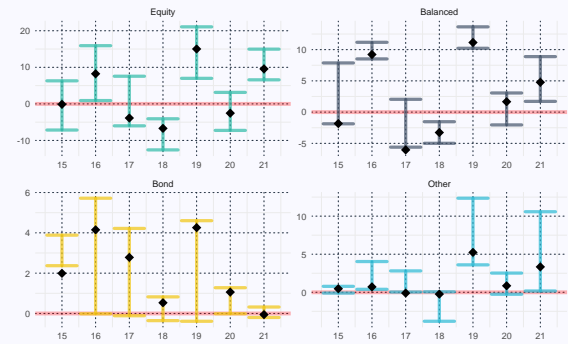


Figure 65 Strong recovery in returns on equity and balanced UCITS in 2021

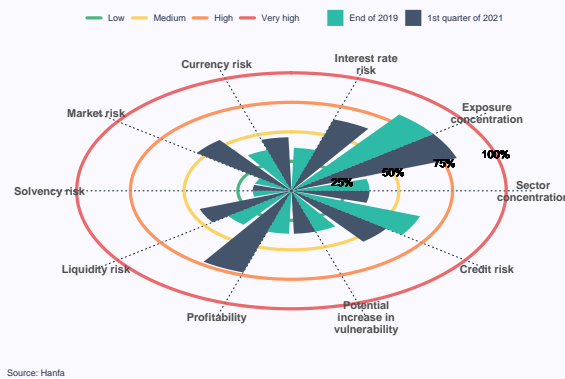
Annual returns of UCITS by fund category, in %



Note: For 2021 presented is return in the first seven months. The line marks indicate interquartile range of yields of individual funds in the sample.
Source: Hantia

6 Insurance companies

Figure 66 The environment of low interest rates and heightened market risks paired with a jump in payments of claims for property insurance put additional pressure on profitability of insurers
Systemic risk score for the insurance companies sector, in %



The decline in the profitability of insurance companies in 2020 was a result of larger payments of claims in the property insurance segment as a consequence of the two earthquakes in 2020 as well as the smaller volume of life insurance business. Pressures on the profitability of insurance companies in the context of low interest rates have persisted into 2021, so that companies have slowly turned towards more risky asset classes in search for satisfactory yields. Although the market perception of credit risk was relatively low in 2020, the high investment concentration of insurance companies maintained exposure to this risk at a moderate level, also elevating exposure to interest rate risk. While aggregate systemic risk exposure of the insurance sector edged up in the preceding period, solvency was retained at very high levels, in part thanks to the adopted macroprudential measures.

Key cyclical trends

The overall insurance sector business was relatively unaffected by the coronavirus crisis in 2020, with total gross written premium remaining at the same level as in the preceding year (HRK 10.5bn). However, the effects of the

coronavirus crisis, and particularly of the long-term period of low returns, were evident in diverging trends between life insurance (a 13.7% annual decrease in premium income in 2020) and non-life insurance (a 5.6% growth in written premium). Gross written premium in life insurance business has edged up in 2021 so far; it was 11.1% larger in the first seven months of the year than in the same period of 2020, whereas premium in the non-life insurance segment steadily grew at a rate of 12.8% (Figure 67). As a result of several-year trends in premiums, the share of life insurance in total premium income of insurance companies dropped to 24.2%, which is well below the European average of 52%²⁴.

Figure 67 Growth in gross written premium in non-life insurance business picks up in 2021
Annual gross written premium, in HRK bn

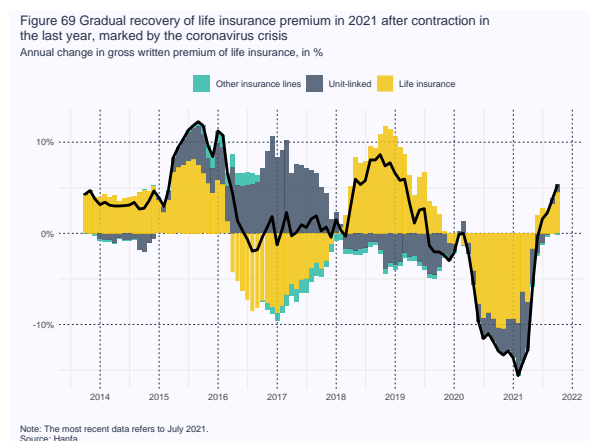
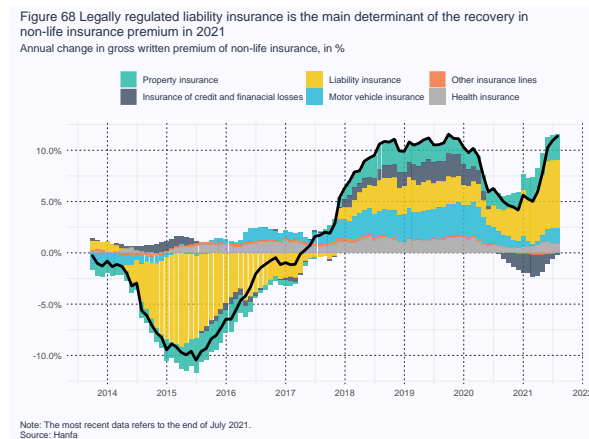


The upturn in gross non-life insurance premium in 2020 and 2021 has been largely driven by the increase in liability insurance premium (Figure 68). This includes the most represented motor vehicle liability insurance, which recorded a rise in business volume, i.e. the number of contracts, and a significant growth in prices (of about 10%). The rise in the average contract price was the outcome of intensified external operations (which are more attractive in terms of prices) of some companies as well as the rise in prices of

²⁴ The data refers to the aggregate structure of premiums in EEA countries in 2020 (more information on [this link](#)).

domestic contracts on motor vehicle liability insurance, partly driven by legislative changes²⁵.

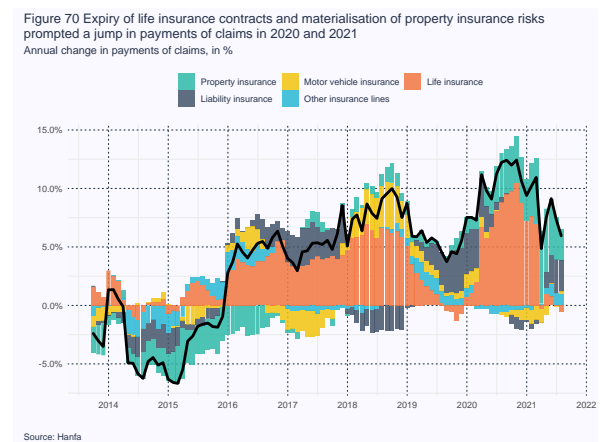
In the segment of non-life insurance, the growth in premium income arising from property insurance contracts²⁶ also picked up slightly, reflecting the last year's earthquakes as well as other, increasingly more frequent, natural disasters. At the same time, a decline in bank lending caused a fall in credit insurance premium (of 27.5% at an annual level), following a sharp growth in the past years. Normalisation of the credit intermediation process also supported the recovery in premiums in this segment, which were 4.7% higher in the first seven months of 2021 than in the pre-crisis 2019.



The dynamics of household lending also contributed to the decline in premium income

from life insurance, which depends extremely on the banking distribution channel. As a result, almost all companies recorded a decrease in gross written premium in life insurance business in 2020 (Figure 69). In addition, low market returns, and the resulting lower guaranteed rates in life insurance products, reduced the investment appeal of such products, so that contracts expiring in that period were not renewed.

The 2020 growth in claims settled in life insurance business (of 18.3% a year) was largely driven by regular expiry of contracts (Figure 70), with only a small contribution coming from the higher value of early terminations²⁷. Considering the maturing portfolios of insurers, payments of claims are expected to continue rising in the coming periods as well, although annualised data for the first half of 2021 indicate a slowdown of this trend.



Claims settled in non-life insurance business grew by 3.9% from 2019 to 2020. Data for the first half of 2021 confirmed the expected amplification of this trend due to the earthquakes from the end of 2020 (annual growth picked up to 18.2%), particularly in the segment of insurance against fire and elementary disasters, including earthquakes

²⁵ A new orientation criteria of the Croatian Supreme Court regarding the compensation for non-material damage.

²⁶ Insurance against fire and elementary disasters as well as other property insurance lines.

²⁷ The surrender rise in 2020 relative to 2019 amounted to 13% of the total growth in claims settled in life insurance business.

(amount of settled claims grew annually by around 33%). In a setting of deteriorated macroeconomic conditions which made loan repayments more difficult, credit insurance claims also increased in 2020. Other types of non-life insurance did not record any major increases in the amounts of settled claims or even saw their decrease, which may be associated with reduced economic activity and mobility of individuals. The amount of claims settled in liability insurance rose on the back of relative normalisation of life in the first half of 2021.

continues to be much more prominent in Croatia than in other comparable EU countries.

Structural characteristics and risks

Insurance services in the domestic market in 2020 were provided by 15 insurance companies with head offices in the Republic of Croatia, which, together with branches of EU insurance companies and the services provided by other companies from Member States exercising the freedom of establishment and the freedom to provide services, **makes the domestic insurance market relatively competitive** (Figure 71).

Figure 71 Sector concentration remains stable

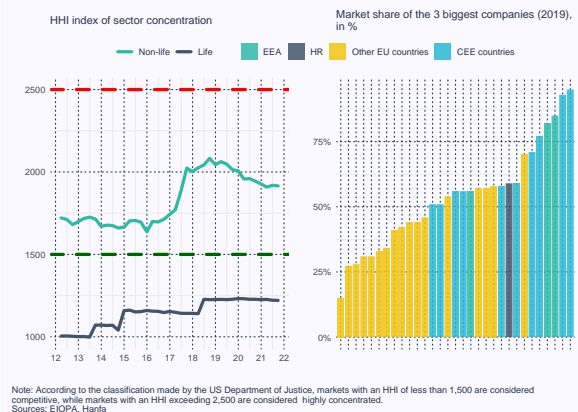
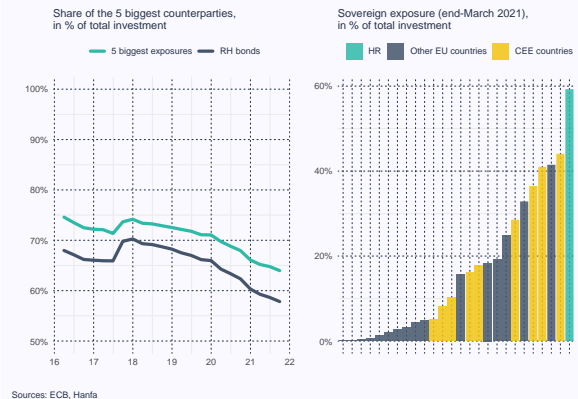
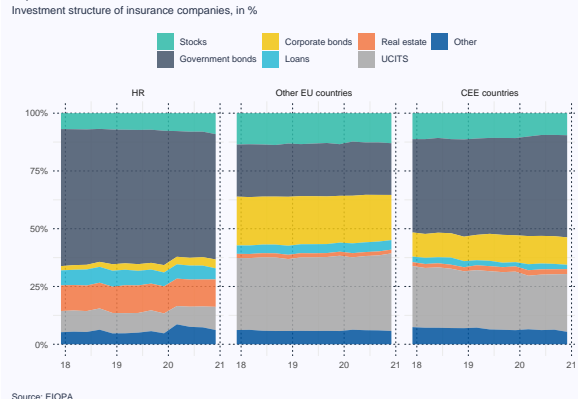


Figure 72 Exposure concentration risk at high levels despite the recent increase in portfolio diversification



As with other financial service providers, **concentration risk is much more prominent in the investment portfolio segment**, that is, assets of insurance companies. With more than 65% of total investments being accounted for by exposures to only five issuers (Figure 72), the bulk of which are subscribed sovereign bonds, **the domestic insurance sector is highly exposed to credit risk associated with the domestic fiscal situation**. In view of the growth in government debt in the context of the coronavirus crisis and cheap money, balance sheets of insurance companies are highly sensitive to the market perception of Croatia's credit risk. Some investment diversification in terms of asset types (growing investment in stocks and investment funds) and in terms of issuers has been seen in recent years. However, the risk of investment concentration, which also amplifies liquidity risk exposure, particularly in case of certain shocks,

Figure 73 Slight increase in investment in stocks and investment funds reduces sovereign exposure

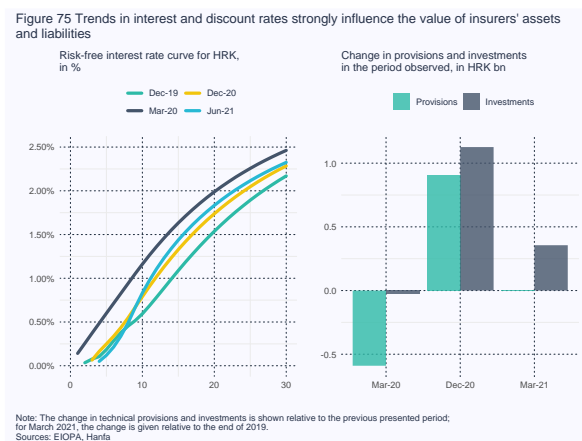
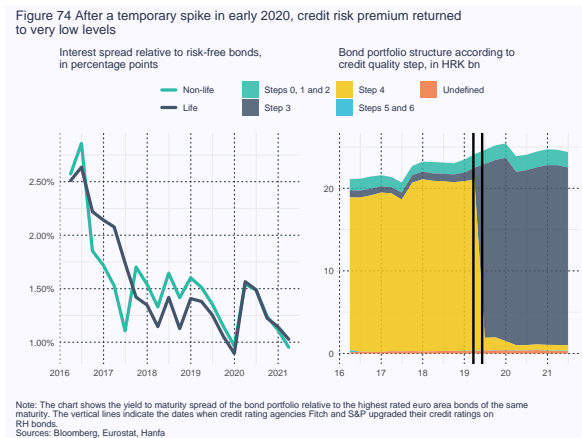


While domestic insurance companies are much less exposed to stock markets, corporate bonds and investment funds than their European counterparts (Figure 73), **allocation of funds in the real estate market exceeds European averages by a large margin**. Investment in real estate, particularly commercial real estate, which

is a relatively less marketable type of assets, exposes companies to additional liquidity risk. In spite of that, this form of investments increased in the first half of 2021, accounting for 7.62% of total investments by insurance companies at the system level. **In the context of liquidity management, an additional reason for concern is a particularly high share of real estate investment in some companies** (in which they account for over 34% of the investment portfolio²⁸). While this form of investment currently provides a stable source of income and boosts a company's profitability, any price overheating in the segmented real estate market, as some research suggest,²⁹ would expose companies to possible substantial losses in property value under a scenario of sudden price corrections that may spill over from the residential market to the commercial property segment.

Highly concentrated investments give prominence to credit risk faced by companies. While the level of credit risk in the most represented bond portfolio is formally low (at the end of June 2021, only 3% of the bond portfolio was assigned a speculative grade rating³⁰) thanks to the upgrade of Croatia's credit rating in late 2019, the materialisation of credit risk depends strongly on its perception and risk aversion of global investors (Figure 74). Bearing in mind the large debt of the domestic government, which is the predominant counterparty in investment portfolios, **the risk of a sudden increase in risk aversion**, particularly in view of the present signs of stagflation, might significantly diminish the value of assets valued at market value. Notwithstanding favourable and formally comfortable levels of exposure to credit risk, one should keep in mind the possibility of its sudden change depending on the market perception of public sector stability

and investor appetite for risky investments. This may cause systemic destabilisation of balance sheets of the entire insurance sector in Croatia.



The value of investments and technical provisions of insurance companies was strongly affected by volatile returns on government bonds over the last quarters (Figure 75). The prolonged period of low interest rates and the consequent search for yields resulted in an extended maturity of bond investments, even in non-life insurance business³¹ (Figure 76). While this makes the sector more sensitive to potential increases in returns (either due to changes in investor sentiment, particularly in view of vulnerability of the domestic fiscal position, either due to financing conditions affected by

²⁸ The data does not include investment in real estate for own use.

²⁹ More information in the Croatian National Bank's publication [Financial Stability No 22](#).

³⁰ Credit quality grades 4, 5 and 6 are considered below-investment-grade or speculative grade.

³¹ In line with the nature of their business, portfolios of insurance companies in the life insurance segment are characterised by longer maturity (8.3 years) compared with portfolios in the non-life insurance segment (6.3 years).

inflationary pressures that may prove not to be of a short-term, transitory nature), **exposure to interest rate risk is moderate because of the relatively low maturity mismatch between assets and liabilities**. Interest rate risk exposure of insurance companies is tolerable in terms of capital stability under the simulated scenario envisaging the materialisation of a systemic shock and notable growth in yields on long-term government bonds since the excess of assets over liabilities would not be significantly reduced (more information in Chapter [9 Stress testing](#)).

denominated in the euro. In addition to a reduction in capital requirements for interest rate risk as well as differential and concentration risks, this will be reflected in the lowering of the solvency capital requirement. The likelihood of currency risk materialisation is very low at present due to the required exchange rate stability during the period of exchange rate mechanism.

Though **still moderate, average liquidity risk exposure of insurance companies rose in 2020**, with the upward trend continuing in the first part of 2021. While the levels of liquid assets of domestic companies exceed European averages, a reason for concern are extremely low liquidity buffers of some companies that are systemically important in terms of offered insurance lines and their market share (Figure 78). High investment concentration emphasizes the importance of existing, formally satisfactory, liquidity profiles of insurance companies, particularly in the context of the general orientation of the entire financial services sector towards domestic government debt issues, whose questionable effective market liquidity partly came to light at the outbreak of the pandemic in 2020.

Though liquidity of insurance companies is usually not perceived as a reason for concern because of the nature of their business, sufficient liquidity is especially important in systemic crisis situations. More specifically, in addition to market disruptions that in such situations reduce the liquidity of otherwise liquid assets, insurance companies may face direct liquidity pressures through a loss of client trust (which may lead to a drop in premium income and increase in surrenders). The number of early terminations of insurance contracts did not rise in 2020 despite reduced economic activity and substantial uncertainty (annual rate of surrenders held steady at slightly above 3%). However, the rate of surrenders picked up in the first half of 2021, so that the risk of increases in early contract

Figure 76 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

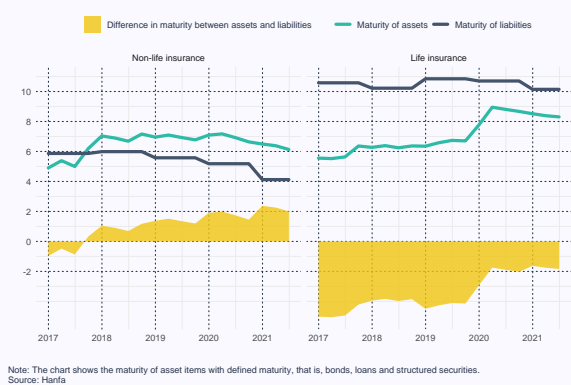
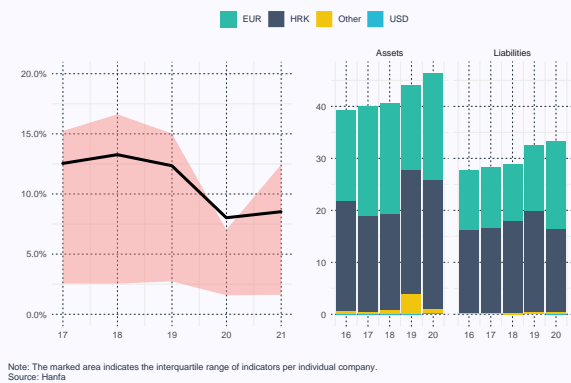
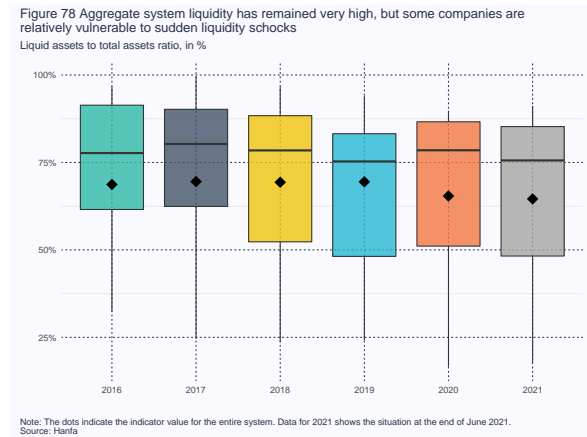


Figure 77 Currency risk exposure has remained relatively lower than in the pre-crisis period
Difference between assets and liabilities exposed to currency risk, in % of total assets
Currency structure of assets and liabilities of insurance companies, in HRK bn



Currency risk exposure of insurance companies is relatively low as the net open foreign currency position was reduced by 0.5 pp from the end of 2019, to 8.5% of net assets in 2020. There were no significant changes in the first half of 2021 either (Figure 77). This risk should be considerably reduced once Croatia joins the euro area as most foreign currency assets and liabilities of insurance companies are

terminations remains elevated and depends primarily on the recovery pace of segments of the economy that were hit hardest by the pandemic, particularly in the context of lifting/reducing government support measures in the remainder of 2021.

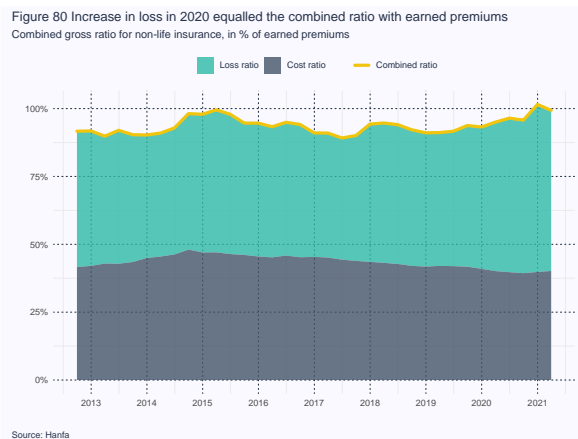
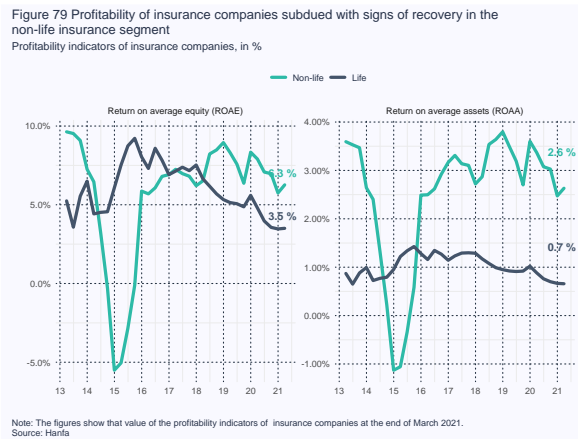


Profitability and capitalisation

The years-long downward trend in the profitability of the domestic insurance sector continued also in the challenging year of 2020 and the first part of 2021. Such performance results follow the trends of the broader EU insurance market, with the median profitability of domestic companies being even marginally higher in 2020 (median ROA stood at 0.38% in late 2020).

The life insurance segment came under particular pressure; its profitability dropped to the lowest level since 2013, taking into account the sharp decrease in premium income, the parallel growth in claims expenditures and the long-lasting challenge to generate adequate returns. While the profitability of non-life insurance business has also been decreasing since the end of 2019, this segment was much less affected by limited profitability opportunities, with a stable increase in premiums. As a result, the mild rebound in profitability at the beginning of 2021 was driven by increases in some segments, particularly cross-border operations, and prices (Figure 79).

Relatively high and growing claims expenditures impose a burden on non-life insurance operations of insurance companies. It has been increasingly more difficult in recent years for companies to compensate for the steady deterioration in the gross combined ratio (it exceeded 100% in 2020 and then dropped to 99.4% in the first quarter of 2021) by increasing operational efficiency, that is, reducing the cost ratio (Figure 80). In the forthcoming period, these trends might be reflected in the price policy of insurance companies and further expansion of external, more profitable, operations.



Generally low interest rates and returns on investments and elevated volatility in financial markets, coupled with the relatively high concentration of exposures through the market risk component, have slightly eroded capitalisation indicators, which have been gradually decreasing since the end of 2018

(Figures 81 and 82). Regardless of this concerning trend, **the level of sector capitalisation in terms of the SCR ratio has remained well above the regulatory minimum**,³² providing adequate protection against possible but highly unlikely systemic disruptions simulated within the stress testing exercise for the financial services sector. Although the insurance sector itself is capable of withstanding new macroeconomic and financial disruptions in spite of reduced capital buffers, individual companies, in particular small ones, would not have sufficient capital reserves in such circumstances.

The satisfactory level of the insurance sector capitalisation in conditions of systemic disruptions seen in 2020 was also ensured by synchronised macroprudential actions of EU regulators, which, in light of the pandemic-driven uncertainty, temporarily restricted profit distribution by insurance companies, as well as banks, investment firms and other counterparties (more information in Box 2 Macroprudential preservation of insurers' capital buffers in stressful circumstances in the publication [Macroprudential Risk Scanner No 5](#)). By retaining within the system previous period profits in the amount of almost HRK 4bn, and aided by existing liquidity levels and reinsurance programmes, domestic companies were able to respond to the challenging circumstances of the pandemic and earthquakes without any major problems. At the beginning of April 2021, Hanfa issued guidelines to insurance companies to refrain from the distribution of profits at least until the end of September 2021, and to apply conservative prudential criteria as regards

profitability, asset structure and own funds when making payments. While recent developments point to economic recovery and relative stability in financial markets, systemic risks in the insurance sector have remained elevated. Therefore, regardless of further implementation of macroprudential measures currently in effect, prudence of insurance companies in the framework of capital management is a necessary prerequisite for the maintenance of system stability in the forthcoming period.

Figure 81 Solvency of insurance companies still well above the regulatory minimum
Total and median SCR ratio, in %

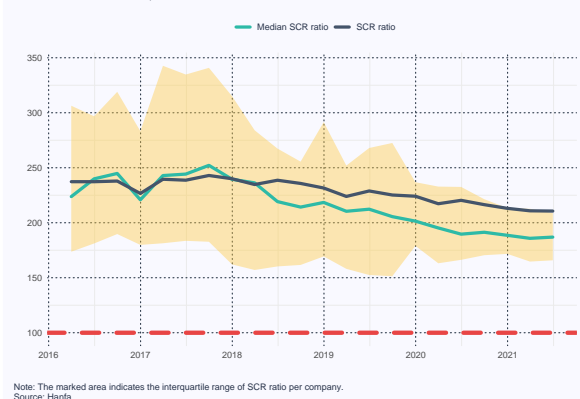
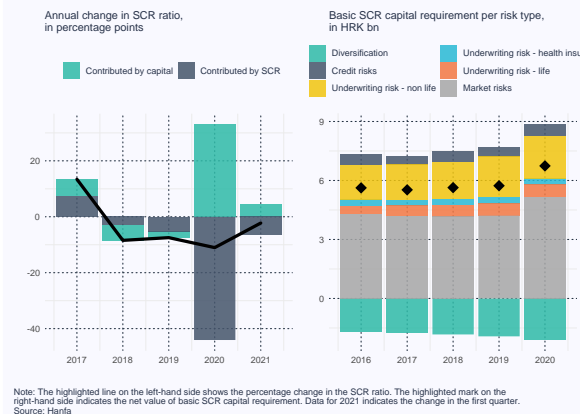
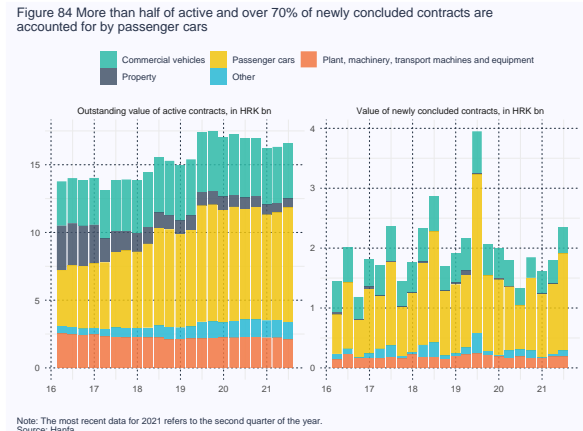
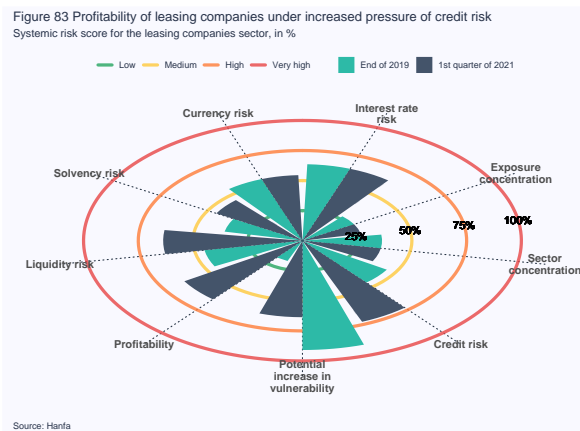


Figure 82 Increase in capital buffers paired with an increase in capital requirements in 2020

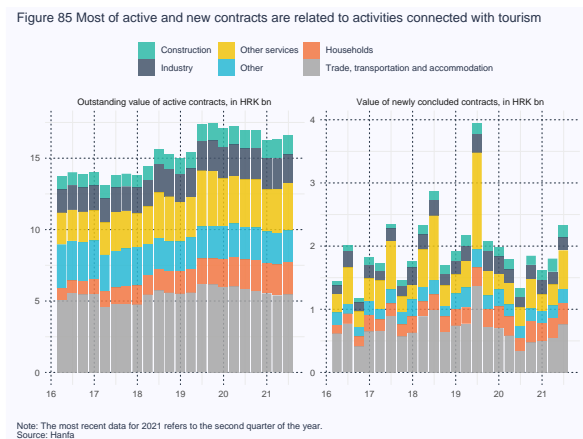


³² SCR ratio at the system level stood at 213.1% at the end of 2020 and at 210.9% at the end of the first quarter 2021.

7 Leasing companies



In 2020, the impact of the pandemic on leasing companies' business operations was most evident in decreased profitability resulting from the smaller volume of new business and difficulties in payments under existing contracts. While this increased exposure to credit risk, its materialisation in the form of the rise in non-performing contracts was mitigated and possibly postponed for future periods due to approved moratoriums.



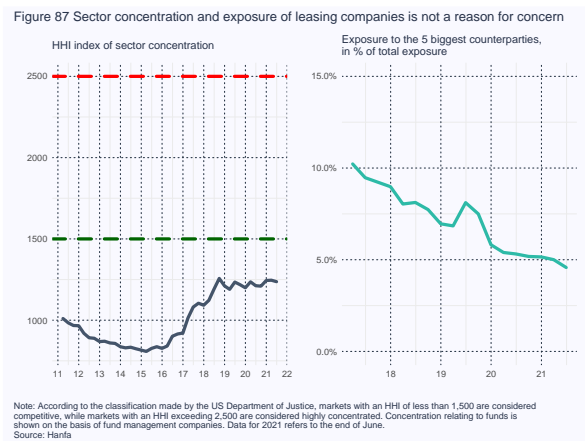
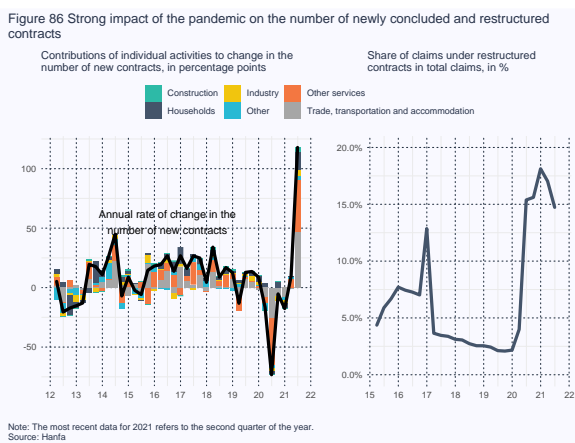
Key cyclical trends

Leasing operations increased from 2016 to 2019 on the back of economic recovery, so that assets of leasing companies reached HRK 21.3bn (6.8% of GDP) at end-2019, growing by 21% in that period. Nevertheless, this was only a fraction of assets of domestic leasing companies in early 2009, when they totalled HRK 35.6bn (10.3% of GDP in 2008). As in the preceding upward phase of cyclical economic growth, leasing companies mostly financed the purchase of vehicles (Figure 84). In the recent period preceding the pandemic, most financing went for vehicles for tourist and tourism-related services (primarily for transport of passengers and renting vehicles and vessels), reflecting the robust growth in tourism activities in that period.

The inherent cyclical nature of leasing companies operations again came to the fore with the introduction of the lockdown measures to counter the pandemic in early 2020. The structure of leased assets, which were predominantly financed in the preceding period of economic expansion, additionally exacerbated negative business trends because of the crisis specifics and the adopted social distancing measures (Figure 85). Assets of leasing companies decreased by 7.6% from 2019 to the end of 2020, and the conclusion of new business deals was significantly reduced (the value under new contracts in the segments of operating and finance lease plummeted on an annual level by 24.0% and 37.5%, respectively). The leasing market saw a recovery in late June 2021, accompanied by an increase in the value

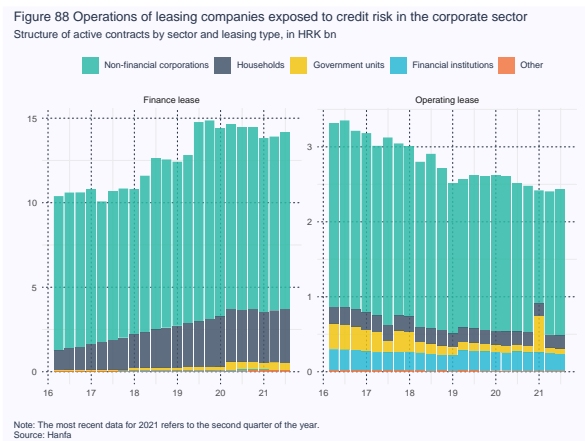
of new contracts³³, a decrease in the number of active rescheduled contracts, as well as the decrease in claims under restructured contracts. In spite of recent positive trends and the short-lived recovery in the leasing market, the macroeconomic situation has remained uncertain and relatively unfavourable and still depends largely on the epidemiological situation in the future (possible fourth wave of the pandemic), duration of government support measures and other economic trends (more information in Chapter [2 Macroeconomic environment](#)).

(vehicles account for 70.5% of the finance lease portfolio and for a high 91.2% of the operating lease portfolio), the institutional sector of lessees (non-financial corporations account for 63.3% and 74.5% of the finance and operating lease portfolios, respectively), and by economic activity of the lessee (the three most significant activities account for 62.3% and 63.5% of the finance and operating lease portfolios, respectively). The structural characteristic of the relative concentration of exposures to the domestic tourism sector emphasizes the (inter-)dependence of leasing operations on the economic cycle, i.e. its procyclicality.



Structural characteristics and risks

The described pandemic-driven movements might intensify the consolidation trend seen in the last ten years. Although **concentration in the leasing market is relatively moderate** (even without accounting for leasing business of credit institutions), it is obvious that this business is becoming increasingly more concentrated³⁴ (Figure 87).



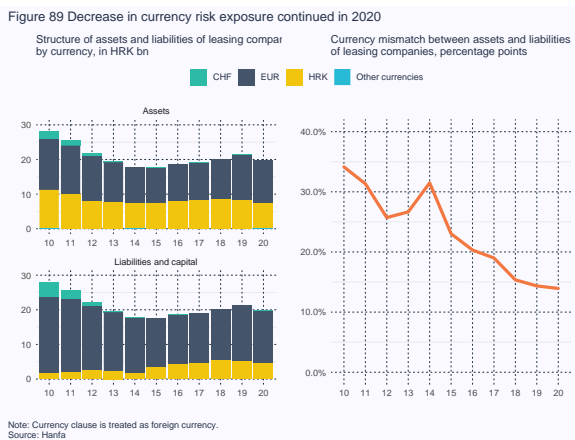
The portfolio of leasing contracts is diversified, with the five biggest clients accounting for only 5% of total exposures at the beginning of 2021 (Figure 87). While concentration of exposures by lessees has been low and decreasing in recent years, **leasing operations are relatively concentrated by the type of leased assets**

Currency mismatch between assets and liabilities of leasing companies has been steadily decreasing over the last five years, a trend which, albeit more slowly, continued into 2020. As many leasing companies operating in Croatia,

³³ Of 34.5% a year for finance lease and 25.1% a year for operating lease.

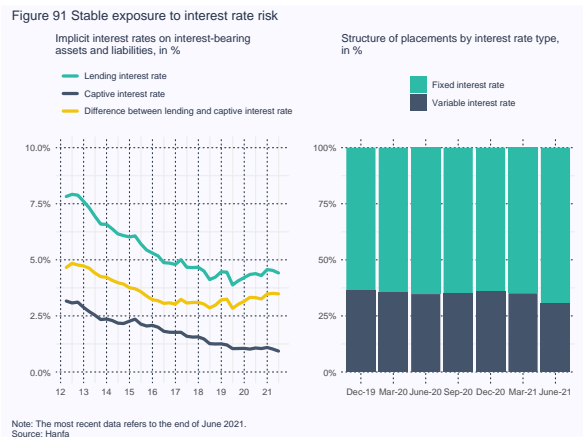
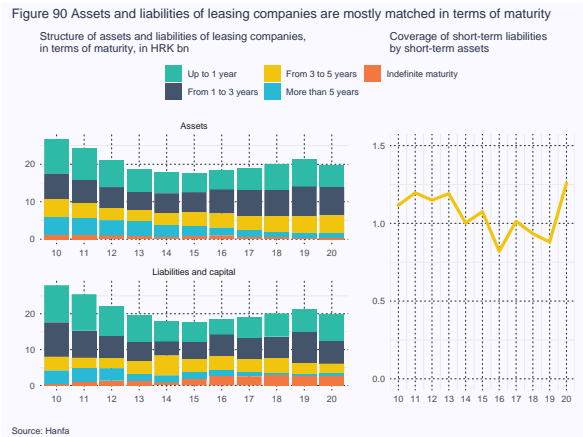
³⁴ More than 50% of market assets are concentrated in four companies.

directly or indirectly, belong to large European banking groups (in late 2020, 98.1% of total assets of leasing companies were in foreign ownership), an important financing source for leasing companies are parent bank loans denominated in foreign currency (mostly euro). At the end of 2020, as much as 76.8% of liabilities of leasing companies were indexed to a foreign currency. The growth in the share of kuna sources of financing, which was observed in recent years, came to a halt in 2020, and the same was true for the currency structure of assets. Even though direct exposure to currency risk is moderate, potential currency mismatch between income of lessees and their obligations under leasing contracts exposes leasing companies to credit risk that may arise in case of exchange rate depreciation. However, Croatia's participation in ERM II, that is, exchange rate stability as a precondition for euro adoption, considerably reduces the probability of materialisation of this risk.



The structure of leasing contracts in terms of interest rate variability has been relatively stable since the end of 2019, with fixed interest rates predominating and accounting for almost 60% of the portfolio³⁵. In view of the implicit lending interest rate at slightly below 5%, this portfolio structure is favourable in an environment of prevailing low returns. However, leasing

companies would not be able to transfer in entirety to lessees a possible increase in benchmark risk-free interest rates, which would inevitably raise their financing costs and which might reduce their interest margin in the final run.

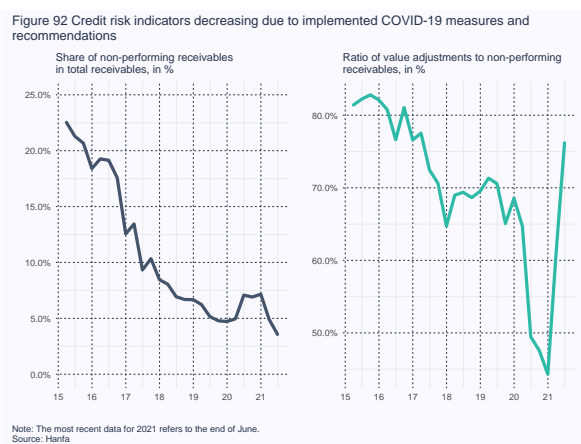


The pandemic interrupted the years' long trend of improvement in the loan portfolio quality of leasing companies; the deterioration in macroeconomic conditions in 2020 led to significant growth in non-performing leasing contracts, so that non-performing claims rose by 40% from the pre-crisis period, as also evident in profitability indicators. While the share of non-performing placements in the total portfolio did not grow much from the pre-pandemic period, when it stood at 5.0%, the coverage of such placements decreased sharply, from a high 65%

contracts (increasing accrued interest) to the disadvantage of lessees. This practice was identified for at least 41,773 contracts.

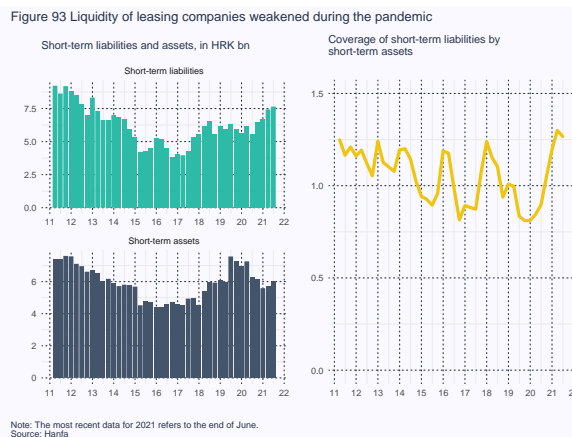
³⁵ Off-site inspections carried out in 2020 showed that some companies, without clear and justified reasons, unilaterally changed contractual obligations under variable interest rate

to 44.3% at the end of 2020 (Figure 92). More specifically, credit risk materialisation was formally reduced and postponed by a number of measures and supervisory recommendations regarding approval of moratoriums to clients previously classified as regular payers (restructured claims came to 18.1% of total claims of leasing companies in late 2020). At the same time, leasing companies were released from the obligation to classify such claims under non-performing placements and to form appropriate value adjustments. The coverage of non-performing claims returned to pre-pandemic levels after recommendations expired, but the share of such claims in total claims decreased due to the increase in new business deals of leasing companies.



Liquidity of leasing companies measured as the coverage of short-term liabilities by assets of the same maturity decreased in 2020, after growing for two years (Figure 93). This was due to the fall in short-term assets, which accounted for 28.7% of total sector assets in late 2020, or 2.7 pp less than in 2019. Extension of asset maturity was also a result of rescheduling and moratoriums approved to clients who were unable to regularly repay their obligations due to the coronavirus crisis as maturities of such contracts were generally extended until expiry of the

approved moratorium period. This liquidity indicator returned to pre-crisis levels with the pick-up in business operations and new contracts in the first half of 2021.



Profitability and capitalisation

The impact of the coronavirus crisis on performance indicators of leasing companies for 2020 was most evident in the segment of profitability (Figure 94). Along with smaller income generated under existing contracts due to approved moratoriums and rescheduling, the slump in new contracts lowered total net income of leasing companies (by 18.1% on an annual basis). The sharpest fall in income was recorded in the category of other operating income, which was 25.3% less than in 2019³⁶. Notwithstanding the temporary suspension of the obligation to form provisions for delinquent contracts, companies increased value adjustments by 69.5% on an annual basis, which further worsened their business performance. As a result, the return on average assets stood at only 1.2% in 2020, the level last seen in 2017.

Notwithstanding the significant increase seen in the first half of 2021, the annual volume of new business deals will likely remain below pre-crisis levels. With potential materialisation of credit risk

³⁶ The fall in income was due to the base effect of 2019, when the other income item was atypically large due to business consolidation of one company.

depending on abilities of lessees to revive their business models and processes and adjust to the post-pandemic environment, this will exert pressures on the profitability of leasing companies in the upcoming period. Adding to this will be the maintenance of interest rates at low levels and the possible imposition of supervisory measures ending the companies' practice to change interest rates in a non-transparent manner and regardless of market conditions.

Capital buffers remained at relatively satisfactory levels in spite of lowered profitability; the capital to total assets ratio stood at 11.7% at the end of June 2021, or 0.4 pp more than at the end of 2020 (Figure 95). Solvency of leasing companies, though currently satisfactory, will in the upcoming period be contingent on the recovery of the business volume and profitability, and possible materialisation of credit risk depending on the degree of synchronisation between the withdrawal of government support measures and stabilisation of business operations, particularly in the tourism sector (more information on economic trends in Chapter [2 Macroeconomic environment](#)).

Figure 94 Profitability of leasing companies decreased after the outbreak of the pandemic

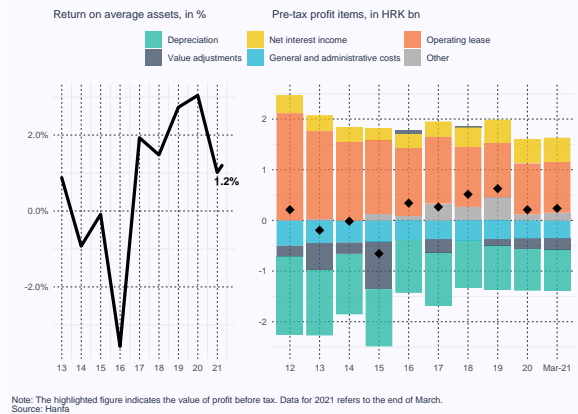
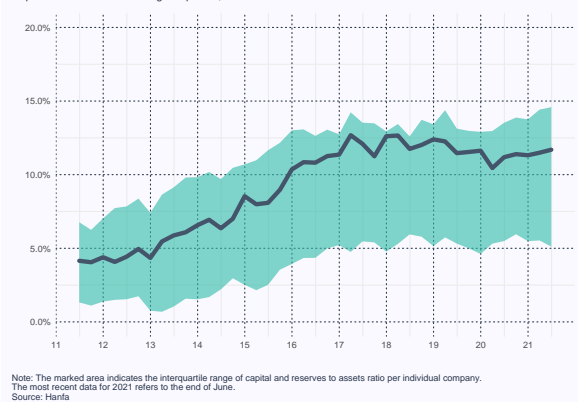
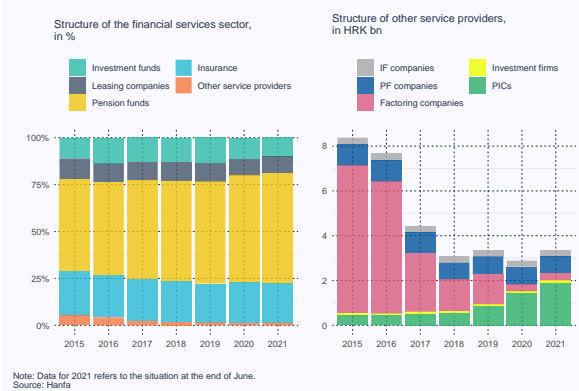


Figure 95 Capitalisation of leasing companies preserved during the pandemic
Capital and reserves of leasing companies, in % of total assets



8 Other financial service providers

Figure 96 Share of assets of other financial services sector at the end of the second quarter of 2021 less than 2%



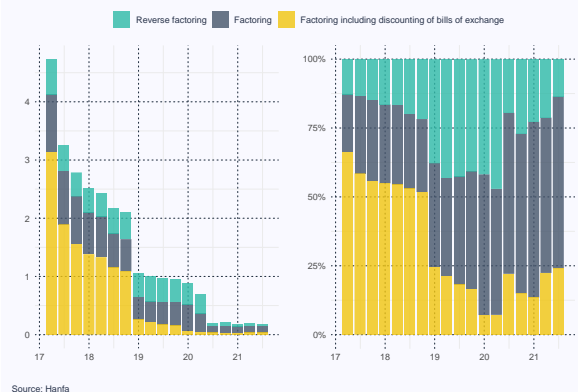
Key cyclical trends

The financial services sector has remained on a several-year-long growth trend in 2021, reaching 32.24% of the overall domestic financial sector or 60.61% of GDP at the end of June 2021. As regards the sector structure in terms of size, pension and investment funds predominate, followed by insurance and leasing companies (accounting together for 98.7% of the financial services sector at end-June 2021, Figure 96). While the importance of other financial service providers is relatively modest compared with the above mentioned industries, their role in the smooth functioning of the overall financial services sector and the financial system in general cannot be overlooked. For example, investment firms, accounting for only 0.04% of assets of the financial services sector, are indispensable intermediaries in financial transactions in the market, participating in half of all transactions in the domestic capital market, the same as credit institutions. In addition to investment firms, one should mention pension and investment fund management companies, factoring companies and pension insurance companies, all of which perform specific and

irreplaceable functions in the domestic financial system³⁷ (Figure 96).

The several year consolidation process in the factoring sector picked up steam in 2020. As a result, four factoring companies³⁸ were in operation at the end of 2020 (two less than in 2019), with total assets of HRK 324.0m, which is a decrease³⁹ of as much as 76.2% compared with 2019.⁴⁰ One of the reasons for the decrease is the transfer of factoring business to credit institutions. Total receivables from factoring transactions in banks stood at HRK 1.9bn at the end of June 2021 (growing annually by 43.3%), which was some ten times more than in factoring companies.

Figure 97 Structure of factoring companies' operations did not change much in 2020. Portfolio structure of factoring companies, in HRK bn (left) and in % (right)



Though the sudden emergence of the coronavirus crisis put pressure on the liquidity of domestic non-financial corporations and raised short-term financing needs, the adopted measures to support the economy eased their liquidity position (more information in Chapter 2 [Macroeconomic environment](#)), and there was no reversal of the downward trend in operations of factoring companies (Figure 97). As a result, no major changes were seen in the business structure of factoring companies, so that classic

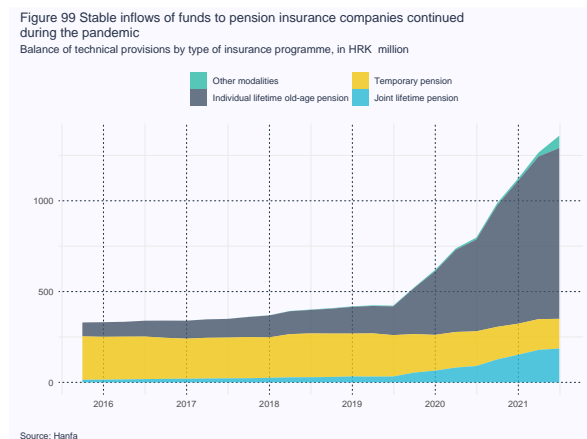
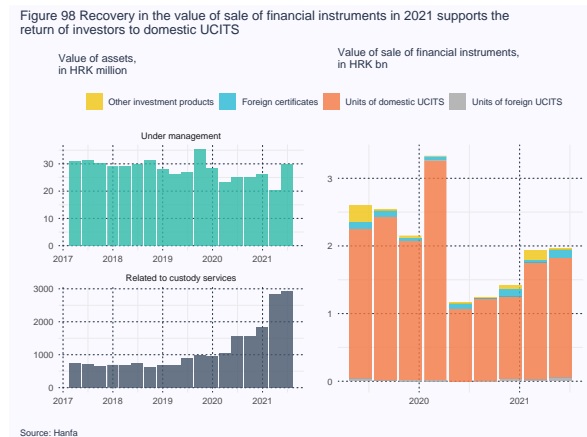
³⁷ More information on the role of particular categories of financial service providers can be found at [Hanfa's website for consumers](#).

³⁸ In late 2016, there were 13 factoring companies in operation.

³⁹ Transaction volume of factoring companies amounted to HRK 993.7m at the end of 2020 (down by 68.1% from 2019).

⁴⁰ Of 94.3% in the last five years.

factoring, accounting for 62.5%, continued to be the dominant type of short-term financing for users of factoring services. Such structure reduces the relative credit risk exposure of factoring companies as classic factoring implies only partial *ex ante* payment before contract maturity.



Turbulence in financial markets in early 2020 and the robust recovery in the rest of the year prompted an increase in the number of financial market transactions (more information in Chapter 3 [Financial markets](#)). As a result, the volume of investment fund operations grew, with the sale of units in domestic UCITS predominating the distribution of financial instruments (Figure 98). The amount of assets under custody of investment firms also grew sharply in 2020 and 2021 (from HRK 950m at end-2019 to HRK 2.9bn at the end of June 2021).

Assets under custody of credit institutions also increased substantially (by 16.5%, reaching HRK 83.7bn at end-June 2021). This trend points to possible larger mobilisation of funds in financial accounts of clients searching for yields, which may give a boost to liquidity in the domestic capital market as well as income generated by investment funds.

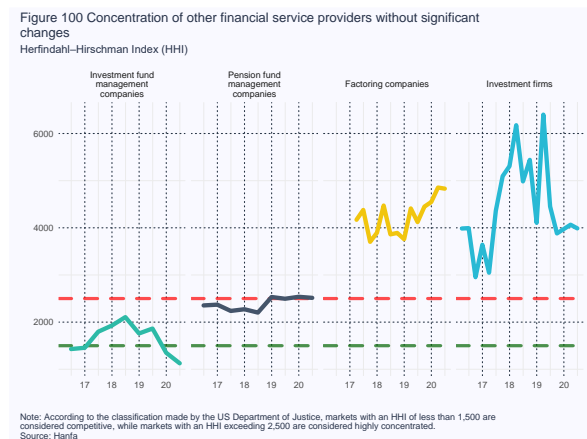
After almost 20 years of the multi-pillar pension system, a new pension insurance company received its authorisation in 2020. This gave rise to competition and provided beneficiaries with the option of choosing a pension insurance company for making pension payments⁴¹. The 2019 legislative changes to the pension system, which extended the payment of pension supplements to pensions paid from both the first and second pillars, significantly increased the attractiveness and competitiveness of combined pensions, also adding to the increase in the number of such pensions' beneficiaries and accelerating the flows of beneficiaries' funds from pension funds to pension insurance companies. Technical provisions of pension insurance companies more than doubled in 2020 and the first half of 2021, standing at HRK 1.36bn at the end of June 2021 (Figure 99). In view of the expected accelerated increase in the number of retirements from the system of individual capitalised savings, forthcoming years will certainly also witness continued growth in assets of pension insurance companies, which are already systemically important because of their indispensable role in disbursing pension payments from the second pillar.

Structural characteristics and risks

The highly specific operations of other financial service providers often require a high degree of specialisation and result in a **high concentration in these markets** (Figure 100). The most prominent example is the market of pension

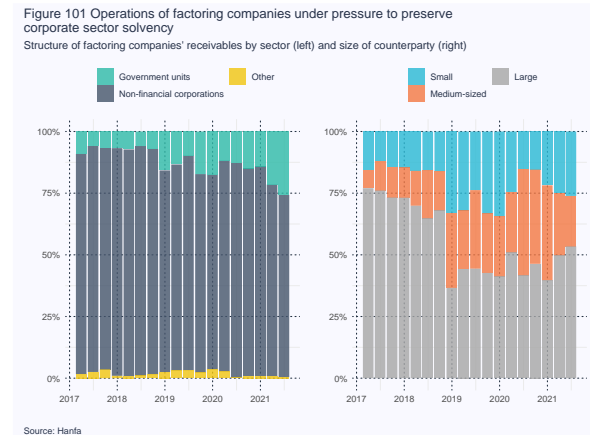
⁴¹ More information on pension payment programmes and options may be found at the following [link](#).

insurance companies, where only one company was operating until September 2020. New inflows of funds and the growing importance of the sector will reinforce pressures for further liberalisation of the market, which is currently very highly concentrated. Concentration is also high in the sectors of factoring and investment firms as well as pension fund management companies. In view of the very narrow operating margins and the legally defined system structure of pension fund management companies, concentration will certainly remain high in the upcoming period, with potential for further consolidation in case of unfavourable market developments. Such system structure puts additional emphasis on individual companies which, though not significant in terms of size, may be systemically important because of their irreplaceability in providing specific financial services.



The increase in risks in the non-financial corporations sector, which was temporarily mitigated by government measures to support the economy (more information in Chapter 2 [Macroeconomic environment](#)), may be materialised in the form of **credit risk** in the balance sheets of financial intermediaries granting placements to this sector. Due to the nature of their business, factoring companies mostly deal with non-financial corporations, which accounted for 73.8% of total placements at the end of June 2021, of which 46.6% were to small and medium-sized enterprises (Figure 101).

In contrast with credit institutions and leasing companies, factoring companies are mostly focused on short-term financing with maturity up to 3 or 6 months, so that their exposure to credit risk is relatively low. Nevertheless, this risk is high in the current environment of substantial uncertainty in the corporate sector.



The bulk of income of investment firms comes from execution, reception and transmission of orders in financial markets (Figure 103), so that their operations strongly depend on market trends. Pension and investment fund management companies are generally also highly exposed to investor sentiment and **market risk** because management fees are the dominant source of their income. While fees in the segment of pension funds are legally prescribed and the value of assets still mostly depends on new inflows, fees paid to investment funds depend on market conditions. As a result, particularly in conditions of low yields, investment fund management companies are under pressure to generate returns (adjusted for assumed risks) that would justify the amount of fees charged to investors. **Interest rate risk** is significant in the sector of pension fund insurance companies because of the large share of government bonds in the portfolio (accounting for two thirds of total investments at the end of June 2021) and the relatively long maturity of the bond portfolio (Figure 102). Potential growth in interest rates, driven by the rise in risk-free benchmark rates or a jump in risk

premium, would expose the bond portfolio to price corrections of the size proportionate to portfolio maturity.

Figure 102 Value of PICs assets vulnerable to potential growth in interest rates

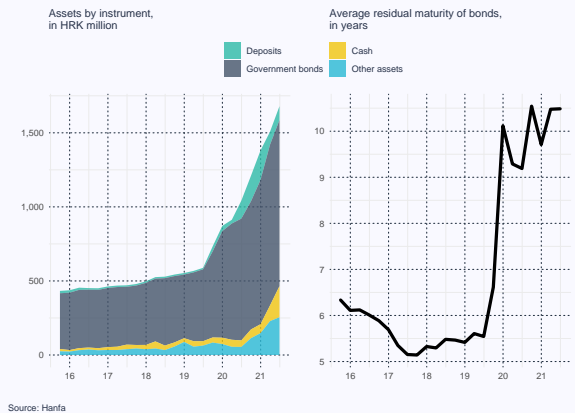


Figure 103 Operations of investment companies rely on the active capital market

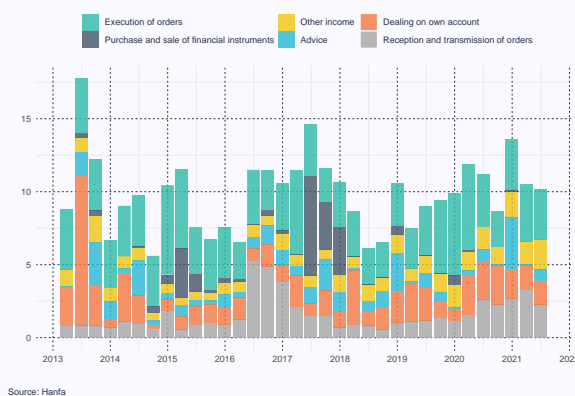
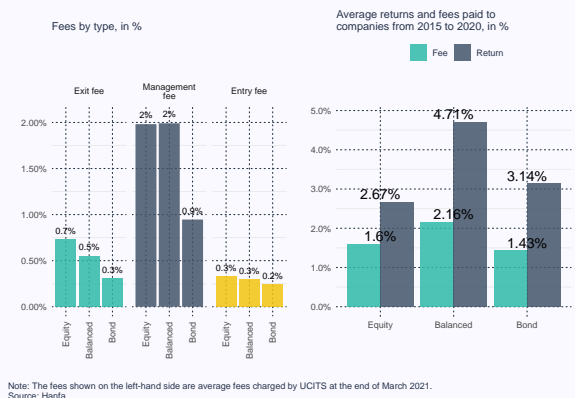
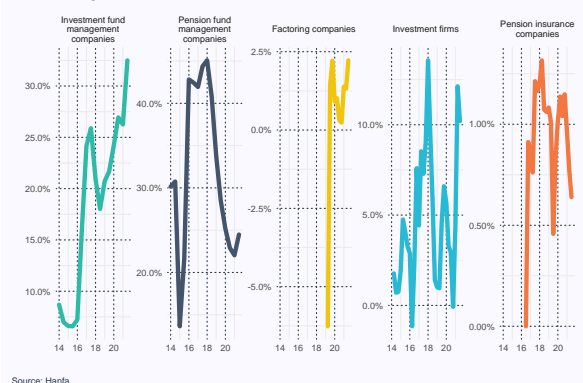


Figure 104 (In)ability to generate returns influences the level of fees charged by investment fund management companies



investment firms, three recorded positive and three recorded negative business results. The dominant source of income are investment services related to the execution, reception and transmission of orders, followed by dealing on own account (Figure 103). The improved profitability of investment firms has further increased capital stocks, so that the capital adequacy ratio in the sector of investment firms has continuously been several times higher than the regulatory minimum (Figure 107).

Figure 105 Heterogeneous impact of the pandemic on the profitability of other financial service providers



The profitability of **investment fund management companies** remained unchanged from 2019, with slightly smaller income from management fees as well as lower management costs. **Pension fund management companies** recorded somewhat smaller profit before tax, continuing the downward trend in profitability triggered by the enforcement of the provisions of the Act on Amendments to the Act on Mandatory Pension Funds ([Official Gazette No 115/2018](#)) that defines the several-year dynamic of the reduction in management fees that companies may charge to investors. The profitability of pension fund management companies is not threatened in spite of the fact that their profit before tax dropped by as much as 54.3% from 2017 to 2020.

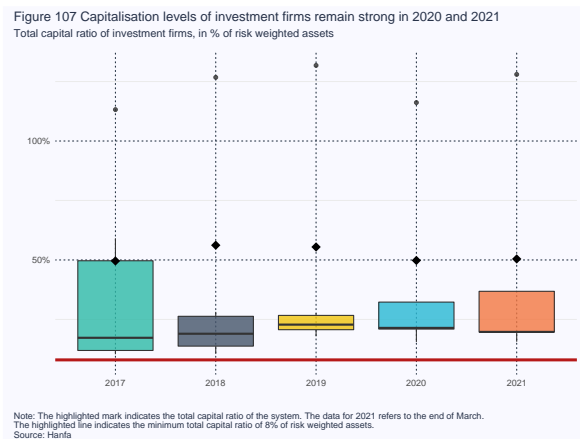
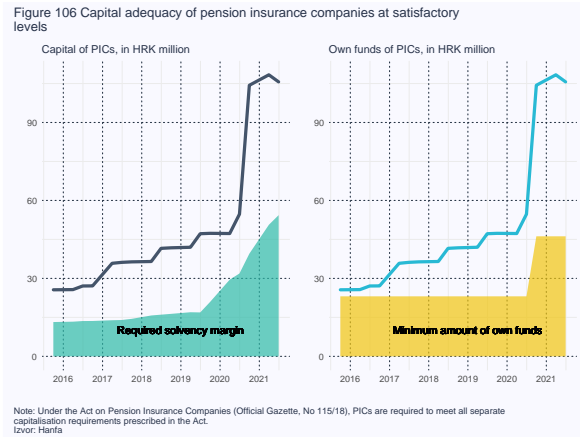
Profitability and solvency

The profitability of **investment firms** edged up in 2020 in line with intensified activity in the capital market, so that return on assets stood at 10.2% at the end of June 2021 (Figure 105). Out of six

Following a very turbulent period of 2017 and 2018, marked by events associated with the

Agrokor Group⁴², the profitability of the **factoring sector** has been stable at around 1%. Factoring companies reported net profit of HRK 7.0m in 2020, down by 36.5 % from 2019. However, profitability was higher than in 2019, at 1.2%, due to the even more pronounced decrease in total assets, of 76.2%, which was the outcome of the consolidation process.

Negative market developments did not have a major impact on the profitability of **pension insurance companies in 2020**. Return on average assets of pension insurance companies remained at 1% in 2020 (Figure 105). As a result, system solvency remained at satisfactory levels, twice as high as the regulatory minimum (Figure 106), ensuring relative resistance to potential interest rate increases in conditions of rising inflationary pressures.



⁴² At the end of 2017 and 2018, factoring companies reported losses after tax of HRK 881.0m and HRK 102.6m, respectively.

9 Stress testing

The COVID-19 pandemic, which characterised last year and has continued to predominantly influence developments both in real economy and in the financial system, makes macroeconomic projections very uncertain and the range of possible outcomes much broader than in more stable times. Though the performed stress testing exercise is surrounded by even higher uncertainty, it provides an important insight into resistance of the financial services sector⁴³ to highly unlikely but plausible shocks in the observed horizon up to the end of 2022. Taking into account the elevated uncertainty regarding projected future developments and assumptions underlying the methodological approach used, results of the performed stress testing exercise point to a satisfactory level of resilience of the financial services sector to simulated highly unlikely events.

Introduction

The spread of the coronavirus and the health crisis that interrupted the normal functioning of the economic system have marked 2020 and 2021. In contrast to any past crisis situations, that were preceded by a period of intensified vulnerabilities which could be, more or less, successfully quantified through early warning systems, the emergence of the coronavirus and the impact of its spread to economic entities and economies could not have been predicted. Though 18 months have passed since the first case of coronavirus infection reported in Europe, it is yet uncertain whether the pandemic will end in the near future, with economic policymakers and regulators constantly facing new challenges. One of them is the exercise of macroeconomic stress testing in such circumstances.

Macroeconomic stress testing is an analytical tool used to test resilience and stability of the entire financial system to highly unlikely but possible disruptions and shocks. This tool has been widely used only since the great financial crisis and the establishment of the [European Systemic Risk Board](#), which moved the focus of competent authorities from individual institutions to the stability of the entire financial system or any of its parts. Stress testing exercises have so far been mostly performed during times of stability by simulating significant volatility and elevated stress levels. The present approach of "stress testing during a period of stress" is relatively less researched. Therefore, this iteration of the stress testing exercise is challenging but necessary in order to test system capacities, which have already been weakened by the coronavirus crisis, in possible new stressful conditions.

Characteristics of the simulation

The starting point of the exercise are data for the end of the first half of 2021⁴⁴, with simulations covering developments in main macroeconomic variables as well as key performance indicators for the financial services sector up to the end of 2022. The selected period of simulation is six quarters because the use of a shorter horizon could not cover the propagation of systemic risk through the system, while the use of a longer horizon significantly increases the standard error and reduces the quality of results. The applied methodological approach follows the concept described in Box 1 Simulation of the effects of the coronavirus crisis on the stability of the financial services sector in [Macroprudential Risk Scanner No 4](#) with two significant alterations: 1) the

⁴³ The analysis covers the sectors of pension and investment funds and insurance companies, accounting for 90% of the domestic financial services sector.

⁴⁴ The exception are insurance companies for which data for the end of the first quarter were used.

number of scenarios has been reduced from three to two; and 2) the approach to assessing initial shocks to GDP has been changed.

The present exercise follows the standard approach to macroeconomic stress testing, which most often includes two scenarios: a baseline scenario and an adverse scenario. The **baseline scenario** reflects expected developments in macroeconomic and financial variables over a simulation horizon, whereas the **adverse scenario** reflects a hypothetical set of possible though highly unlikely macroeconomic and financial shocks.

The second alteration relates to the new approach to calibrating the initial GDP shock.

Shocks are assessed by analysing residual deviations of structural VAR models, which, apart from GDP, comprise the component of personal consumption and investments. Long-term shocks are assessed by means of defining limits on coefficients. In the short run, i.e. the first two quarters of the simulation horizon, these shocks are further amplified by short-term shocks simulating a sudden and powerful shift in consumer and producer sentiment, which is expected to occur in stressful circumstances.

Other methodological changes are not significant and mostly relate to the recalibration of existing models and integration of last year's outliers in the simulation.

Table 1 Macroeconomic scenario

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

Indicator	2016	2017	2018	2019	2020.	Baseline scenario		Adverse scenario	
						2021	2022	2021	2022
Gross domestic product (annual growth rate)	3.4	4.6	4.9	4.5	-7.2	5.0	5.5	-3.9	-2.2
Inflation (in %)	0.7	1.3	1.0	1.3	-0.3	0.4	0.4	5.8	5.1
Unemployment rate (in % of active population)	12.5	9.7	7.4	6.4	8.0	6.4	5.1	9.2	11.6
Gross wages (annual growth rate)	1.5	1.6	4.4	3.4	4.4	1.2	1.2	-0.8	-0.5
Real estate prices (annual growth rate)	0.8	7.6	4.7	10.0	6.4	5.9	6.7	-7.8	-5.2
Public debt level (in % of GDP)	80.8	77.6	74.3	72.8	88.3	87.8	83.2	93.6	95.7
General government balance (in % of GDP)	-0.9	0.8	0.2	0.3	-7.4	-4.8	-2.7	-7.6	-8.7
Yield on government bonds (in %)	3.1	2.7	2.1	0.5	0.8	0.4	-0.1	1.4	3.0
Bank loans to real sector (in %)	0.0	1.2	0.0	2.3	1.1	2.2	2.4	-1.6	-0.9
Short-term interest rates (in %)	6.7	6.1	5.8	5.3	5.0	4.8	4.5	5.0	5.7
Long-term interest rates (in %)	5.5	4.6	4.7	4.0	3.8	3.8	3.8	4.1	5.1
Stock market shock (VaR level)						70.0	60.0	2.5	1.0
Investment fund market shock (VaR level)						70.0	60.0	2.5	1.0
Exchange rate shock (VaR level)						50.0	50.0	60.0	55.0

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

Source: Hanfa

Baseline scenario

The main feature of the baseline scenario is the assumption that restrictive epidemiological measures would be lifted and that the pandemic would gradually come to an end by the end of 2021. This would enable the realisation of the tourism potential to a greater extent and give

momentum to rapid economic recovery in the upcoming period. In line with the expected containment of the health crisis, the exercise assumes real economic growth of 5% in 2021 and continued recovery in 2022, with a somewhat higher projected growth of 5.5%⁴⁵ (Table 1). However, it should be noted that the growth in 2021 and 2022 is strongly influenced

⁴⁵ Expected economic growth in 2021 and 2022 is obtained by averaging currently available projections of relevant institutions: EC, IMF and CNB.

by the base effect, so that the seemingly high growth rates will be insufficient to offset the largest ever GDP decline seen in 2020. At the same time, unemployment is not expected to increase significantly after the withdrawal of government measures to preserve jobs, and the unemployment rate is projected to fall by 1.6 pp and 1.3 pp in 2021 and 2022 respectively with a slight increase in gross wages (of 1.2% in both years). Regardless of relatively favourable aggregate indicators for the labour market, the present crisis has aggravated inequalities, opening more room for policy makers to replace existing linear support measures with new, targeted measures and thereby slow down the process of segmentation in the society.

In spite of currently elevated inflationary pressures fuelled by the hike in producer prices, the baseline scenario projects that these pressures will be of short duration, without causing a major increase in inflation in the next period. It also assumes that the prospects for the real estate market would not change significantly from the previous period and that prices would continue to trend up, though at a slightly slower pace, in part due to the announced absence of the housing loan subsidy programme in the rest of 2021.

According to the baseline scenario, after the initial sharp deterioration, fiscal indicators should improve in the rest of 2021 and in 2022 owing to the expected economic recovery, the gradual withdrawal of current support measures and expected inflows of EU grants for the implementation of the National Recovery and Resilience Plan endorsed by the European Commission in early July 2021⁴⁶. The general government deficit is expected to decrease gradually by the end of 2022 (to -4.8% in 2021 and -2.7% in 2022), while public debt should fall by 5 pp, to 83.2% of GDP, remaining much

above the pre-crisis levels. Nevertheless, as the application of the general escape clause from the fiscal rules of the European Commission⁴⁷ has been extended to 2022, allowing Member States to provide fiscal support to the economy without being subject to the Excessive Deficit Procedure, the return of fiscal indicators within the boundaries prescribed by the convergence criteria will be slightly postponed. The announced adoption of the euro as the official currency at the beginning of 2023 at the earliest will certainly be an additional incentive to fiscal policy makers to take action and maintain public finance stability, and encourage the CNB to continue maintaining exchange rate stability, so that no major exchange rate fluctuations are foreseen under the baseline scenario.

Adverse scenario

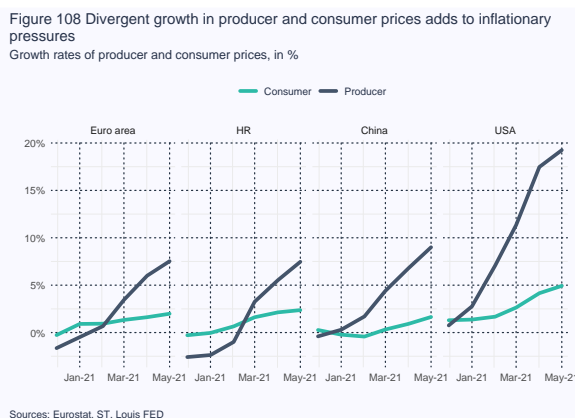
The initial shock which might have a systemic character in a post-pandemic environment and which underlies the adverse scenario, refers to the global spillover of rapidly growing producer prices into consumer prices and the ensuing increase in inflation rates. While international projections used in the baseline scenario⁴⁸ assess that the risk of persistently high inflation in China is low, a more permanent increase in prices, particularly in the Chinese and US economies, might come as a result of the inability of supply to quickly adjust to robust global demand in conditions of disrupted supply chains. The indicator of such movements is the segmentation between producer and consumer prices perceived in leading global economies, particularly in China, which has been leading the recovery from the coronavirus crisis (Figure 108). Under the adverse scenario, such trends would inevitably destabilise future inflation expectations in China and the USA and generate more perceptible increases in the general price level. These obvious signs of economy

⁴⁶ The document is available at the following [link](#).

⁴⁷ This refers to the activation of the general escape clause of the Stability and Growth Pact, which is available at the following [link](#).

⁴⁸ See the World Bank document entitled *Global Economic Prospects* from June 2021, available at the following [link](#).

overheating would force the FED to reverse its monetary policy course by sharply reducing the quantitative easing programme and raising benchmark interest rates at a faster than expected pace. All this would tighten financing conditions and create debt servicing difficulties in the private sector, fuelling a significant increase in the number of insolvent entities because of the large share of zombie companies in the US non-financial corporate sector⁴⁹. This would reduce both corporate sector profitability and room for investment. Difficulties in the corporate sector would push up unemployment because of cost reductions, which would, coupled with high inflation, inevitably lead to a slump in personal consumption and contraction of aggregate US economic activity.



In view of the high degree of globalisation⁵⁰, the negative effects of the simulated crisis would rapidly spread to the European economy by means of trade channels. Taking into account the dominant position of the US dollar as the world's primary reserve and trade currency, any appreciation of the US dollar triggered by US monetary policy tightening would create another shock for the euro area market through the import component. As a result of simulated higher inflation and associated stagflation risks,

the envisaged support measures (Next Generation EU⁵¹) would not be sufficient to prevent a serious shock to the euro area economy as the purchase of bonds would be limited in such stress conditions. A sudden surge in interest rates would prompt a major correction of stock and bond prices, primarily in the US financial market, because of its high level of overheating. This impact would differ depending on a company's activity (growing technological stocks would be hit harder), as well as debt level (that is, the market perception of credit risk in the private and, especially, the public sector) in view of the expected growth in risk aversion of global investors. These trends would spill over to Europe because of the high degree of correlation between the US and European financial markets (of 0.8 in the period from 2003 to 2018). The rise in interest rates and investor risk aversion would hamper the payment of large public and private debts and new borrowings, particularly of the fiscal sector, which would further impede economic activity.

Such new contraction of the euro area activity, characterised by strong inflationary pressures and emerging tensions in financial markets, would considerably and immediately dampen the recovery prospects for the Croatian economy. Under the adverse scenario, domestic GDP contracts by 3.9% in 2021 and 2.2% in 2022. Apart from the economic contraction, the spillover of external shocks combined with domestic structural vulnerabilities would have a definite impact on other macroeconomic indicators: the unemployment rate would be 3.6 pp higher by the end of the simulation horizon than at the beginning of that period (end of the first quarter of 2021), wages would hold steady and real estate prices would dip by 7.8% in 2021 and by another 5.2% in 2022, which is

⁴⁹ Although official data are not available, some research suggests that the share of zombie firms in the US non-financial corporate sector ranged between 20% and 30% at the end of 2020.

⁵⁰ According to a recent ECB paper entitled *Monetary policy and its transmission in a globalised world* (available at the following [link](#)), the correlation between the euro area and US inflation has

been growing; it was 0.9 between 2003 and 2018, with similar trends seen in other indicators: GDP (correlation of around 0.6), stock markets (correlation of 0.8) and financing conditions (correlation of around 0.5).

⁵¹ More information on the recovery plan may be found in the press release by the European Council, available at the following [link](#).

comparable to decreases seen after the great financial crisis. With the inflation shock spreading from the European markets to domestic prices, the inflation rate would remain elevated throughout the simulation horizon. As Croatia joined the European Exchange Rate Mechanism ERM II in mid-2020, the monetary policy stance of the CNB would remain unchanged, aiming at sustaining the exchange rate of the kuna against the euro around its median value. At the same time, interest rates would respond (in terms of increases in the base rate and the risk premium), giving an upward push to private sector financing costs and dampening aggregate domestic demand. This would also increase snowball risk⁵² and threaten the sustainability of private and public sector debt.

Coupled with external instability, the propagation of the initial shock would also be amplified by domestic vulnerabilities. The downturn in aggregate income of domestic economy would result in lower tax revenues, which would, without rapid and significant reductions in budget expenditures, lead to an increase in the deficit. The growth of the already high budget deficit, burdened by the measures to support the economy in response to the pandemic, coupled with the accumulated relatively high public debt, becomes a significant source of instability, which would probably spill over to the private sector. General government would generate a deficit of 7.6% of GDP in 2021 and 8.7% of GDP in 2022, while public debt would reach 95.7% of GDP by the end of the simulation horizon. The deterioration in public finances would further negatively affect the risk premium and give another push to yields on long-term government bonds, which would come to 3% under the adverse scenario by the end of 2022. Despite the fact that difficulties in servicing existing debts and higher costs of new

borrowing under stressful conditions of tight financing would adversely affect the risk perception of Croatia, the simulation scenario does not assume the loss of investment grade rating⁵³.

As the domestic financial market is predominantly influenced by the spillover of external shocks, any sudden negative response of foreign markets would also have a significant and strong effect on domestic bond and stock indices. These distortions would be reinforced by the simulated contraction of economic activity and unfavourable macroeconomic developments, with dramatic repercussions for the entire financial sector.

Results of the stress testing exercise

Assets of the financial services sector absorb relatively well potential short-term instabilities under the **baseline scenario**, where all observed segments of the financial services sector record positive rates of asset growth (Figure 109). The growth in net assets of pension funds, projected to reach 3.5% in 2021 and 6.3% in 2022, is mostly the outcome of favourable conditions in the labour market and stable net payments over the entire period under review. Under the baseline scenario, returns of both voluntary and mandatory pension funds remain in the positive territory, though below 1% over the observed period (Figure 110).

Other sectors covered in the exercise also record increases in (net) assets under that scenario, though at lower rates than pension funds. The growth rate of assets of insurance companies is estimated at slightly below 1% in 2021, with a possibility to edge up in 2022, to 2%. Net assets of investment funds grow a bit less than 1% in 2021 and 2022 under the baseline scenario, with

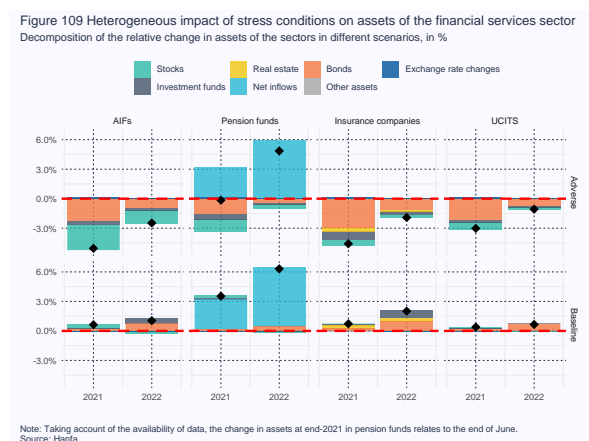
⁵² Snowball risk is defined as the difference between the interest to debt ratio and the annual rate of income growth.

⁵³ It is assumed that credit rating agencies would be more flexible with regard to high public sector debt levels and macroeconomic

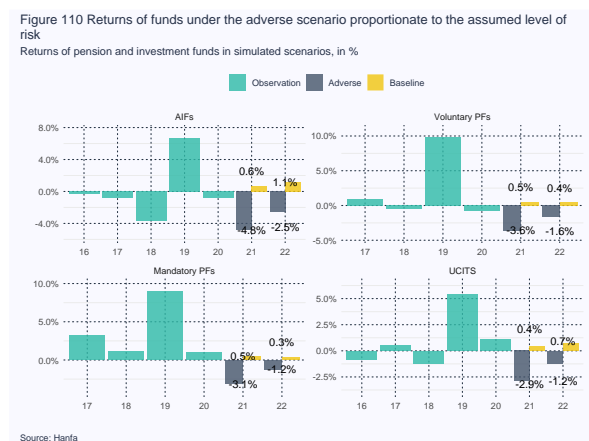
imbalances because of the global (systemic) nature of the simulated shock, particularly following the global, pandemic-related, upsurge in public debt levels.

slightly positive returns in late 2021 and 2022. Nevertheless, returns are expected to remain subdued, notwithstanding positive data for the end of the first half of 2021 and projected positive returns. Net assets of AIFs remain almost unchanged under the baseline scenario, with the expected growth rate of around 1% in both 2021 and 2022. This is largely the outcome of the described trends in the market for government bonds, which account for the largest share of AIFs portfolios (Figure 109).

drawing down their (net) assets and restraining further growth of the entire sector. Net assets of pension funds would be least affected by the simulated stress conditions: they would hold steady in 2021 (the annual rate of change of -0.2%) and grow by as much as 4.9% in 2022, mostly on account of positive net inflows. While no major contraction in net assets of pension funds is projected under the adverse scenario, their overall risk assessment would be worse, primarily due to market turbulence and diminished profitability, as pension funds would record negative returns under the simulated stress conditions.



In contrast with pension funds, assets of insurance companies would go down in both years, with sharp contractions projected for as early as late 2021,⁵⁴ i.e. soon after the emergence of stressful conditions. Changes in assets of insurance companies under the adverse scenario depend mostly on the increase in yields on domestic government bonds, which account for a large share of their portfolios. The adverse scenario does not include a downgrading of Croatia’s credit rating, which would further negatively affect performance indicators of financial service providers in view of the high interconnection of the financial services sector and the public sector⁵⁵. Assets of insurance companies are also influenced by changes in unit prices of investment funds as well as negative trends in the real estate market, though their contribution is much more modest.



Simulated initial shocks under the **adverse scenario** and their impact on the macroeconomic environment and financial markets would have a detrimental effect on performance indicators of all observed segments of the financial services sector,

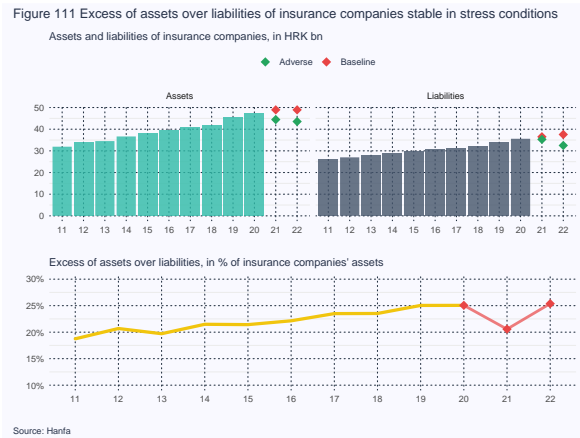
Under simulated stress conditions, UCITS would record a decrease in net assets in both years of the projection horizon (of 3% in 2021 and 1% in 2022), largely due to price corrections in the bond market and, to a lesser extent, stock market. In addition to the fall in assets,

⁵⁴ At the end of 2021, the annual rate of change in assets of insurance companies would be -4.6%, while the contraction in 2022 would be slightly less, at 2%.

⁵⁵ 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, available at the following [link](#).

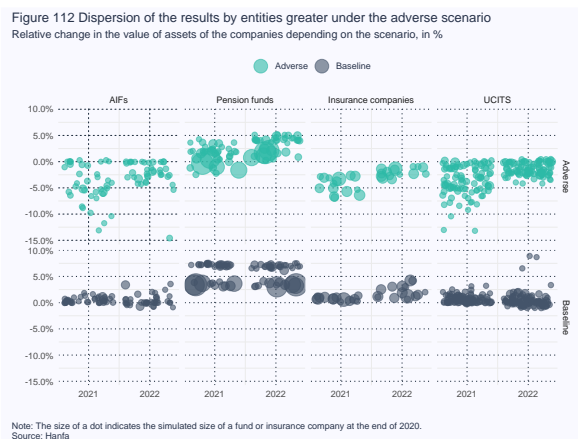
profitability indicators of funds would deteriorate sharply under the adverse scenario, so that all types of investment funds would see negative annual returns in 2021 and 2022, ranging between -1% to -6%⁵⁶.



In terms of the relative change in assets from the end of 2020, the simulated crisis would give the strongest blow to AIFs, which corresponds to the higher risk of their investments in comparison with the rest of the fund industry and the insurance sector. Their assets would fall by 5.1% in 2021 and by another 2.5% in 2022, primarily due to corrections in the stock and bond markets.

The analysis of results at the level of individual entities shows that results are more dispersed in stress conditions, and that distribution widens, reflecting the risk profile of the individual entity's investment portfolio, which is not significant in normal conditions (Figure 112). As expected, the dispersion is largest in investment funds because of their much more heterogeneous investment strategies (made possible by regulations). Individual results of insurance companies and pension funds reflect high homogeneity of their portfolios, in which domestic government bonds predominate. Although the high concentration

of investment, which characterises the entire financial services sector, poses significant systemic risk, its impact is subdued in the simulated stress exercise as the initial correction in stock markets is more pronounced than the correction in bond markets. On the one hand, this is due to the method of shock calibration, which is based on historical movements in those markets⁵⁷, and, on the other hand, this is due to the fact that the downgrading in Croatia's credit rating has not been simulated and because of the assumption that companies experiencing liquidity and solvency problems do not react to market disruptions⁵⁸. In reality, response of companies to disrupted business indicators (e.g. rebalancing of investment portfolios or partial liquidation of portfolios in order to raise the needed liquidity) is inevitable and gives rise to secondary shocks, which are accentuated by the high degree of investment concentration⁵⁹.



Conclusion

The extreme event of global proportions suddenly and severely affected the global economy in 2020 and set the direction of fiscal and monetary policies in the recent past period. The aim of macroeconomic stress testing

and market illiquidity, so that the shock calibration based on such data sample is somewhat biased.

⁵⁶ Assuming a static balance sheet of companies.

⁵⁷ These secondary effects are planned to be integrated in future iterations of the exercise through the introduction of dynamic elements.

⁵⁶ In the simulated stress episode, bond funds would see the smallest decrease in returns (of -2.3% in 2021 and -1% in 2022), while equity funds would record the sharpest fall (of -5.9% and -2.3%, respectively).

⁵⁷ There have been no significant historical corrections in the domestic bond market because of the absence of severe shocks

exercises is to prepare regulators and the financial system to possible effects of such events. The coronavirus crisis has once again highlighted the importance of redefining on an ongoing basis capital and liquidity buffers in the financial system that are sufficient to withstand potential future (similar) shocks. With this in mind, a highly unlikely adverse macroeconomic scenario has been calibrated in order to identify the main sources (structural and cyclical risks) of possible financial system destabilisation. The conducted stress testing exercise is based on projections that are highly uncertain and primarily depend on the future evolution of the epidemiological situation. Bearing in mind the high uncertainty surrounding projected future developments and assumptions underlying the applied methodological approach, the stress

testing results indicate that, in spite of the simulated severe stress, the capitalisation level of insurance companies would remain satisfactory with a stable excess of assets over liabilities (Figure 111), while the amplitude of the decrease in returns of pension and investment funds is below or at the level of their annualised positive annual returns over the last ten years. Although the obtained results suggest that the entire sector would remain stable in stressful circumstances, individual companies and funds might have difficulties in withstanding simulated shocks, depending primarily on their structural vulnerabilities as well as the level of assumed cyclical risks, which are particularly pronounced in the context of the events in 2020 and the first half of 2021.

List of abbreviations

AIF - alternative investment fund	m - million
GDP - gross domestic product	bn - billion
CHF - Swiss franc	PIC - pension insurance company
EBRD - European Bank for Reconstruction and Development	pp - percentage point
ECDC - European Centre for Disease Prevention and Control	REGOS - Central Registry of Affiliates
EEA - European Economic Area	ROA - return on assets
EIOPA - European Insurance and Occupational Pensions Authority	SCR - solvency capital requirement
EC - European Commission	CEE - Central and Eastern Europe
ERM II - Exchange Rate Mechanism	UCITS - undertakings for collective investment in transferable securities
ECB - European Central Bank	USD - US dollar
ESRB - European Systemic Risk Board	ZSE - Zagreb Stock Exchange
ETF - exchange-traded fund	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 - Iceland; 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
EU - European Union	
EUR - euro	
FED - Federal Reserve System	
Hanfa - Croatian Financial Services Supervisory Agency	
CNB - Croatian National Bank	
HRK - Croatian kuna	
IF - investment fund	
PF - pension fund	
IMF - International Monetary Fund	

