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What have banks done wrong?

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***Abstract*—**This paper aims to provide a conceptual framework to examine competitive disadvantage of banks that suffer from poor performance. Banks generate revenues mainly from the interest rate spread on taking deposits and making loans while collecting fees in the process. To maximize firm value, banks seek loan growth and expense control while managing risk associated with loans with respect to non-performing borrowers or narrowing interest spread between assets and liabilities. Competitive disadvantage refers to the failure to access imitable resources and to build managing capabilities to gain sustainable return given appropriate risk management. This paper proposes a four-quadrant framework of organizational typology is subsequently proposed to examine the features of competitive disadvantage in the banking sector. A resource configuration model, which is extracted from CAMEL indicators to examine the underlying features of bank failures.

***Keywords*—**bank failure, CAMEL, competitive disadvantage, resource configuration

I. Introduction

THE overall market value of world banking sector declined at least $5.5 trillion during the 2008-09 financial crisis [1]. This financial disaster has led some banks into distress but others remain sustained. Why is that some banks suffered from failure situation, while still others remain unscathed in financial crisis? What are the underlying factors that differentiate the collapses from sustainability in baking industry in dynamic surroundings?

Traditionally, banks generate revenue from the interest rate spread on taking deposits and making loans while collecting fees in the process. The typical sources of profitability are loan growth and expense control, both of which generate low cost advantage. However, banks have to manage risk associated with loans provided that borrowers may default or that changes in market interest rates may narrow the interest spread between assets and liabilities. Many studies present the significant effect of management inefficiency (using high cost as the proxy) on bank failures [2]-[5]. The resource-based view (RBV) specifies that resources are important antecedents to a firm's overall performance [6], [7] as well as the source of sustainable competitive heterogeneity between and among firms [8]. RBV suggests that firms with perfectly-inimitable resources and managing capabilities, the genes of competitive advantage, outperform others [6], [9]–[10]. However, firms which obtain superior performance may not necessary due to the antecedents of competitive advantage but simply being lucky [9]–[11], Stinchcombe, 2000). Powell (2001; 2002; 2003) suggested transforming the deterministic, unidirectional proposition sustainable competitive advantages create sustained superior performance into a probabilistic inference: *sustainable competitive advantage is more probable in firms that have already achieved sustained superior performance.*

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From the probabilistic view, banks with superior performance do not ensure the existence of competitive advantage, instead, they are just "most likely" to have competitive advantage. Powell's probabilistic statement can be re-stated in an opposite way: banks which failed are most likely to have competitive disadvantage (Powell and Arregle, 2007). This statement implies that there are banks exhibit unexpected performance: banks with competitive advantage but fail and banks with competitive disadvantage but do not fail. Unlike previous studies which focus on the accuracy of bank failure prediction model, this paper provides a comprehensive examination to the four groups of banks.

The strategy taken by the bank for enlarging profitability and risk control are uncovered by its financial statement. Tang and Liou (2010) have denoted that financial ratios can reveal the causes of financial performance. The present study uses financial indicators included in the Uniform Financial Rating System (known as CAMEL) rating system, which was introduced by U.S. regulators in 1979 to assess the health of individual banks, as predictors to configure the competitive advantage /competitive disadvantage in the banking sector.

II. 2. Literature Review

A. Prediction of Bank failures

Most research of bank failures focus on identifying effective indicators and techniques that can be used to develop an early warning system for individual bank failure [5], [11]–[19] or examine how external or internal factors such as regulations and efficiency relate to bank failures [4], [20]. The common approach of these studies is to select one or several traditional multivariate statistical methods and/or modern technical models (such as neural networks, data mining, or other intelligent techniques), with financial ratios (occasionally augmented with market variables) as inputs, that accurately distinguish a group of trouble banks from comparable banks.

Since the pioneer of Beaver [21] and Altman [22] in the late-1960s many traditional statistical methods and modern intelligent techniques have been used to develop business failure predicting models. Most of these models are mainly based on financial reports. The failure prediction model aims at identifying firms most likely to bring loss to investors, creditors and other firm stakeholders at least one year in advance. This prediction approach has been used to develop early warning system for bank failure since the mid 1970s. At early stage, business failure prediction models were built on multivariate statistical models such as discriminant analysis [22], factor analysis [23], and conditional probability analysis including but not limited to logit regression (first suggested by Martin [12]), linear probability modeling (such as Cox proportional hazards model developed by Lane et al. [14]). At latter stage, intelligent techniques such as neural networks [24], split-population survival-time model [15], and Bayesian belief networks [25] are also applied.

Reference [26] provide comprehensive review on the developmental progress of bank distress prediction models while Zhao et al. [27] indicate common techniques used to formulate the early warning models for bank failures.

Most failure prediction or warning models are built on accounting data [28], [29]. The Uniform Financial Rating System (UFRS) designates six major risk factors for bank soundness: Capital adequacy, Asset quality, Management quality, Earnings ability, and Liquidity position. These categories make up the CAMELS rating, which is used by all bank regulatory agencies to denote the summary measure of bank condition. Previous studies have found that CAMELS ratings are useful tools to examine bank fundamentals [16], [30].

B. Why Banks fail

Other than distinguishing failed banks from non-failed ones, there are studies seeking to identify the characteristics that cause banks to fail. Reference [31] develops a logit regression with CAMEL-proxy variables as regressors to predict bank failures from 1984 to 1989. He concludes that bank failure is a function of variables related to its solvency since the majority of CAMEL-motivated proxy variables are significantly related to the probability of failure as much as four years before a bank fails. Alternatively, [2] show that high-cost banks incur a greater probability of failure, and this probability increases as the time of failure nears. They attribute bank failures to management inefficiency since high-cost banks have difficulty competing. Similarly, using cost efficiency to proxy management quality, [3] also found that management inefficiency had significant explanatory power for explaining bankruptcy in the USA. References [4], [5] present that the probability of failure was higher for managerially inefficient banks, as reflected in measures of both cost and technical inefficiency. Reference [4] signifies that most bank inefficiencies are operational in nature, involving the overuse of physical inputs, rather than financial, involving overpayment of interest. In addition, technical inefficiencies, defined as proportionate overuse of all inputs, dominate allocative inefficiencies (improper mix of inputs). The above-mentioned literatures indicate that banks with relatively illiquid, low-quality assets or little capital were more likely to fail. And, apart from excessive risk taking, or simply bad luck, banks that managed their operations inefficiently involving high operational cost may also have been at greater risk of failing.

Size was not indicated as an important factor of bank performance in the prior research. But most recent study indicated that large banks have tended to be more profitable than small banks in recent years, and exhibit larger increases in productivity and efficiency [32]. Moreover, examining bank lending in response to the financial crisis following the failures of Lehman Brothers and Washington Mutual in 2008, Ivashina and Scharfstein [33] found that Banks that have access to deposit financing cut their lending less than banks with less access to deposit financing. This fact shows that capital structure is still one of the key factors for bank sustainability as confronting the environmental turmoil.

C. The probabilistic view of competitive advantage and competitive disadvantage

Competitive advantage is not visible but can be revealed by the performance of the firm [34]. However, since the superior performance a firm may also can be the result of or some manifestation of luck [10], the provision of performance does not guarantee the existence of competitive advantage. Therefore, the relationship between competitive advantage and performance is not deterministic but probabilistic (conditional). That is, the firms that have achieved superior performance may not definitely lead by competitive advantage however they are most probable to have competitive advantage [36]–[38]. The probabilistic relationship can be stated as equation (1).

$$Prob(q|p) = \frac{Prob(p|q) \times Prob(q)}{Prob(p|q) \times Prob(q) + Prob(p|\sim q) \times Prob(\sim q)} \quad (1)$$

whereas,

$Prob(q|p)$: the probability that a firm has sustainable competitive advantage given the provision of performance of that firm; $prob(q)$: the probability that a firm has competitive advantage among a group of firms; $prob(\sim q)$: the probability that a firm has no competitive advantage among a group of firms; $Prob(p|q)$: the probability that a firm's performance is the result of sustainable competitive advantage; $Prob(p|\sim q)$: the probability that a firm's performance is not led by sustainable competitive advantages achieve sustained superior performance.

Reference [24] generalizes equation (1) to equation (2) illustrate the relationship between competitive advantage hypotheses or theories ($\boldsymbol{\theta}$) and superior performance ($\mathbf{Y}$). The article then extends the competitive advantage- performance causal relation by introducing organizational configuration as the auxiliary hypotheses to mediate the two. Furthermore, Liou [38] add strategy to the front of the causal relations to evaluate the effects of corporate strategy on firm value. The causal relation of strategy-competitive advantage-configuration-performance can be expressed as equations (2) and (3).

$$P(\boldsymbol{\theta}|\mathbf{Y}) = \frac{P(\mathbf{Y}|\boldsymbol{\theta})P(\boldsymbol{\theta})}{P(\mathbf{Y}|\boldsymbol{\theta})P(\boldsymbol{\theta}) + P(\mathbf{Y}|\sim\boldsymbol{\theta})P(\sim\boldsymbol{\theta})} = \frac{P(\mathbf{Y}|\boldsymbol{\theta})P(\boldsymbol{\theta})}{P(\mathbf{Y})} \quad (2)$$

$$P(\boldsymbol{\theta}, \psi|\mathbf{Y}) = P(\boldsymbol{\theta}|\psi, \mathbf{Y}) \times P(\psi|\mathbf{Y}) \quad (3)$$

Whereas ψ is an auxiliary proposition representing a mixture of heterogeneous resource bundles $\mathbf{x}$ and their associated weights $\boldsymbol{\lambda}$, that is, $\psi = (x, \lambda)$.

This epistemological significance of the Bayesian process is a parameterizing process that to assert a relationship between 'rational constructions' and the unobserved properties of behavioral theories, and to derive an instance of the relationship based on empirical data that are easier to observe and measure [34: p. 45]. Bayesian discriminant model [39], which assumes that the population of firms is composed of two unaffiliated factions: those with competitive advantage and those without (i.e., having competitive disadvantage) is suggested to be used to extract the causal series with tangible data.

The probability of the competitive advantage (or disadvantage) hypothesis θ is derived from statistical inference based on the unobserved configurations of heterogeneous resource bundles Ψ and the empirical evidence of performance Y. They subsequently propose a resource configuration of competitive advantage to generate the possible rational construction of sustainable competitive advantage and competitive disadvantage.

III. Configuring Competitive Disadvantage in the Banking Sector

A. Competitive disadvantage vs. failure

All firms in the industry can be grouped into one of the four types according to their position at the four-quadrant figure composed by competitive advantage / competitive disadvantage and fail / non-fail. Fig. 1 shows the four types of firms and the associated probability:

1) *Tape A (Stars):* firms with competitive advantages showing good performance;
2) *Type D (dogs):* firms with competitive disadvantage showing poor performance;
3) *Type N (Lucky ones):* firms with competitive disadvantage but showing good performance;
4) *Type C (Falling Angels):* firms with competitive advantage showing poor performance.

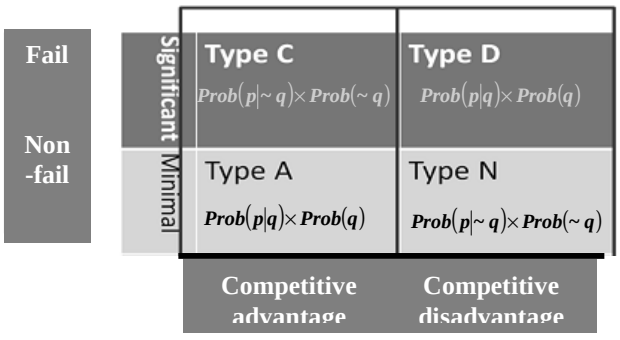

Fig. 1 The four-quadrant types of firms

B. Resource configuration of banking sector

Causal ambiguity, which refers to the knowledge-based impediments to competitors' imitation, plays an important role in strategic management thinking. Strategic researchers suggest that company resources can generate causal ambiguity in sustainable competitive advantages, which exploit information asymmetry and raise barriers to imitation, and thus yield superior performance [7], [40]–[44] The resource configuration framework based on tangible information attempt to uncover the causal ambiguity between competitive advantage and performance. Information constitutes those significant regularities residing in the data that receivers attempt to extract from. The act of extracting involves an assignment of the data to existing categories according to some set of pre-established schemas or constructs that shape expectations of the receivers [45].

These a priori expectations will be in turn modified subsequently by the arrival of information [46]. Data is the originating in discernible differences between at least two physical states [45] such as higher or lower stock price, new or old formula, and various levels of product sales. Data is the resource as well as the constraining affordance to transform it into information. Data can be the financial variables or survey results generated by the focal firm. However, not every data is meaningful unless the informees (the individual, the organization, the firm, etc.) obtain the data and comprehend it [47]. Although a bountiful supply of data are available to the public, only those in possession of the "key position" can epistemically extract from it [48]. This cryptographic nature of the data limits the ability of individuals or firms in transforming (receiving, storing, retrieving, transmitting) the data into information [49].

Financial statements systematically record firm's daily activities and operations which notoriously leave a trail of derivative information for outsiders. Financial ratios are basic data revealing the corresponding firm's dynamic strategies in response to the external environment [50]–[52]. However, the undaunted great number of financial indicators and ratios are chaotic to use. Financial managers usually compare ratios with those of benchmarks to examine the strength and weakness of the firm. Usually, some of the ratios reveal superior while other inferior to the benchmarks. We can identify appropriate financial ratios as the basic "generic codes" to explain the inheritance of resource heterogeneities across firms.

Variety of financial ratios captures different signaling of resource allocation and capabilities of the firm. In previous studies, the financial ratios selected or the number of categories assigned varies depending on the research purpose. For any given purpose, only few financial ratios are useful provided that many others are redundant [53]. The commonly used du Pont identity of the return on invested capital (ROIC) focus on profit margin (measuring the competitive advantage from differentiation or lower cost) and asset turnovers (measuring managing capability on assets) does not apply to the banking sector, of which financial items are differ from other industries. This paper uses CAMEL, a ratio-based model for evaluating the performance of banks, to extract the feature of competitive disadvantage in the banking sector. The acronym "CAMEL" refers to the five components of a bank's condition that are assessed: Capital adequacy, Asset quality, Management, Earnings, and Liquidity. Appendix 1 lists various ratios forming this model while Fig. 2 draws the resource configuration composed by CAMEL.

$$ROA = AU - ER - Tax = \frac{\mathrm{Re}v - Exp - Tax}{TA}$$

$$ROE = ROA \times \frac{TA}{E} = \frac{\mathrm{Re}v - Exp - Tax}{TA} \times \frac{TA}{E} = \frac{\mathrm{Re}v - Exp - Tax}{E}$$

TA: total assets; E: owners' equity; Equity multiplier (EM) = TA / E

IV. Future Research

Fig. 1 and Fig. 2 provide a conceptual framework for empirical study. Since all indicators in included in the CAMEL can be found on financial statements, it provides a good opportunity to examine the underlying factors that lead to the competitive advantage and competitive disadvantage over time.

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APPENDIX

Indicators measuring CAMEL

Capital Adequacy

Equity capital = Equity Capital / Average Assets
(primary measurement for judging capital strength)
Tier 1 leverage ratio (T1LR) = Tier 1 Capital / Total Tangible Assets (= Total Assets less Goodwill and Intangibles) (≧ 5% for "well capitalized")
Tier 1 risk-based capital ratio (T1RBCR) = Tier 1 Capital / Total Risk-adjusted Assets (≧ 6% for "well capitalized")
Tier 1 risk-based capital ratio (T2RBCR) = Tier 2 Capital / Total Risk-adjusted Assets (≧ 8% for "well capitalized")
Tax ratio = Delinquent Loans + Non-performing Assets / Capital + Loan Loss Reserves
(If the ratio is 100% or higher then the bank may be in imminent danger of failing. If the ratio is between 50% and 100% then a capital infusion is necessary. The ratio is a quick way to determine the bank's ability to absorb losses.)

Assets Quality

LLRTL = Loan Loss Reserves / Total Loans
(minimum 1.0% but it is not sure if it is adequate unless it is compared to Provisions/Total loans: percentage of provisions from fiscal income statement as a percentage of the portfolio)
Coverage ratio = Loan Loss Reserves / Non-Performing or Non-current Loans and leases (≧ 1.5x) (non-performing or non-current loans are 90 days or more overdue)
Overdue Loans to Total Loan Ratio (OLTL) = Total Loans 30-89 Days Past Due / Total Loans
90-Day Overdue Loans to Total Loans Ratio (90DOLL) = Total Loans 90-Days Past Due / Total Loans

Management Quality

MVTC = market value to equity / capital
ATD = total advance / total deposit
Business per employee (BPE) = Total income / number of employees
Profits per employee (PPE) = net profits after tax / number of employees

Earnings Quality

Net Interest Margin (NIM) = NII (annualized) / Average Interest Earning Assets
Return on Average Assets (ROAA) = Net operating income (annualized) after taxes (including realized gain or loss on investment securities) / Total Average Assets (assets at the previous fiscal year plus assets at this current fiscal year divided by 2)
(0.60% ROAE 2.0% for U.S. Banks. Historically in the U.S. the benchmark was 1.0% or better for the bank to be considered to be doing well. De novo banks are usually below the 1.0% benchmark.)
Return on Average Equity (ROAE) = Net operating income after taxes (including realized gain or loss on investment securities) / Total (average) equity (common stock)
(In the long run, a return of around 15% to 17% is regarded as necessary to provide a proper dividend to shareholders and maintain necessary capital strengths.
Return on Earning Assets (ROEA) = Revenue from loans, securities, cash equivalents and earning assets (including non-interest) before interest expense / Earning Assets
(Measures the results of operations prior to funding costs and as if the operations were totally funded by equity.)
Operating Profit Margin = Operating profits (before the loan loss provision and excluding gains or losses from asset sales and amortization expense of intangibles) / Net operating revenues (interest income less interest expense plus noninterest income) (the higher the margin, the more efficient the bank)
Non-interest Income to Average Assets Ratio (NIIAAR)= Non-Interest Income (annualized) / Total Average Assets
(Non-interest income is income derived from fee-based banking services such as service charges on deposit accounts, consulting and advisory fees, rental of safe deposit boxes and other fee income, fiduciary, brokerage and insurance activities.)
Average Collection of Interest (ACI) (Days) = Accrued Interest Receivable / Interest Income × 365
Overhead Ratio = Total Non-Interest Expenses (annualized) / Total Average Assets
Efficiency Ratio = Total Non-interest expenses / Total Net Interest Income (before provisions) plus Total Non-Interest Income
(measuring the productivity of the bank; "efficient"- ≦40%, i.e., ; "expensive to operate"- ≦ 75%)

Source of efficiency
Personnel expenses / TA; Total expenses / TA; Burden / TA
(Burden = non-II – non-IE – PLL; NI = NII – Burden)
Productivity measures
EFF; Personnel expenses / Employee; Assets / Employee
Determinants of IE
Volume effects: interest paying liabilities / TA
Interest paid on interest earning liabilities:
Rate effect: level of interest paid on liabilities of a given type (trend analysis)
Composition/Mix effects: types of interest bearing liabilities

Net interest margin (NIM) and spread

$$NIM = \frac{NII}{average\ Earning\ Assets}$$

$$Spread = \frac{II}{average\ Earning\ Assets} - \frac{IE}{average\ Earning\ Assets}$$

Liquidity

Loans as a Percentage of Deposits (LD) = Loans (gross) / Total Deposits
(Maximum 80% to 90% (the higher the ratio the more the institution is relying on borrowed funds; Between 70% to 80% indicates that the bank still has capacity to write new loans.)
Liquid Assets to Total Deposits (LATD) = Liquid Assets / Total Deposits
(Measures deposits matched to investments and whether they could be converted quickly to cover redemptions)

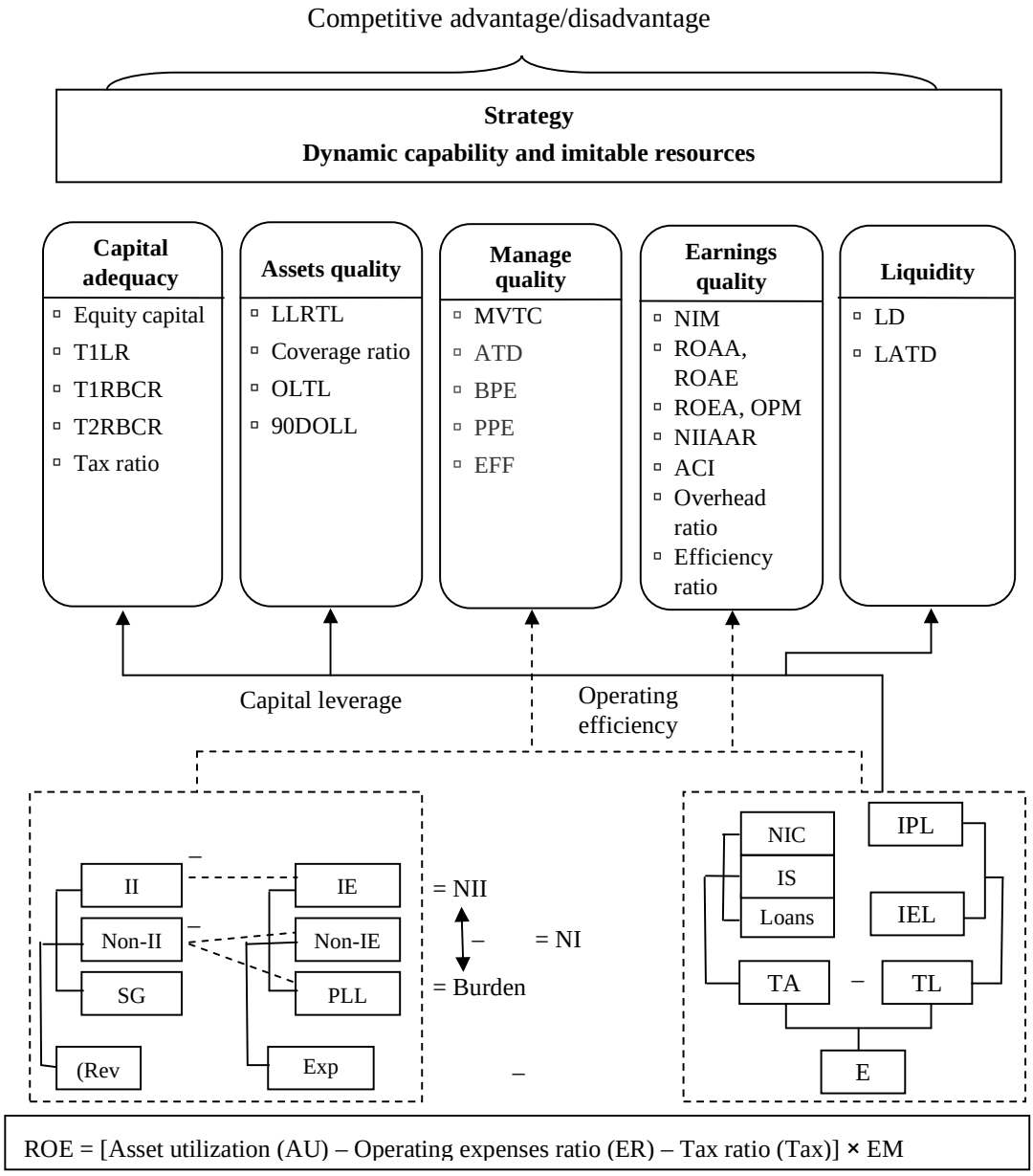

Fig. 2 Financial performance and resource configuration of banks

[a]Indicators in each dimension are suggested by Credinrisk.com (2012) except that indicators in Management are suggested by Ganeriwal and Modi (2012).
[b]**Revenue related items**: Rev: total revenues; II: interest income; Non-II: non-interest income; SG: securities gains or loss; ; NII: net interest income; NI: net income; NIM: net interest margin; ROE: return on equity;
[c]**Expense related items**: Exp: total expenses; IE: interest expenses; Non-IE: non-interest expenses; PLL: provisions of loan losses;
[d]**Assets related items**: TA: total assets; A: average assets; IS: invested securities; NIC: non-interest cash & due from banks; EA: average earning assets; TL: total liabilities; PL: average paying liabilities; IPL: interest paying liabilities; IEL: interest earning liabilities.
[e]Revenues (Rev) = interest income (II) + non-interest income (non-II) + security gains (SG); Expenses = interest expenses (IE) + non-interest expenses (non-IE) + provisions for loan loss (PLL); $AU = \frac{\text{Rev}}{TA} = \frac{II}{TA} + \frac{Non-II}{TA} + \frac{SG}{TA}$; $ER = \frac{E}{TA} = \frac{IE}{TA} + \frac{Non-IE}{TA} + \frac{PLL}{TA}$; Net interest income (NII)= II – IE; Burden = Non-II – Non-IE - PLL

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