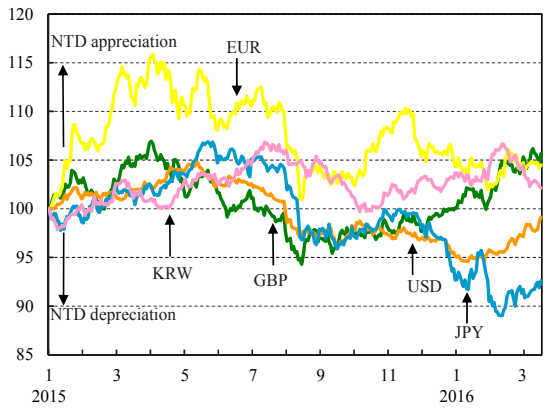
counterparty showed that the average daily trading volume in the interbank market accounted for 74.95% of the total in 2015, while the retail bank-customer market made up a 25.05% share. As for types of transactions, spot trading accounted for the largest share of 41.51% of the total, followed by foreign exchange swaps with 40.08%.

NT dollar exchange rate volatility remained relatively stable

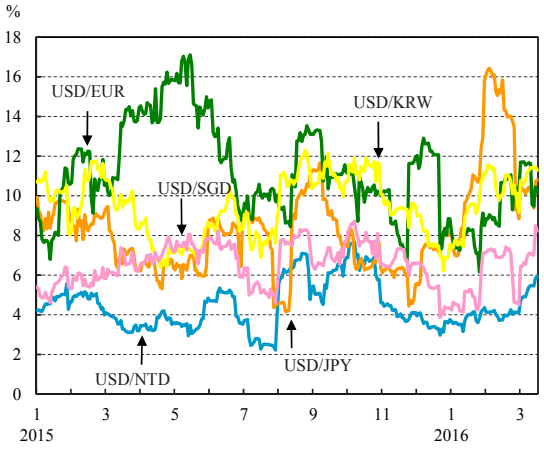
Volatility in the NT dollar exchange rate against the US dollar fluctuated between 2.22% and 7.67% in 2015, and registered an annual average of 4.54%. In early 2016, owing to the fluctuations of the renminbi, the exchange rates of other Asian currencies fluctuated dramatically. Notably, volatility in the NT dollar exchange rate against the US dollar fluctuated between 3.13% and 5.95% during 2016 Q1. Since 2015, the NT dollar exchange rate against the US dollar has been relatively stable compared to the exchange rates of major currencies such as the Japanese yen, the euro, the Korean won and the Singapore dollar (Chart 3.15).

Chart 3.14 Movements of NT dollar exchange rate against key international currencies



Note: 2 January 2015 = 100.
Source: CBC.

Chart 3.15 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.

3.2 Financial institutions

3.2.1 Domestic banks

In 2015, the total assets of domestic banks[52] accumulated continuously, though at a slower pace than in the previous year. Asset quality improved and the concentration in corporate loans kept declining while the concentration of credit exposures in real estate loans decreased

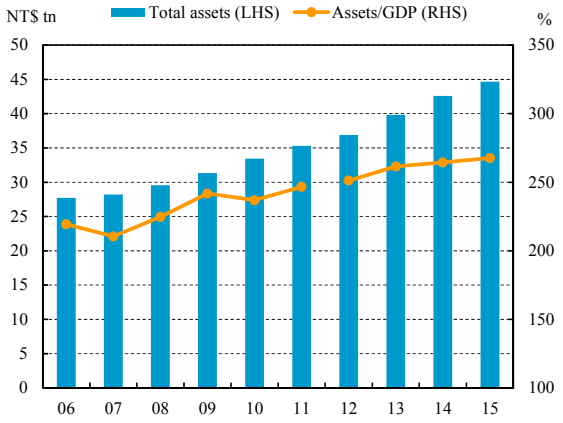
[52] The 40 domestic banks referred to in this section include the Agricultural Bank of Taiwan.

slightly. Nevertheless, banks should take prudent actions to address related credit risks deriving from contracting trading volume and moderately falling prices of real estate. The estimated VaR of overall market risk exposures of domestic banks rose but had limited influence on their capital adequacy. Moreover, liquidity risk was moderate thanks to ample liquidity in the banking system. The profitability of domestic banks in 2015 declined slightly compared to that of the previous year, while the average capital adequacy ratio also rose. This revealed that the capacity of domestic banks to bear losses was satisfactory.

Total assets continued to increase at a moderate pace

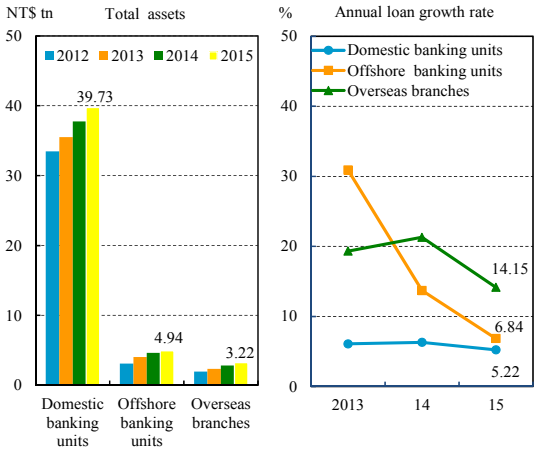
The total assets of domestic banks kept increasing, albeit at a more moderate pace, and reached NT$44.66 trillion at the end of 2015, equivalent to 267.64% of annual GDP (Chart 3.16). The annual growth rate of total assets decreased to 4.94% from 6.86% a year earlier. Annual growth rates of assets held by domestic banking units, offshore banking units, and overseas branches declined, particularly offshore banking units (Chart 3.17). This was mainly because slowing global and domestic economic growth affected firms' demand for investment and operating funds. As a result, banks' loan policies turned more conservative, leading to a slower growth in domestic and foreign corporate loans.

Chart 3.16 Total assets of domestic banks



Note: Figures for total assets from 2012 are on the TIFRSs basis, while those of prior years are on the ROC GAAP basis.
Sources: CBC and DGBAS.

Chart 3.17 Total assets and annual asset growth rate of domestic banks (DBUs, OBUs and Overseas branches)



Notes: 1. Figures for total assets are on the TIFRSs basis.
2. Figures for total assets are inclusive of interbank transactions.
Source: CBC.

Credit risk

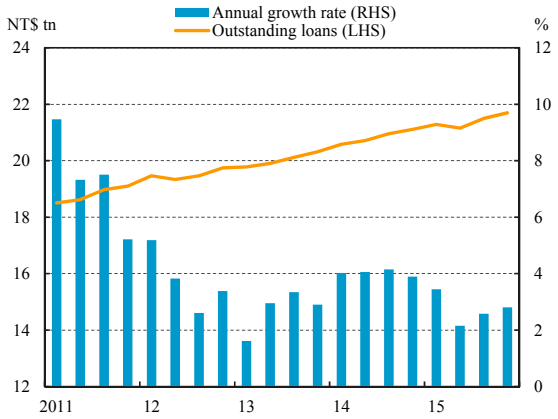
Customer loans growth slowed

In 2015, customer loans[53] were the major source of credit risk for domestic banks.

[53] The term "customer loans" herein refers to discounts, overdrafts, other loans, and import bills purchased. It excludes export bills purchased, non-accrual loans and interbank loans.

Outstanding loans of their domestic banking units (DBUs) stood at NT$21.70 trillion at the end of 2015, accounting for 48.59% of total assets, with the annual growth rate decreasing to 2.80% from 3.89% a year earlier (Chart 3.18) .

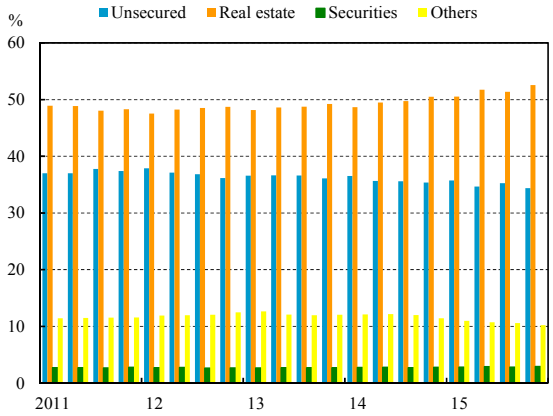
Chart 3.18 Outstanding loans and annual loan growth rate in domestic banks



Source: CBC.

In terms of borrowers of loans, at the end of 2015, the annual growth rate of corporate loans decreased to 1.48% from 3.11% a year earlier as a sluggish global economy affected firms' demand for borrowing. The annual growth rate of individual loans fell to 5.17% from 5.93% at the end of the previous year because of a slowdown in real estate loans growth. The annual growth rate of loans to government agencies was -6.97%, mainly because an increase in government tax revenues caused a decrease in demand for bank borrowing.

Chart 3.19 Credit by type of collateral in domestic banks



Note: End-of-period figures.
Source: CBC.

Concentration of credit exposure in real estate loans descended slightly

Outstanding real estate loans[54] granted by the DBUs of domestic banks amounted to NT$7.91 trillion, accounting for 36.46% of total loans at the end of 2015. The ratio descended slightly by 0.12 percentage points over the previous year, reflecting a decline in the concentration of credit exposure in real estate loans. However, the total real estate-secured credit granted by domestic banks reached NT$14.07 trillion, accounting for 52.53% of total credit,[55] with an increase of 2.05 percentage points over the previous year (Chart 3.19). The ratio of real estate-secured credit remained high.

Although the CBC loosened most targeted macro-prudential measures regarding real estate loans except for high-value house-purchase loans, the trading volume of real estate contracted and real estate prices trended downwards owing to the integrated housing and land taxation

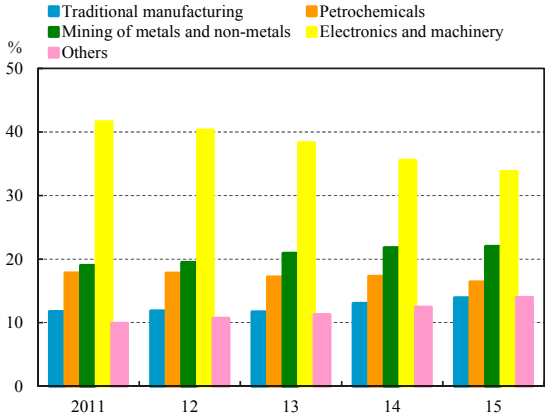
[54] The term "real estate loans" herein refers to house-purchase loans, house-refurbishment loans, and construction loans.
[55] The term "credit" herein includes loans, guarantee payments receivable, and acceptances receivable.

policy, a rise in the property tax, and a slack domestic economy. Banks should cautiously adjust their loan policies and strengthen risk control mechanisms to address related credit risks.

Credit concentration of corporate loans declined gradually

Outstanding corporate loans of the DBUs of domestic banks stood at NT$9.49 trillion at the end of 2015, while loans to the manufacturing sector registered NT$3.72 trillion and accounted for the largest share of 39.17% of the total. Within the manufacturing sector,[56] the largest proportion of loans was for the electronics industry, which stood at NT$1.26 trillion and accounted for 33.76% of the total loans to the whole manufacturing sector. However, the exposures to the electronics industry has gradually decreased in recent years (Chart 3.20), reflecting an improvement in the credit contentration in corporate loans.

Chart 3.20 Exposure to the manufacturing sector by domestic banks

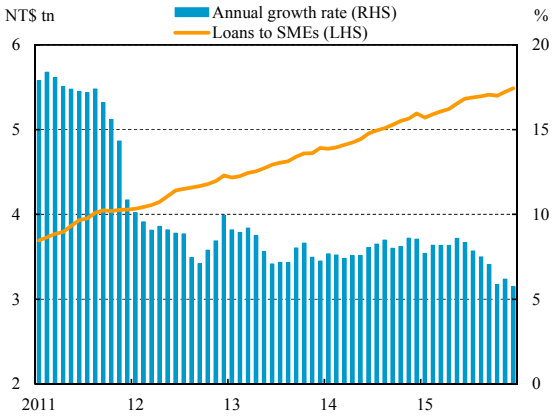


Notes: 1. End-of-period figures.
2. Exposure to each sector = loans to each sector/loans to the whole manufacturing sector.

Source: CBC.

Outstanding corporate loans to small and medium enterprises (SMEs) by domestic banks steadily expanded to NT$5.49 trillion at the end of 2015, increasing by NT$297.0 billion or 5.72% over the previous year, corresponding to a decrease in the annual growth rate of 2.81 percentage points compared to the previous year (Chart 3.21). The ratio of these loans to outstanding corporate loans has kept rising year by year and reached a ten-year high of 57.81% at the end of 2015. This indicates that banks continued to conform with government policy to extend SME loans to meet firms' funding demand, while at the same time taking into consideration proper risk control. The outstanding amount of loan guarantees applied for by SMEs through the Small and Medium Enterprise Credit Guarantee Fund of Taiwan (SMEG) decreased by 5.44% from year-end

Chart 3.21 Loans to SMEs by domestic banks



Source: CBC.

[56] 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.

2014 to NT$823.1 billion at the end of 2015. This was due to weak corporate funding needs caused by shrinking export orders; yet the figure for the total amount remained at a relatively high level.

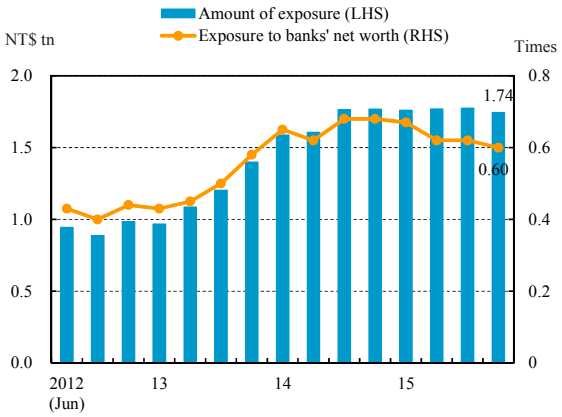
The outstanding nominal amount of TRFs and DKOs has decreased, but the default risks should be cautiously monitored

Domestic banks with higher exposures to target redemption forwards (TRFs) and discrete knock-outs (DKOs) faced higher default risk from clients due to a sharp depreciation in the renminbi during 2015. If the renminbi depreciates further, such banks might suffer greater losses. The FSC has introduced four rounds of strengthened regulation directed at complex, high-risk financial derivatives, such as TRFs and DKOs, to help enhance the sound operation of banks and to strengthen consumer protection since April 2014 (see Chapter 3.3). Moreover, the outstanding nominal amount of such contracts has decreased markedly[57] with existing contracts expiring successively. However, some settlement default cases should be cautiously monitored.

Exposure to Mainland China gradually decreased

According to Article 12-1 of the *Regulations Governing the Banking Activity and the Establishment and the Investment by Financial Institution Between the Taiwan Area and the Mainland Area*, the aggregate amount of credit, investment, and interbank loans/deposits (hereafter statutory exposure)[58] extended by a domestic bank to customers in the Mainland Area should not exceed 100% of the bank's net worth as of the end of the preceding fiscal year. At the end of 2015, the aggregate amount of such exposure of all domestic banks stood at NT$1.74 trillion, or 60% of banks' net worth, lower than 68% a year earlier (Chart 3.22). The exposure level continued to fall and no domestic bank exceeded the limit.

Chart 3.22 Exposure to the Mainland China area by domestic banks



Note: The FSC implemented calculation method of statutory exposure in the Mainland China area since April 2012.
Source: CBC.

[57] According to the FSC, the nominal amount of TRFs-related contracts of all domestic banks dropped from a peak of NT$97.4 billion in May 2014 to NT$82.0 billion at the end of 2015, and then further down to NT$39.8 billion in February 2016.

[58] Statutory exposure refers to aggregate exposure, but excludes: (1) short-term trade financing within one year; (2) credits and investments backed by guarantees or collateral which are fully secured outside Mainland China. Moreover, specific interbank loans/deposits with remaining maturity less than three months and the underlying counterparty rated at investment-grade are weighted with 20% of the aggregate amount of exposure.

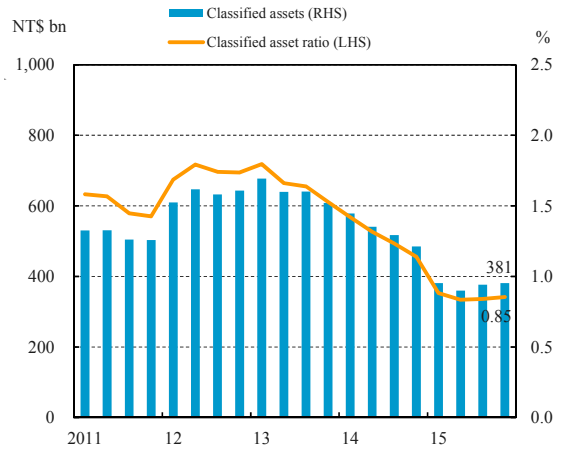
In order to reinforce risk control and risk-bearing capacity for credit exposure of domestic banks to customers in the Mainland Area, the FSC implemented four intensified measures[59] in 2015. However, affected by a slowdown in economic growth in Mainland China, rising volatility in stock and foreign exchange markets, and heightening NPL ratios of Mainland China's commercial banks, the related exposure of domestic banks still faces higher credit and market risk. Accordingly, domestic banks should cautiously monitor economic and financial conditions in Mainland China, as well as taking preemptive measures when warranted.

Asset quality improved continuously

Outstanding classified assets[60] and the average classified asset ratio of domestic banks stood at NT$381.3 billion and 0.85% at the end of 2015, decreasing by 21.39% and 0.29 percentage points, respectively, over the previous year (Chart 3.23). This revealed that the asset quality kept improving. Meanwhile, expected losses of classified assets[61] also contracted by NT$5.3 billion or 7.29% from a year earlier to NT$48.3 billion, while the ratio of expected losses to loan loss provisions was only 12.47%, indicating sufficient provisions to cover expected losses.

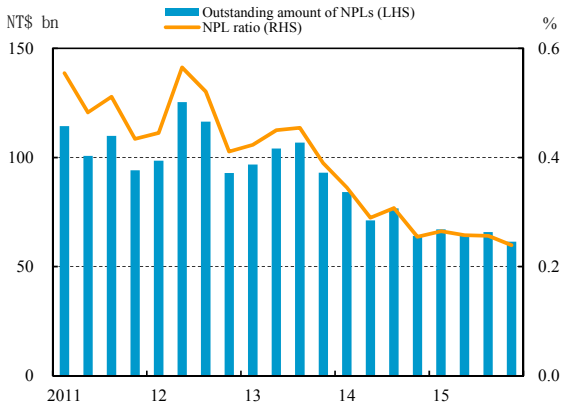
The outstanding NPLs of domestic banks registered NT$61.4 billion at the end of 2015, decreasing by 4.05% year on year, owing to bad debt write-offs and NPL recoveries. The average NPL ratio fell to a record low of 0.24%

Chart 3.23 Classified assets of domestic banks



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

Chart 3.24 NPL ratio of domestic banks



Note: Excludes interbank loans.
Source: CBC.

[59] Such measures include: (1) requiring banks to sufficiently verify the authenticity of related documents of short-term trade financing; (2) asking banks' audit departments to conduct internal audits on the authenticity of short-term trade financing, which should otherwise be counted into exposure to Mainland China; (3) including new interbank loans/deposits, of which the maturity is extended to more than 3 months, into the calculation of exposure to Mainland China; and (4) increasing the regulatory loss provision ratio of performing credit assets exposed to Mainland China to at least 1.5% by the end of 2015.

[60] The *Regulations Governing the Procedures for Banking Institutions to Evaluate Assets and Deal with Non-performing/Non-accrual Loans* break down all assets into five different categories, including: category one – normal credit assets; category two – credit assets requiring special mention; category three – substandard credit assets; category four – doubtful credit assets; and category five – loss assets. The term "classified assets" herein includes all assets classified as categories two to five.

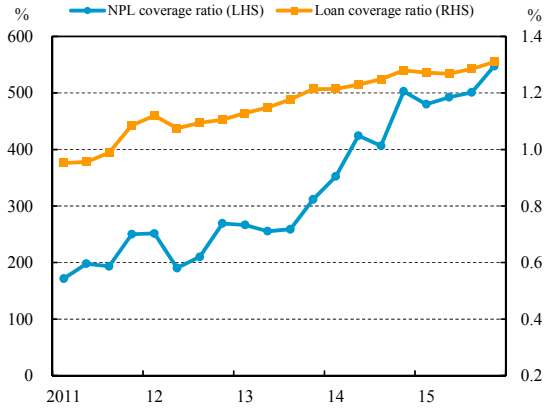
[61] Loss herein refers to the losses from loans, acceptances, guarantees, credit cards, and factoring without recourse.

(Chart 3.24). With the decrease in NPLs and the increase in provisions, the NPL coverage ratio and the loan coverage ratio rose to 547.66% and 1.31%, respectively, at the end of 2015 (Chart 3.25), showing an improving capability in addressing bad debt losses.

Among 40 domestic banks, all had NPL ratios of less than 1% at the end of 2015. In terms of borrowers, the NPL ratio for individual loans remained at 0.23% and corporate loans declined by 0.05 percentage points to 0.32% compared to the previous year. Among corporate loans, the NPL ratios saw a rise in the wholesale and retail trade industries, together with financial and insurance industries, while the ratio of the manufacturing and real estate industries dropped (Chart 3.26).

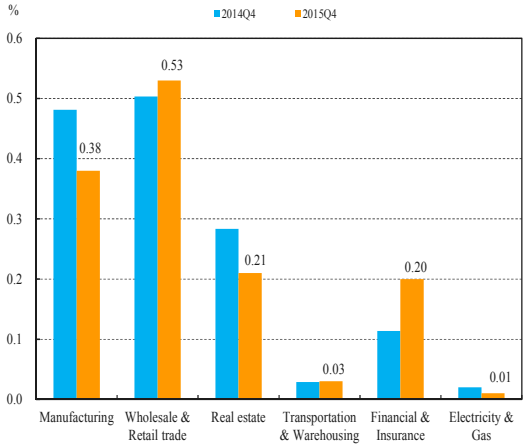
Compared to the US and neighboring Asian countries, the average NPL ratio of domestic banks in Taiwan was much lower (Chart 3.27) .

Chart 3.25 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.

Chart 3.26 NPL ratios of domestic banks in selected industries



Note: Excludes interbank loans.
Source: JCIC.

Market risk

Estimated Value-at-Risk for market risk exposures rose

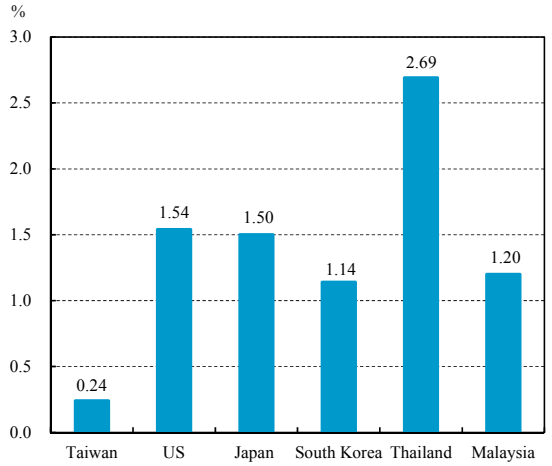
The net position of debt securities accounted for the largest share of total market risk exposures of domestic banks at the end of 2015, followed by the net positions of foreign exchange and of equity securities. Based on the new market risk model constructed by the CBC (Box 2), the estimated total VaR for foreign exchange, interest rate, and equity exposures of domestic banks stood at NT$131.8 billion at the end of 2015, ascending by NT$30.6 billion or 30.24% compared to the figure a year earlier (Table 3.1). The estimated VaR for each of those market risk exposures was higher than a year earlier. Among them, the

interest rate VaR increased by 33.18%, while the foreign exchange and equity VaRs also increased by 7.69% and 16.24%, respectively (Table 3.1).

The effects of market risk on capital adequacy ratios were slight

According to the estimated results mentioned above, the total VaR would cause a decrease of 0.34 percentage points in the average capital adequacy ratio of domestic banks and induce the ratio to drop from the current 12.93% to 12.59%. Nevertheless, it would still be higher than the statutory minimum of 8% in 2015.

Chart 3.27 NPL ratios of banks in selected countries



Note: Figure for Japan is end-September 2015 data, while the others are end-December 2015 data.
Sources: CBC, FDIC, FSA, FSS, BOT and BNM.

Table 3.1 Market risks of domestic banks

Unit: NT$ bn

Types of risk	Items	End-Dec. 2014	End-Dec. 2015	Changes	
				Amount	PP ; %
Foreign exchange	Net position	205.1	208.7	3.6	1.76
	VaR	3.9	4.2	0.3	7.69
	VaR/net position (%)	1.90	2.01		0.11
Interest rate	Net position	1,157.9	1,447	289.1	24.97
	VaR	85.6	114	28.4	33.18
	VaR/net position (%)	7.39	7.88		0.49
Equities	Net position	75.8	80.1	4.3	5.67
	VaR	11.7	13.6	1.9	16.24
	VaR/net position (%)	15.44	16.98		1.54
Total VaR		101.2	131.8	30.6	30.24

Note: PP = percentage point.
Source: CBC.

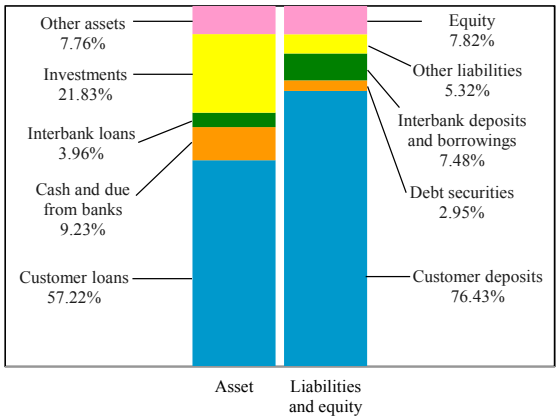
Liquidity risk

Liquidity in the banking system remained ample

The structure of assets and liabilities for domestic banks roughly remained unchanged in 2015. As for the sources of funds, relatively stable customer deposits still made up the largest share of 76.43% of the total, followed by equity at 7.82%, while debt securities issues contributed a mere 2.95%. Regarding the uses of funds, customer loans accounted for the biggest share of 57.22%, followed by securities investments at 21.83%, while cash and due from banks accounted for 9.23% (Chart 3.28).

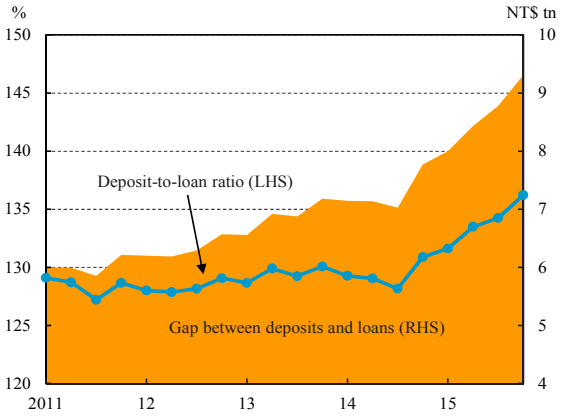
Given that the increase in deposits exceeded that in loans in 2015, the average deposit-to-loan ratio of domestic banks rose to 136.21%. The funding surplus (i.e., deposits exceeding loans) also expanded to NT$9.31 trillion, indicating that the overall liquidity in domestic banks remained abundant (Chart 3.29).

Chart 3.28 Asset/liability structure of domestic banks



Notes: 1. Figures are as of end-December 2015.
2. Equity includes loss provisions. Interbank deposits include deposits with the CBC.
Source: CBC.

Chart 3.29 Deposit-to-loan ratio of domestic banks



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

Overall liquidity risk was moderate

The average NT dollar liquid reserve ratio of domestic banks was well above the statutory minimum of 10% in every month of 2015 and stood at 30.99% in December, an increase of 1.95 percentage points year on year (Chart 3.30), while the ratios of individual banks were each higher than 15%. Looking at the components of liquid reserves in December 2015, Tier 1 liquid reserves, mainly consisting of certificates of deposit issued by the CBC, accounted for 86.60% of the total, while Tier 2 and other reserves accounted for a total of 13.40%. This revealed that the quality of liquid assets held by domestic banks remained satisfactory.

At the end of 2015, the average liquidity coverage ratio (LCR) of all domestic banks was 125%, while the average ratios of state-owned banks and private banks were 117% and 128%, respectively. All banks met the minimum requirement of 60% in 2015. Overall liquidity risk was moderate.

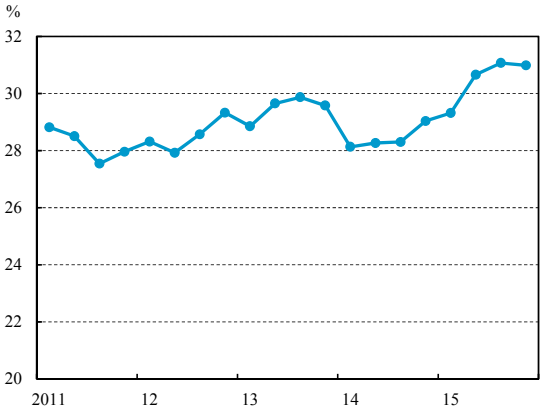
Profitability

Profitability in 2015 decreased slightly

The aggregate net income before tax of domestic banks was NT$320.6 billion in 2015, decreasing slightly by NT$0.1 billion or 0.03% year on year (Chart 3.31). The average ROE and ROA also fell year on year to 10.65% and 0.73% from 11.62% and 0.77%, respectively, due to the continuous increases in equity and assets. Affected by a fall in the trading volume of TRFs owing to the depreciation of the renminbi and the measures taken by the FSC to strenghten the oversight of complex and high-risk products, gains on foreign exchange and valuation gains on financial assets or liabilities shrank. This, together with an increase in provisions related to bad debt expenses for tackling TRF disputes, mainly resulted in profitability turning to decline (Chart 3.32).

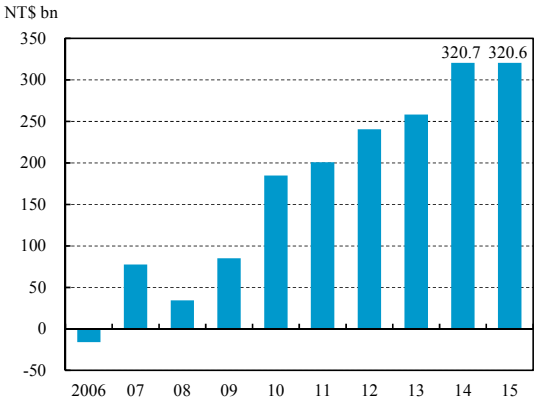
Compared to selected neighboring Asia-Pacific economies, the ROAs of domestic banks still lagged behind their counterparts, only better than South Korea and Japan. The ROEs ranked in the middle, higher than the US, South Korea

Chart 3.30 Liquid reserve ratio of domestic banks



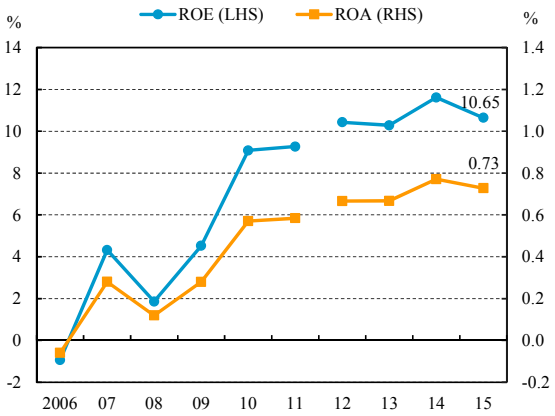
Note: Figures are the average daily data in the last month of each quarter.
Source: CBC.

Chart 3.31 Net income before tax of domestic banks



Note: Figures from 2012 forward are on the TIFRSs basis, while prior years are on the ROC GAAP basis (same as all charts in this section).
Source: CBC.

Chart 3.32 ROE & ROA of domestic banks



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

and Japan (Chart 3.33).

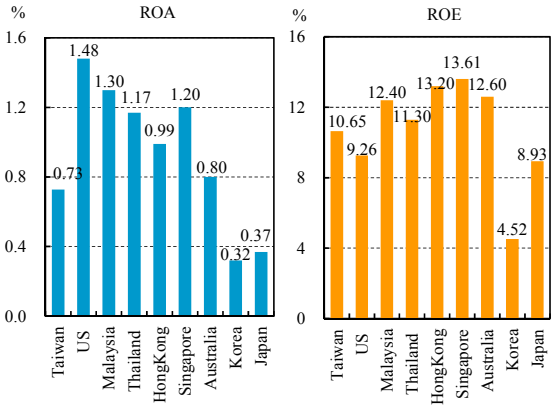
Among the sources of income, offshore banking units (OBUs) and overseas branches' annual net income before tax in 2015 declined for the first time in recent years, dropping by 16.34% and 7.07%, respectively. OBUs contributed 22.27% of total profit, decreasing from 26.61% a year earlier, and the ratio for overseas branches shrank to 9.87% (Chart 3.34).

In 2015, two domestic banks achieved profitable ROEs of 15% or more, decreasing from seven banks in 2014; the number of domestic banks whose ROAs reached the international standard of 1% decreased from ten to seven (Chart 3.35). Nevertheless, the ROEs of 14 banks, and ROAs of 17 banks increased compared to the previous year.

Net operating income grew slowly

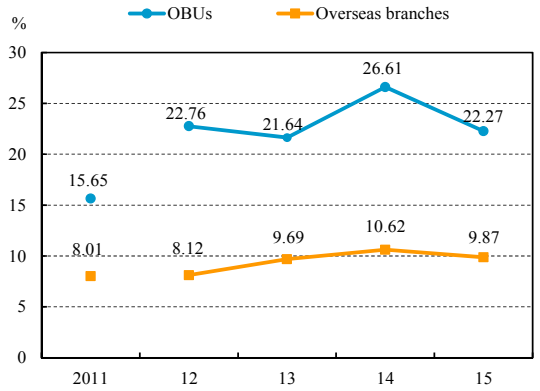
Total net operating income of domestic banks registered NT$734.6 billion in 2015, increasing by NT$3.8 billion or 0.52% year on year, mainly owing to growth in net fee income and interest income. Analyzed by income component, net fee income increased by NT$18.6 billion or 12.29% year on year, supported by growth in the wealth management business related to insurance and credit card business. Net interest income rose by NT$13.4 billion year on year; however, the annual growth rate decreased from 10.73% to 3.08%. Moreover, net gains on financial instruments decreased by NT$32.6 billion or 31.62%, driven by a significant decrease in

Chart 3.33 Comparison of ROAs and ROEs of banks in selected economies



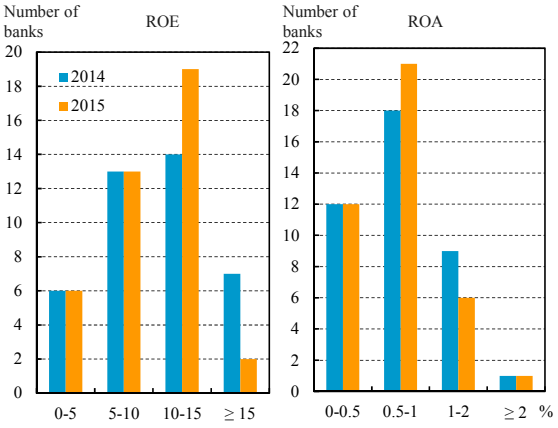
Note: Figure for Japan is as of April 2015 to September 2015, while the others are as of 2015.
Sources: CBC, FDIC, BNM, BOT, APRA, FSS and IMF.

Chart 3.34 Profit contributions of OBUs and overseas branches



Note: Overseas branches include branches in Mainland China.
Source: CBC.

Chart 3.35 Distribution of ROEs and ROAs of domestic banks



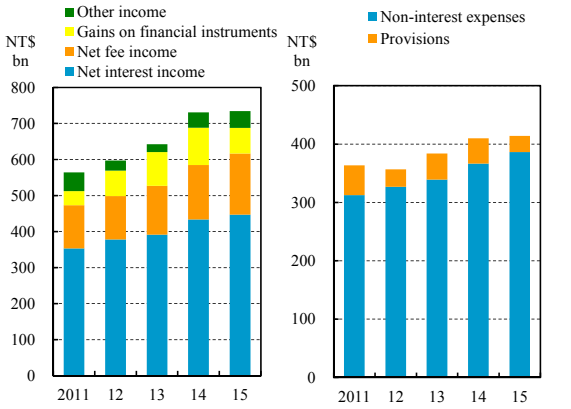
Source: CBC.

valuation gains (Chart 3.36).

Operating costs increased by a smaller margin

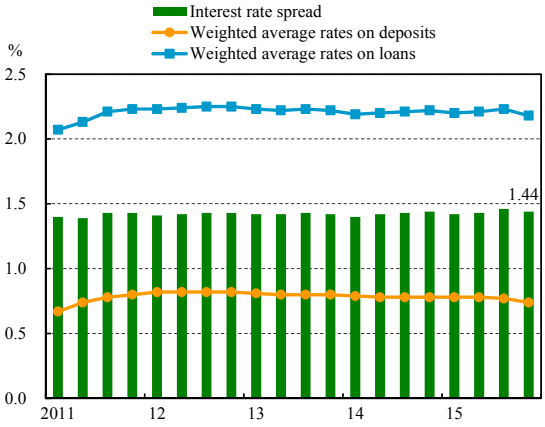
The operating costs of domestic banks registered NT$414 billion in 2015, rising slightly by NT$3.9 billion or 0.94% compared to the previous year. Among them, non-interest expenses [62] increased by NT$20 billion or 5.45% and accounted for an increasing share of 93% of total operating costs, owing to the rise in employee benefits expenses and other operating and management expenses. Meanwhile, provisions for loan losses and guarantee reserves decreased by NT$16.1 billion or 36.99% year on year, mainly because the moderate growth of loans resulted in a decrease in additional provisions (Chart 3.36).

Chart 3.36 Composition of income and costs of domestic banks



Source: CBC.

Chart 3.37 Interest rate spread between deposits and loans



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 preferred deposits of retired government employees and central government loans.

Source: CBC.

Factors that might affect future profitability

In the first three quarters of 2015, the interest rate spread between deposits and loans of all domestic banks gradually rose owing to the reduction in low interest loans and the raising of interest rates on long-term loans by some domestic banks. However, the spread reversed and declined to 1.44 percentage points in 2015 Q4 (Chart 3.37), as the CBC cut interest rates and some banks granted new state-owned enterprises loans with low interest rates. In addition, the shrinkage of the trading volume of TRFs and the possible rise of relative default losses could influence banks' future profitability.

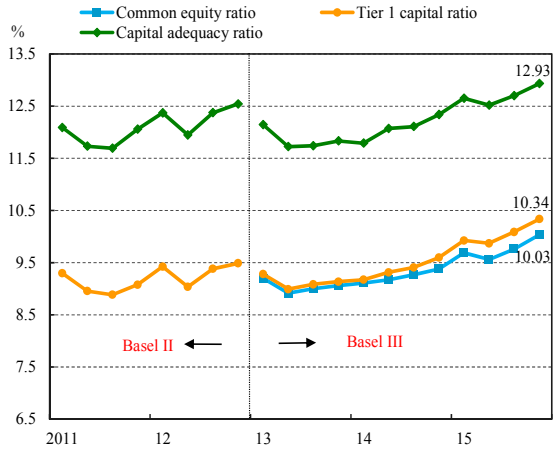
In December 2014, the FSC required that domestic banks maintain a provision ratio of at least 1.5% against loans for home purchase, refurbishment, or construction by the end of

[62] Non-interest expenses include employee benefits expenses, depreciation and amortization expenses, and other operating and management expenses.

2016. Some large private banks had already achieved the 1.5% provision ratio at the end of 2014; however, some small banks with higher ratios of real-estate loans faced difficulties reaching the required provision ratio. Nevertheless, the requirement is estimated to have a limited influence on overall profits.

Moreover, in response to the trends of global FinTech innovation and the the need to enhance service effectiveness of domestic banks, the FSC implemented the policy of "Building Digital Financial Environment 3.0" in January 2015, set up the Financial Technology Office, permitted banks to invest 100% in a FinTech company, and established a FinTech development fund. Provided that domestic banks are able to come up with appropriate FinTech innovations in the future, their profitability will be enhanced. Nevertheless, banks will face numerous challenges during the transformational process (Box 3).

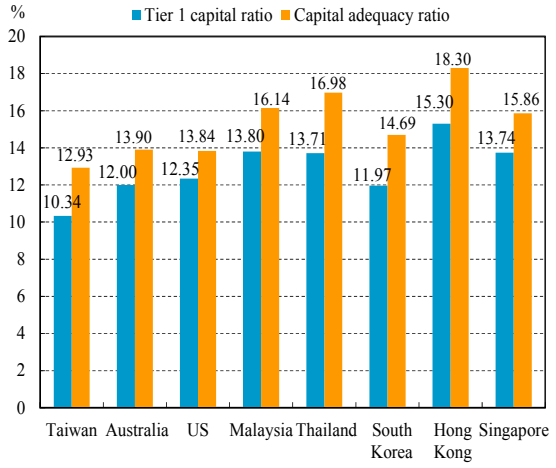
Chart 3.38 Capital ratios of domestic banks



Notes: 1. Figures from 2013 forward are based on Basel Ⅲ, while prior years are based on Basel Ⅱ.
2. Common equity capital ratio = common equity Tier 1 capital/risk-weighted assets
3. Tier 1 capital ratio = Tier 1 capital/risk-weighted assets
4. Capital adequacy ratio = eligible capital/risk-weighted assets

Source: CBC.

Chart 3.39 Comparison of capital ratios in selected economies



Note: Figures are as of the end of 2015.

Sources: CBC, APRA, FDIC, BNM, BOT, FSS, HKMA, and IMF.

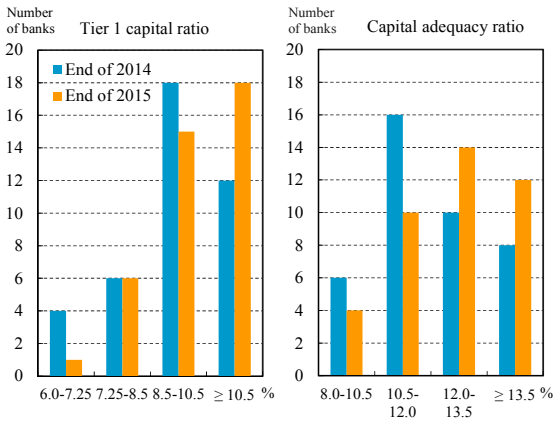
Capital adequacy

Capital ratios trended upward

In the second quarter of 2015, the average capital ratio of domestic banks declined slightly owing to faster growth in risk-weighted assets and seasonal effects such as cash dividends declared and paid. Afterwards, as a result of capital injection and accumulated earnings as well as the issuance of Basel III-compliant capital instruments, the average common equity ratio, Tier 1 capital ratio, and capital adequacy ratio rose and stood at 10.03%, 10.34%, and 12.93%, respectively, at the end of 2015 (Chart 3.38). However, compared to neighboring Asia-Pacific economies, domestic banks in Taiwan had lower capital levels (Chart 3.39).

Further breaking down the components of regulatory capital, common equity Tier 1 capital, which features the best loss-bearing capacity, accounted for 77.58% of eligible capital, while non-common equity Tier 1 capital and Tier 2 capital registered only 2.33% and 20.09%, respectively, at the end of 2015. It showed that the capital quality of domestic banks was satisfactory.

Chart 3.40 Number of domestic banks classified by capital ratios



Source: CBC.

The capital levels of all domestic banks were higher than the 2015 statutory minimum

At the end of 2015, the common equity ratios, Tier 1 capital ratios, and capital adequacy ratios for all domestic banks remained above the statutory minimum requirements for 2015 and 2016.[63] Compared to the end of the previous year, the number of banks with Tier 1 capital ratios higher than 10.5% significantly increased, indicating that most banks have been improving their capital quality and levels (Chart 3.40).

Some banks faced pressure to raise their capital levels

Even though the capital ratios of all banks at the end of 2015 met the minimum standards for 2016, some banks, particularly state-owned and private banks, might not fulfill all minimum capital requirements effective from 2017 onwards and thus face pressure to raise their capital levels. Such banks should actively reinforce their capital adequacy via seasoned equity offerings, accumulating earnings, issuing subordinated debts, and adjusting asset structures to raise their capital ratios gradually.

[63] The minimum capital requirements in the Basel Ⅲ transition periods are as follows:

Items	2013	2014	2015	2016	2017	2018	2019 onwards
Common equity ratio (%)	3.5	4.0	4.5	5.125	5.75	6.375	7.0
Tier 1 capital ratio (%)	4.5	5.5	6.0	6.625	7.25	7.875	8.5
Capital adequacy ratio (%)	8.0	8.0	8.0	8.625	9.25	9.875	10.5

Credit ratings

Average credit rating level enhanced

With respect to the overall risk assessments of Taiwan's banking system made by credit rating agencies, Standard & Poor's Banking Industry Country Risk Assessment (BICRA)[64] maintained Taiwan's BICRA unchanged at Group 4. Compared to other Asian economies, the risk of Taiwan's banking industry was higher than those of Hong Kong, Singapore, Japan, and South Korea, about the same as that of Malaysia, but much lower than those of Mainland China, Thailand, Indonesia and the Philippines. The assessment of Taiwan's banking system evaluated by Fitch Ratings' Banking System Indicator/Macro-Prudential Indicator (BSI/MPI)[65] also remained unchanged at level bbb/1 (Table 3.2).

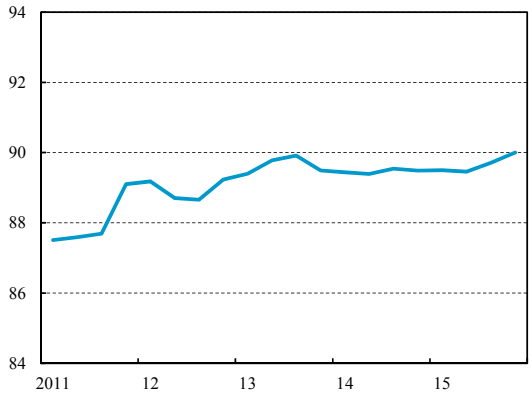
All domestic banks were rated by credit rating agencies for 2015. As for the rating results[66] released by credit rating agencies, the credit rating index[67] of domestic banks went up in 2015 (Chart 3.41), mainly because three banks received rating upgrades.

Table 3.2 Systemic risk indicators for the banking system

Banking System	Standard & Poor's		Fitch	
	BICRA		BSI/MPI	
	2015/2	2016/2	2015/2	2016/2
Hong Kong	2	2	a/3	a/3
Singapore	2	2	aa/2	aa/2
Japan	2	2	a/1	a/1
South Korea	3	3	bbb/1	bbb/1
Taiwan	**4**	**4**	**bbb/1**	**bbb/1**
Malaysia	4	4	bbb/1	bbb/1
China	5	5	bb/3	bb/3
Thailand	6	6	bbb/1	bbb/1
Indonesia	7	7	bb/2	bb/2
Philippines	7	7	bb/1	bb/1

Sources: Standard & Poor's and Fitch Ratings.

Chart 3.41 Credit rating indices of rated domestic banks



Note: End-of-period figures.
Sources: Taiwan Ratings Corporation, Fitch Ratings, and CBC.

[64] The analytical dimensions of Standard & Poor's BICRA include economic risk and industry risk. The economic risk of a banking sector is determined by factors including economic resilience, economic imbalances, and credit risk in the economy, while industry risk is determined by institutional framework, competitive dynamics and system-wide funding. The overall assessments of those factors will lead to the classification of a country's banking system into BICRA groups, ranging from group 1 (lowest risk) to group 10 (highest risk), in order to indicate the relative country risk and banking sector credit quality.

[65] Fitch Ratings has devised two complementary measures, the BSI and MPI, to assess banking system vulnerability. The two indicators are brought together in a Systemic Risk Matrix that emphasizes the complementary nature of both indicators. The BSI represents banking system strength on a scale from aa (very strong) to ccc/cc/c (very weak). On the other hand, the MPI indicates the vulnerability to stress on above-trend levels of private sector credit, a bubble in real asset prices, and/or major currency appreciation, measuring the vulnerability of the macro environment on a scale from 1 (low) to 3 (high) in terms of banking system vulnerability.

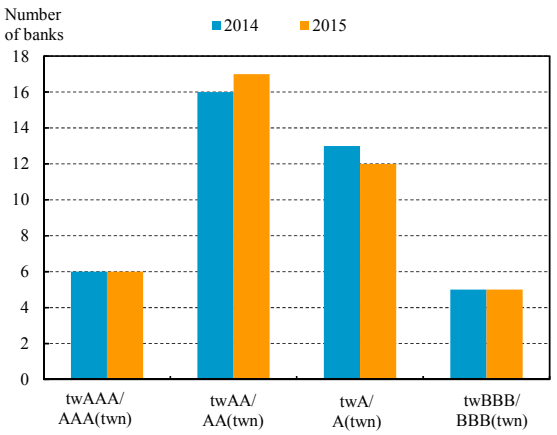
[66] As of the end of 2015, the majority of Taiwan's domestic banks received long-term issuer ratings from Taiwan Ratings, followed by those with national long-term ratings from Fitch Ratings. Therefore, this section is based primarily on the Taiwan Ratings' ratings (tw~), and secondarily on Fitch Ratings' ratings (~twn).

[67] 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.

Rating outlooks for the majority of domestic banks remained stable or positive

Most domestic banks maintained credit ratings of twAA/twA (Taiwan Ratings) or AA(twn)/A(twn) (Fitch Ratings) at the end of 2015, and none had credit ratings lower than twBB/BB(twn) (Chart 3.42). The results were similar to those received the previous year. Regarding rating outlooks, only one bank turned negative in 2015,[68] while the other 39 banks remained stable or positive.

Chart 3.42 Number of domestic banks classified by credit ratings

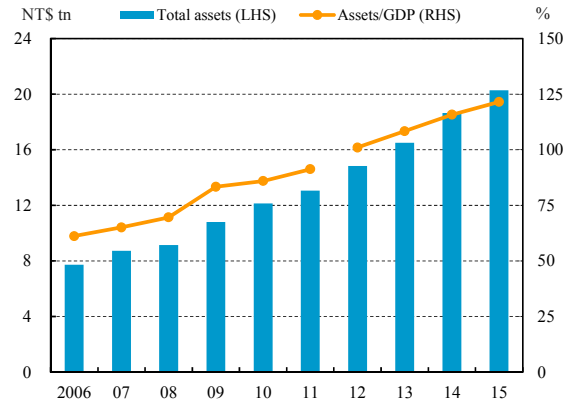


Note: End-of-period figures.
Sources: Taiwan Ratings Corporation and Fitch Ratings.

3.2.2 Life insurance companies

In 2015, asset growth in life insurance companies moderated and their profitability enhanced, showing an improvement in operating performance. At the end of 2015, the average RBC ratio of life insurance companies decreased slightly. However, the RBC ratios for all insurance companies were higher than the statutory minimum, except that of Chaoyang Life Insurance Company, which was taken into receivership in early 2016.

Chart 3.43 Total assets of life insurance companies



Note: Figures from 2012 forward are on the TIFRSs basis, while prior years are on the ROC GAAP basis.
Sources: FSC and DGBAS.

Asset growth moderated

The total assets of life insurance companies grew continually and reached NT$20.28 trillion at the end of 2015, equivalent to 121.50% of annual GDP (Chart 3.43). The annual growth rate of total assets fell to 8.8% at the end of 2015, decelerating from 12.93% a year earlier.

At the end of 2015, 21 domestic life insurance companies[69] held a 98.57% market share by assets, four of which were foreign affiliates holding a 2.77% market share, while four foreign

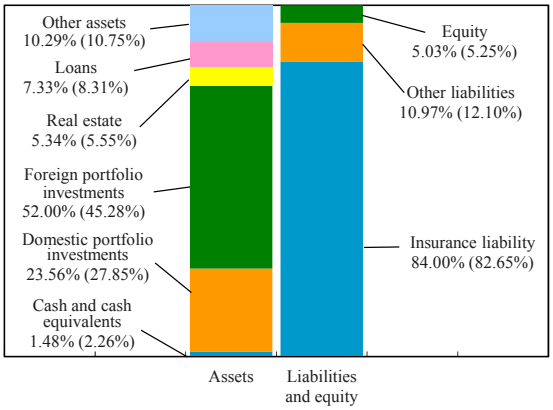
[68] The reason why this bank received a negative rating outlook was that Taiwan Ratings expected the financial holding company's acquisition of another bank could result in higher leverage and a weaker credit profile for the group.
[69] Foreign affiliates included.

life insurance companies held the remaining 1.43% of total assets. The top three companies in terms of assets held a combined market share of 56.14%, revealing a slight increase of 0.8 percentage points year on year. The market structure of the life insurance industry roughly remained unchanged in 2015.

The share of foreign portfolio investments increased rapidly

The funds of life insurance companies at the end of 2015 were mainly invested in foreign portfolios and domestic securities. The share of foreign portfolio investments rose to 52%, benefiting from the relaxation of related regulations that expand the scope of eligible foreign corporate bond investments[70] and exclude foreign currency-denominated international bonds from the amount subject to the overseas investment ceiling. The share of domestic securities investments continued to drop to 23.56%. As for the sources of funds, insurance liability accounted for the largest share of 84%, and equity decreased to a share of 5.03% because available-for-sale financial assets with unrealized gains turned into that with unrealized losses. As a result, overall financial leverage of life insurance companies increased marginally (Chart 3.44).

Chart 3.44 Asset/liability structure of life insurance companies

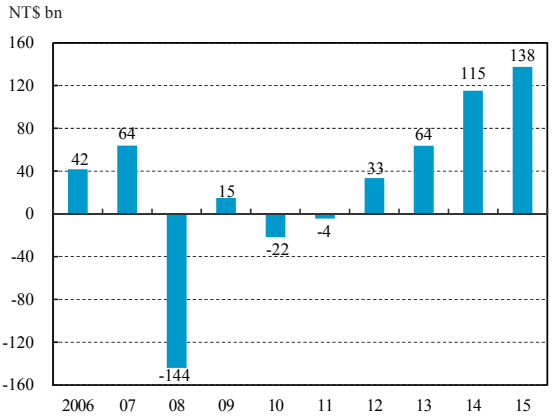


Note: End-December 2015 data; figures in parentheses are as of the end of December 2014.
Source: FSC.

Profitability enhanced

Life insurance companies reported net income before tax of NT$137.6 billion in 2015, a year-on-year increase of NT$23 billion or 19.35% (Chart 3.45). This was chiefly driven by incremental expansion of interest income spurred by continuous growth in foreign bond or

Chart 3.45 Net income before tax of life insurance companies



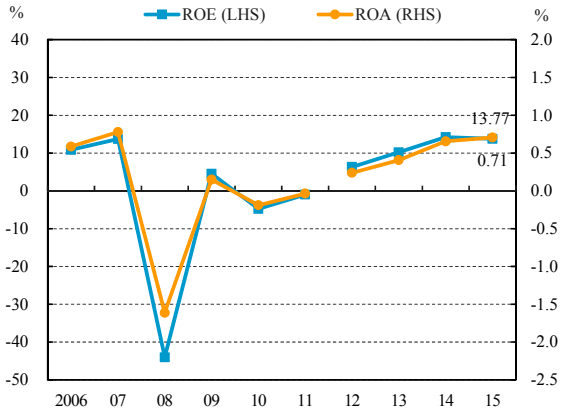
Note: Figures from 2012 forward are on the TIFRSs basis, while prior years are on the ROC GAAP basis.
Source: FSC.

[70] In order to help the insurance industry boost investment returns amid a low interest rate environment, the FSC expanded the scope of eligible foreign corporate bond investments for insurance companies that meet certain risk management requirements.

international bond investments, as well as cash dividends deriving from investment portfolios.

During the same period, average ROE and ROA were 13.77% and 0.71%, respectively (Chart 3.46). While the ROA posted an eight-year high, the ROE was slightly lower than the 14.20% registered in the previous year yet remained at a high level. Among all 25 life insurance companies, ten companies posted better profits and achieved ROEs of 10% or more, which was one company more than that of the previous year. However, 11 companies still suffered losses, a number same as a year earlier.

Chart 3.46 ROE & ROA of life insurance companies

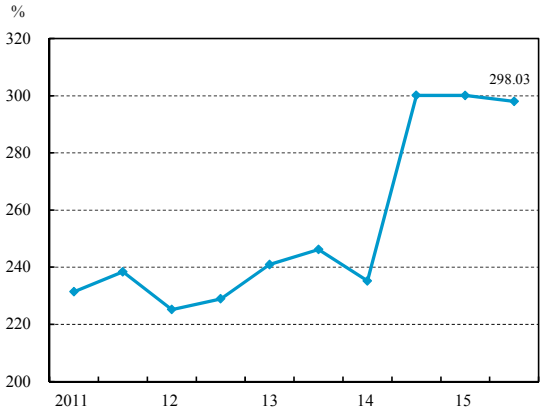


Notes: 1. Figures from 2012 forward are on the TIFRSs basis, while prior years are on the ROC GAAP basis.
2. ROE = net income before tax/average equity.
3. ROA = net income before tax/average assets.

Source: FSC.

There were huge unrealized losses on available-for-sale financial assets [71] at year-end 2015 owing to the slump in major global stock markets in the second half of the year, despite an increase in profitability of life insurance companies. However, such losses started to shrink considerably in 2016 Q1 as stock markets began to recover.

Chart 3.47 RBC ratio of life insurance companies



Notes: 1. RBC ratio = regulatory capital/risk-based capital.
2. Kuo Hua Life Insurance Company, which was taken into receivership by the Taiwan Insurance Guaranty Fund in August 2009 and merged into TransGlobe Life Insurance Company in March 2013, is excluded. Figures from 2014 onwards are exclusive of Singfor and Global Life Insurance companies, which were taken into receivership on 12 August 2014 and merged into Cathay Life Insurance Company on 1 July 2015.

Source: FSC.

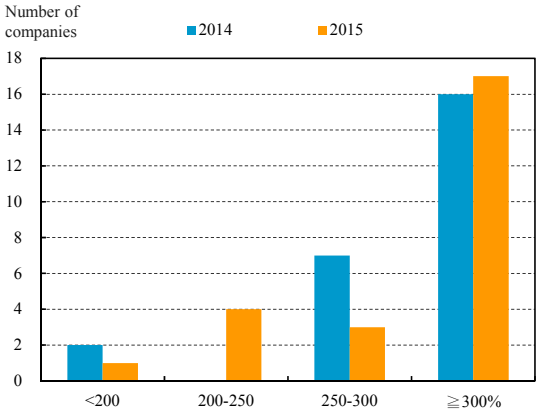
Average RBC ratio decreased slightly

In 2015, operating profits of life insurance companies bolstered the amount of regulatory capital; however, growing investment portfolios and the FSC's measure to raise the coefficient for the interest rate risk capital charge[72] significantly increased the amount of RBC. As a result, the average RBC ratio declined slightly to 298.03% at the end of 2015 from 300.12% a year before, but still remained at a high level (Chart 3.47).

[71] Unrealized loss on available-for-sale financial assets is not included in net income before tax.
[72] In order to strengthen capital adequacy and reflect interest rate risk of life insurance companies, the FSC raised the coefficient for the capital surcharge of prior-year interest rate risk from 0.1 to 0.3.

By individual company, there were 17 companies with RBC ratios over 300%, one more than the figure of the previous year. There was only one company, Chaoyang Life Insurance Company, with an RBC ratio below the statutory minimum of 200%, one less than the number a year earlier (Chart 3.48). On 26 January 2016, the FSC took over Chaoyang Life Insurance Company and appointed the Taiwan Insurance Guaranty Fund as the receiver because the company's RBC ratio was seriously inadequate and the company failed to carry out the capital increase plan or the corrective action plan for finance or business within the period required by the FSC.

Chart 3.48 Number of life insurance companies classified by RBC ratios



Notes: 1. End-of-period figures.
2. Figure for 2014 is exclusive of Singfor and Global Life Insurance Companies.
Source: FSC.

Overall credit rating level elevated slightly, with most obtaining stable credit outlooks

Among 11 life insurance companies rated by Taiwan Ratings or Fitch Ratings, only Taiwan Life Insurance Company received a rating upgrade from twA+ (Taiwan Ratings) to AA+(twn) (Fitch) after being merged into CTBC Financial Holding Company[73] and thus rated by a different credit rating agency. None of the others received credit rating adjustments in 2015. As of the end of December, all rated life insurance companies maintained credit ratings above twA or its equivalent, while the three biggest insurance companies by assets were all rated twAA+, showing strong capability to fulfill all financial commitments. As for the credit outlook, all received stable credit outlooks, except for Taiwan Insurance Company, CTBC Life Insurance Company, and China Life Insurance Company, which received negative credit outlooks.

Life insurance companies faced higher market risk

The funds of life insurance companies are mainly invested in securities, part of which is measured at fair value. Recent turbulence in financial markets signaled higher market risk for

[73] Taiwan Insurance Company completed the shares conversion with CTBC Financial Holding Company (CTBC Holding) on 15 October 2015 and became a 100% shareholding subsidiary of CTBC Holding.

life insurance companies, particularly an increase in foreign exchange risk with the widened currency mismatches between their assets and liabilities. The main reason behind this was that life insurance companies actively built up foreign portfolio positions but the expansion of their foreign currency policy positions was limited. Meanwhile, although the vast majority of life insurance companies' securities investments were investment grade financial assets, the pick-up in the share of some insurance company holdings in non-investment grade financial assets warrants close attention.

3.2.3 Bills finance companies

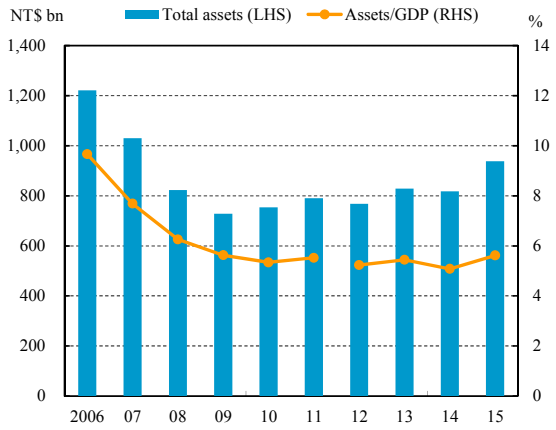
The total assets of bills finance companies expanded markedly in 2015, whereas the outstanding balance of guarantees grew slowly. Profitability improved and the average capital adequacy ratio rose, while credit asset quality remained sound. However, liquidity risk in bills finance companies stayed high.

Total assets expanded markedly

The total assets of bills finance companies stood at NT$937.6 billion at the end of 2015, a figure equivalent to 5.62% of annual GDP, with an annual growth of 14.60%. The magnitude of this expansion of total assets was mostly caused by rising bill and bond holdings as falling market rates were favorable to yielding operations (Chart 3.49).

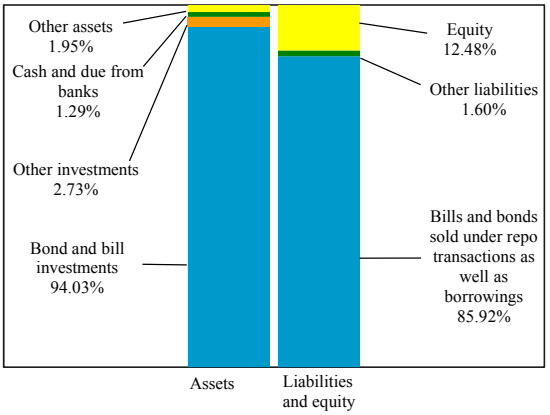
In terms of the asset and liability structure at the end of 2015, bond and bill investments constituted 94.03% of total assets, an increase of 0.72 percentage points year on year. On the liability side, bills and bonds sold under repo transactions as well as borrowings accounted for 85.92% of total assets, while equity only accounted for 12.48% (Chart 3.50).

Chart 3.49 Total assets of bills finance companies



Note: Figures from 2012 onwards are on the TIFRSs basis, while prior years are on the ROC GAAP basis.
Sources: CBC and DGBAS.

Chart 3.50 Asset/liability structure of bills finance companies



Note: Figures are end-December 2015 data.
Sources: CBC and FSC.

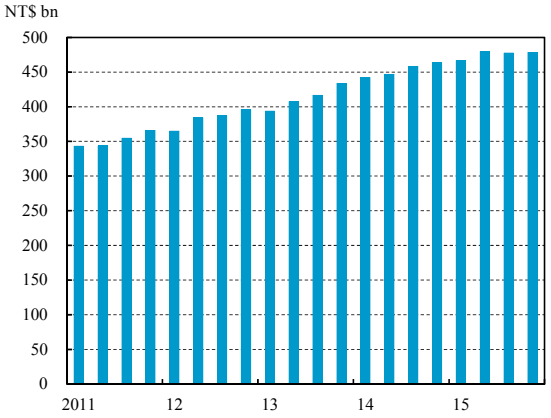
Credit risk

Outstanding balance of guarantees grew slowly while the ratio of real estate-secured credit continued its upward trend

The outstanding guarantees business undertaken by bills finance companies registered NT$478.6 billion at the end of 2015, a slower increase of NT$14.9 billion or 3.22% year on year owing to weak funding demand of enterprises in view of sluggish domestic economic growth in the second half of the year (Chart 3.51). Nevertheless, the average multiple of outstanding guarantees to equity of bills finance companies rose to 4.62 times at the end of 2015, compared to 4.58 times a year before. Each bills finance company still conformed to the regulatory ceiling of 5.5 times.[74]

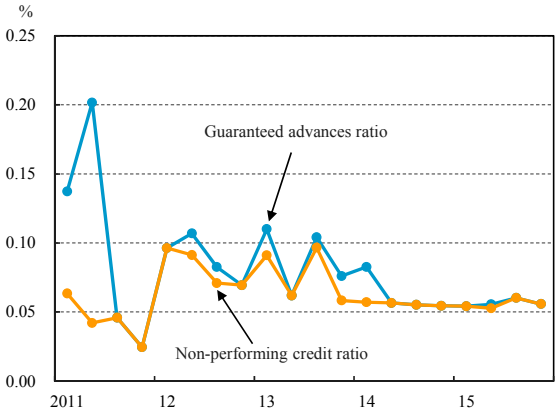
Guarantees granted to the real estate and construction industries and the credits secured by real estate accounted for 28.59% and 33.95%, respectively, of total credits of bills finance companies, continuing an upward trend. Such credit risks might heighten under a backdrop of contracting transaction volume and moderating prices in the housing market. In response, the FSC put a greater emphasis on real estate credit concentration and risk management in their financial examinations of bills finance companies in 2016.[75]

Chart 3.51 Outstanding commercial paper guarantees of bills finance companies



Note: End-of-period figures.
Source: CBC.

Chart 3.52 Guaranteed advances ratio and non-performing credit ratio of bills finance companies



Notes: 1. Guaranteed advances ratio = overdue guarantee advances/(overdue guarantee advances + guarantees).
2. Non-performing credit ratio = non-performing credit/(overdue guarantee advances + guarantees).
Source: CBC.

Credit quality remained sound

At the end of 2015, the average guaranteed advances ratio and the non-performing credit ratio of

[74] According to the *Ceiling on the Total Amounts of the Short-term Bills Guarantee and Endorsement Conducted by Bills Finance Companies*, the ratio of outstanding commercial paper guaranteed to equity for a bills finance company should not exceed 1, 3, 4, 5 or 5.5 times, respectively, depending on the level of its capital adequacy ratio of below 10%, above 10% but below 11%, above 11% but below 12%, above 12% but below 13%, or above 13%.

[75] According to the press release of the Financial Examination Bureau of the FSC on 20 January 2016.

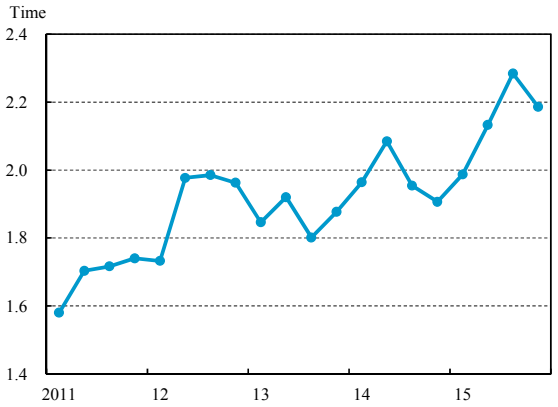
bills finance companies both grew slightly but stayed at a relatively low level of 0.056%, reflecting sound credit quality (Chart 3.52). At the same time, both the ratios of credit loss reserves to total guaranteed advances and those to non-performing credits were 29.38 times, indicating that the reserves set aside were significantly sufficient to cover potential credit losses.

Liquidity risk remained high

Over 90% of funds in bills finance companies were invested in bills and bonds, 43.8% of which were long-term bonds, while the sources of funds still heavily relied on short-term interbank call loans and repo transactions. It showed a significant maturity mismatch existing between assets and liabilities. Moreover, the substantial increase of bond investments caused the average multiple of the 0-60 day maturity gap between major assets and liabilities to equity to increase to 2.19 times, compared to 1.91 times a year before. Therefore, the liquidity risk in bills finance companies remained elevated (Chart 3.53).

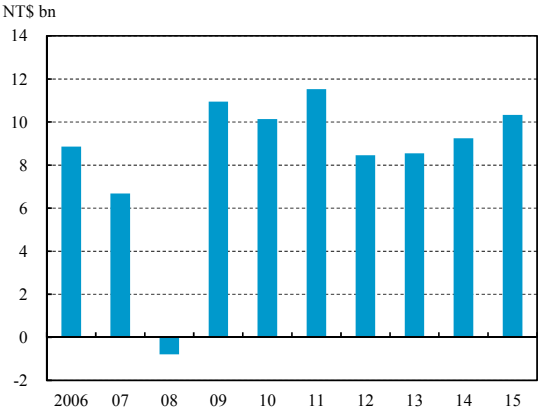
As the total assets expanded, major liabilities in bills finance companies grew by 16.10% in 2015, bringing the average multiple of major liabilities[76] to equity higher to 7.77 times at the end of 2015, compared to 6.85 times a year before. However, the multiple of each bills finance company was below the regulatory ceilings of ten or twelve times.[77]

Chart 3.53 Maturity gap between major assets and liabilities to equity of bills finance companies



Source: CBC.

Chart 3.54 Net income before tax of bills finance companies



Note: Figures from 2012 forward are on the TIFRSs basis, while prior years are on the ROC GAAP basis.
Source: CBC.

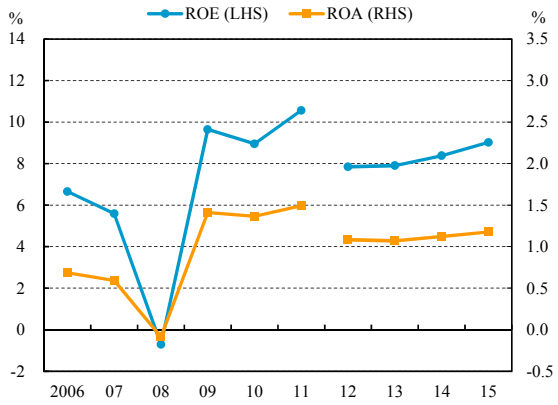
[76] Major liabilities include call loans, repo transactions as well as issuance of corporate bonds and commercial paper.

[77] According to the *Directions for Ceilings on the Total Amounts of the Major Liabilities and Reverse Repo Transactions Conducted by Bills Houses*, which aim to reduce the operating and liquidity risks of bills finance companies, the major liabilities of a bills finance company could not exceed six times, eight times or ten times its equity depending on the level of its capital adequacy ratio of below 10%, above 10% but below 12%, or above 12%. If a bills finance company is a subsidiary of a financial holding company or its bank shareholder meets safe and sound criteria, the ceiling will be raised by an additional two times its equity. As of the end of 2015, the capital adequacy ratio of each bills finance company was above 13%, so the ceilings were capped at ten times or twelve times for each one.

Profitability rose markedly

Bills finance companies posted a net income before tax of NT$10.3 billion in 2015, with an increase of NT$1.1 billion or 11.79% year on year (Chart 3.54). Over the same period, average ROE and ROA registered 9.02% and 1.18%, respectively, both higher than the ratios of 8.38% and 1.12% posted in 2014 (Chart 3.55). This rise was mainly driven by the increase in commission fee income as bills finance companies actively undertook the commercial paper guarantees and underwriting businesses and by the growth in bond investments earnings as they greatly expanded bond positions in expectation of lower interest rates.

Chart 3.55 ROE & ROA of bills finance companies

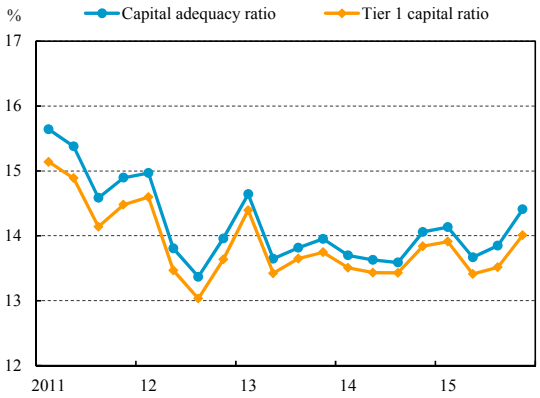


Notes: 1. Figures from 2012 forward are on the TIFRSs basis, while prior years are on the ROC GAAP basis.
2. ROE = net income before tax/average equity.
3. ROA = net income before tax/average assets.
Source: CBC.

Average capital adequacy ratio rose

Owing to accumulating earnings and the decrease in risk-weighted assets, the average capital adequacy ratio of bills finance companies registered 14.41% at the end of 2015, higher than 14.06% of the previous year, while the Tier 1 capital ratio rebounded to 14.01% from 13.84% a year before. [78] Furthermore, the capital adequacy ratio for each bills finance company was higher than 13%, well above the statutory minimum of 8% (Chart 3.56).

Chart 3.56 Capital adequacy ratios of bills finance companies



Source: CBC.

[78] Bills finance companies particularly increased short-term bond holdings with lower risk weights, and reduced non-guarantee commercial paper holdings with higher risk weights.

Box 2
Modification to VaR model for measuring banks' market risks under Basel III

In September 2006, the CBC developed a value-at-risk (VaR) model for measuring market risks of domestic banks and modified it for the first time in 2009. In response to the continual revisions of the method for calculating capital requirements for banks' market risk exposures under the Basel Accord, coupled with the increased volatility in domestic and international financial asset prices in recent years, the CBC modified the VaR model again in 2015 to improve the model's accuracy and robustness and to meet Basel III capital requirements.

1. Key modifications

In the spirit of the value-at-risk model of Jorion (2006), which has been widely used in financial risk management, and the market risk internal model developed by Chung (2015), while taking into account the Basel III capital requirements for market risks, the CBC revised the existing market risk model. The main modifications are shown below and summarized in Table B2.1.

(1) Instead of the current methods for measuring banks' general market risks, a dynamic Nelson-Siegel term structure model and a vector autoregressive VAR(1) model used for multivariate time series are applied to interest rate risks, while a random walk model is used for foreign exchange risks. Meanwhile, an AR(1)-EGARCH(1,1) model is employed in assessing equity risks. The settings of the above-mentioned models, which are straightforward and flexible, are able to be performed under either baseline or stress scenarios.

(2) In addition to general market risks, specific risks calculated under the standardized approach to market risks are incorporated in the estimation of exposures to interest rate risks and equity risks.

(3) In accordance with Basel III, the time to maturity of traded positions related to interest rate risk exposures is precisely constructed in more detail with 13 time-buckets (originally consisted of 4 buckets) based on the maturity and coupon rate of individual instruments, so as to capture the risks deriving from changes in the term structure of interest rates.

(4) In view of a more conservative treatment of the relationship among interest rate risks, foreign exchange risks and equity risks, the calculation of the aggregate VaR of the aforementioned three market risks by a Copula is substituted for an add-up method.

Furthermore, in addition to the current calculation of a VaR-based measure of banks' exposures to market risk under normal market conditions, an estimation of stressed VaR calculating significant losses deriving from market risks under stressed market conditions will be considered.

2. Estimation process

(1) Firstly, the maximum likelihood estimators of the above-mentioned models are measured for 40 domestic banks in terms of their equity, foreign exchange, and interest rate risk exposures.

(2) Secondly, in accordance with the foregoing estimations, the aggregate loss distribution for all banks is estimated using a variance-covariance method and a Monte Carlo simulation. The loss distributions of bank-specific risks subjected to the aggregate loss distribution are, in turn, calculated based on the result of the Monte Carlo simulation.

(3) Finally, all bank and bank-specific VaRs for market risks deriving from the output of the aggregate and bank-specific loss distributions are computed. The resulting capital adequacy ratios of individual banks would be adjusted accordingly, given that their market risk capital charges under the standardized approach are less than their VaR estimates.

Table B2.1 The revised market risk model

Item	Interest rate risk	Foreign exchange risk	Equity risk
Model	• Dynamic Nelson-Siegel Term Structure model • Multivariate Autoregression AR(1) model	Random Walk model	AR(1)-EGARCH(1,1) model
Risk	General risks & specific risks	General risks	General risks & specific risks
Risk Exposure	Interest rate positions in the trading book which are denominated in 9 currencies[1] and mapped to 13 time buckets[2]	Foreign exchange positions denominated in 8 currencies[1]	Equity positions in the trading book traded in 9 major stock exchanges[1]
Market index	Yields on government bonds with different terms in selected economies	Spot exchange rates of foreign currencies against NT dollar	Stock indices in selected economies
Adding a stressed VaR	Yes	Yes	Yes

Notes: 1. Interest rate risks and foreign exchange risks mainly derive from interest rates and foreign exchange positions denominated in NTD, USD, JPY, GBP, HKD, KRW, RMB, AUD and EUR; equity risk mainly results from equity exposures in the stock

markets of Taiwan, US, Japan, UK, Hong Kong, South Korea, Mainland China, Australia, and EU.

2. The 13 time buckets include 1 month, 2 months, 4.5 months, 9 months, 1.5 years, 2.5 years, 3.5 years, 4.5 years, 6 years, 8.5 years, 12.5 years, 17.5 years, and 20 years.

Source: CBC.

Reference: 1. Chung, C.F. (2015), *The development of an internal model for measuring banks' market risks under Basel III*, CBC internal paper, December.

2. Jorion, P. (2006), *Value at Risk: The New Benchmark for Managing Financial Risk*, Third Edition, McGraw-Hill.

Box 3
FinTech developments and their influence on the domestic banking industry

Financial technologies, also known as FinTech, integrate finance and technology in ways that bring disruptive innovation. They dramatically alter financial business models by offering more affordable, efficient, and accessible financial services. In spite of being an ideal tool for achieving financial inclusion, they could have a great impact on the traditional banking industry. In this Box, we collect global FinTech innovation trends, demonstrate current FinTech developments in the domestic banking industry, as well as analyzing the challenges and influences faced by the banking industry under the evolution of FinTech.

1. Global trends of FinTech developments

1.1 Global investment in FinTech has grown significantly in recent years

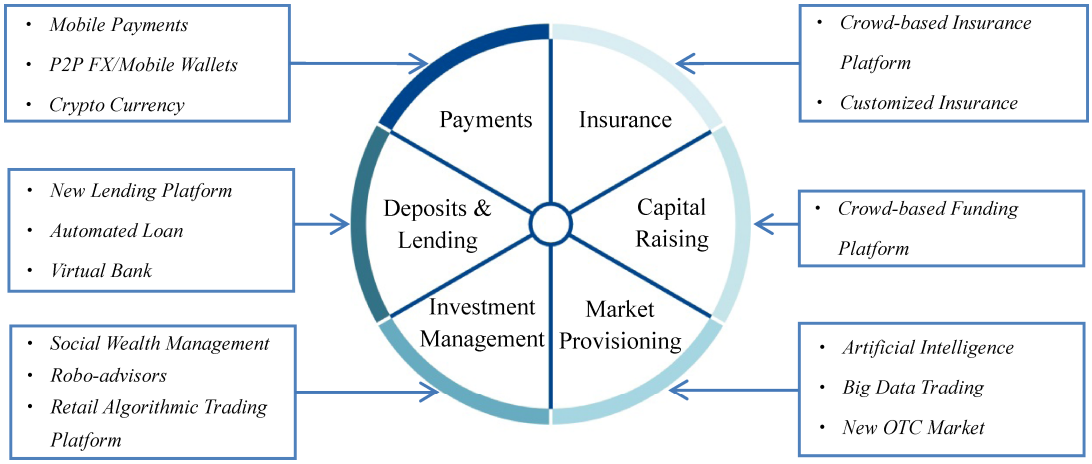
According to Accenture (2015), global investment in FinTech ventures has grown 12 times during 2008-2014. In the first half of 2015, the total amount of investment in FinTech further increased to US$16 billion from US$12.21 billion registered in 2014. Furthermore, as reported by CB Insight (2015), venture capital (VC) investors invested mainly in the payment field during 2007-2014, while the second most invested area was personal finance management. Lending and Bitcoin occupied the third and the fourth places respectively in the same period.

Silicon Valley is the biggest FinTech center in the world, while New York and London rank second and third, respectively. Among them, FinTech investment in Silicon Valley and New York combined accounts for more than 75% of global investment. Even though other emerging FinTech hubs, such as Dublin, Berlin, Tel Aviv, Singapore, Hong Kong, and Sydney, have not reached large enough scales, they are positioning themselves as the leading regional FinTech hubs underpinned by government support and other distinctive advantages.

1.2 Main areas of FinTech innovations

The World Economic Forum (2015) pointed out that FinTech innovations mainly focus on six financial areas: payment, deposit & lending, investment management, market provisioning, capital raising, and insurance. Many innovative services, which overturn traditional financial business models, are promoted in each area[1] (Chart B3.1).

Chart B3.1 Six fields of FinTech and examples of innovative services

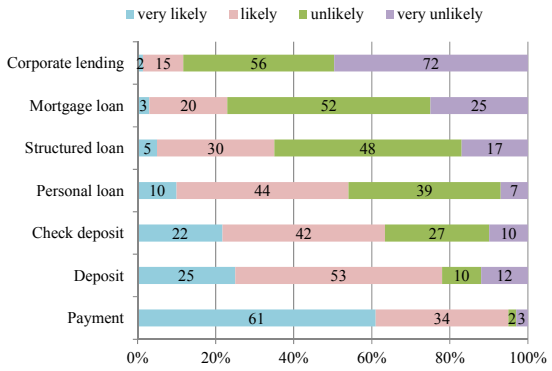


Note: In this chart, the CBC merely reveal a part of the innovative services in each field instead of covering all the services mentioned in the report.
Source: World Economic Forum.

1.3 Impacts on the global banking industry

Roland Berger (2015), who surveyed 60 banks, reported that new competitors will probably disrupt traditional banking businesses, especially payment and deposit, owing to the prevalence of FinTech (Chart B3.2). Additionally, since consumers will be more accustomed to using digitized virtual channels (such as internet and mobile phone), they will tend not to visit bank branches personally, thus lowering the value of those branches. In some countries (such as European countries like Denmark, Netherlands and Germany), the number of bank branches is decreasing.

Chart B3.2 Banking businesses that seem likely to be disrupted in the next three years



Note: The survey sample includes 60 banks across 15 countries.
Source: Roland Berger.

1.4 Strategic actions taken by the global banking industry to cope with FinTech

In order to deal with the impact of FinTech, the global banking industry has generally adopted four strategic actions, including: (1) investing in FinTech-related industries (e.g., Barclays invested in Barclays Accelerator); (2) acquiring FinTech-related companies (e.g., BBVA, a Spanish banking group, acquired Simple, a US company); (3)

strategically allying with FinTech-related companies (e.g., Westpac, an Australian bank, partnered with Moven); (4) selling financial services to FinTech-related companies (e.g., German bank Fidor offered software, such as Fidor OS and Fidor API, to FinTech-related companies with a charge).

2. Current developments of domestic banks concerning FinTech

In view of global FinTech trends and Bank 3.0, the program "Building Digital Environment 3.0" introduced by the FSC was officially launched in January 2015. In addition to permitting 12 types of financial business that could be applied by banks' consumers online, the FSC established the Financial Technology Office in September 2015, together with raising the Financial Technology Development Fund, creating a FinTech incubation center, and forming a database for Big Data application. Moreover, with the deregulations made by the FSC, domestic banks also actively promoted FinTech innovations. Some of them have already established FinTech departments and devoted considerable human resources and funds to improve technology innovations. The FinTech services launched by domestic banks are summarized in Table B3.1.

Table B3.1 FinTech services developed by some banks

Measures	Contents
1. Establishing FinTech departments	In the first half of 2015, some banks established FinTech departments for research and implementation of innovative financial technology, as well as devoting considerable human resources and funds to individual innovative projects.
2. Major innovative financial services	• Currently, banks mainly focus on mobile payment and third-party payment. • Other innovative services include big data analysis, ATMs using finger vein verification technology, robo-advisors, and interbank deposit ATMs.
3. Investing in FinTech companies	Some banks have already announced FinTech investment projects, while some others are actively assessing potential investments.
4. Branch transformation	• In the future, banks will tend to adopt multiple-channel models, indicating that physical branches will coexist with virtual channels. • As physical branches still preserve their own value, banks do not plan to shut branches in the near term. Instead, banks will transform the functions of branches into financial product sales and consulting services. In addition, they will train and take their branch employees on the transition journey.

Source: Interviewed banks, CBC.

Despite the fact that domestic banks are vigorously devoted to FinTech, they face many challenges during the development of innovations, such as: (1) the difficulty of knowing the young digital generation's appetite; (2) uneasiness of nurturing talented FinTech

employees; (3) short lifecycle and high R&D cost of digital financial products; (4) intense competition from many non-financial companies.

3. Possible FinTech Impacts on the domestic banking industry

(1) FinTech enterprises offering many banking services are skimming off banking profits.[2] On the other hand, FinTech development can benefit the banking industry by introducing new products and cutting costs. McKinsey & Company (2014) evaluated that if Asian banks could properly respond to these digital trends, they would represent opportunities rather than threats in the future.[3]

(2) To respond to the changes in business models under the digital environment, banks must make substantial adjustments in many aspects, such as organizational structure, operating procedure, sales channels, information systems, and human resources management. Banks will have to confront substantial challenges when trying to transform smoothly.

(3) As customers broadly conduct financial transactions through internet and mobile channels, cyberattacks and personal information theft are likely to be problems. Therefore, inadequate network security and personal information protection will become important sources of risks for banks.

(4) In Taiwan, given the insufficiency of FinTech talents in the banking sector, it is urgent for banks and associated academies to strengthen FinTech-related training and education.

4. Conclusion

Rapidly innovating FinTech exerts tremendous competitive pressure on domestic and foreign financial industry participants, but this also brings them new opportunities. Domestic banks should make the best use of FinTech technologies and innovative business models to increase their competitiveness through smooth business transformation. In the meantime, banks should enhance internet security management so as to lower related risks.

Notes: 1. The World Economic Forum (2015) also listed crucial innovative products/platforms/enterprises in each area. For instance, payment field includes: (1) mobile payment such as Apple Pay and Android Pay; (2) P2P FX/mobile wallets such as TransferWise and M-Pesa; (3) crypto currency such as Bitcoin and Ripple. For more detailed information, please refer to the report.

2. Global bank revenues estimated at US$4.7 trillion and profits at US$470 billion a year could potentially be disrupted by nonfinancial FinTech firms, according to analysts at Goldman Sachs.

See The Economist (2014), Banks Glory Days May Be Over with New Financial Technology, or "Fintech", Companies Taking Aim at Their Services and Profits, special report, 8 May.

3. McKinsey & Company analysis demonstrated that FinTech could be a threat to the Asian banking industry (such as leading to business erosion, profit shrinkage, and higher operation risk), which might decrease banks' net profits by 29-36% of. If banks respond properly to digital trends, FinTech will emerge as opportunities (such as lowering costs, introducing new FinTech products, and capturing market share from other banks), which might increase banks' net profits by 43-48% of. Overall, opportunities would be larger than threats.

Reference: 1. Accenture (2015), The Future of Fintech and Banking: Digitally Disrupted or Reimagined.
2. CB Insight (2015), *Disruption in Financial Services*, Webinar Presentation.
3. McKinsey & Company (2014), Digital Banking in Asia: Winning Approached in a New Generation of Financial services.
4. Roland Berger (2015), Executive Retail Banking Survey: Digital Transformation.
5. World Economic Forum (2015), The Future of Financial Services: How Disruptive Innovations Are Reshaping the Way Financial Services Are Structured, Provisioned and Consumed.