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IMPROVING BANK EFFICIENCY IN ADVANCED ECONOMIES THROUGH CONSOLIDATION, RESTRUCTURING AND DIGITAL TRANSFORMATION

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Abstract

This paper compares the mechanisms associated with improvements in commercial-bank efficiency in advanced economies over 2016–2025. The analysis combines supervisory statistics for the United States and the United Kingdom with public disclosures by Deutsche Bank and DBS, with the latter observed for 2021–2025. Four mechanisms are examined: consolidation and scale, income expansion, restructuring and cost reduction, and digital transformation; the licensing of digital banks in the Republic of Korea is considered as a complementary regulatory mechanism. Operating-jaws analysis for 2021–2025 shows that Deutsche Bank was the only case in which reported operating costs declined in absolute terms (−3.9 per cent). In the other cases, cost-to-income ratios improved because income grew faster than costs. The findings are used to derive implications for banking-sector reform in Uzbekistan.

Keywords: Commercial banks, efficiency, cost-to-income ratio, efficiency ratio, consolidation, restructuring, digital transformation, operating jaws.

1. Introduction

During 2016–2025, banks in advanced economies operated through markedly different interest-rate and margin environments. In the United States, the net interest margin of insured institutions declined from 3.40 per cent in 2018 to 2.53

per cent in 2021 before recovering to 3.28 per cent in 2025, while non-interest expenses generally increased. This variation provides a useful setting for identifying the mechanisms through which measured efficiency improved under different macro-financial conditions. The experience is relevant for Uzbekistan because its banking-sector reform likewise involves consolidation, restructuring of banks with a state share, digital-bank entry and technology investment.

Research on bank efficiency has developed along several lines. Frontier studies measure the distance of a bank from best practice and show that differences in managerial efficiency are larger than differences due to scale (Berger and Humphrey, 1997; Berger and Mester, 1997). Later work nevertheless finds significant economies of scale for the largest banks once risk is taken into account (Wheelock and Wilson, 2012; Hughes and Mester, 2013). Studies of the low-rate period show that falling rates reduce net interest margins and profitability (Borio, Gambacorta and Hofmann, 2017; Claessens, Coleman and Donnelly, 2018), and the literature on financial technology argues that digitalisation lowers the cost of intermediation but also intensifies competition (Vives, 2019). The aim of this paper is to compare these mechanisms over one period, 2016–2025, using official statistics and bank disclosures.

2. Data and method

Four statistical sources are used: the Quarterly Banking Profile of the Federal Deposit Insurance Corporation (FDIC), which covers all insured institutions in the United States (FDIC, 2026); the annual profit and loss statistics of monetary financial institutions and the regulatory capital statistics of the Bank of England (2026a; 2026b; 2026c); the Financial Data Supplements and results presentations of Deutsche Bank, a German banking group that carried out a full restructuring in the period (Deutsche Bank, 2017–2026; 2020; 2023; 2025); and the annual

report of DBS, a Singapore banking group that discloses the economic effect of its digital and data initiatives (DBS Group Holdings, 2026, p. 175), with data for 2021–2025. The first two sources describe whole banking systems, the last two individual banking groups. The licensing mechanism is described on the basis of a press release of the Financial Services Commission of the Republic of Korea (Financial Services Commission, 2024).

The central indicator is the ratio of operating costs to operating income: the efficiency ratio of the FDIC (non-interest expense less amortisation and impairment of intangible assets, as a percentage of net interest income plus non-interest income) and the cost-to-income ratio in the other three cases. Because a ratio can improve either through lower costs or through higher income, it is supplemented by operating jaws, $J = g(I) - g(C)$, where $g(I)$ and $g(C)$ are the percentage changes in operating income and in operating costs between two years. Positive jaws mean that the ratio improved; a negative $g(C)$ shows that a reduction of costs contributed to the improvement. Full-year ratios for the United States in Table 1 and the ratio for the United Kingdom are the author's calculations from the published aggregates.

The definitions are not identical: the British data refer to unconsolidated returns of institutions operating in the United Kingdom, and the DBS ratios exclude one-off items. Levels are therefore compared with caution, and the argument rests mainly on changes over time within each case.

3. Results and discussion

3.1. United States: consolidation and scale. Figure 1 and Table 1 show the main indicators of FDIC-insured institutions.

Between 2016 and 2025 the number of insured institutions fell by 26.7 per cent, from 5,913 to 4,336, while assets grew by 50.5 per cent and employment

remained practically unchanged at about 2.05 million (Figure 1). Assets per employee rose from $8.2 million to $12.3 million. The efficiency ratio improved from 58.4 per cent in 2016 to 56.3 per cent in 2018, deteriorated to 61.1 per cent in 2021, when the net interest margin fell to 2.53 per cent, and reached 55.6 per cent in 2025, the best value of the decade. Consolidation alone, therefore, did not improve the ratio: between 2016 and 2021 the number of institutions fell by 18.2 per cent while the ratio deteriorated.

Consolidation concentrated the system in the largest banks: the number of institutions with assets above $250 billion increased from 9 to 16 and their share of industry assets from 50.3 to 60.3 per cent, whereas the number of institutions with assets below $100 million fell from 1,541 to 572. Table 2 and Figure 2 compare the size groups in 2025.

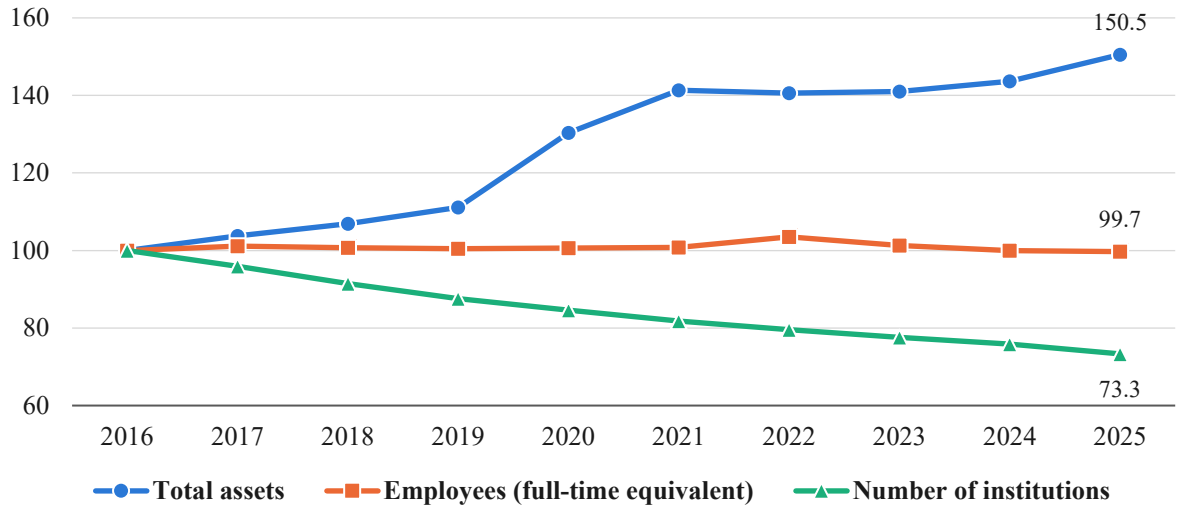


Figure 1. Assets, employment and number of FDIC-insured institutions in the United States, index (2016 = 100)

Source: FDIC (2026).



Table 1. Main indicators of FDIC-insured institutions in the United States, 2016–2025

Indicator	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Institutions, number	5,913	5,670	5,406	5,177	5,002	4,839	4,706	4,587	4,487	4,336
Employees, thousand	2,053	2,076	2,067	2,063	2,066	2,069	2,125	2,079	2,052	2,047
Assets, $ trillion	16.8	17.4	17.9	18.6	21.9	23.7	23.6	23.7	24.1	25.3
Assets per employee, $ million	8.2	8.4	8.7	9.0	10.6	11.5	11.1	11.4	11.7	12.3
Net income, $ billion	171	164	237	233	147	279	263	254	268	296
Return on assets, %	1.04	0.96	1.34	1.27	0.71	1.22	1.11	1.08	1.12	1.19
Net interest margin, %	3.12	3.23	3.40	3.31	2.81	2.53	2.93	3.27	3.21	3.28
Efficiency ratio, %	58.4	58.0	56.3	56.7	59.8	61.1	57.8	57.5	57.3	55.6
Non-current loans, % of loans	1.42	1.20	0.99	0.91	1.19	0.89	0.74	0.86	0.98	0.96

Note: Year-end stocks are reported. Annual ROA, net interest margin and efficiency ratios are author calculations and closely match FDIC-published values; the 2025 efficiency ratio is identical at 55.60%.

Source: FDIC (2026).

Table 2. Efficiency and profitability of FDIC-insured institutions by asset size, full year 2025

Asset size group	Number of institutions	Share of assets, %	Efficiency ratio, %	Non-interest expense to assets, %	Net interest margin, %	ROA, %	ROE, %
Over $250 billion	16	60.3	53.23	2.19	2.98	1.17	11.98
$10–250 billion	136	25.3	57.16	2.85	3.79	1.25	11.63
$1–10 billion	900	10.1	59.17	2.74	3.78	1.25	11.61
$100 million–$1 billion	2,712	4.1	66.24	3.18	3.84	1.23	11.59
Under $100 million	572	0.1	75.88	4.12	3.86	1.02	7.32
All institutions	4,336	100.0	55.60	2.45	3.30	1.20	11.82

Source: FDIC (2026).

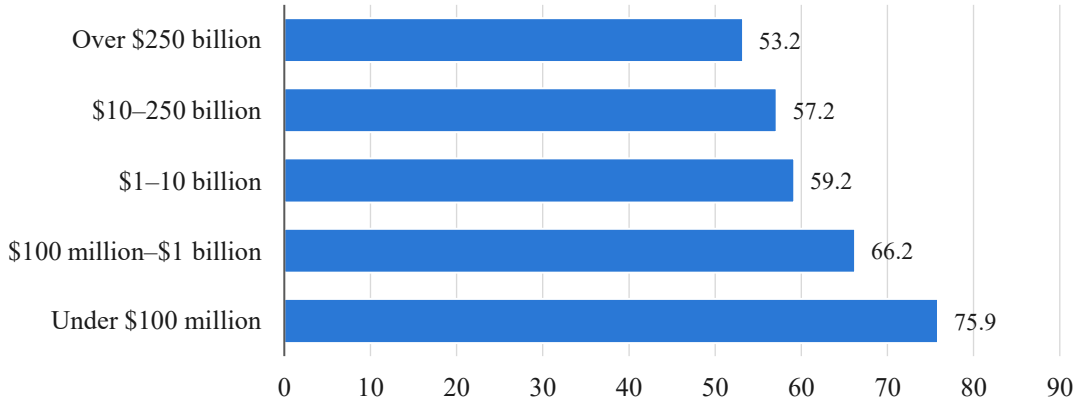


Figure 2. Efficiency ratio of FDIC-insured institutions by asset size, full year 2025, % (a lower value means higher efficiency)

Source: FDIC (2026).

In 2025 institutions with assets above $250 billion spent 2.19 per cent of assets on non-interest expenses and had an efficiency ratio of 53.2 per cent; for institutions with assets below $100 million the figures were 4.12 and 75.9 per cent. The relation is not strictly monotonic: non-interest expenses were 2.85 per cent of assets in the $10–250 billion group against 2.74 per cent in the $1–10 billion group. Smaller institutions have a wider net interest margin (3.78–3.86 per cent against 2.98 per cent), so that the return on assets of the three middle groups (1.23–1.25 per cent) is slightly above that of the largest banks (1.17 per cent); the smallest group has a lower return on assets (1.02 per cent) and a clearly lower return on equity (7.32 per cent). this shows that very small scale raises the cost of producing banking services, but that scale does not by itself guarantee higher profitability. Nor does size remove risk: in 2023 five institutions with combined assets of $552.5 billion failed, far more by assets than in all the other years from 2018 to 2025 taken together ($6.1 billion), so that the growth of large banks has to be accompanied by adequate supervision of their risks.

3.2. United Kingdom: income-driven improvement. In the United Kingdom the cost-to-income ratio of monetary financial institutions remained between 69 and 74 per cent until 2021 and then fell sharply (Table 3).

Between 2021 and 2025 operating income rose by 44.3 per cent, from £119.1 billion to £172.0 billion, while operating expenses rose by 18.2 per cent; the cost-to-income ratio fell from 73.8 to 60.4 per cent and pre-tax profit doubled. Costs were not reduced: in absolute terms they were £10.5 billion higher in 2025 than in 2016, and staff costs rose by 24.0 per cent in 2021–2025, so that their ratio to income fell (from 27.0 to 23.2 per cent) only because income grew faster. Nor did the additional income come from net interest income, which was £2.1 billion lower in 2025 than in 2021, whereas trading income rose from £4.2 billion to £50.0 billion and accounted for £45.8 billion of the increase of £52.8 billion. The improvement thus rests on the most volatile component of income. Over the same period the CET1 ratio of the banking sector declined from 16.8 to 15.5 per cent, remaining above its 2016 level (15.0 per cent).

Table 3. Income, costs and capital of monetary financial institutions in the United Kingdom, 2016–2025

Indicator	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Operating income, £ billion	134.2	136.1	126.7	123.9	120.3	119.1	149.3	160.2	159.3	172.0
of which net interest income	63.7	65.7	62.3	58.2	63.2	68.8	69.7	52.3	50.8	66.8
of which trading income	7.1	2.9	5.8	12.8	12.8	4.2	28.0	58.1	56.7	50.0
Operating expenses, £ billion	93.4	93.9	89.6	90.1	88.7	87.9	92.9	96.6	98.2	103.9
Cost-to-income ratio, %	69.6	69.0	70.7	72.7	73.7	73.8	62.2	60.3	61.7	60.4
Staff costs to income, %	25.5	25.0	25.8	26.2	26.2	27.0	23.0	22.6	23.7	23.2
Pre-tax profit, £ billion	24.9	26.6	17.2	20.3	12.7	29.5	45.5	59.3	57.7	59.1
CET1 capital ratio, %	15.0	14.9	15.5	15.6	16.3	16.8	16.1	16.0	16.0	15.5

Note: the cost-to-income and staff-cost ratios are the author's calculations. The CET1 ratio is that of the UK banking sector in the regulatory capital statistics

(fourth quarter of each year), a different reporting population from the unconsolidated returns of monetary financial institutions.
Source: Bank of England (2026a; 2026b; 2026c).

3.3. Germany: restructuring of Deutsche Bank. Deutsche Bank is an example of an improvement in efficiency that followed a restructuring (Table 4).

In 2016 the bank spent 98.1 cents to earn one euro of revenue. The strategy announced in July 2019 included the exit from equities sales and trading, the transfer of non-strategic assets to a Capital Release Unit, the reduction of the workforce and the migration of information systems (Deutsche Bank, 2020; 2023; 2025). Its immediate result was negative: in 2019 the cost-to-income ratio rose to 108.2 per cent and the bank reported a net loss of €5.3 billion, and the cumulative transformation-related effects of 2019–2022 amounted to €8.5 billion. The benefits followed later. Between 2019 and 2025 revenues rose by 38.6 per cent and non-interest expenses fell by 17.6 per cent; the cost-to-income ratio fell to 64.4 per cent in 2025 and to 60.9 per cent in the first half of 2026 (62.3 per cent in the first half of 2025), and the return on tangible equity reached 10.3 per cent. Over the decade the number of branches fell by 55.6 per cent. The number of employees fell from 99.7 thousand in 2016 to 83.0 thousand in 2021 and then rose to 89.9 thousand, and net revenues per employee rose from €301 thousand to €357 thousand.

Two implications follow. First, restructuring exhibits a delayed payoff: costs are recognised early, whereas the cost-to-income ratio improves only after implementation measures begin to affect the operating base. Second, restructuring therefore requires an explicit capital and funding plan capable of absorbing one-off transformation costs during the transition period.

Table 4. Efficiency indicators of Deutsche Bank Group, 2016–2025

Indicator	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Net revenues, € billion	30.0	26.4	25.3	23.2	24.0	25.4	27.2	28.9	30.1	32.1
Non-interest expenses, € billion	29.4	24.7	23.5	25.1	21.2	21.5	20.4	21.7	23.0	20.7
Cost-to-income ratio, %	98.1	93.4	92.7	108.2	88.3	84.6	74.9	75.1	76.3	64.4
Post-tax return on tangible equity, %	−2.7	−1.4	0.5	−10.9	0.2	3.8	9.4	7.4	4.7	10.3
CET1 capital ratio, %	11.8	14.0	13.6	13.6	13.6	13.2	13.4	13.7	13.8	14.2
Employees, thousand	99.7	97.5	91.7	87.6	84.7	83.0	84.9	90.1	89.8	89.9
Branches, number	2,656	2,425	2,064	1,931	1,891	1,709	1,536	1,432	1,307	1,179
Net revenues per employee, € thousand	301	271	276	264	284	306	320	320	335	357

Note: Values are from the respective annual supplements; employees are year-end full-time equivalents. Net revenue per employee is author-calculated.
Source: Deutsche Bank (2017–2026).

3.4. Singapore: digital transformation of DBS. DBS has the lowest cost-to-income ratio of the four cases (Table 5).

Table 5. Efficiency indicators of DBS Group, 2021–2025

Indicator	2021	2022	2023	2024	2025
Total income, S$ billion	14.2	16.5	20.2	22.3	22.9
Expenses, S$ billion	6.5	7.1	8.1	8.9	9.2
Cost-to-income ratio, %	45.6	43.0	39.9	39.9	40.4
Net profit, S$ billion	6.8	8.2	10.3	11.4	11.0
Return on equity, %	12.5	15.0	18.0	18.0	16.2
Net interest margin, %	1.45	1.75	2.15	2.13	2.01
Non-performing loan rate, %	1.3	1.1	1.1	1.1	1.0

Note: the cost-to-income ratio, net profit and return on equity exclude one-time items.
Source: DBS Group Holdings (2026).

Between 2021 and 2025 total income grew by 61.4 per cent and expenses by 43.0 per cent, so that the cost-to-income ratio fell from 45.6 to 40.4 per cent and the return on equity rose from 12.5 to 16.2 per cent. The improvement was not continuous: in 2025 income grew by 2.7 per cent and expenses by 4.0 per cent, and the ratio rose from 39.9 to 40.4 per cent. The bank reports the effect of data and artificial intelligence separately: in 2025 it reported more than 2,000 models in over 430 use cases, with an economic value of about S$1 billion, and its computerisation expenses amounted to S$1.36 billion (DBS Group Holdings, 2026, pp. 29, 34–35 and note 10). What distinguishes this case, in the author's view, is not the amount of technology spending but the fact that its economic effect is measured and disclosed, which makes digital investment a managed mechanism for raising efficiency rather than a cost item.

3.5. Republic of Korea: competition through licensing. A different, regulatory mechanism is used in the Republic of Korea, where three internet-only banks already operate. In November 2024 the Financial Services Commission announced the criteria for licensing a new internet-only bank: stability in raising capital, innovativeness (above all of the credit evaluation model), inclusiveness (lending to underserved customers and to small and medium-sized enterprises outside the capital region) and feasibility of the business plan; it also plans to attach a condition under which part of the business of the bank can be suspended if the plan is not observed (Financial Services Commission, 2024). Entry is thus used to promote competition, but under conditions that are verified after the licence is granted.

3.6. Comparison of the mechanisms. Table 6 and Figure 3 bring the four cases together.

Table 6. Operating jaws in the four cases, 2021–2025

Case	Growth of income, %	Growth of costs, %	Operating jaws, pp	Cost-to-income 2021, %	Cost-to-income 2025, %
United States, FDIC-insured institutions	30.0	18.5	11.5	61.1	55.6
United Kingdom, monetary financial institutions	44.3	18.2	26.2	73.8	60.4
Deutsche Bank	26.3	−3.9	30.2	84.6	64.4
DBS	61.4	43.0	18.4	45.6	40.4

Note: Income and cost definitions follow each institution's reporting framework: income is net interest plus non-interest income (United States), operating income (United Kingdom), net revenues (Deutsche Bank), and total income (DBS); costs are non-interest expenses, operating expenses, or total expenses as applicable.
Source: Tables 1 and 3–5.

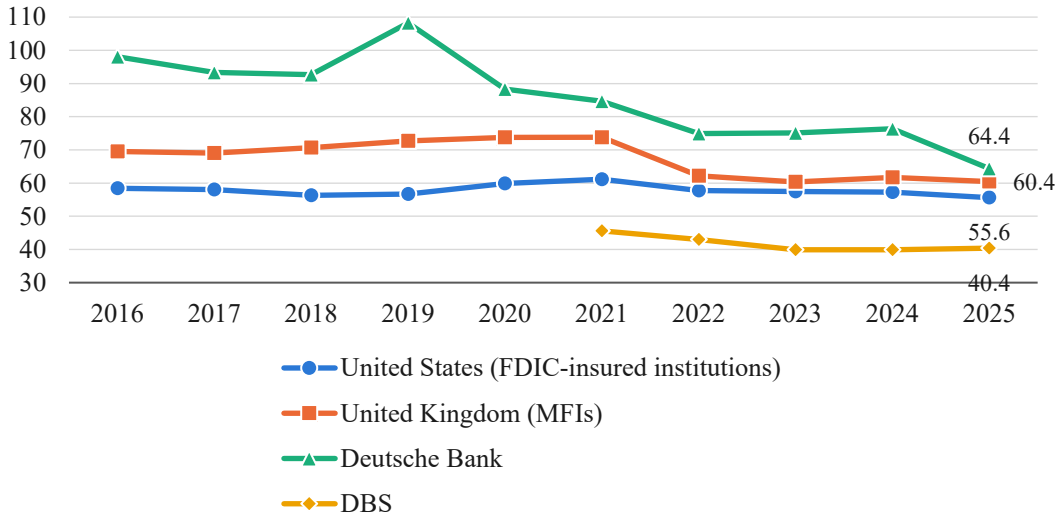


Figure 3. Cost-to-income ratio in the four cases, 2016–2025, %

Note: The United States uses the FDIC efficiency ratio; DBS data begin in 2021. Definitions differ across cases.
Source: FDIC (2026); Bank of England (2026c); Deutsche Bank (2017–2026); DBS Group Holdings (2026).

All four cases show positive operating jaws for 2021–2025, from 11.5 percentage points in the United States to 30.2 points at Deutsche Bank. Their nature, however, differs. Only Deutsche Bank reduced its reported costs in absolute terms (by 3.9 per cent), and even there the growth of revenues (26.3 per cent) contributed more to the fall of the ratio than the reduction of costs. In the United States, the United Kingdom and at DBS costs rose by 18.5, 18.2 and 43.0 per cent respectively, and the ratio improved only because income grew faster: net interest income in the United States (by 40.0 per cent), trading income in the United Kingdom. Moreover, 2021 was the weakest year of the decade for the ratios of the United States and the United Kingdom, so that part of the improvement is a recovery: against 2018 the United States ratio improved by only 0.7 points. The author therefore distinguishes structural improvements in efficiency, which rest on lower costs, from improvements that rest on income and can be reversed, and considers that judging efficiency by the cost-to-income ratio alone, without separating its two components, leads to over-optimistic conclusions.

4. Conclusions and proposals

The comparison supports the following conclusions and proposals for the banking sector of Uzbekistan.

1. Efficiency should be assessed by its components. Supervisory reporting and the strategies of banks should show the growth of income and of costs separately (operating jaws), so that income-driven gains are not mistaken for structural ones.

2. Very small banks carry a cost disadvantage. The difference between 2.19 and 4.12 per cent of assets in the United States is an argument for encouraging the consolidation of the smallest banks, combined with proportionate regulation and close supervision of the risks of large banks.

3. The restructuring of banks with a state share needs a budget and a horizon. The case of Deutsche Bank shows that the cost-to-income ratio deteriorates before it improves. Transformation programmes should therefore fix in advance the amount of one-off costs, the capital buffer that will absorb them, and targets for a period of five to six years.

4. Digital investment should be measured. Banks should be required to disclose the economic effect of their digital and data projects, as DBS does, rather than only the amount spent.

5. Licensing can be used to promote competition. Digital-bank licences should be conditional on capital stability, an innovative credit model and inclusion commitments, with powers to restrict the business of a bank that does not honour them.

The study is limited to two banking systems and two individual banking groups, and to accounting ratios; a frontier analysis on bank-level data would be a useful extension.

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