III. Financial system assessment

3.1 Financial markets

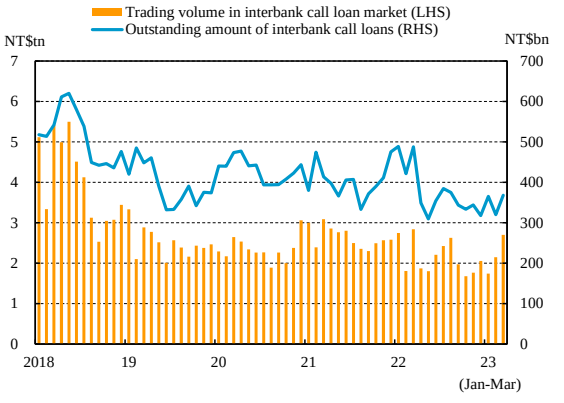
In 2022, the outstanding amount and trading volume in interbank call loans both declined, while the markets remained stable. The outstanding amount of bill issuance slightly edged down mainly because of the reduction in the issuance of treasury bills. However, the bill trading volume in the secondary market continued to expand, with CP constituting the largest share, which facilitated short-term financing for businesses. Meanwhile, the outstanding amount of bond issuance kept growing, with international bonds increasing the most, but the trading volume decreased mildly owing to reduced positions of major traders. Moreover, in 2022, domestic stock indices rebounded from previous slumps and gradually stabilized. The NT dollar appreciated after depreciating against the US dollar, but with low volatility. Overall, domestic financial markets have remained stable since 2022; however, international circumstances such as global interest rate hikes, future developments of the US banking turmoil, and geopolitical factors could impact Taiwan's financial market and their developments and implications warrant close attention.

3.1.1 Money and bond markets

Both outstanding amount and trading volume of interbank call loans declined

In 2022, the average daily outstanding amount of interbank call loans registered NT$375.7 billion and dropped by 6.58% year on year, mainly owing to a decrease in interbank lending. Given the fact that financial institutions became more conservative in fund allocation and the lengthening of interbank lending periods led to a lower incidence of rolling over such loans, the trading volume of interbank call loans decreased by 18.60% year on year in 2022. In 2023 Q1, the average daily outstanding

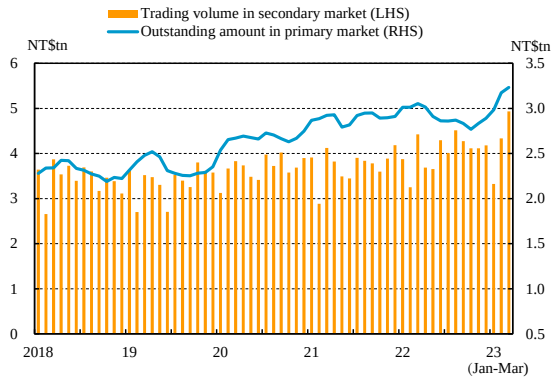
Chart 3.1 Interbank call loan market



Note: Outstanding amount is the monthly average of daily data.
Source: CBC.

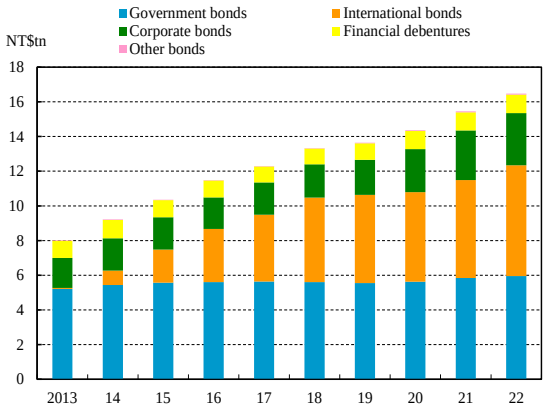
amount and trading volume of interbank call loans both decreased year on year (Chart 3.1).

Chart 3.2 Primary and secondary bill markets



Source: CBC.

Chart 3.3 Bonds outstanding in the primary market



Note: Other bonds include beneficiary securities and foreign bonds.
Source: FSC.

Outstanding amount of bill issuance edged down, while the bill trading volume in the secondary market continued to increase

The outstanding amount of bill issuance in the primary market registered NT$2.89 trillion at the end of 2022 and dropped by 0.69% year on year, which was mostly attributed to the reduction in the issuance of treasury bills due to ample tax revenue. In 2023 Q1, the outstanding amount of bill issuance began to climb again as the issuance of treasury bills and CP increased (Chart 3.2).

Although the outstanding amount of bill issuance edged down in 2022, the trading volume in the secondary market increased by 7.86% year on year to NT$48.40 trillion thanks to factors such as strong demand for CP investment by corporates. Among them, CP constituted the largest share of 96.81%, slightly expanding from a year earlier. In 2023 Q1, the bill trading volume continued its upward trend over the same period of the previous year (Chart 3.2).

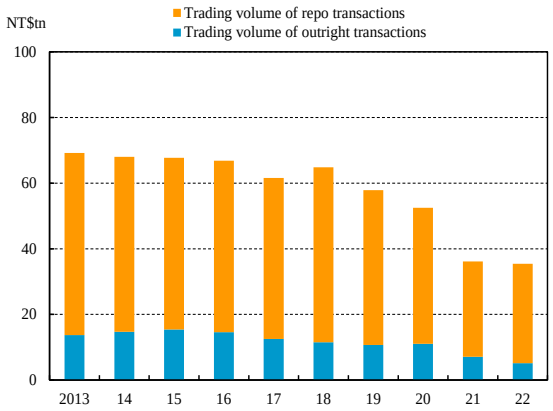
Bond issuance continued to expand, while the trading volume decreased marginally, and the turnover rate of outright bond transactions continued to drop to a record low

The outstanding amount of bond issuance reached a new high of NT$16.48 trillion at the end of 2022 and increased by 6.63% over the end of the previous year, mainly attributed to the 13.14% increase of international bond issuance as foreign institutions issued bonds ahead of schedule or reduced early redemption owing to the expectation of the Fed's rates hike. At the end of 2022, the outstanding amount of corporate bonds and government bonds issuance

increased by NT$0.14 trillion and NT$0.11 trillion, respectively, compared to the end of the previous year (Chart 3.3).

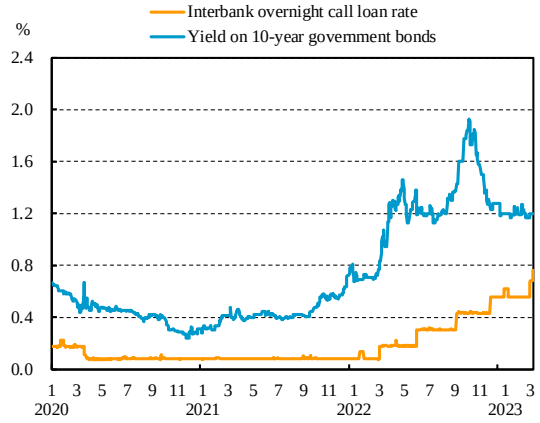
On the other hand, the trading volume in the secondary bond market registered NT$35.40 trillion in 2022, slightly decreasing by 2.03% year on year (Chart 3.4). This was mainly owing to the fact that major bond market traders such as bills finance companies and securities firms reduced their bond holdings after considering the increasing risks of rising bond yields and a narrowing yield spread between their long-term bonds and short-term reverse repos. By trading type, outright transaction volume significantly shrank by 27.72%, while repo transaction volume increased by 4.26% year on year. Nevertheless, the overall trading volume remained at a relatively low level in recent years. As a result, the average monthly outright turnover rate of major bonds decreased continually in 2022 to a recent low of 1.65% and declined further to a record low of 1.55% in 2023 Q1.

Chart 3.4 Outright and repo transactions in the bond market



Source: CBC.

Chart 3.5 Interbank overnight rate and 10-year government bond yield



Source: Bloomberg.

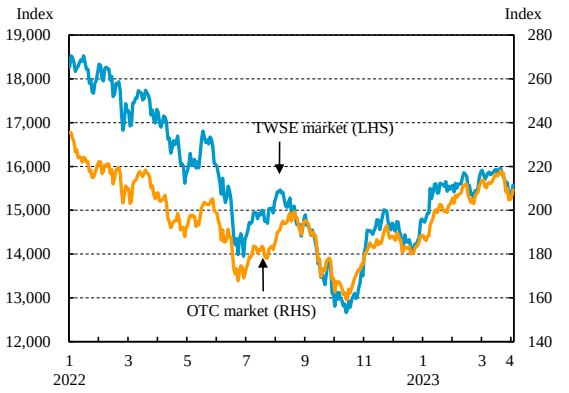
Short-term market rates increased gradually, while long-term market rates surged to a new 14-year high before trending downwards

In terms of short-term market rates, the interbank overnight call loan rate trended upwards after the Bank raised the policy interest rates and the interest rate on the Bank's certificates of deposit (CDs) four times in 2022 (Chart 3.5). Still, liquidity in financial markets remained ample.

As for long-term market rates, influenced by sharp rises in US government bond yields following the Fed's rate hikes, domestic 10-year government bond yields fluctuated and trended upwards during the first three quarters of 2022 and hit a new 14-year high of 1.93% on October 24, 2022 (Chart 3.5). Afterwards, following the decline in US bond yields, domestic

10-year government bond yields also descended gradually but still stood higher than the yields at the end of 2021 (Chart 3.5). Considering that the upward pressure on bond yields globally still exists while inflation in major economies persists and many uncertainties surrounding the future inflation outlook remain, domestic 10-year government bond yields are likely to increase again. The interest rate risk related to bond investments of domestic financial institutions is still high and warrants close attention.

Chart 3.6 Taiwan's stock market indices



Sources: TWSE and TPEx.

3.1.2 Equity markets

Stock indices rebounded after falling from record highs and were not significantly affected by the turmoil in the US and European banking sectors

In 2022, owing to the compound impacts of both negative and positive developments, such as the prolonged pandemic, the outbreak of the Russia-Ukraine war, the Fed's accelerated interest rate hikes, and the measures taken by the FSC to stabilize the domestic stock market, the TAIEX (index of the TWSE market) rebounded to 14,138 at year end after trending down from the historical high of 18,526 at the beginning of the year (Chart 3.6), posting a decrease of 22.40% year on year. Major indices in international stock markets fell sharply in the same period. The TPEX of the OTC market closely tracked the movements of the TAIEX, dropping to 180 at the end of 2022, showing a yearly decrease of 24.08%.

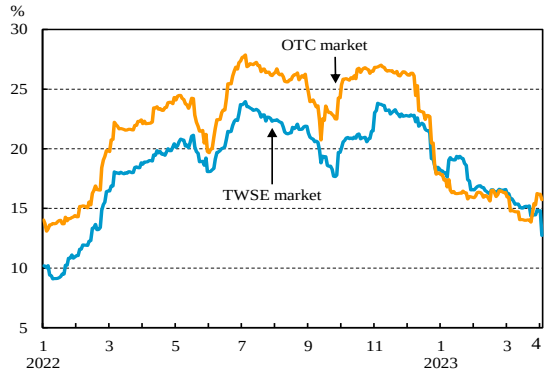
Entering 2023, benefitting from loosened domestic COVID-19 prevention measures and border control, economic activity gradually returned to normal and consumer confidence stabilized. In addition, Taiwan's stock markets were only modestly affected by the recent turmoil in the US and European banking sectors. As a result, the TAIEX fluctuated with an uptrend in the first four months of the year, and the TPEX also followed the same trend (Chart 3.6).

Volatility in the stock markets increased, while annual turnover rates declined

In 2022, rising uncertainty surrounding the international political and economic situation riled global stock markets and, in turn, increased volatility in Taiwan's stock markets. Thanks to the support from the National Financial Stabilization Fund in July, volatility in the TWSE and the OTC markets gradually dropped to 21.33% and 22.71%, respectively, at the end of the year and declined further as of the end of April 2023 (Chart 3.7).

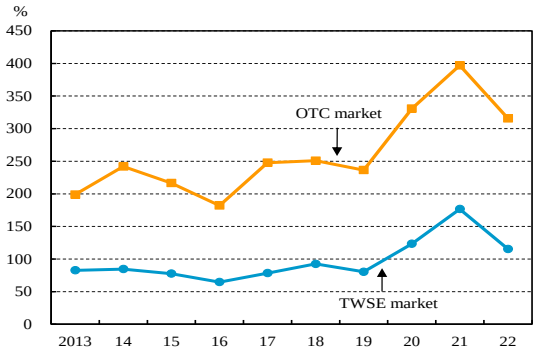
Owing to the notably declining trading volume of Taiwan's stock markets, the monthly average trading value in both the TWSE and the OTC markets significantly dropped by 39.23% and 26.62% year on year to NT$4.67 trillion and NT$1.24 trillion in 2022, respectively. Among market participants, domestic individual investors accounted for 58.30% of the total, lower than the previous year's 69.77%. Affected by the above factors, the annual turnover rates in terms of trading value fell sharply to 115.44% and 315.73% in the TWSE and the OTC markets (Chart 3.8), respectively. This was still higher than in most major international stock markets and only lower than in the US, South Korea, and China (Chart 3.9), indicating that trading in Taiwan's stock markets was still quite active and liquidity remained ample.

Chart 3.7 Stock price volatility in Taiwan's markets



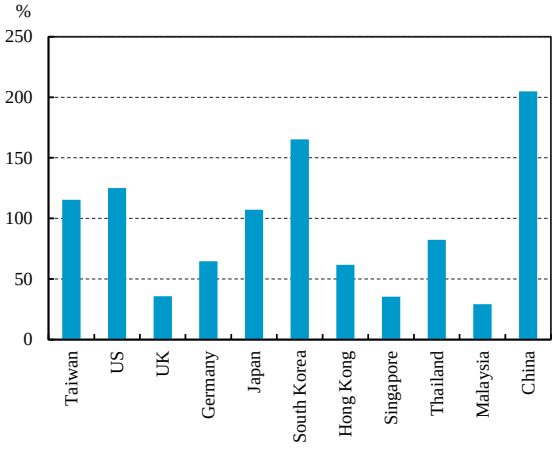
Note: Volatility refers to the annualized standard deviation of 60-day daily index returns.
Sources: TWSE, TPEx, and CBC.

Chart 3.8 Annual turnover rates in Taiwan's stock markets



Sources: TWSE and TPEx.

Chart 3.9 Turnover rates in major stock markets



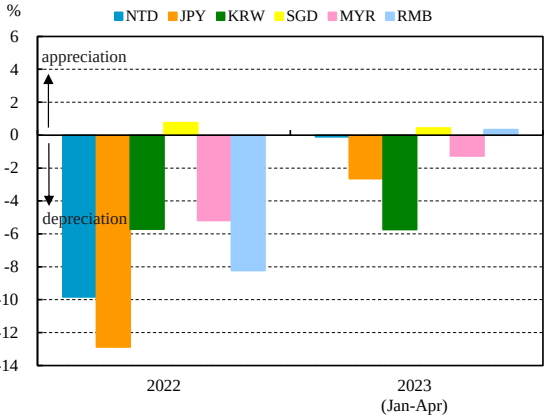
Note: Figures refer to accumulated turnover rates in 2022.
Source: TWSE.

Overall, domestic stock markets were supported by sound economic fundamentals. However, factors including increased uncertainties over the economic prospects and inflation trends in major economies and lingering fear among investors over the repercussions of the banking turmoil in the US and Europe may continue to affect the global economy and international stock markets and, in turn, impact the domestic stock markets. It is necessary to pay close attention to these developments.

Chart 3.10 NTD/USD exchange rate

Source: CBC.

Chart 3.11 Exchange rate changes of major Asian currencies against the US dollar



Note: Changes in 2022 are figures at the end of the year compared to those at the end of 2021; changes in the period of Jan-Apr 2023 are figures at the end of April 2023 compared to those at the end of 2022.

Source: CBC.

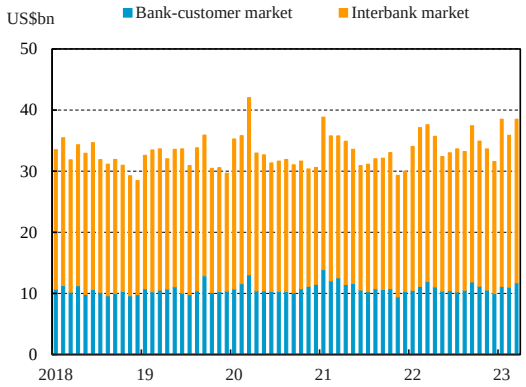
3.1.3 FX market

The NT dollar turned to appreciate after depreciating against the US dollar, while the trading volume of the FX market increased

In 2022, in view of high and persistent inflation, the Fed implemented an aggressive series of interest rate hikes, resulting in a strong US dollar. This, coupled with continued outflows driven by a reduction of investments by foreign institutional investors in Taiwan's stock markets, led to NT dollar depreciation against the US dollar towards a level below 32 in October. Subsequently, as the US headline and core inflation rates both showed signs of easing, along with the expectation of the Fed slowing its pace of rate hikes, the NT dollar exchange rate rebounded to 30.708 against the US dollar at the end of 2022, depreciating by 9.83% from the end of the previous year. Then, at the beginning of 2023, as an easing in US inflation reinforced market expectation of slower Fed rate hikes, the NT dollar uptrend thus continued before reversing a while later to end April at 30.740 (Chart 3.10), depreciating by 0.10% compared to the end of 2022.

In 2022, most major Asian currencies depreciated against a strong US dollar. However, as the US dollar weakened between January and April 2023, the downward pressure on most major Asian currencies eased, with the SGD and RMB even appreciating against the US dollar. In the meantime, the NT dollar depreciated relatively slightly against the US dollar; most of the other major Asian currencies continued to depreciate against the US dollar, albeit to a smaller degree than earlier (Chart 3.11).

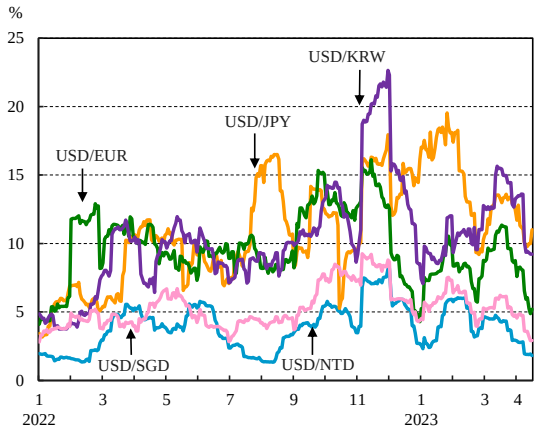
Chart 3.12 FX market trading volume



Notes: 1. Trading volume is the monthly average of daily data.
2. The latest data for trading volume are as of March 2023.
Source: CBC.

Trading in Taiwan's FX market expanded in 2022 and the average daily trading volume amounted to US$34.5 billion, rising by 4.40% from US$33.0 billion a year earlier primarily because of an increase in interbank transactions (Chart 3.12). The daily trading volume in March 2023 amounted to US$38.5 billion, higher than the US$37.6 billion registered in the same period of the previous year.

Chart 3.13 Exchange rate volatility of various currencies versus the US dollar



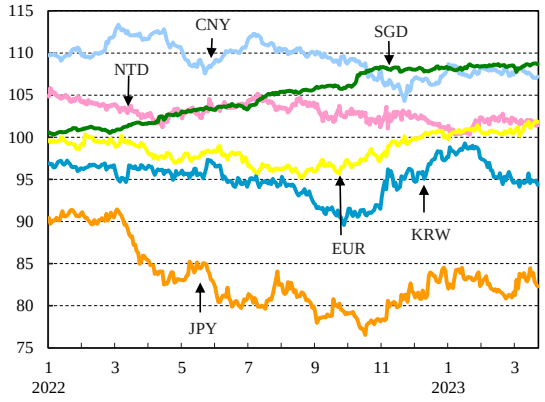
Note: Volatility refers to the annualized standard deviation of 20-day daily returns.
Source: CBC.

NT dollar exchange rate volatility remained relatively stable

The volatility of the NT dollar exchange rate against the US dollar fluctuated between 1.33% and 8.18% in 2022 and registered an annual average of 3.89%, which was relatively lower than those of other major currencies. From January to April 2023, the volatility of the NT dollar exchange rate declined and registered between 1.81% and 6.04%. Compared to major currencies such as the Japanese yen, the euro, the Singapore dollar, and the Korean won, the NT dollar exchange rate remained relatively steady against the US dollar (Chart 3.13).

The nominal and real effective exchange rate indices of the NT dollar fluctuated within a narrow range, indicating the dynamic stability of the NT dollar

Chart 3.14 NT dollar nominal effective exchange rate index



Source: BIS.

In 2022, the NEER of the NT dollar weakened with narrow fluctuations throughout the year and registered 100.88 at year end, a decrease of 3.43% compared to 104.46 at the end of 2021. The main reasons were poor export growth in the second half of the year owing to a slowdown in the global economy, and continued capital outflows driven by a reduction of investments by foreign institutional investors in Taiwan's stock markets. However, the NEER of the NT dollar rebounded to 101.47 at the end of March 2023, a slight increase of 0.58% compared to the end of the previous year (Chart 3.14). During the same period, the real effective exchange rate (REER) index of the NT dollar also fluctuated within a limited range and stood at 99.16 in December 2022, dropping by 4.58% compared to 103.92 registered in December 2021. In March 2023, the NT dollar's REER continued to decline to 98.62, a slight decrease of 0.54% compared to December 2022. The volatility of the NT dollar's REER remained relatively stable compared to other major Asian currencies.

3.2 Financial institutions

In 2022, the performance of Taiwan's financial institutions varied greatly. Domestic banks registered high profitability thanks to widening spreads as domestic interest rates rose, and they continued to enjoy satisfactory asset quality and adequate capital. The insurance industry, on the other hand, faced significant challenges in operations due to sharp drops in global stock and bond markets and the surge of pandemic-related insurance claims. However, the situation improved after regulatory authorities took proactive measures. Bills finance companies also experienced a decline in profitability mainly due to rising interest rates, but their capital remained adequate. On the whole, operations of domestic banks and bills finance companies remain steady, while the insurance industry needs to continue improving its operational conditions.

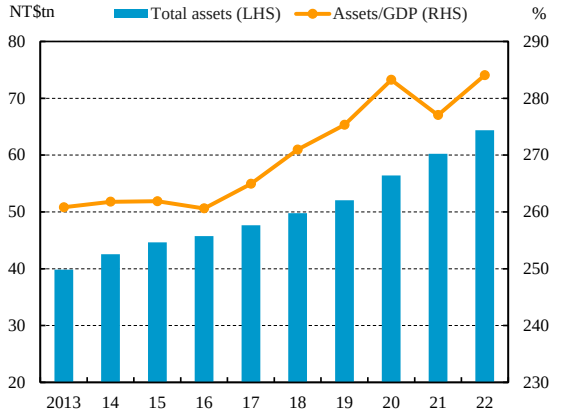
3.2.1 Domestic banks

In 2022, the total assets of domestic banks[36] continued to expand, while asset quality improved. The sectoral concentration in corporate loans and real estate-related loans declined marginally, and exposures to China continued to decline. The estimated value at risk (VaR) of market risk exposures increased, but its impacts on capital adequacy ratios were limited. Liquidity in the banking system was ample, and overall liquidity risk remained relatively low. The profitability of domestic banks significantly strengthened in 2022, reaching a near 20-year high. The average capital adequacy ratio declined marginally, but the capacity to bear losses remained satisfactory.

Total assets kept growing

The total assets of domestic banks kept growing and reached NT$64.39 trillion at the end of 2022, with an annual growth rate of 6.91% compared to 6.78% a year earlier, while the ratio of total assets to annual GDP also rose to 284.06% (Chart 3.15). Broken down by sector, the annual asset growth rates of offshore banking units (OBUs) and overseas branches trended upwards sharply, whereas the rate of domestic

Chart 3.15 Total assets of domestic banks



Sources: CBC and DGBAS.

[36] Includes Agricultural Bank of Taiwan.

banking units (DBUs) continued to decline (Chart 3.16).

Credit risk

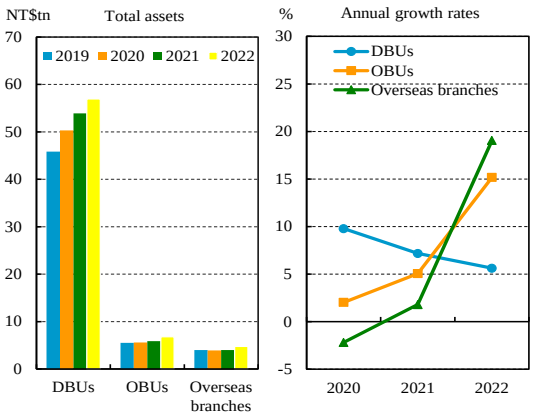
Customer loans growth slowed

Customer loans were the major source of credit risks for domestic banks. The outstanding customer loans of DBUs stood at NT$32.48 trillion at the end of 2022, accounting for 50.60% of total assets with an annual growth rate of 8.44% (Chart 3.17). Among them, the annual growth rate of household borrowing declined to 6.42% owing to weakening demand for mortgage loans, while the growth rate of corporate loans rose to 11.92%, driven by rising funding demand after the pandemic eased. However, the annual growth rate of government loans dropped to -2.17% mainly because increasing government tax revenues lessened the demand for bank borrowing.

The share of real estate-secured credit declined marginally

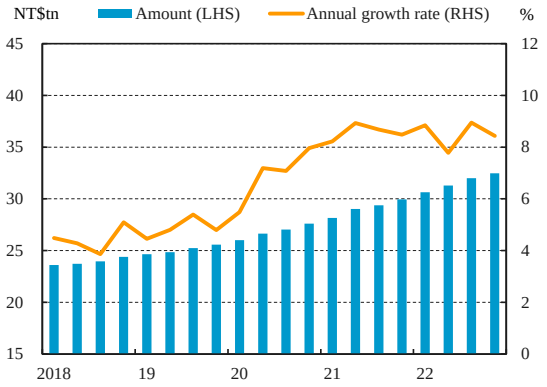
At the end of 2022, real estate-secured credit granted by domestic banks dropped slightly to NT$22.23 trillion, accounting for 57.67% of total credit [37] (Chart 3.18). As the government's measures to curb real estate speculation showed positive effects, the transactions in the housing market became more conservative. This, coupled with rising

Chart 3.16 Total assets of domestic banks by sector



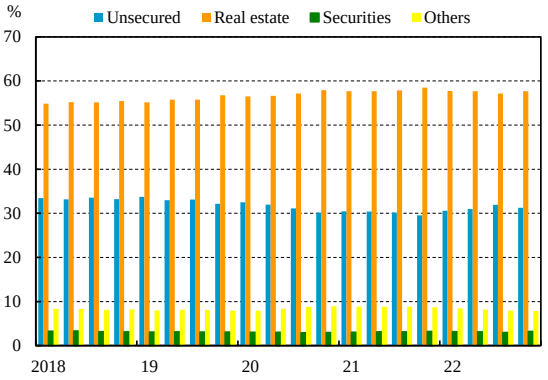
Note: Figures for total assets include interbranch transactions.
Source: CBC.

Chart 3.17 Outstanding loans in domestic banks



Note: Loans of OBUs and overseas branches are excluded.
Source: CBC.

Chart 3.18 Credit by type of collateral in domestic banks



Source: CBC.

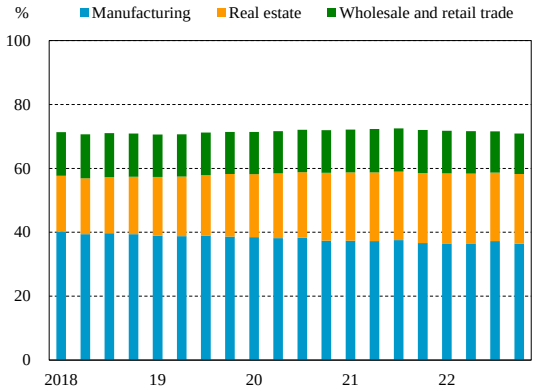
[37] The term "credit" herein includes loans, guarantee payments receivable, and acceptances receivable.

interest rates on bank loans, could pose greater challenges for some medium or small-sized construction companies with poor financial conditions. Against this backdrop, the impact of changes in the real estate market on banks' credit quality warrants close attention.

Credit concentration in corporate loans slightly decreased

Corporate loans granted by the DBUs of domestic banks stood at NT$14.38 trillion at the end of 2022. Among the borrowers, the largest three industries accounted for 70.90%, slightly lower than the 72.04% of the previous year (Chart 3.19), indicating that credit concentration in corporate loans reduced mildly. Among loans to the manufacturing sector, [38] which represented the highest segment, loans to the electronics industry constituted the largest share at 31.88%, slightly increasing from 31.42% the previous year.

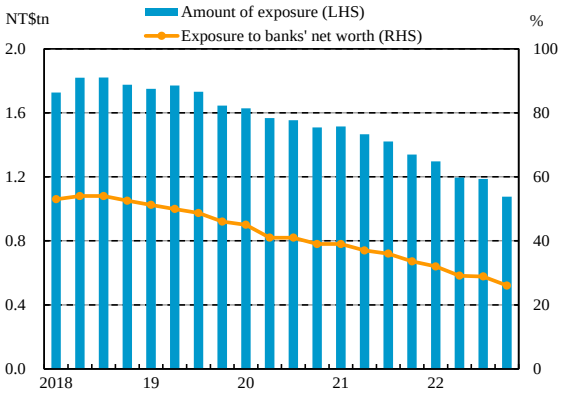
Chart 3.19 Shares of corporate loans of the three largest industries



Notes: 1. Share of corporate loans = loans to each industry /corporate loans.
2. Exposures of OBUs and overseas branches were excluded.

Source: CBC.

Chart 3.20 Exposures of domestic banks to China



Source: FSC.

Exposures to China decreased persistently, but potential risks remained high

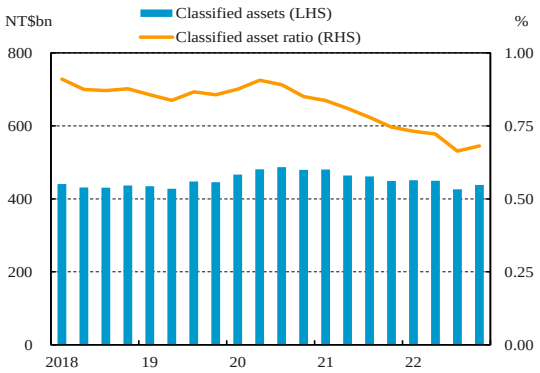
At the end of 2022, the exposures of domestic banks to China stood at NT$1.08 trillion, representing a 19.69% decrease from the previous year, mainly attributed to a 37.13% reduction in investments. The above exposures as a percentage of net worth also reached a new low of 26% (Chart 3.20).

Although domestic banks' exposures to China remained relatively low, the potential economic and financial risks in China are still high due to ongoing financing pressures in the

[38] Loans to the manufacturing sector are divided into five categories by industry, including: (1) electronics, (2) mining of metals and non-metals, (3) petrochemicals, (4) traditional manufacturing, and (5) others.

real estate market and the high level of debt burden of local governments, coupled with the escalating US-China technology dispute. Therefore, they warrant continual close attention.

Chart 3.21 Classified assets of domestic banks



Note: Classified asset ratio = classified assets/total assets.
Source: CBC.

Exposures to related banks in the recent banking turmoil in the US and Europe were limited

Beginning in early March 2023, four small and medium-sized banks in the United States, namely Silicon Valley Bank (SVB), Silvergate Bank, Signature Bank and First Republic Bank, failed or were liquidated one after another. Then, in Europe, UBS acquired financially-distressed Credit Suisse. These events intensified fluctuations in financial markets. According to the statistics of the FSC, domestic banks had no exposure to the four failed US banks as of the end of February 2023, and only small exposure of NT$46.1 billion to Credit Suisse, accounting for 0.07% of total assets of domestic banks. Furthermore, no domestic banks held Credit Suisse's AT1 bonds. This showed that the impact of the turmoil on domestic banks was limited, but their possible spillover effects warrants continual close attention.

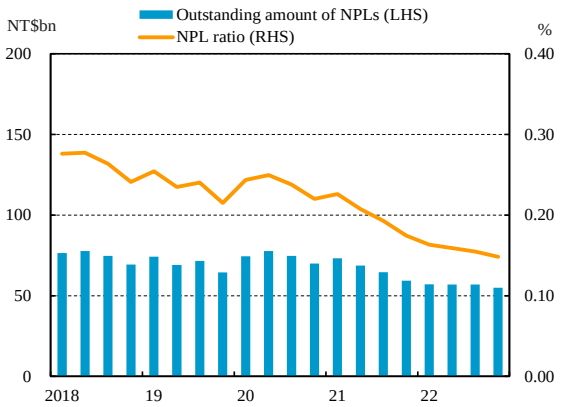
Asset quality improved

The outstanding classified assets[39] of domestic banks decreased by 2.39% from a year earlier to NT$438.4 billion at the end of 2022. The average classified asset ratio also slightly decreased by 0.07 pps from the end of the previous year and stood at 0.68% (Chart 3.21), showing that the asset quality of domestic banks improved. Although the expected losses of classified assets[40] increased by NT$5.0 billion from a year earlier to NT$50.2 billion, they only accounted for 9.11% of allowances for doubtful accounts and loss provisions, indicating sufficient provisions to cover expected losses without eroding equity.

[39] Assets of domestic banks are broken down into five categories: normal, special mention, substandard, doubtful, and loss. The term "classified assets" herein includes all assets classified under the latter four categories.
[40] Loss herein refers to losses from loans, acceptances, guarantees, credit cards, and factoring without recourse.

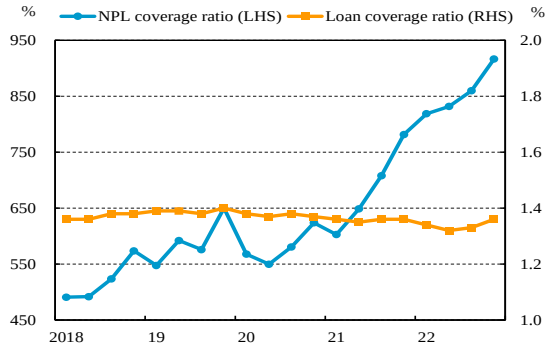
The outstanding NPLs of domestic banks registered NT$55.0 billion at the end of 2022, decreasing by 7.36% from the end of the previous year. The average NPL ratio also declined to a record low of 0.15% (Chart 3.22). In addition, at the end of 2022, the loan coverage ratio remained at 1.36%, whereas the NPL coverage ratio increased significantly to 916.53% (Chart 3.23) due to a greater decrease in NPLs. The overall ability of domestic banks to compensate potential loan losses remained satisfactory.

Chart 3.22 NPLs of domestic banks



Note: Excludes interbank loans.
Source: CBC.

Chart 3.23 NPL coverage ratio and loan coverage ratio of domestic banks



Notes: 1. NPL coverage ratio = total provisions/non-performing loans.
2. Loan coverage ratio = total provisions/total loans.
3. Excludes interbank loans.
Source: CBC.

Market risk

Estimated value-at-risk for market risk exposures increased

Based on the Bank's VaR model,[41] the estimated total VaR for market risk exposures of domestic banks stood at NT$169.3 billion at the end of 2022, increasing by NT$16.2 billion or 10.58% compared to a year earlier. Among the market risk exposures, the interest rate VaR rose by 14.50% year on year in 2022. This mainly resulted from a surge in bond yield volatility because of the sharp tightening of monetary policies implemented by central banks in many countries to rein in inflation. The FX VaR also increased by 33.33% owing to elevated volatility in the NT dollar exchange rate against the US dollar. However, the equities VaR declined by 26.88% compared to the previous year, reflecting a substantial reduction of 47.28% in the net position of equity securities (Table 3.1).

[41] For more details about the Bank's VaR model, please see CBC (2016), Box 2, *Financial Stability Report*.

Table 3.1 Market risks in domestic banks

Unit: NT$bn

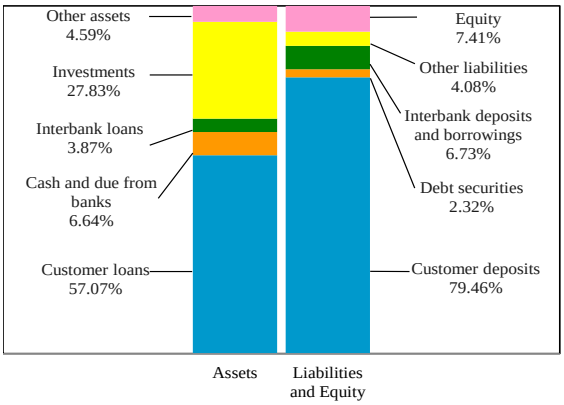
Type of risk	Item	End-Dec. 2021	End-Dec. 2022	Changes	
				Amount	pps
Foreign exchange	Net position	200.2	200.5	0.3	0.15
	VaR	3.3	4.4	1.1	33.33
	VaR/net position (%)	1.65	0.219		0.54
Interest rate	Net position	2,001.3	1,760.9	-240.4	-12.01
	VaR	133.8	153.2	19.4	14.50
	VaR/net position (%)	6.69	8.70		2.01
Equities	Net position	112.3	59.2	-53.1	-47.28
	VaR	16.0	11.7	-4.3	-26.88
	VaR/net position (%)	14.25	19.76		5.51
Total VaR		153.1	169.3	16.2	10.58

Source: CBC.

The impacts of market risk on capital adequacy ratios were limited

According to the estimation mentioned above, the total VaR would lead to a decrease of 0.49 pps[42] in the average capital adequacy ratio of domestic banks, causing the ratio to drop from the current 14.68% to 14.19%. Nevertheless, it would still be higher than the statutory minimum of 10.5%. Considering that market panic over the banking turmoil in the US and Europe lingered on and the uncertainty of subsequent developments is also high, market risk could further increase and therefore warrants close attention.

Chart 3.24 Asset/liability structure of domestic banks



Notes: 1. Figures are as of end-December 2022.
2. Equity includes loss provisions. Interbank deposits include deposits with the CBC.
Source: CBC.

Liquidity risk

Liquidity in the banking system remained ample

The asset and liability structure of domestic banks remained roughly unchanged in 2022. For the sources of funds, customer deposits,

[42] Domestic banks had already set aside capital for market risk in accordance with relevant regulations. To avoid double counting, the impacts of market risk on the capital adequacy ratio herein were estimated using capital shortfalls after considering the aforementioned market risk capital.

which tend to be relatively stable, still made up the largest share with 79.46% of the total, followed by equity at 7.41%. As for the uses of funds, customer loans accounted for the biggest share with 57.07%, followed by securities investments at 27.83% (Chart 3.24).

At the end of 2022, the average deposit-to-loan ratio of domestic banks slightly dropped to 141.14%, and the funding surplus (i.e., deposits exceeding loans) was NT$15.25 trillion (Chart 3.25). The overall liquidity of domestic banks remained abundant.

Overall liquidity risk remained relatively low

The average NT dollar liquid reserve ratio of domestic banks was well above the statutory minimum of 10% in every month of 2022 and stood at 28.31% in December (Chart 3.26).

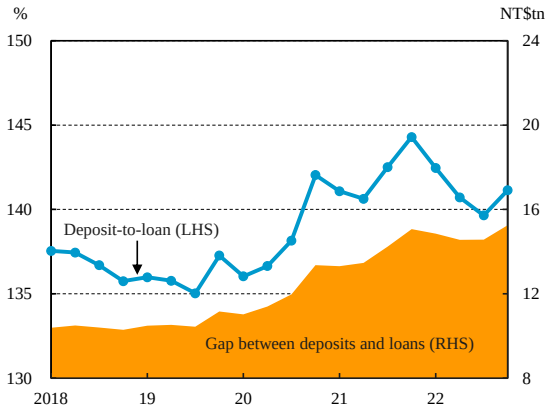
At the end of 2022, the average liquidity coverage ratio (LCR) and the net stable funding ratio (NSFR) of domestic banks marginally dropped to 134% and 138%, respectively (Chart 3.27). However, all banks met the statutory minimum LCR and NSFR requirements, indicating that the overall liquidity risk of domestic banks was relatively low.

Profitability

Profits in 2022 reached the highest level in nearly 20 years

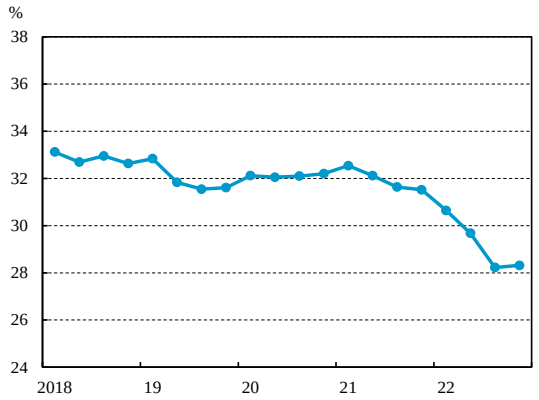
Benefiting from a substantial pickup in net interest income owing to expanding interest

Chart 3.25 Deposit-to-loan ratio of domestic banks



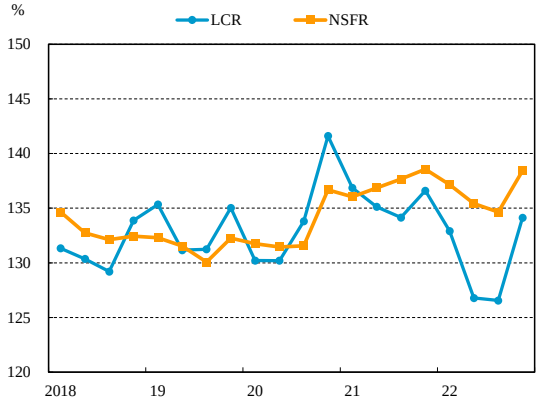
Note: Deposit-to-loan ratio = total deposits/total loans.
Source: CBC.

Chart 3.26 Liquid reserve ratio of domestic banks



Note: Figures are the average daily data in the last month of each quarter.
Source: CBC.

Chart 3.27 LCR and NSFR of domestic banks



Source: CBC.

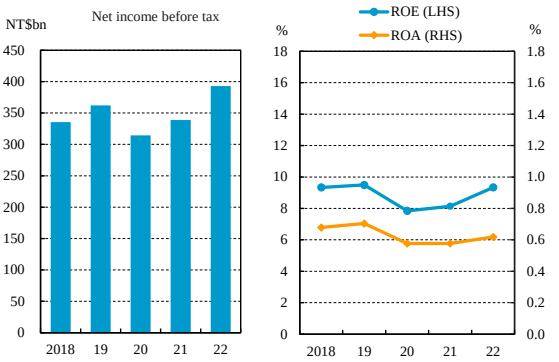
rate spreads between deposits and loans and increasing interest revenue from debt instruments, the net income before tax of domestic banks in 2022 increased by 15.97% over the previous year to NT$392.8 billion, a record high in nearly 20 years. The average ROE and ROA also went up to 9.33% and 0.62%, respectively, indicating improved profitability (Chart 3.28).

In 2022, three internet-only banks, which officially began operations in the last two years, posted operating losses, whereas all the other banks made profits. Most banks' ROEs and ROAs were higher than the previous year. Fourteen banks achieved a profitable ROE of 10% or more, compared to five banks in 2021. Meanwhile, three banks recorded ROAs above the international standard of 1%, more than two banks in 2022 (Chart 3.29).

Factors that might affect future profitability

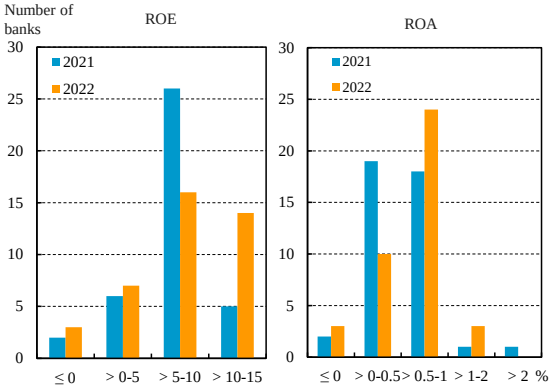
Affected by the Bank's policy rate hikes in 2022, the average interest rate spread between deposits and loans of domestic banks notably rose to 1.36% at the end of 2022 from 1.24% a year earlier (Chart 3.30), which helped to strengthen the profitability of domestic banks. However, there are still some uncertainties which warrant close attention: (A) Financial markets are increasingly sensitive to the expectations of the Fed's future rate-hike path, and there are still uncertainties regarding the subsequent developments of the recent turmoil in the US and European banking sectors, which could further increase volatility in global

Chart 3.28 Net income before tax of domestic banks



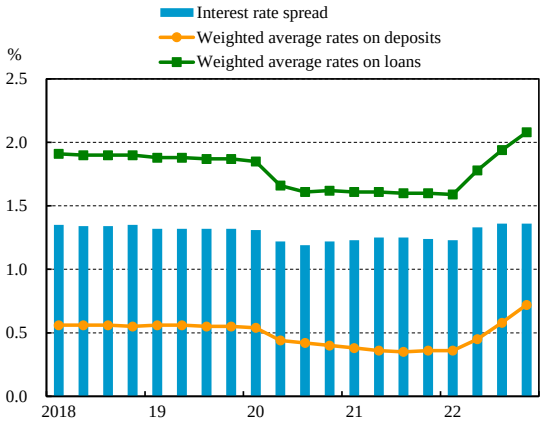
Notes: 1. ROE = net income before tax/average equity.
2. ROA = net income before tax/average assets.
Source: CBC.

Chart 3.29 Domestic banks classified by ROE and ROA



Source: CBC.

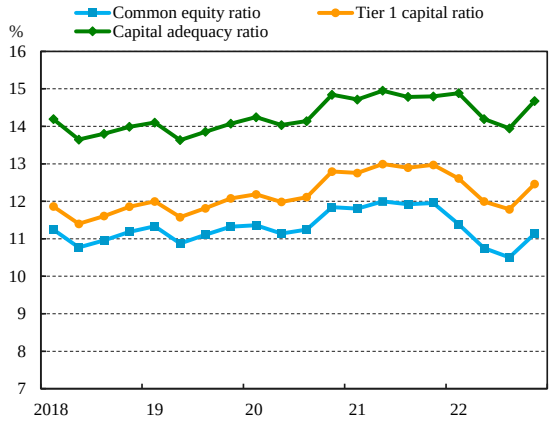
Chart 3.30 Interest rate spread of domestic banks



Notes: 1. Interest rate spread = weighted average interest rates on loans - weighted average interest rates on deposits.
2. The weighted average interest rates on deposits and loans exclude preferential deposits of retired government employees and central government loans.
Source: CBC.

financial markets, thus affecting banks' returns on investment. (B) A significant slowdown in the global economic and trade momentum, together with weak customer demand and manufacturers' continuous inventory adjustments, might suppress Taiwan's export momentum and impair corporate profit growth and debt-servicing capabilities, consequently affecting banks' profitability and credit quality.

Chart 3.31 Capital ratios of domestic banks



Notes: 1. Common equity ratio = common equity Tier 1 capital/risk-weighted assets.
2. Tier 1 capital ratio = Tier 1 capital/risk-weighted assets.
3. Capital adequacy ratio = eligible capital/risk-weighted assets.

Source: CBC.

Capital adequacy

Capital ratios slightly descended

In 2022, influenced by an increase in unrealized valuation losses on debt instrument investments and dividend distributions, the regulatory capital of domestic banks decreased. Meanwhile, an increase in loans led to the expansion in risk-weighted assets. As a result, the average common equity ratio, Tier 1 capital ratio, and capital adequacy ratio dropped to 11.13%, 12.46%, and 14.68%, respectively, at the end of 2022 (Chart 3.31). Among the components of regulatory capital, common equity Tier 1 (CET 1) capital accounted for 75.86%. The high share of CET1 capital, which features the best loss-bearing capacity, showed that the capital quality of domestic banks was satisfactory.

Moreover, the average leverage ratio of domestic banks stood at 6.28% at the end of 2022, marginally lower than 6.46% a year earlier but still above the 3% statutory standard, indicating that financial leverage remained sound.

All domestic banks had capital ratios and leverage ratios higher than the statutory minimum

At the end of 2022, the capital ratios of six domestic systemically important banks (D-SIBs) and non-D-SIBs were all above statutory minimum standards or the relevant capital buffer requirements set by the FSC in 2022.[43] Leverage ratios of all domestic banks also exceeded the statutory minimum of 3%.

[43] The statutory standards for the common equity ratio, Tier 1 capital ratio, and capital adequacy ratio of non-D-SIBs are 7%, 8.5% and 10.5%, respectively. D-SIBs are required to set aside an additional 2% of buffer capital and 2% of internal management capital according to the requirement of the FSC. The additional capital must be achieved before the end of each of the four years equally starting from the next year after the designated date (the enforcement of the internal management capital requirement was postponed for one year and must be achieved before each year-end of the four years equally from 2022 onwards).

Credit ratings

Average credit rating level remained steady

Of the overall risk assessments of Taiwan's banking system made by credit rating agencies, Standard & Poor's kept Taiwan's Banking Industry Country Risk Assessment (BICRA) [44] unchanged at Group 4 with moderate risk. Compared to other Asian economies, the systemic risk level of Taiwan was the same as that of Malaysia, but much lower than those of the Philippines, China, Thailand and Indonesia. Moreover, the assessment of Taiwan's banking system by Fitch Ratings in its Banking System Indicator/ Macro-Prudential Indicator (BSI/MPI)[45] also remained unchanged at level bbb/2 (Table 3.2).

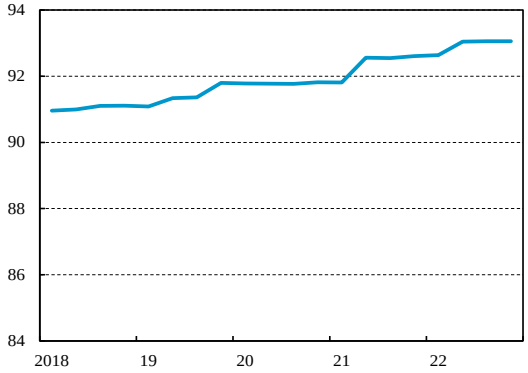
Moreover, the weighted average credit rating index [46] went up slightly compared to the previous year owing to the upgrading of four banks (Chart 3.32).

Table 3.2 Systemic risk indicators for the banking system

Banking System	Standard & Poor's		Fitch	
	BICRA		BSI/MPI	
	2022/2	2023/2	2021/8	2022/7
Singapore	2	2	aa/2	aa/2
Hong Kong	2	2	a/2	a/2
Japan	3	3	a/2	a/3
South Korea	3	3	a/2	a/2
Taiwan	**4**	**4**	**bbb/2**	**bbb/2**
Malaysia	4	4	bbb/1	bbb/1
Philippines	5	5	bb/1	bb/1
China	6	6	bb/1	bb/1
Thailand	6	7	bbb/1	bbb/1
Indonesia	6	6	bb/1	bb/1

Sources: Standard & Poor's and Fitch Ratings.

Chart 3.32 Credit rating index of domestic banks



Sources: Taiwan Ratings, Fitch Ratings and CBC.

Rating outlooks for every rated bank remained stable or positive

As of the end of 2022, all but one domestic bank received ratings by credit rating agencies. Most of the rated domestic banks maintained credit ratings of twAA/twA (Taiwan Ratings) or AA(twn)/A(twn) (Fitch Ratings) and none had credit ratings lower than twBB/BB(twn) (Chart 3.33). Rating outlooks for all rated banks remained stable or positive.

[44] BICRA is scored on a scale from 1 to 10, ranging from the lowest-risk (group 1) to the highest-risk (group 10), which indicates the assessment results by Standard & Poor's of economic and industry risks of a country's banking system.

[45] Fitch Ratings assesses banking system vulnerability with two complementary measures, the BSI and the MPI. These two indicators are brought together in a Systemic Risk Matrix. The BSI represents banking system strength on a scale from aaa, aa, a, bbb, bb, b, ccc, cc, c and f. The MPI indicates the vulnerability of the macro environment on a scale from 1, 2, 2* and 3.

[46] The credit rating index is an asset-weighted average rating score of rated domestic banks, measuring the overall creditworthiness of those banks on a scale from 1 (weakest) to 100 (strongest). The rating score for banks is determined according to their long-term issuer ratings from Taiwan Ratings or national long-term ratings from Fitch Ratings. The higher the index is, the better the bank's overall solvency.

Taiwan Ratings projected that Taiwan's banking industry outlook remained stable in 2023, and indicated that domestic banks' adequate capital levels could help offset a possible increase in credit losses arising from the domestic economic slowdown.[47]

3.2.2 Insurance companies

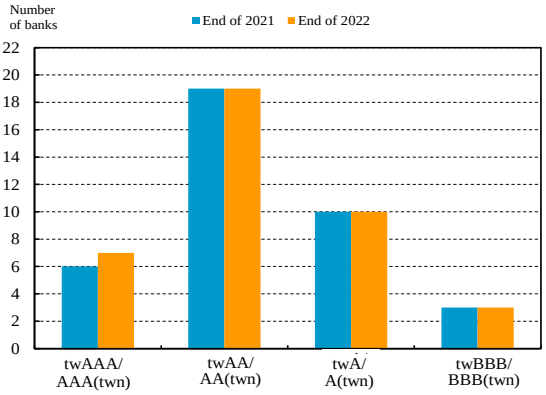
Life insurance companies

In 2022, the total assets of life insurance companies grew at a slower pace and their profits slumped. The average equity to asset ratio rebounded after a sharp drop, and overall credit ratings remained stable. However, owing to the expansion of foreign investment positions, life insurance companies still faced higher FX risk, interest rate risk and equity risk.

Assets grew at a slower pace

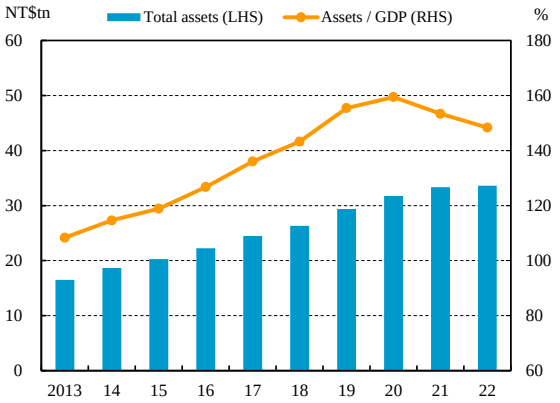
The total assets of life insurance companies reached NT$33.62 trillion at the end of 2022, equivalent to 148.34% of annual GDP (Chart 3.34). The annual growth rate of total assets slowed markedly to 0.84% from 5.00% a year earlier. The market structure of the life insurance industry remained roughly unchanged in 2022, with the top three companies in terms of assets making up a combined market share of 54.61%.

Chart 3.33 Number of domestic banks classified by credit ratings



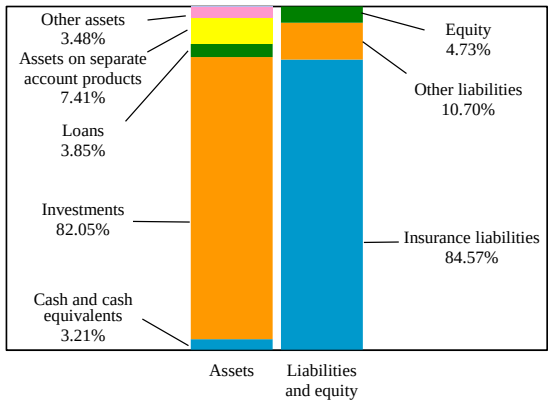
Sources: Taiwan Ratings and Fitch Ratings.

Chart 3.34 Total assets of life insurance companies



Sources: FSC and DGBAS.

Chart 3.35 Asset/liability structure of life insurance companies



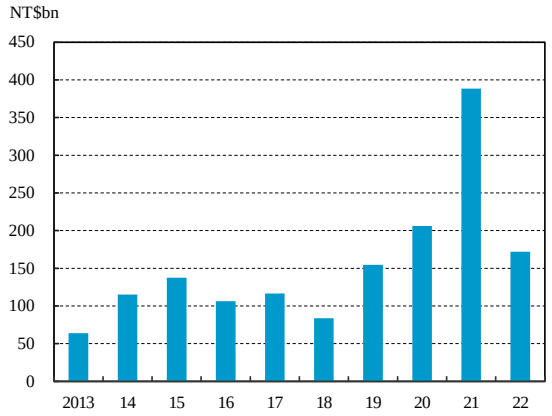
Note: Figures are as of the end of 2022.
Source: FSC.

[47] Press release by Taiwan Ratings on December 21, 2022.

Investment positions continued to grow

In terms of the usage of funds of life insurance companies as of the end of 2022, investments continued to take up the primary share of total assets, which rose to 82.05% owing to the expansion of foreign investments.[48] As for the sources of funds, insurance liabilities accounted for the largest share of 84.57%, while the share of equity decreased to 4.73% mainly owing to the expansion of unrealized valuation losses from financial assets and a sharp decline in profits (Chart 3.35).

Chart 3.36 Net income before tax of life insurance companies

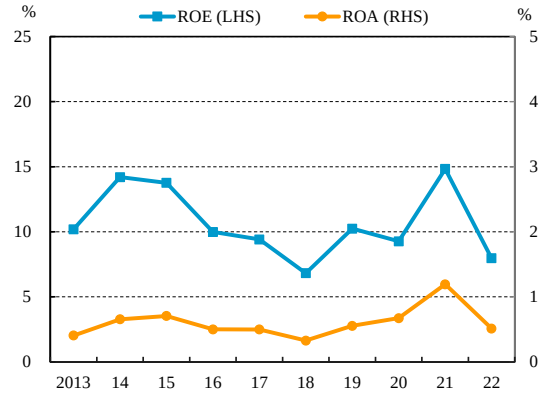


Source: FSC.

Pretax income slumped

Life insurance companies reported net income before tax of NT$171.9 billion in 2022, a substantial year-on-year decrease of 55.75% from NT$388.5 billion a year earlier (Chart 3.36). This mainly resulted from a huge reduction in investment revenue as the loss on valuation of financial assets expanded, which was influenced by the decline in international stock and bond markets. Accordingly, their average ROE and ROA dropped to 7.97% and 0.51%, respectively, from 14.83% and 1.19% a year earlier (Chart 3.37), indicating a deterioration in profitability.

Chart 3.37 ROE & ROA of life insurance companies



Notes: 1. ROE = net income before tax/average equity.
2. ROA = net income before tax/average assets.
Source: FSC.

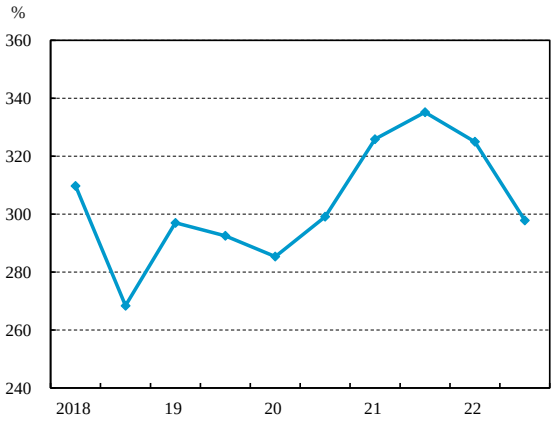
Average RBC ratio and equity to asset ratio both decreased

In 2022, the total capital of life insurance companies fell because of a slump in international stock and bond markets. As a result, the average RBC ratio decreased to 297.82% at the end of the year from 335.17% a year earlier (Chart 3.38). Among them, one life insurance company had an RBC ratio below the statutory minimum of 200%.

[48] Foreign investments and domestic portfolio investments (including investments in insurance-related enterprises) made up 63.01% and 16.32% of total assets, respectively.

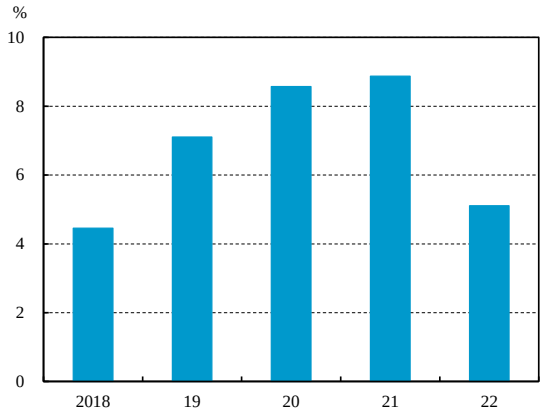
Furthermore, the average equity to asset ratio continued to drop in the first three quarters of 2022, affected by the Fed's rapid interest rate hikes and the adoption of different accounting treatments for evaluating insurers' assets and liabilities. [49] Afterwards, with some life insurance companies conducting cash capital increases or financial asset reclassification, the ratio climbed to 5.11% at the end of 2022, still far below the 8.87% registered a year earlier (Chart 3.39). The number of life insurance companies with equity to asset ratios below the statutory minimum of 3% was four at the end of 2022, but the number shrank to two as of the end of March 2023.

Chart 3.38 RBC ratio of life insurance companies



Notes: 1. RBC ratio = regulatory capital/risk-based capital.
2. Figures are exclusive of life insurance companies in receivership.
Source: FSC.

Chart 3.39 Equity to asset ratios of life insurance companies



Notes: 1. For equity, unaudited figures are used.
2. For assets, the assets of investment-linked insurance products in separate accounts are excluded.
Source: FSC.

Overall credit ratings remained stable

Among the 14 life insurance companies rated by credit rating agencies in 2022, only one life insurance company was downgraded to twA from twA+ by Taiwan Ratings because of its weakened capital level, while ratings for the other companies remained unchanged. As of the end of the year, all rated life insurance companies maintained credit ratings above twA or its equivalent, with the ratings of the top three companies in terms of assets holding at twAA, which means a very strong capacity to meet their financial commitments. As for the prospects of these companies, most of them were rated with a positive or stable outlook, except for two companies being rated with a negative outlook.

Taiwan Ratings indicated[50] that the decline in the life insurance premium income is expected to slow down in 2023. However, the spiking volatility in financial markets and the expansion

[49] The financial assets of the insurance industry are measured at fair value in compliance with IFRS 9, while the insurance liabilities are discounted at the predetermined interest rate at the issuance of the policies and are not reassessed when interest rates change. Consequently, when market interest rates rise, the asset side reflects the unrealized valuation losses, but the liability side does not reflect the valuation gains therefrom, causing a reduction in equity.
[50] Taiwan Ratings (2022), "2023 Taiwan Credit Outlook," December.

of FX hedging costs will affect life insurers' profitability and capital adequacy throughout the year. The resultant challenges in their credit outlook warrant close attention.

Foreign investment positions faced higher market risk and systemic risk

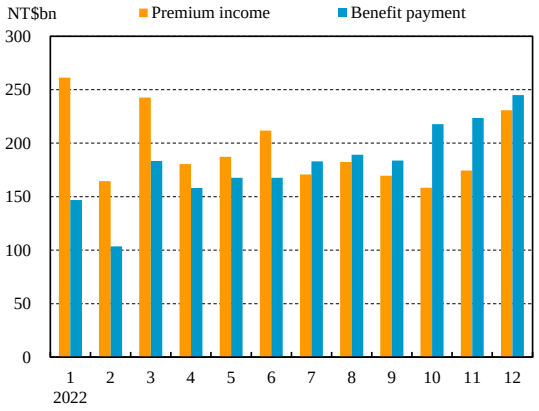
Foreign investment positions of life insurance companies grew continuously and reached NT$21.19 trillion at the end of 2022. Securities investments constituted the largest share, of which about 90% were invested in bills and bonds and 10% in equities. Although the Fed slowed down the pace of interest rate hikes recently, the volatility in stock markets increased owing to concerns about multiple downside risks which might adversely affect the global economic outlook. In addition, global bond yields remained high. As a result, life insurance companies still faced higher equity risk and interest rate risk.

Furthermore, more than 90% of foreign investment positions of life insurance companies were denominated in US dollars. In order to alleviate the impacts of exchange rate fluctuations, life insurance companies actively used derivative financial instruments for FX hedging, as well as building up FX valuation reserves in compliance with the relevant regulations. However, the FX risk inherent in large-value open FX positions of life insurance companies still warrants close attention. Given that the FX hedging costs for insurance companies surged in 2022, the FSC amended the regulations related to FX valuation reserves and established a new provision (write-off) mechanism for traditional hedging costs in March 2023. The amendments aimed to enable insurers to manage currency risk in a more flexible manner and stabilize hedging costs, thereby strengthening their solvency and financial soundness.

Liquidity risk raised as insurance benefit payment has exceeded premium income

After the Fed accelerated interest rate hikes, the impact from the lower return on USD-denominated insurance policies compared to USD preferential deposit rates and poor investment performance caused the premium income of life insurance companies to significantly decrease by 21.43% in 2022 compared to a year earlier. Furthermore, bearish news such as the decline in total equity of life insurance companies struck

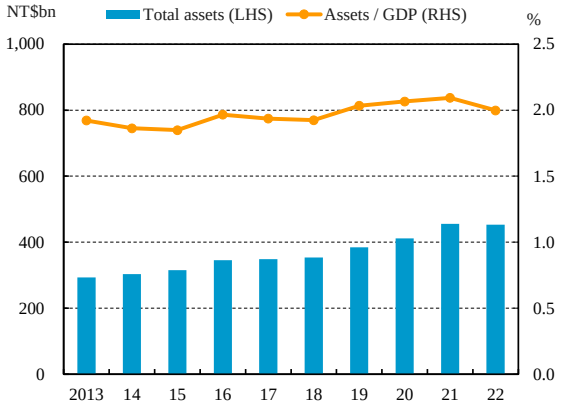
Chart 3.40 Premium income and benefit payment of life insurance companies



Note: Benefit payment includes maturity, survival repayment and termination.
Source: Taiwan Insurance Institute.

policyholders' confidence. As a result, the life insurance benefit payment has exceeded premium income since July 2022 (Chart 3.40). In addition, some life insurance companies reclassified their financial assets to "financial assets measured at amortized cost," which could limit their ability to realize the capital gains from bond investments and place pressure on their cash flows.[51]

Chart 3.41 Total assets of non-life insurance companies



Sources: FSC and DGBAS.

Exposure to the four failed American banks and Credit Suisse was limited and insurers did not hold AT1 bond positions

According to the statistics of the FSC, the exposure of Taiwanese insurers (mainly life insurance companies) to SVB and First Republic Bank was NT$150 million and NT$42 million, respectively, as of the end of February 2023. Meanwhile, the insurance industry did not hold exposure to Signature Bank and Silvergate Bank. Moreover, the exposure to Credit Suisse was NT$109.3 billion, accounting for only 0.35% of the total usable assets, indicating the risks were under control, and no domestic insurers held Credit Suisse's AT1 bonds.

Non-Life Insurance companies

In 2022, the total assets of non-life insurance companies contracted slightly. They reported a significant pretax loss and a decreasing average RBC ratio owing to a drastic surge in COVID-19 insurance claim settlements, but the pressure to settle claims is expected to ease in 2023.

Assets contracted slightly

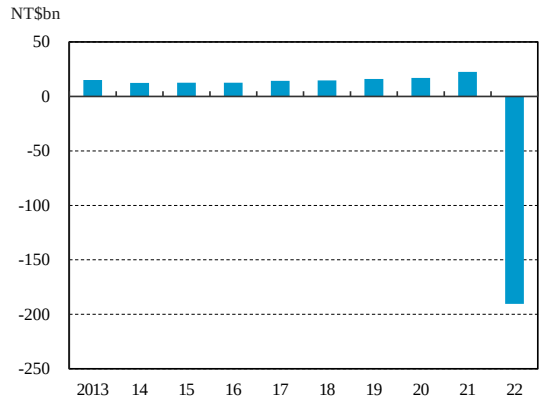
The total assets of non-life insurance companies reached NT$452.9 billion at the end of 2022, equivalent to 2.00% of annual GDP (Chart 3.41). The annual growth rate of total assets plummeted to -0.56% from 10.63% a year earlier, representing a contraction in the size of total assets. The top three companies in terms of assets made up a combined market share of 46.17%. The market structure of the non-life insurance industry remained roughly unchanged.

[51] Under the FSC's regulations, the insurance industry is not allowed to sell more than 5% of the original bonds measured at amortized cost each year. When the insurer exceeds the limitation, it will be prohibited from measuring new bonds at amortized cost starting from the next year to 2025 when IFRS 17 is adopted domestically.

Significant pretax loss

Non-life insurance companies reported net income before tax of minus NT$190.5 billion in 2022 owing to a drastic increase in COVID-19 insurance claim settlements (Chart 3.42). Their average ROE and ROA declined to -171.40% and -41.96% from 14.80% and 5.22% a year earlier, respectively. Among 19 non-life insurance companies, ten companies reported a net loss, compared to two companies a year earlier.

Chart 3.42 Net income before tax of non-life insurance companies

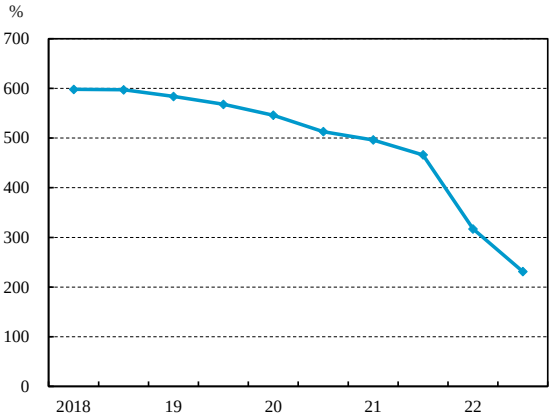


Source: FSC.

Average RBC ratio and equity to asset ratio both decreased

In 2022, total capital in non-life insurance companies fell because of the pretax loss. Correspondingly, the average RBC ratio trended downwards to 231.30%[52] at the end of the year from 466.12% a year earlier (Chart 3.43). Among them, five non-life insurance companies were below the statutory minimum of 200%. Furthermore, the average equity to asset ratio dropped to 15.14% from 35.20% at the end of the previous year, with four non-life insurance companies recording ratios below the statutory minimum of 3%.

Chart 3.43 RBC ratio of non-life insurance companies



Note: RBC ratio = regulatory capital/risk-based capital.
Source: FSC.

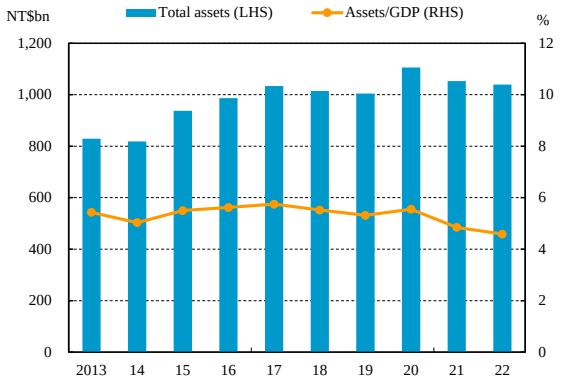
COVID-19 insurance claim settlements surged in 2022, while the pressure is expected to ease in 2023

Many non-life insurance companies issued COVID-19 insurance policies in early 2022. Afterwards, as the government relaxed some of the pandemic containment measures, the number of infections surged and, as a result, COVID-related claim settlements increased. Consequently, the total payout of quarantine and vaccine insurance reached NT$211.6 billion

[52] RBC data of the non-life insurance companies is reported on a semiannual basis.

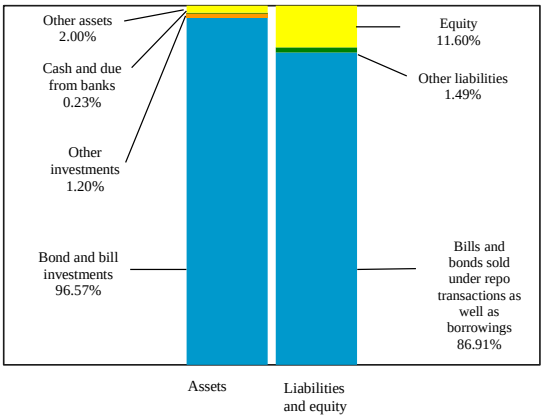
in 2022.[53] Considering that some non-life insurers could not afford large claim settlements, the FSC approved certain insurers to borrow funds to cover these large payments. Additionally, in order to stabilize the insurance market and maintain the operational capabilities of insurance enterprises, the FSC provided several financing-related measures to insurers in September 2022. In the beginning of 2023, as the pandemic eased and COVID-19 insurance policies gradually expired without renewal, the number and amount of related claims decreased gradually and are expected to ease insurers' pressure of claim settlements.

Chart 3.44 Total assets of bills finance companies



Sources: CBC and DGBAS.

Chart 3.45 Asset/liability structure of bills finance companies



Note: Figures are as of the end of 2022.
Sources: CBC and FSC.

3.2.3 Bills finance companies

In 2022, the total assets of bills finance companies decreased, along with a reduction in their guarantee business. However, the concentration of credit secured by real estate remained high, while credit asset quality remained sound. Although the capital adequacy ratio increased due to the reduction in risk-weighted assets, profitability declined significantly. Moreover, liquidity risk and interest rate risk remained high.

Total assets decreased

The total assets of bills finance companies stood at NT$1,039.6 billion at the end of 2022, a decrease of 1.29% compared to a year earlier, mainly owing to substantial valuation losses on bond investments. The ratio of their total assets to annual GDP dropped continually to 4.59% over the same period (Chart 3.44).

With respect to the asset and liability structure of bills finance companies, bill and bond

[53] The claim settlements of quarantine and vaccine insurance were NT$169.3 and NT$42.3 billion, respectively.

investments constituted the largest share of 96.57% of total assets as of the end of 2022. On the liability side, bills and bonds sold under repo transactions as well as borrowings accounted for 86.91% of total assets, while the proportion of equity accounted for 11.60% (Chart 3.45). The asset and liability structure remained roughly unchanged compared to a year earlier.

Credit risk

Guarantee liabilities decreased, but the concentration of credit secured by real estate remained high

The amount of CP guaranteed by bills finance companies registered NT$548.8 billion at the end of 2022, decreasing by 13.12% year on year. This decline was primarily because the widening valuation losses on financial assets eroded capital. To maintain a satisfactory capital adequacy ratio, bills finance companies reduced their CP guarantee business. As a result, the average ratio of guarantee liabilities to equity decreased to a multiple of 4.24 times, and the ratio for each company remained below the regulatory ceiling of 5.5 times.

At the end of 2022, guarantees granted to the real estate and construction industries and credit secured by real estate rose to 31.45% and 42.05%, respectively, of the total credit of bills finance companies. Meanwhile, the proportion of real estate industry guarantees registered 27.60%, still below the regulatory ceiling of 30%, but the overall concentration of credit secured by real estate remained high. Considering the recent conservative prospects of the domestic real estate market, elevated pressure on the clearance of unsold new residential housing units, and the potential financial health deterioration of some small and medium-sized construction companies, bills finance companies should monitor closely the above-mentioned impacts on the asset quality of mortgage-related credit.

Guaranteed advances ratio rose but credit quality remained sound

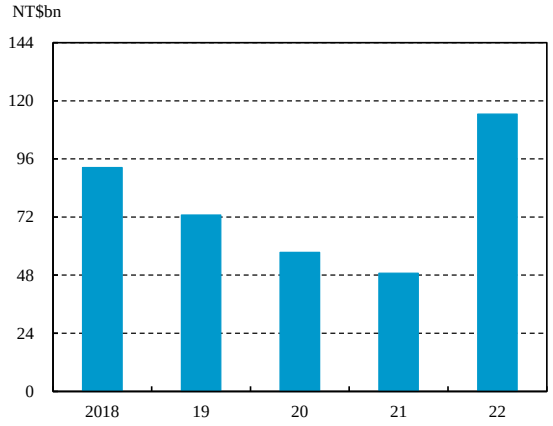
At the end of 2022, the guaranteed advances ratio of bills finance companies was 0.16%, higher than 0.01% a year earlier yet still reflecting sound credit quality. Although the credit loss reserves to guaranteed advances ratio[54] decreased to 8.40 times due to the increase in guaranteed advances, the provision was still sufficient to cover potential credit losses.

[54] Credit loss reserves to guaranteed advances ratio = (provisions + loss reserves to guarantees)/guaranteed advances.

Investment in non-guaranteed CP issued by the leasing industry expanded continually and its potential credit risk warrants attention

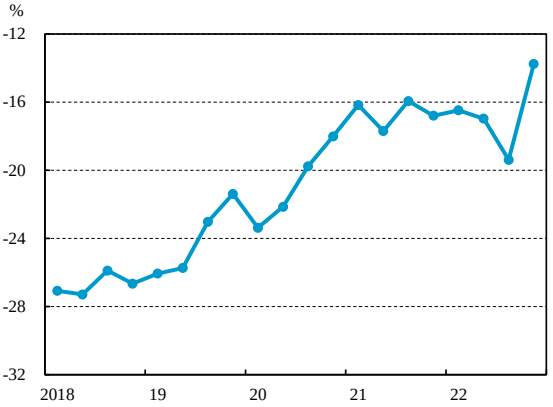
The non-guaranteed CP investment of bills finance companies stood at NT$114.5 billion at the end of 2022, representing a significant increase of 134.41% year on year (Chart 3.46). This increase was primarily because the anticipation of rising interest rates and tight market liquidity impacted the willingness of counterparties to purchase bills and, in turn, hampered the ability of the bills finance companies to offload their underwriting positions. Each company's ratio of non-guaranteed CP investment to equity remained below the self-disciplinary ceiling of 2 times. However, the investment in non-guaranteed CP issued by the leasing industry kept increasing, reaching NT$34.1 billion during the same period. The leasing industry may pose a higher potential credit risk owing to the fact that it tends to rely on short-term sources for funding long-term investments, hence warranting close attention to the impact on the asset quality of bills finance companies.

Chart 3.46 Outstanding amount of non-guaranteed CP investments of bills finance companies



Source: CBC.

Chart 3.47 0-30 day maturity gap ratio of bills finance companies



Note: 0-30 day maturity gap ratio = net NTD cash flow within 0-30 days/total assets denominated in NTD.
Source: CBC.

Liquidity risk remained high

Bills finance companies still faced a significant maturity mismatch between assets and liabilities. At the end of 2022, more than 80% of their funding sources relied on short-term interbank borrowing and repurchase agreements with financial institutions. Furthermore, more than 90% of their assets were invested in bills and bonds as of the end of the year, 40.83% of which were long-term bonds, reflecting a significant maturity mismatch between assets and liabilities. Nevertheless, bills finance companies' ratio of 0-30 day maturity gap to total NTD-

denominated assets shrunk further and registered -13.76% at the end of the year (Chart 3.47), reflecting a declining but still high liquidity risk.

The average ratio of major liabilities [55] to equity increased slightly to 7 times at the end of 2022 because the expansion in bill and bond repo transactions held by bills finance companies resulted in an increase in major liabilities and led to a higher degree of financial leverage. Moreover, the leverage ratios of all bills finance companies stayed below the regulatory ceilings of 10 or 12 times.

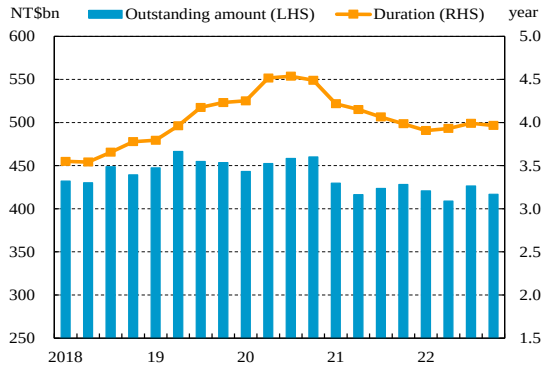
Interest rate risk of bond investments remained high

In 2022, the outstanding amount of fixed-rate bond investments of bills finance companies decreased by 2.65% to NT$416.9 billion with the average duration shortening to 3.97 years (Chart 3.48). Taiwan government bond yields dropped gradually recently. However, considering the uncertain future trajectory of monetary policy, the global bond market might continue to face correction pressure. The interest rate risk of bills finance companies' bond investments remained high, warranting close attention.

Pretax income decreased significantly and profitability declined

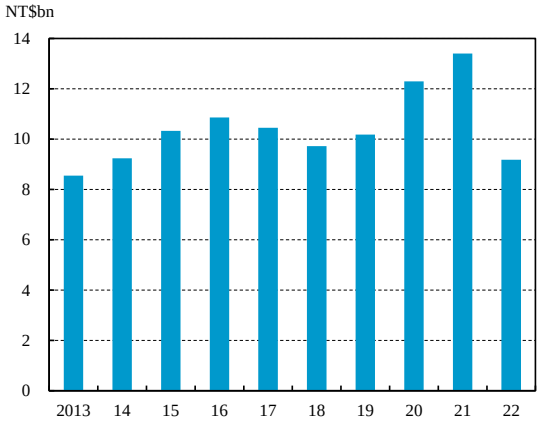
The net income before tax of bills finance companies decreased by 31.54% year on year

Chart 3.48 Outstanding amount of fixed-rate bond investments and bond duration of bills finance companies



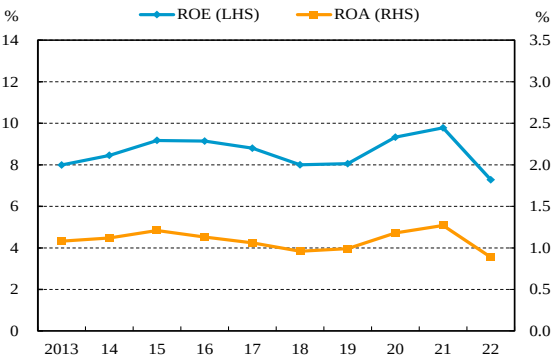
Source: FSC.

Chart 3.49 Net income before tax of bills finance companies



Source: CBC.

Chart 3.50 ROE & ROA of bills finance companies

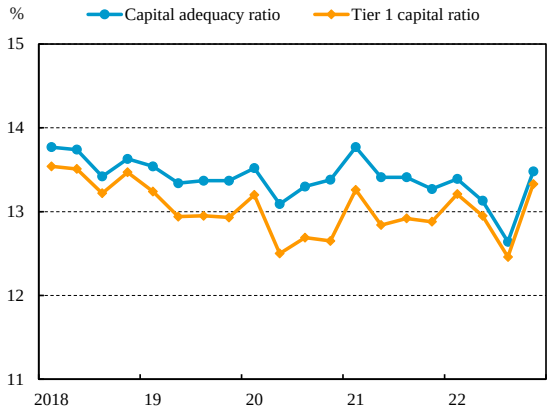


Notes: 1. ROE = net income before tax/average equity.
2. ROA = net income before tax/average assets.
Source: CBC.

[55] Major liabilities include call loans, repo transactions, as well as issuance of corporate bonds and CP.

to NT$9.2 billion in 2022 (Chart 3.49) owing to an increase in interest expenses and a reduction in gains on disposal of financial assets. The average ROE and ROA thus reduced to 7.28% and 0.89% (Chart 3.50), respectively, reflecting declining profitability.

Chart 3.51 Average capital adequacy ratios of bills finance companies



Source: CBC.

Average capital adequacy ratio rose

At the end of 2022, the average Tier 1 capital ratio and the average capital adequacy ratio of bills finance companies rose to 13.33% and 13.48%, respectively (Chart 3.51). Moreover, the capital adequacy ratio remained well above the statutory minimum of 8% for each company.

3.3 Financial infrastructure

In 2022, Taiwan's payment and settlement systems operated smoothly and continued to develop. The FSC planned to implement appropriate monitoring of crypto assets in a gradual manner. Furthermore, in order to align with the government's policy of Taiwan's Pathway to Net-Zero Emissions in 2050, the Bank released the "CBC Strategic Plan to Address Climate Change Issues." Meanwhile, the FSC also continued an aggressive effort in implementing the green finance action plan with the aim of facilitating Taiwan's sustainable development, and continuously amended regulations to bolster the sound development of the financial sector.

3.3.1 Payment and settlement systems

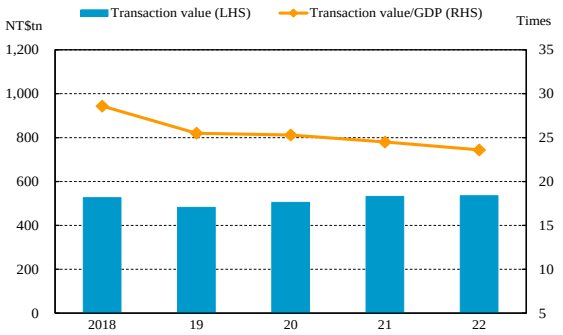
The transaction value of the CBC's CIFS and the IFIS, operated respectively by the Bank and the FISC, grew steadily and functioned smoothly. The FISC continued to strengthen the shared infrastructure for retail payments. Moreover, with an increase in the public's willingness to use non-cash payment instruments, consumer spending related to these instruments has also been expanding. Meanwhile, in light of recent risk events in the international crypto asset market, the FSC planned to take a step-by-step approach to enhance the protection of customer interests on domestic crypto asset platforms.

Overview of the CIFS's operation

The CIFS deals with large-value interbank funds transfers and provides the final settlement of interbank transfers. It is connected to each clearing system, such as those for domestic securities, bills, bonds and retail payments. In 2022, the amount of funds transferred via the CIFS was approximately NT$535 trillion, about 23.6 times the GDP for the year (Chart 3.52).

In terms of the retail payments, they are primarily processed by the IFIS, which utilizes the funds deposited by financial institutions in the Interbank Funds Transfer Guarantee Special Account (hereinafter the Guarantee Account) under the CIFS to clear and settle

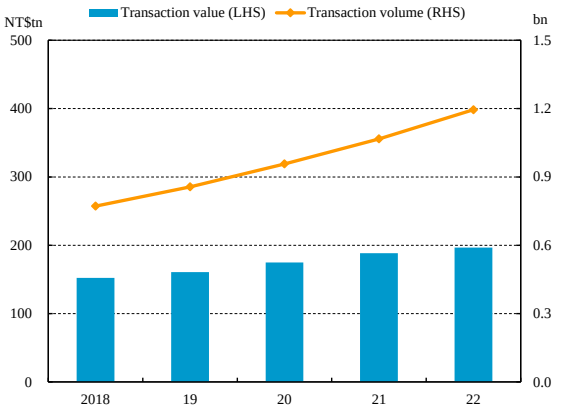
Chart 3.52 Funds transferred via the CIFS



Note: Figure for GDP in 2023 is published by DGBAS on May 26, 2023.
Sources: CBC and DGBAS.

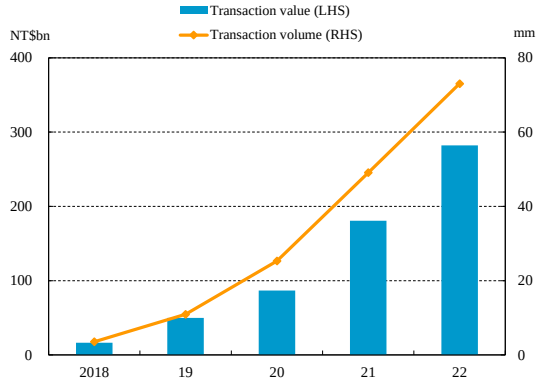
interbank payment transactions on a trade-by-trade basis.[56] In 2022, approximately 1.19 billion transactions were processed by the IFIS with the value totaling NT$197 trillion (Chart 3.53), increasing respectively by 12.00% and 4.32% compared to 2021.

Chart 3.53 Transaction value and volume processed by the IFIS



Source: CBC.

Chart 3.54 Transaction value and volume via QR code payment standard



Source: CBC.

Development of shared infrastructure for retail payments

To enhance the convenience of using mobile payment for the public, the Bank continues to urge the FISC to establish a common QR Code payment standard. Since its launch in September 2017 till the end of 2022, a total of 37 participating institutions and over 250,000 affiliated merchants have joined this initiative. The accumulated volume of transactions processed through this common standard has exceeded 160 million with a total value of approximately NT$616.5 billion. The volume and value of transactions in 2022 increased by 48.79% and 56.11%, respectively, compared to the previous year (Chart 3.54).

Additionally, to facilitate the interconnection of information and cash flows between banks and e-payment institutions, the FISC established a shared platform for cross-institution e-payments in October 2021. This platform subsequently added various functions, such as e-payments for taxes and utility bills from 2022 onwards and is expected to provide a payment service for shopping in 2023 Q3.

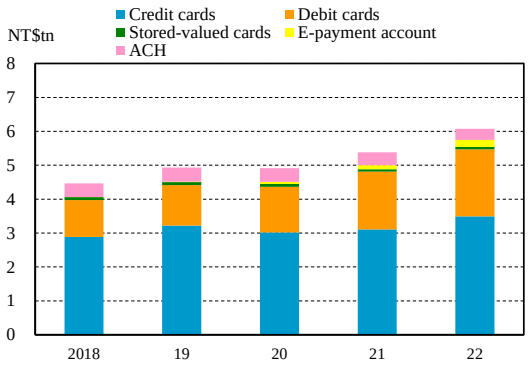
Domestic consumption via non-cash payment instruments

In 2022, the overall expenditure on non-cash payment instruments reached NT$6.08 trillion (Chart 3.55), an increase of 12.92% year on year. Among a variety of these payment instruments, the consumption amount via credit cards, debit cards, and e-payment accounts

[56] Interbank payment transactions include remittances, automated teller machine (ATM) withdrawals, transfers (including online and mobile transfers), tax payments and corporate funds transfers.

increased by NT$382.5 billion, NT$274.9 billion, and NT$86.5 billion, respectively. The growth could be attributed to the rising demand for contactless payments amid the pandemic and an improvement in convenience of e-payments.

Chart 3.55 Consumption via non-cash payment tools



Notes: 1. The consumption statistics of debit cards include consumer purchases with domestic chip bank cards, VISA and other international debit cards, UnionPay cards, and ATM transfers for shopping payments.
2. ACH inter-bank collection means that the payment institutions handle deduction and account entry through the ACH system of the TCH after obtaining the entrustment of the public.

Sources: CBC, FSC and FISC.

Development, risks, and international regulatory trends of the crypto asset market

In 2022, the crypto asset market remained highly volatile, triggered by multiple risk events such as the collapse of the stablecoin UST and the bankruptcy of the trading platform FTX. These developments caught the attention of international regulatory authorities. International institutions, including the Bank for International Settlements (BIS), have also advocated country-level regulation based on the principles of "same activity, same risk, same regulation." In this vein, the FSC also expressed its policy stance to implement appropriate monitoring of crypto assets in a gradual manner.

3.3.2 The Bank adopted policy measures in response to climate change

In recent years, extreme weather events attributable to climate change have led to substantial economic losses. As a result, the international community has been prompting nations to progressively adopt measures for transitioning towards a low-carbon economy. However, the transition process may pose operational challenges for industries, exert upward pressures on prices through green inflation, increase risks within the financial sector, and have an impact on financial stability. In this context, major central banks and financial supervisory agencies have been proactively evaluating the economic and financial impacts of climate change risks and progressively incorporated such risks into the realm of prudential supervision. They also carry out studies on the influence of climate change risks on the efficacy of monetary policies and corresponding countermeasures.

To align with the global development trajectory and support the government's 2050 net-zero transition plan, the Bank formulated the "CBC Strategic Plan to Address Climate Change Issues"

and released it on December 30, 2022. The plan includes two policy objectives and three core strategies which are expected to be achieved through the gradual implementation of five categories of policy measures as follows: (1) to conduct research on the impact of climate change on monetary policies; (2) to utilize monetary policy operational tools to facilitate sustainable financial development; (3) to conduct research on macroprudential instruments to address climate change risks; (4) to incorporate green bonds into the foreign exchange reserve management consideration; and (5) to actively engage in international projects and collaboration pertaining to climate change risks.

Given that the economic and financial implications of climate change are highly uncertain and that international research in this field is still at an early stage, the Bank will conduct a rolling review to fine-tune the aforementioned measures. To understand the potential impacts of climate change risks on various aspects of the economy and the financial system, the Bank will draw insights from international organizations. Furthermore, the Bank has enhanced supervisory cooperation with the FSC on climate change issues to jointly facilitate Taiwan's sustainable development, mitigate the impact of climate change risks on the domestic economy, and bolster resilience of the financial system to climate change risks (Box 2).

Box 2
CBC Strategic Plan to Address Climate Change Issues

In recent years, extreme weather events resulting from climate change have become more frequent, which not only poses serious threats to life, property, and the ecosystem but also exerts a substantial impact on global economic output. Climate change risks could adversely affect the real economy and through the interconnections across economic and financial sectors amplify financial risks, and even build up systemic risks that threaten financial stability. In light of this, the Bank released the "CBC Strategic Plan to Address Climate Change Issues" on December 30, 2022. Based on the plan, the Bank will progressively implement a series of measures to maintain financial stability and foster sustainable economic development in Taiwan.

1. Definition and impact of climate change risks

1.1 Climate change might result in physical and transition risks

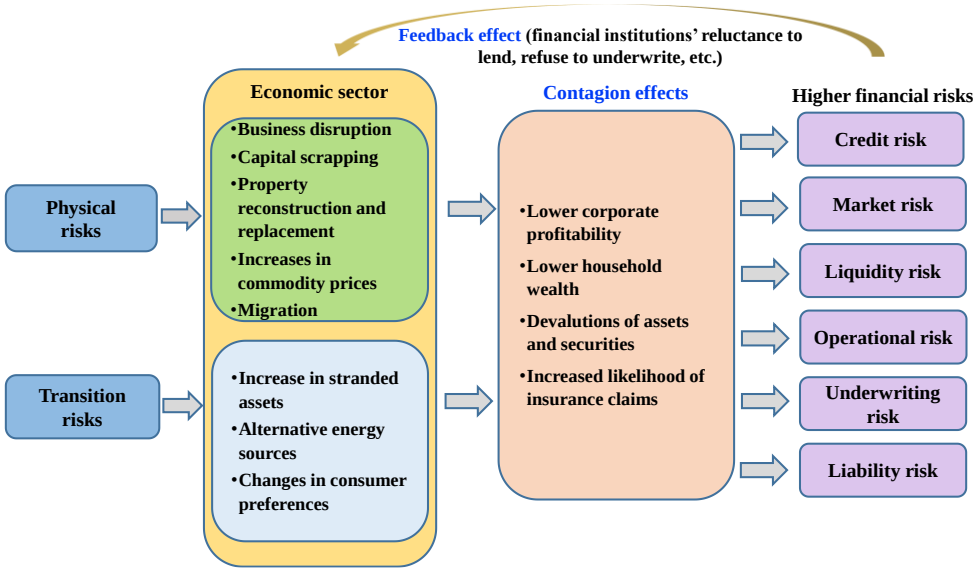
According to the Network for Greening the Financial System (NGFS),[1] climate change risks include physical risks and transition risks.

- **Physical risks** refer to the risks associated with acute impacts from extreme weather events (such as hurricanes and floods) and chronic impacts from global warming (such as increased average temperatures and sea levels), with such adverse implications as business disruption, capital impairment, property reconstruction or replacement, increases in commodity prices, and forced migration.
- **Transition risks** refer to the risks arising from the process of transition towards a low-carbon economy, including policy changes leading to the accumulation of stranded assets in specific industries, the impact of alternative energy sources resulting from advancements in energy technology, or changes in consumer preferences driven by households conforming to environmental protection policies.

1.2 Climate change risks amplify the contagion and feedback effects across the economic and financial sectors, posing a threat to financial stability

When the economic sector is exposed to physical risks and transition risks, it could heighten the risks of the financial sector through contagion effects. These risks encompass credit, market, and liquidity risks related to investments or financing positions, operational risks arising from business disruptions owing to disasters, and an increase in underwriting and liability risks owing to an upsurge in compensation claims or indemnity payouts. Consequently, the impacts could be transmitted from the economic sector to the financial

Chart B2.1 Contagion effects and feedback effects of climate risks



Sources: FSB (2020), NGFS (2019), NGFS (2020), and CBC.

sector. In turn, to prevent such risks from increasing, the financial sector might take a series of countermeasures against the shocks, which would generate feedback effects through channels such as capital markets, business adjustments, and cross-border contagion effects, thereby amplifying the impact on the economic sector (Chart B2.1).[2]

2. Policies and measures adopted by the Bank in response to climate change

Being a responsible member of the global community, the Taiwanese government announced the *Taiwan Sustainable Development Goals (T-SDGs)* in December 2018, and has actively engaged in sustainable development initiatives. In April 2021, the government declared its commitment to achieving net-zero transition in 2050. Subsequently, in March 2022, it unveiled the comprehensive action plans and measures covering the *12 Key Strategies*[3] to fulfill the long-term net-zero transition goal.

Although the Bank is not the primary driver of the climate change-related actions in Taiwan, it recognizes the importance of aligning itself with the international trend and supporting the government's 2050 net-zero transition plan. The Bank thus formulated two policy objectives and three core strategies after drawing on the experiences and practices of major international central banks and developed a policy framework for the Bank's response actions to address climate change challenges (Chart B2.2). To achieve its policy objectives, the Bank will progressively implement the following measures across five key aspects, namely monetary policy, monetary policy tools, macroprudential surveillance, foreign exchange reserve management, and international engagement and collaboration.

Chart B2.2 The Bank's policy framework in response to climate change

Policy objectives	• Strengthen the resilience of the economic and financial system in response to climate risks • Facilitate the smooth transition of the economic system towards a sustainable green economy				
Core strategies	• Support the establishment of a green and sustainable investment and financing environment • Proactively enhance the Bank's expertise and capabilities to address climate-related issues • Incorporate climate risk considerations into the Bank's operation and management of foreign exchange reserves				
	Monetary policy	Monetary policy operating tools	Macroprudential surveillance	FX reserve management	International collaborations
Policy measures	Conduct research on the impact of climate change upon monetary policies	Utilize monetary policy operational tools to facilitate the development of sustainable finance	Conduct research on macroprudential instruments to address climate change risks	Incorporate green bonds into the FX reserve portfolio	Actively engage in international collaborations pertaining to climate change risks

Source: CBC.

2.1 Conducting research on the impact of climate change upon monetary policy

The Bank is deliberating on how to incorporate weather factors into its price forecasting model and plans to collect climate change-related data to compile climate indicators. In the medium term, the Bank will explore the development of industry-specific models and multi-sector models, combined with the results from macro-econometric model analysis, to investigate the impacts of changes in energy or food prices under various scenarios, seeking a deeper understanding of the implications of climate change risks on the economy and the financial system.

2.2 Utilizing monetary policy operational tools to facilitate the development of sustainable finance

The Bank is mulling over the adoption of domestic banks' performances of implementing green/sustainable finance as a component of the Bank's reference indictors when conducting open market operations and accepting redeposits from domestic banks. In addition, the Bank plans to include sustainability debentures issued by banks in its annual small-scale test repo operation targets, in order to encourage banks to increase the issuance of such instruments and enhance investors' willingness to hold them.

2.3 Conducting research on macroprudential instruments to address climate change risks

The Bank stays updated with the latest international advancements in climate risk

assessment data and methodologies and studies the experiences of major central banks in assessing climate change-related risks and in developing prudential instruments. Going forward, the Bank will collaborate with experts and scholars to conduct research, aiming to enhance expertise in developing in-house climate risk-related models. This will serve as a basis for planning climate risk-related macro-stress testing and for evaluating viable options of macroprudential instruments.

2.4 Incorporating green bonds into the FX reserve portfolio

Under the principles of safety, liquidity, and profitability, the Bank will incorporate green bonds into its consideration of foreign exchange reserve portfolio management. On the premise that bond issuers meet the Bank's credit rating requirements, the Bank will continuously invest in green bonds that meet international standards and are issued by foreign governments or international financial organizations. Moreover, the Bank will gather and analyze information related to the implementation of sustainable development goals by stakeholders directly involved in foreign exchange reserve portfolio management, thereby contributing to the development of the international green finance market.

2.5 Actively engaging in international cooperation and collaboration pertaining to climate change risks

Sustainable development has become a key focus in financial policies of various countries. The Bank continues to participate in climate change risk- and green finance-related seminars, and establish interactive channels such as bilateral video conference mechanisms with major central banks and international organizations. These initiatives have facilitated exchanges on the best practices in response to climate change risks and sharing of relevant experiences among central banks.

3. Conclusion

Although the Bank is not the primary driver of climate change-related actions in Taiwan, it will proactively monitor the evolution and developments of climate-related issues. Given that the impact of climate change on the economy and the financial system is highly uncertain and migrates greatly over time, and that international research in this field is just emerging, the Bank will draw insights from international organizations and continuously review and adjust the aforementioned measures. In addition, the Bank has strengthened collaborative efforts with the FSC on climate change issues, aiming to collectively mitigate the impact of climate change risks on Taiwan's economy and enhance the financial system's resilience to climate change risks, so as to ensure the sound development of

Taiwan's financial sector and sustainable economic growth.

Notes: 1. NGFS (2020), "Climate Change and Monetary Policy Initial Takeaways," June; NGFS (2021), "NGFS Climate Scenarios for Central Banks and Supervisors," June.
2. FSB (2020), "The Implications of Climate Change for Financial Stability," November; NGFS (2019), "A call for Action, Climate Change as a Source of Financial Risk," April; NGFS (2020), "Climate Change and Monetary Policy Initial Takeaways," June.
3. Including wind/solar photovoltaics, hydrogen, innovative energy, power systems and energy storage, energy saving and efficiency, carbon capture utilization and storage, carbon-free and electric vehicles, resource recycling and zero waste, carbon sinks, green lifestyle, green finance and just transition.

3.3.3 The FSC continues to take measures related to green finance

In order to coordinate financial resources to support net-zero transition in Taiwan and continuously enhance the management of climate risk for the financial industry, the FSC has successively implemented important measures since 2022 as follows:

Launching "Green Finance Action Plan 3.0"

The FSC launched the Green Finance Action Plan 3.0 (hereinafter referred to as the Plan) in September 2022. The vision of the Plan will be achieved through the efforts in five aspects,[57] namely "deployment, funding, data, empowerment, and ecosystem," and via 26 measures. The Plan is expected to encourage financial institutions to: (1) identify GHG emissions of their own operations and of their investments and financing positions; (2) assess climate-related risks and opportunities; and (3) set goals and strategies to reduce their GHG emissions. Financial institutions could in turn drive corporate efforts towards low-carbon transition and enhance the disclosure of information related to environmental, social, and governance (ESG) performance.

Strengthening financial institutions' management of climate-related risks and disclosure of GHG emission information

To assess the impact of climate change risks on the banking industry, the FSC commissioned the Bankers Association of the Republic of China to draw up the "Plan for Climate Change Scenario Analysis of Domestic Banks." The climate change scenarios, based on the scenarios designed by the NGFS, are used to assess the impact of climate change risks on the credit risk positions of domestic banks and evaluate their ability to withstand climate-related risks. Moreover, in order to enhance the disclosure of GHG emission information of the financial industry, the FSC's compulsory disclosure of scope 1 and scope 2 inventory and verification by financial institutions[58] will be phased in gradually from 2024 onwards based on the size of their capital or asset management business.

[57] The five major aspects include: (1) Deployment: to require compulsory disclosure of information about GHG emissions by financial institutions and set strategies and objectives, so as to drive companies to reduce their GHG emissions; (2) Funding: to promote the adoption of Taiwan Sustainable Taxonomy and to channel funds into promoting sustainable development; (3) Data: to integrate information from different institutions and to build an ESG data platform; (4) Empowerment: to enhance the professional competencies of sustainable finance for financial institutions' employees through training programs and certification; (5) Ecosystem: to foster cooperation among financial institutions and to conduct the evaluation of sustainable finance.

[58] Financial institutions comprise banking enterprises, insurance firms, financial holding companies, bills finance companies, securities firms, futures commission merchants, and securities investment trust enterprises.

Formulating the "Taiwan Sustainable Taxonomy"

The FSC, the Environmental Protection Administration (EPA), the Ministry of Economic Affairs (MOEA), the Ministry of Transportation and Communications (MOTC), and the Ministry of the Interior (MOI) jointly issued the "Taiwan Sustainable Taxonomy" (the Taxonomy) in December 2022, as a reference guide[59] for corporates to determine whether their economic activities are in conformity with sustainable finance. The Taxonomy offers, as a start, guidance for the top three industries in terms of the amount of investment and financing by domestic financial institutions, which are manufacturing, building and construction, and transportation and storage, so as to help them identify whether their economic activities, namely 16 ordinary economic activities and 13 forward-looking economic activities, qualify as sustainable.

Establishing the "Financial Industry Net-Zero Working Platform"

The FSC and the Taiwan Financial Services Roundtable jointly established the "Financial Industry Net-Zero Working Platform" with five workstreams in December 2022. The platform has invited 16 peripheral institutions and financial industry associations to become members to develop relevant tools, guidelines and plans in a collective effort while serving as a space in which financial institutions can cooperate, collaborate, and exchange ideas.

3.3.4 Reclassifying financial assets by some insurers

Form March 2022 onwards, rapid interest rate hikes of major central banks led to a sharp decline in profits or net worth of insurance companies in Taiwan. The reason is that insurance companies applied different accounting treatment principles to the valuation bases for assets and liabilities. While their financial assets are measured at fair value in accordance with International Financial Reporting Standard (IFRS) 9, their liabilities are still recognized on a lock-in basis as Taiwan has not yet adopted the IFRS 17 *Insurance Contracts*, and thus have not yet been valued at current market rates. As a result, when market interest rates rise sharply, the asset side reflects huge unrealized evaluation losses, while the liability side cannot reflect the gains correspondingly.

To mitigate the impact of large fluctuations in interest rates on their balance sheets, some

[59] The Taxonomy is to provide one of five judgments (aligned; working on it; improving; not aligned; and not eligible) regarding the degree of sustainability of the primary economic activities in terms of certain conditions such as "substantial contribution to climate change mitigation," "shall not significantly harm five other environmental goals," "shall not significantly harm social safeguards," and whether they have adopted any concrete improvement or transition plans.

insurance companies planned to change their business models for managing financial assets to address the challenges resulting from changes in the external environment to their operations. Moreover, in October 2022, Taiwan's Accounting Research and Development Foundation also provided reference guidelines to address the issues and questions about the reclassification of financial assets as drastic changes in the international economic situation ushered in different business models in managing financial assets. As of the end of March 2023, nine life insurance companies have reclassified their financial assets.

In addition, in order to maintain capital soundness of the insurance industry, the FSC required those insurers who had reclassified financial assets to set aside a provision for special reserves. Furthermore, for net worth increases after reclassification, the FSC required that special reserves should be set aside by insurers' parent financial holding companies to reflect the full amount of the increases and by the public companies with equity method investments in life insurers based on their shareholding ratio, so as to prevent the reclassification from leading to increased distribution of dividends.

3.3.5 Establishing the financial vulnerability index of Taiwan

In the wake of the 1997 Asian financial crisis, central banks and regulatory authorities have been devoted to developing indicators for measuring financial stability or vulnerability, with the intention of reflecting the current financial condition, or even predicting crises. For instance, the International Monetary Fund (IMF) has been collaborating with various economies since 1999 to promote the compilation of financial soundness indicators (FSIs), so that central banks and regulatory authorities are able to enhance surveillance of relevant financial systems through more comprehensive information on financial and real sectors. In accordance with international standards, the Bank also consulted the IMF compilation guide on FSIs and began to regularly publish the Taiwan FSIs in 2008.

Despite the fact that FSIs can be employed to monitor changes in financial soundness across various sectors on a regular basis, the trends of different financial indices may sometimes take divergent paths, making it difficult to grasp the full picture of the financial landscape. Therefore, in 2018, the Bank conducted a pilot study to develop the TFVI based on the FSIs by referring to the methodologies used in past research and literature. Subsequently, in view of a major revision of the FSIs framework by the IMF in 2019, along with the fact that the aforementioned TFVI still needs improvement on the correlation among variables and on the warning thresholds, the Bank therefore worked with domestic academics[60] to utilize the hierarchical

[60] See Hsu, Shih-Hsun (2023) "Taiwan Financial Vulnerability Index," commissioned research report by the Bank, February.

common factor model to develop the TFVI in a more comprehensive manner for the index to better reflect the vulnerability dynamics of the Taiwanese financial system (Box 3).

With the abovementioned effort, the TFVI is able to offer a broad picture of the current financial system's vulnerabilities, and its trend is correlated, to some extent, with material financial distress episodes over the past years in Taiwan. Moreover, the lead-lag relationship between the TFVI and the credit-to-GDP gap is statistically significant, indicating that the TFVI aggregated by extracted information from multiple sectors does possess a certain degree of early warning capability. In the future, subsequent to trial calculations, the TFVI can serve as a reference for the Bank to monitor the vulnerability of the financial system.

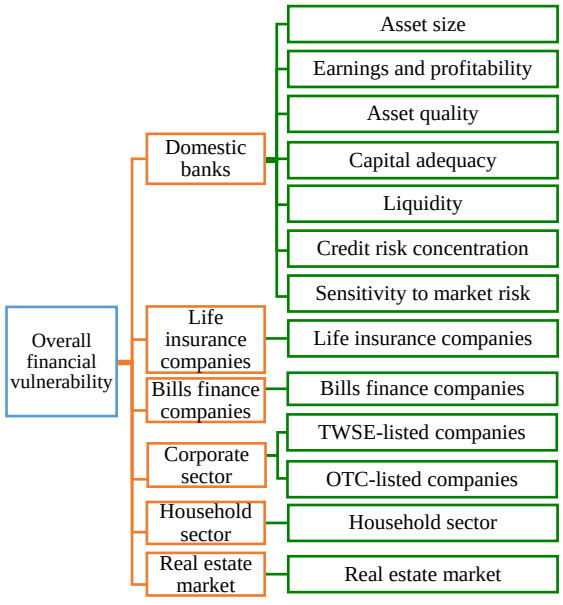
Box 3
Establishing the Financial Vulnerability Index of Taiwan

From 2008 onwards, the Bank has compiled and published Taiwan's FSIs after taking reference from the FSI compilation guidelines published by the IMF.[1] These indicators, regularly disclosed in the *Financial Stability Report* and on the Bank's website, are used to monitor changes in individual sectors as well as financial markets. However, given that the FSIs currently comprise as many as 58 indicators and cover multiple sectors, it is not meant to promptly gauge the overall stability or vulnerability of the financial system. Against this backdrop, in collaboration with domestic academics,[2] the Bank endeavored to establish the Taiwan Financial Vulnerability Index (TFVI) based on the existing framework of the FSIs. The TFVI aims to provide a comprehensive measurement of financial system vulnerabilities, which helps the Bank to identify the source of vulnerabilities and take response measures in a timely manner. In this Box, we would like to briefly introduce the methodology applied to establish the TFVI, and the interpretation of the preliminary research results.

1. Compilation methodology for the TFVI

The TFVI, built on the basis of the FSIs compiled by the Bank, is divided into six sectors, including domestic banks, life insurance companies, bills finance companies, non-financial corporate sector, household sector and real estate market. The banking sector is further classified into seven subsectors, while the corporate sector is split into two (Chart B3.1). Finally, each sector or subsector consists of a different number of indicators.[3] The methodology for compiling the TFVI is as follows:

Chart B3.1 The structure of the TFVI



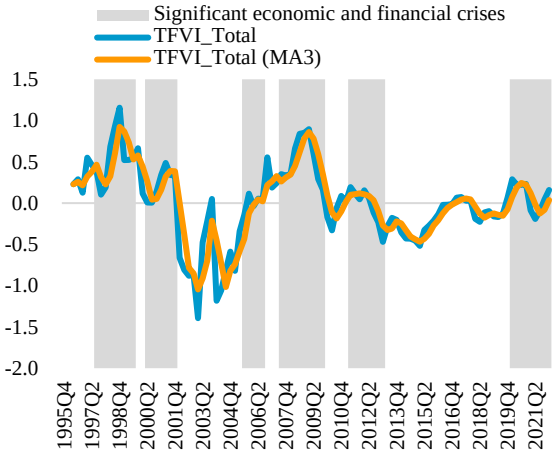
Note: For more details about the indicators, please refer to the "Appendix: Financial soundness indicators," in the *Financial Stability Report*, May 2023.
Source: CBC.

(1) After computing the differences of the FSIs, we employ sequential principal component analysis to estimate a hierarchical common factor model. This methodology allows us to decompose the trend and variance of each FSI

into two parts - one affected by multilevel common factors and the other capturing the variable-specific variation.

(2) Via a linear regression analysis of the FSIs treated as explained variables, together with the previous period's value of the hierarchical common factors constructed in the above step as explanatory variables, we obtain the residuals corresponding to each FSI.[4] The residuals, representing uncertain information that cannot be captured by previous hierarchical common factors, serve as the basis for establishing the vulnerability index.

Chart B3.2 The movement of the TFVI



Notes: 1. TFVI_Total is the original FVI, and TFVI_Total (MA3) is the moving average of the TFVI from time t to t - 3.
2. For more detailed information about significant economic and financial crises, please see Note 7.

Source: CBC.

(3) After adjusting the signs of the corresponding residuals in respect of the correlation between each FSI and financial vulnerability,[5] we aggregate the weighted residuals in every subsector so as to acquire the respective financial vulnerability index. The weighted subsectoral indices are then summed up to create sectoral indices. Lastly, the overall financial vulnerability index can be calculated by combining the six sectoral indices.[6]

2. Preliminary TFVI research results

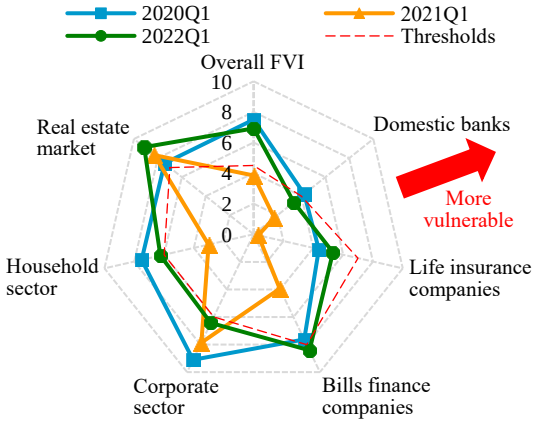
2.1 The movement of the TFVI and its association with financial crises

In order to assess whether the TFVI is capable of accurately reflecting changes in the vulnerability of Taiwan's financial system, this study defines eight material economic and financial events domestically and globally since 1995 Q4,[7] and explores their relationship with the TFVI. As shown in Chart B3.2, the TFVI shows a trend highly correlated to the aforementioned events. Furthermore, with regard to the smoothed TFVI,[8] points in time where the index exceeded 1.65 times standard deviation coincide with the periods of domestic financial distress (from 1998 Q4 to 1999 Q3) and the global financial crisis (from 2008 Q4 to 2009 Q2). These results exhibit that the TFVI compiled in this study should have the ability to identify notable changes in domestic and international financial conditions.

2.2 Visualization analysis of the TFVI

Apart from the overall TFVI, this study further adopts visualization analysis to present the variations in vulnerability for each sector. The main approach involves specifying optimal thresholds by applying the Youden index. Subsequently, we transform these threshold values and subsectoral indices into a scale ranging from 0 to 10. These figures are depicted on a radar chart, aiming to compare the extent of adverse impacts across different sectors.

Chart B3.3 The radar chart of the TFVI



Source: CBC.

Taking the period of the COVID-19 crisis for example, the subsectoral indices for the household sector, corporate sector and real estate market were more significantly affected by the pandemic than the others (see Chart B3.3). The result suggests that the COVID-19 pandemic had a more profound impact on household income and corporate profits, thereby disturbing the supply-demand balance in the real estate market. By contrast, domestic banks and life insurance companies have generally maintained TFVI levels well below the threshold values over the past three years, showing relatively less vulnerability.

3. Conclusion

This study uses the FSIs compiled by the Bank to construct the TFVI. A hierarchical common factor model is introduced to filter the co-movement and common trends between variables and to subsequently build the TFVI for each sector and total TFVI from the bottom up. In sum, the TFVI is able to broadly reflect changes in Taiwan's financial vulnerability and possesses an early warning capacity. Thus, it can be a vital supplementary tool for the Bank to monitor the financial stability landscape.

Notes: 1. For more details about the FSIs of the Bank, please see the "Appendix: Financial soundness indicators" in the *Financial Stability Report*, May 2023.

2. See Hsu, Shih-Hsun (2023), "Taiwan Financial Vulnerability Index," commissioned research report by the Bank, February.

3. The construction of the TFVI utilized a total of 63 FSIs, including the current 58 indicators and the other five indicators removed according to the 2019 IMF compilation guide (i.e., household loans to total loans, corporate loans to total loans, large exposure to capital, gross asset positions in financial derivatives to capital, and gross liability positions in financial derivatives to capital).

4. Baker, Scott R., Nicolas Bloom, and Steven J. Davis (2016), "Measuring economic policy

uncertainty," *Quarterly Journal of Economics*, March.

5. Positive/negative values represent an increase/decrease in financial vulnerability caused by movement of the indices. For example, a higher return on assets (ROA) of financial institutions indicates better profitability and lower financial vulnerability. Therefore, ROA and financial vulnerability tend to move in opposite directions, and a negative sign should be applied when aggregating its residuals for subsector indices.
6. All indices are aggregated using equally-weighted averages owing to various starting points for each FSI, and only indices available at specific points in time are summed up when calculating the corresponding vulnerability index. Furthermore, under the current methodology for compiling financial soundness indicators, only domestic banks and the corporate sector have subsectoral indices.
7. The eight material economic and financial events refer to the Asian financial crisis (from 1997 Q3 to 1998 Q3), the domestic financial crisis (from 1998 Q4 to 1999 Q3), the bursting of the dot-com bubble (from 2000 Q2 to 2001 Q4), the credit card crisis in Taiwan (from 2005 Q3 to 2006 Q3), the subprime mortgage crisis (from 2007 Q3 to 2008 Q2), the global financial crisis (from 2008 Q3 to 2009 Q4), the European sovereign debt crisis (from 2011 Q2 to 2013 Q1), and the COVID-19 pandemic (from 2020 Q1 onwards).
8. TFVI_Total (MA3) refers to the moving average of the TFVI over the past three quarters.

3.3.6 FX regulation amendments

To enhance the effectiveness of anti-money laundering and counter-terrorism financing, strengthen the administration of foreign currency exchange counter (FCEC), match up with the amendment of the *Civil Code* lowering the age of majority for natural persons, provide clear guidance regarding FX settlement declarations for legal entities such as companies and limited partnerships, and to streamline relevant administrative processes, the Bank continued to amend FX regulations in 2022 as follows:

- The Bank revised the *Directions Governing Banking Enterprises for Operating Foreign Exchange Business* and the *Regulations Governing the Establishment and Administration of Foreign Currency Exchange Counters* in January 2022. The main amendments of the latter included: (1) lowering the cap on each foreign currency exchange transaction for each customer handled by a FCEC from US$10,000 to US$3,000 (or its foreign currency equivalent); (2) adding the provision that an FCEC should keep documents related to enhanced due diligence, suspicious transactions, and designated sanctions and should promptly provide the documents required to be kept under the *Regulations* while being inspected; (3) amending the stipulations regarding the situations under which the Bank of Taiwan may revoke or cancel the approval of an FCEC, and adding that it may notify an FCEC to take remedial actions within a specific period of time in view of the circumstances when an FCEC violates relevant regulations; and (4) adding the provision requiring the implementation of enhanced customer due diligence by an FCEC.

- The Bank revised the *Regulations Governing the Declaration of Foreign Exchange Receipts and Disbursements or Transactions* and relevant regulations in December 2022. The main amendments included: (1) amending the stipulations governing the age of natural persons in the competent laws and regulations, and revising the provisions for the declaration of FX settlement for “companies” and “limited partnership”; (2) relaxing the restrictions on the declaration of FX settlement for equity investment by overseas Chinese and foreign nationals and for direct investment in Taiwan by people from Mainland China Area; and (3) stipulating that the declaration of FX settlement involving outward/inward remittances of the allocated disbursements for terminating the issuance of Global Depositary Receipts (GDRs), American Depositary Receipts (ADRs), and Taiwan Depositary Receipts (TDRs) can be processed directly by banks after verifying and confirming relevant documentations that evidence the FX disbursements, instead of applying to the Bank for an approval.

3.4 General assessment of Taiwan's financial system

From 2022 onwards, various factors such as the eruption of Russia-Ukraine war, the accelerated rate hikes and balance sheet tapering by the Fed, the zero-COVID policy in China, and the banking crises in the US and Europe have caused significant turbulence in global financial markets. Nonetheless, the impact on Taiwan's financial system has been relatively moderate.

In Taiwan's financial markets, the outstanding amount of bill issuance edged down, while the outstanding amount of bond issuance reached a historical high. The secondary markets for bonds and bills remained relatively stable. As for equity markets, stock indices rebounded after falling from record highs and volatility gradually decreased. Additionally, Taiwan's stock markets continued to enjoy brisk trading and were not significantly affected by the banking turmoil in the US and Europe. Meanwhile, the foreign exchange market saw a rise in trading volumes and the NT dollar exchange rate remained relatively stable.

Regarding financial institutions, domestic banks' asset quality improved and their profitability reached a near 20-year high with adequate capital levels. However, against the backdrop of a more conservative real estate market and rising interest rates on bank loans, the impact of real estate market changes on banks' credit quality warrants close attention. Meanwhile, insurance companies' profitability slumped but their average capital adequacy ratio rebounded after a sharp drop, coupled with higher market risk of foreign investment positions. The guarantee business of bills finance companies contracted and their profitability declined, along with still-high liquidity risk and interest rate risk.

Domestically, payment and settlement systems operated smoothly and the shared infrastructure for retail payments was further enhanced. The Bank constructed the Taiwan Financial Vulnerability Index to actively monitor for vulnerabilities of the financial system. In addition, the Bank collaborated with the FSC to address climate change issues so as to mitigate their impact on the financial system.

Overall, financial markets in Taiwan kept functioning smoothly. Among financial institutions, banks and bills finance companies still operated soundly. Meanwhile, the insurance companies were confronted by greater adverse impacts, but they increased capital and took other measures to counter the challenges. Additionally, domestic systemically important payment systems functioned in an orderly manner. In general, Taiwan's financial system remained largely stable. Nevertheless, some direct and indirect effects on the financial markets and financial institutions, which could arise from factors such as a slowdown in global economic growth, interest rate hikes by major central banks, spillover effects from the banking crises in the US and Europe, and geopolitical risks, deserve closer attention.