A Study of Performance of State-Owned Banks of Sikkim

A Thesis Submitted

To

Sikkim University

In Partial Fulfilment of the Requirement for the

Degree of Doctor of Philosophy

By

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DECLARATION

I declare that the thesis entitled **"A Study of Performance of State-Owned Banks of Sikkim"** submitted to **Sikkim University** in partial fulfillment of the requirement for the degree of **Doctor of Philosophy** is my original work. This thesis has not been submitted for any degree of this University or any other University

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All the assistance and help received during the course of the investigation have been duly acknowledged by him.

I recommend this thesis to be placed before the examiners for evaluation.

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LIST OF ABBREVIATIONS

CAGR	Compound Annual Growth Rate
CAMEL	Capital Adequacy, Assets Quality, Management Efficiency, Earning Quality, Liquidity Performance
CRAR	Capital to Risk weighted Assets Ratio
CRS	Constant Return to Scale
DEA	Data Envelopment Analysis
DMU	Descision Making Unit
EFFCH	Efficiency Change
EPS	Earnings per Share
MI	Malmquist Index
NIM	Net Interest Margin
NPA	Net Performing Assets
PSB	Public Sector Bank
PTE	Pure Technical Efficiency
RBI	Reserve Bank of India
ROA	Return on Assets
SBS	State Bank of Sikkim
SD	Standard Deviation
SE	Scale Efficiency
SISCO	Sikkim State Cooperate Bank Ltd.
TCC	Technological Change
TEC	Technical Efficiency Change
TFPC	Total Factor Productivity Change
VRS	Variable Return to Scale

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Chandra Bahadur Chhetri

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CONTENTS

CHAPTER 1

An Introduction to Analysis of Performance of the Banks

1.1 Introduction

The bank plays a crucial role in the economic growth and development of a nation, and it certainly is an indispensable institution in today's contemporary society (Tahir et al., 2009). It acts as a critical indicator of the economic health of a country. Besides providing banking services, banks have now emerged as the institutions extending social services and helping people in their economic prosperity and safety through services like wealth management, investments, insurance. Banks are now reaching rural areas evermore and improving the financial inclusion of rural India. India's banking system comprises commercial banks and cooperatives banks, and commercial banks account for approximately 95 percent of the total assets of the Indian Banking industry. Indian banking system saw a metaphorical change after the liberalisation and banking sector reforms undertaken by the Government of India during the nineties based on the recommendations of the Narasimham Committee (Jayaraman & Srinivasan, 2014). Due to intensified competition after reforms, the share of the Public Sector Banks in deposits, advances, and total assets of the Indian banking industry has been gradually declining (Kumar & Gulati, 2008). Only banks with sound financial health, profitability and productivity would survive and maintain their market share in such a dynamic and competitive banking market environment; inefficient ones will eventually cease to remain in the market.

With the kind of competitive market and dynamic environment the banks operate in, analysis of their performance has always been a subject for study by researchers and professionals. Unlike the rest of the world, Sikkim is very new to formal banking services without a proper bank until 1968. Sikkim now has two-state owned banks, namely State Bank of Sikkim and Sikkim Cooperative Bank Ltd. Sikkim started to witness the entry of almost all leading commercial banks post 2000, giving fierce competition to the state-owned banks of Sikkim under study. Unless these state-owned banks remain competitive and efficient shall, in time, be eliminated from the banking market. This study thus attempts to assess the financial health, efficiency, and productivity of these state-owned banks to help them realise their relative weaknesses and strengths.

The first customary institution identical to what we now call a Bank was established in Venice nearly seven hundred years ago (Hildreth, 1972). The origination of the bank of Venice was not for doing banking business. The country was engaged in a war and fell short of funds, so it resorted to a forced loan that carried a four percent fixed annual interest. To look after this business of borrowings and ensure timely interest payment to the lenders, the Government established a Chamber of Loans. The chamber gradually engaged in other banking activities like purchasing and selling bills of exchange, investment of unutilised funds, and business of deposits. Until the emergence of two institutions resembling the Bank of Venice in Genoa and Barcelona, the Bank of Venice remained without competitors. The list of the banks that sprung after establishing the Bank of England was interminable (Cook, 1963).

Numerous shreds of evidence of banks being present in India, in various forms, from the Vedic times. However, the first modern bank established in India was the Bank of Hindustan in 1770. From setting up the first modern bank to institutionalising the Central Bank, nationalising banks, and implementing reforms recommended by various committees, India as a nation has come a long way. Banks have played a crucial role in the economic development of India by providing finances required by her industries from sectors like agriculture, textile, construction, manufacturing, and services. With the entry of foreign banks after liberalisation, Indian banks had to change their structure, organisation, and functioning significantly. The Indian banking system now comprises Public Sector Banks, Cooperative Banks, Private Banks, Foreign Banks, and New Generation Banks.

Sikkim, the erstwhile kingdom, was without a traditional bank, except for the State Bank of India (1966), which had a limited jurisdiction of working as a treasury to the Government of India, till it established one in the year 1968 (Government of Sikkim, 2013). Till the establishment of the State Bank of Sikkim in 1968, a private firm, namely M/s Jetmull&Bhojraj, catered to the banking need of the erstwhile kingdom (Government of Sikkim, 2013). As of 31.03.2020, thirty-two banks representing Public Sector banks, Private Banks, Cooperative banks, and foreign banks are operating in the state of Sikkim.

Apart from introducing the topic of the study, this chapter discusses the world history of banks, the history of banking in India, the history of the Reserve Bank of India, and the banking history of Sikkim. This chapter also briefly discusses the research method followed in the study. The chapter lays a foundation for chapters to follow in this study.

1.2 Origin of word ‘Bank.’

The belief that the word ‘bank’ has originated from Banca, an Italian word meaning a table, is widespread. Another common idea is that the word ‘bank’ originated from the German word banc, which means bench or a counter. In those days, banking transactions were transacted through a desk or exchange counter laid at the marketplace.

1.2.1 Meaning of Banking

Banking Regulation Act, 1949 in its Section 6 defines banking as a service of accepting deposits of money from the public, repayable on demand or otherwise, and withdrawal by cheque, draft, order, or otherwise, for lending or investment.

Section 7 of the Act states that no company other than a banking company shall use as part of its name any of the words "bank," "banker," or "banking." It further says that no company shall carry on the business of banking in India unless it uses at least one of such words as part of its name. The state-owned banks of Sikkim considered for the study fall well within the meaning of the bank as per the Banking Regulation Act, 1949.

1.3 World History of Banks

There is a belief that many favoured temples for the safekeeping of wealth during ancient times as they were built well and considered sacred and regularly attended by the people, thus discouraging thieves (Gajdhane, 2012). Several shreds of evidence are available of loans being granted to the merchants by the priests of the temples from the 18th century B.C.

The first standard institution identical to what is now being called a Bank was established nearly seven hundred years ago in Venice (Hildreth, 1972). The origin of the Bank of Venice was not for carrying out any banking activities. The country was engaged in a war and severely fell short of funds, compelling it to resort to a forced loan. An annual interest of four percent was payable to the loan contributors on the sum obliged to lend. The state assigned certain branches of its revenue for the payment of interest as and when it fell due. A Chamber of Loans was later formed to look after this business of borrowings, managing those branches of revenue and ensuring timely payment of interest to the lenders. Before the Chamber of Loans was formed, there was no record of the existence of a bank; in a sense, we understand the word them now. In its business, the chamber occasionally engaged in the purchase and sale of bills of exchange. With its assured income and highly respectable image, it successfully had its name upon a bill that added its value in the market. The chamber soon realised it beneficial to invest their unutilised funds to buy and sell exchange and lend money upon mercantile paper, which later became a regular branch of its business.

Though the deposits started with the state's decree, soon, the Venetian merchants got habituated to place their money with the chamber as it was safe and generating interest, resulting in the introduction of another important branch of deposit business. The money deposited in the chamber was as good as holding cash, and soon the practice of making payments through the transfer of credit in bank from payer's account to receiver's account spread across the country. The payment method by the credit transfer brought great relief to the Venetian Merchants from the trouble of counting large sums of coins and transporting them from one place to another. The advantages this method offered to the merchants were enormous. Later considering its benefits, the Government enforced it through a law that bound all the merchants to compulsorily open an account and make payments through the transfer of such credit in their bank account. Payment through the transfer of credit became an initial step towards another important branch business of banknotes. The Bank of Venice, till the beginning of the 15th century, was without a competitor. Then the world witnessed the emergence of two institutions resembling the Bank of Venice in Genoa and Barcelona.

Another bank that deserves generous mention in the world history of the banks is the Bank of England. The Bank of England chartered in 1694 can be considered the prototype of our modern banks. The bank started with a capital of 12,00,000 sterling lent the entire money to the Government against a guaranteed interest of eight percent with an additional annuity of 4000 sterling to the subscribers (Hildreth, 1972). Such lending terms depict the low credit carried by the Government during those days. The bank chartered to carry out the banking business lent its entire capital to the Government, leaving no money to start its operations which led to the introduction of the banknotes. The convenience of banknotes spread all over the kingdom in no time and led to improved capital and credit of the bank.

With a condition of a new loan to them, the Government continued to renew the bank's charter from time to time. With the gradual improvement in the image of the Government, the stiff conditions imposed were considerably relaxed. High interest became moderate, and lending by the subscribers to the Government started even without the interest. The Bank of England engaged itself in four kinds of activities; first, the bank managed the public debt and paid interest as it fell due from the fund provided by the Government. Secondly, it lent money to the Government against the interest payable from the taxes collected in the future. The third was circulating and discounting exchequer bills that bore interest but were payable at the Government's bliss. The fourth activity they engaged with was to assist the merchants through discounts of bills of exchange. The list of the banks that sprung after establishing the Bank of England was interminable (Cook, 1963). Michael Collins, in his book, records the number of banks and banking offices in the United Kingdom, and the same is in table 1.1 (Collins, 2014).

Table 1.1
Number of banks and banking offices in Britain between 1850-1913

Year	**England & Wales**				**Scotland**		**Ireland**		**UK**	
	Private banks		**Joint Stock banks**							
	Banks	**Offices**	**Banks**	**Offices**	**Banks**	**Offices**	**Banks**	**Offices**	**Banks**	**Offices**
1850	327	518	99	576	17	407	16	184	459	1685
1875	236	595	122	1364	11	921	12	440	381	3320
1900	81	358	83	4212	10	1085	10	614	184	6269
1913	29	147	41	6426	8	1248	10	789	88	8610

Source: Collins, M. (2014)

1.4 History of Banking in India

1.4.1 Ancient India

The practise of lending money at unfairly higher rates known as usury finds mentioned in the Vedas. The word usury finds generous mention in the Sutras (700–100 BCE) and the Jatakas (600–400 BCE). We find that the texts from this period generally condemn the practice of usury. The Manusmriti considers usury an acceptable way of earning wealth and livelihood; however, lending money beyond regular rates and charging different rates is a severe sin (Jain, 1929).

An instrument, namely Adhesa, found to be in use during the Mauryan period (321–185 BCE), was an order to a banker to pay the sum to a third person, which is identical to what we now call a bill of exchange (Gajdhane, 2012). The practise of issuing letters of credit among the Merchants also finds reference in the texts of this period.

1.4.2 Medieval era

The use of loan deeds with various names continued into the Mughal era and started to be called dastawez (Jain, 1929). Records suggest the presence of two types of loans deeds, i.e., the dastawez-e-indultalab and dastawez-e-miadi. Dastawez-e-indultalabwas paid on demand, whereas dastawez-e-miadi was payable after a predetermined time. Royal treasuries using payment orders, called barattes, have also been documented. During this era, records reveal the usage of bills of exchange by Indian bankers. Hundis, which is still in use, is a credit instrument that evolved during this period (Panandikar, 1937).

1.4.3 Colonial era

This era witnessed the presence of more than 600 banks, of which the first was the Bank of Hindustan. The Bank of Hindustan is considered the first modern bank established in colonial India. The Bank of Hindustan, based by the agency house of Alexander and

Company in the year 1770, existed till 1832 (Dadabhoy, 2015). At around 1785, two more banks, namely the Bengal Bank and the General Bank of India, were chartered by the East India Company. The Bengal Bank failed mainly due to the panic of war with Tipu Sultan in 1791. The General Bank of India voluntarily liquidated in 1793, as it could not earn profit. Need for the credit institutions was felt after closing the agency houses during the period of crisis of 1829-32. The banks started after the agency houses to cater to civil and military services' banking needs and closed down are presented in table 1.2.

Table 1.2
List of the banks started for civil and military services post-crisis of 1829-32

Name of the Bank	Opened	Closed	Head Office
The Agra and United Services Bank	1833	1900	Agra
The Government Savings Banks	1833	-	Calcutta
The Bank of Mirzapur	1835	1837	Mirzapur
North-Western Bank of India	1840	1859	Mussoorie
The Agra Savings Bank	1842	-	Agra
Delhi Banking Corporation, Ltd.	1844	-	-
The Simla Bank, ltd.	1844	-	Simla
The Benares Bank	1844-45	1849	Benares
The Cawnpore Bank	1845	1851	Cawnpore
The Commercial Bank of India	1845	-	Bombay
Uncovenanted Service Bank, ltd.	1846	1891	Agra
Dacca Bank	1846	1862	-

Source: Jain, L. C. (1929)

Foreign banks started to enter India from 1860 onwards. ComptoirEscompte de Paris opened their first branch in 1860 in Calcutta and another chapter in Bombay in1862 (Muirhead& Green, 2016). Their branches were also later opened in Pondicherry and Madras. Grind lays bank also opened its first branch in Calcutta in 1864. HSBC started operating in Bengal in 1869. During this period, Calcutta was the banking centre due to the increasing trade of the British Empire through Calcutta port, which was then the most active trading port in India.

From 1906 to 1911, several banks enthused by the Swadeshi Movement were founded for the Indian community by Indian businessmen and political figures (Gajdhane, 2012). Banks established during that period and have still managed to survive listed hereunder.

Bank of India (1906)

Corporation Bank (1906)

Canara Bank (1906)

Indian Bank (1907)

Bank of Baroda (1908)

The South Indian Bank (1908)

Central Bank of India (1911)

Catholic Syrian Bank (1920)

Dakshina Kannada and Udupi districts were previously one district known as South Canara (South Kanara), which witnessed the establishment of many private banks inspired by the Swadeshi movement. A leading private bank and four nationalised banks were started in this district, giving undivided Dakshina Kannada district a "Cradle of Indian Banking" title.

The First World War (1914–1918) and the Second World War (1939–1945) were testing times for Indian banking. The First World War alone led to around 94 banks in India's failure, and its details are in table 1.3.

Table 1.3
No. of banks failed during First World War

Years	Number of failed banks	Authorized Capital (Rs.)	Paid-up Capital (Rs.)
1913	12	27400000	3500000
1914	42	71000000	10900000
1915	11	5600000	500000
1916	13	23100000	400000
1917	9	7600000	2500000
1918	7	20900000	100000

Source: Reserve Bank of India (2008)

Though this era saw the domination of banking in India by the Presidency Banks and Exchange Banks, some Indian joint-stock banks also existed. Owned mainly by the Europeans, the exchange banks remained focused on financing foreign trades. Indian joint-stock banks lacked the professional experience and were also immensely undercapitalised, which surfaced as a big hurdle for them to compete with the presidency and exchange banks.

1.4.4 Post-Independence

Bank branches had reached 3469 by 1946, and deposits increased to a whopping sum of ₹962 crores. However, the partition of India in 1947 had a severe impact on the banking activities leading to a negative effect on the economies, mainly of two states, i.e., Punjab and West Bengal. The regime of leniency in the governance of banking by the Government came to an end with India's independence. Post-independence, the Government of India initiated several measures to improvise the nation's economy, which resulted in the adoption of the Industrial Policy Resolution in the year 1948. Free India chose to be a mixed economy, resulting in more extensive government participation in banking and finance. Some of the significant early steps taken by the state to regulate banking include the following.

1. India’s central banking authority, the Reserve Bank of India, established in 1935, was nationalised on January 1, 1949, enacting the Reserve Bank of India (Transfer to Public Ownership) Act, 1948 (Gauba, 2012).
2. The Banking Regulation Act enacted in 1949 empowered the Reserve Bank of India (RBI) to regulate, control, and inspect the banks in India (Kaptan&Choubey, 2003).
3. With the enactment of the Banking Regulation Act, 1949, no two banks could have joint directors, and opening a new bank or branch of an existing bank was possible without getting a license from the RBI.

1.4.4.1 First nationalisation in 1969

The country’s banking industry had developed as an essential instrument for developing the nation’s economy by the 1960s, and it had arisen as one of the country’s largest employers. Leaving the State Bank of India, all other banks were owned and operated by private individuals before the nationalisation regardless of the control and regulations levied by the Reserve Bank of India. As the banking industry played a significant role in developing the nation’s economy, debates on the nationalisation of the banks got ignited. Indira Gandhi, the then Prime Minister of India, expressed her Government’s intention through a paper entitled *Stray thoughts on Bank Nationalization* towards nationalisation of the Indian banks in the annual conference of the All India Congress.

Issuing the Banking Companies (Acquisition and Transfer of Undertakings) Ordinance, 1969, the Government of India nationalised 14 commercial banks, which controlled almost 85 percent of the country’s bank deposits from midnight of July 19, 1969 (Muraleedharan, 2014). Before completing the two weeks from the date of issue of the ordinance, the Government brought the Banking Companies (Acquisition and Transfer of Undertaking) Bill in Parliament. The same received the assent of the President on August 9, 1969.

The names of the banks nationalised through the Banking Companies (Acquisition and Transfer of Undertaking) Bill in the Parliament are as under:

1. Allahabad Bank
2. Bank of Baroda
3. Bank of India
4. Bank of Maharashtra
5. Central Bank of India
6. Canara Bank
7. Dena Bank
8. Indian Bank
9. Indian Overseas Bank
10. Punjab National Bank
11. Syndicate Bank
12. UCO Bank
13. Union Bank of India
14. United Bank of India

1.4.4.2 Second nationalisation in 1980

The Government announced the second phase of nationalisation in 1980 to ensure better control over credit delivery. The Government nationalised six commercial banks in the second phase of nationalisation (Gauba, 2012). The second round of nationalisation increased the Government's control over the country's banking business to more than 90% (Sharma, 2007).

The second round of nationalisation brought the following six banks under the control of the Government.

1. Punjab and Sind Bank
2. Vijaya Bank
3. Oriental Bank of India
4. Corporation Bank
5. Andhra Bank
6. New Bank of India

The Government, later in the year 1993, merged the New Bank of India with the Punjab National Bank reducing the total number of nationalised banks to nineteen.

1.4.4.3 Liberalisation in the 1990s

Liberalisation policy adopted by the then Government in power led to licensing by the RBI to a small number of private banks. These banks were regarded as the *New Generation tech-savvy banks*, including the Global Trust Bank, which later amalgamated with the Oriental Bank of Commerce. Other private banks to obtain licenses were IndusInd Bank, UTI Bank, ICICI Bank, and HDFC bank. Liberalisation helped revitalise India's banking sector, which recorded rapid growth with contributions from all three banking sectors, i.e., public sector, private, and foreign banks.

The Narsimham Committee Report (December 1991) served as a basis for bringing liberalisation to the Indian banking sector (Muraleedharan, 2014). Based on the committee's recommendations, the reforms undertaken in the wake of liberalisation covered various aspects of banking such as deregulation of interest, abolition of directed credit rules, and deregulation of entry of foreign banks. The committee under Mr M. Narasimham, the 13th governor of the Reserve Bank of India, was set up in 1991. From the lists of the recommendations, only a few of the reforms recommended by the committee received the acceptance of the Government, leading to setting up the second committee once again under Mr M Narasimhamagain in 1998.

1.4.4.4 Amalgamations of Public Sector Banks between 2000-20

With the idea of making four to five global-sized banks, the Government of India has been planning for mergers of banks. The unions executed from 2000 to 2020 by the Government of India may be seen below.

1. **State Bank of India**

Two associate banks, namely State Bank of Saurashtra and State Bank of Indore, were merged with the State Bank of India in 2008 and 2009, respectively. The merger continued, and five reaming associate banks of the State Bank of India and the Bharatiya Mahila Bank were merged with the State Bank of India on April 1, 2017. The five associate banks to merge with the State Bank of India on April 1, 2017, are as follows.

1. State Bank of Bikaner and Jaipur
2. Stat Bank of Hyderabad
3. State Bank of Mysore
4. State Bank of Travancore
5. State Bank of Patiala

2. **Bank of Baroda**

On September 17, 2018, the Government of India proposed the amalgamation of Dena Bank and Vijaya Bank with the Bank of Baroda, which was approved on January 2, 2019, by the boards of the respective banks and the Union Cabinet. The merger was made effective from April 1, 2019. As per the approved share exchange ratio, the Bank of Baroda issued 402 shares of face value Rs. 2 each for every 1000 shares of Rs. 10

each to Vijaya Bank and 110 shares of Rs. 2 each for every 1000 shares of Rs. 10 each to Dena Bank.

3. **Punjab National Bank**

On March 4, 2020, the Union Cabinet approved the merger of the Oriental Bank of Commerce and the United Bank of India with the Punjab National Bank. The coalition made the Punjab National Bank the second largest Public Sector Bank in the country, with its total assets of Rs. 17.95 lakh crore (US$250 billion) and 11,437 branches. The merger got effective on April 1, 2020. As per terms of the union, the shareholders of the Oriental Bank of Commerce and the United Bank of India received 1,150 shares and 121 shares of Punjab National Bank, respectively, for every 1,000 shares they held by them.

4. **Canara Bank**

With the approval of the Union Cabinet on March 4, 2020, the Canara Bank subsumed the Syndicate Bank w.e.f. 1.04.2020. After taking control over Syndicate Bank, the Canara Bank turned to the fourth-largest Public Sector Bank of the country. The shareholders of the Syndicate Bank received 158 equity shares in Canara Bank as against 1,000 shares they held by them in the Syndicate Bank.

5. **Union Bank of India**

The Union Cabinet also approved the merger of Andhra Bank and Corporation Bank with the Union Bank of India on March 4, 2020, which made the Union Bank of India the fifth largest Public Sector Bank of the country. The merger of Andhra Bank and Corporation Bank with Union Bank of India was also effective from April 1, 2020. Based on the agreed equity Share Exchange Ratio, shareholders of the Andhra Bank received 325 equity shares of Rs.10 each in the Union Bank for every 1,000 equity shares of Rs.10 each held by them. Shareholders received 330 equity shares of Rs.10

each in Union Bank of India for every 1,000 equity shares of Rs.2 each held by them in the Corporation Bank.

6. Indian Bank

With the Union Cabinet's approval of the merger on March 4, 2020, Indian Bank subsumed Allahabad Bank on April 1, 2020. The said merger made the Indian Bank the sixth-largest Public Sector Bank of the country. Shareholders were issued 115 equity shares of Rs 10 each of Indian Bank against every 1,000 shares of Rs 10 each held by them in the Allahabad Bank.

1.5 History of Reserve Bank of India

The Reserve Bank of India is the central bank of the country. The concept of Central banks is relatively new, and most banks of the countries were founded in the early twentieth century.

The recommendations of the Hilton Young Commission in 1926 served as the basis for setting up the Reserve Bank of India. The Reserve Bank of India began its operations on April 1, 1935. It was guided by the Reserve Bank of India Act, 1934 (II of 1934) in terms of the statutory basis of their functioning (Goyal & Joshi, 2012). The initial purpose of the constitution of the Reserve Bank was to regulate the issue of banknotes, ensure maintenance of reserves to obtain monetary steadiness, and manage the credit and money system of the country to its advantage. The bank started its operations by taking over management of the Government accounts and public debt, previously performed by the Controller of Currency and the Imperial Bank of India. The Reserve Bank of India was established with an authorised capital of Rupees Five crores only with a limited Government share of Rupees twenty to twenty-two lakhs.

The Reserve Bank of India remained as the Central Bank for Burma (Mynamar), even after Burma's separation from the Indian Union in 1937, till the Japanese occupation of Burma during 1942-1945 and later up to April 1947. Even after the partition of Pakistan from India, till the State Bank of Pakistan commenced its operations in Pakistan in June 1948, the Reserve bank of India continued to serve as the central bank of Pakistan. Initially set up as a shareholder's bank, the Reserve Bank of India was nationalised later in 1949, following India's independence on August 15, 1947.

The Reserve Bank of India was unique in developing the nation from its inception. The Reserve Bank of India gained much importance after the five-year development plans were rolled out by the Government of India, especially during the sixties when it established the usage of finance to accelerate and fulfil the country's developmental objectives. Reserve Bank of India proved to be instrumental in the development of several important institutions like the Unit Trust of India, Deposit Insurance and Credit Guarantee Corporation of India, the Discount and Finance House of India, the Industrial Development Bank of India, and the National Bank of Agriculture and Rural Development.

With the adoption of liberalisation policy by the Government of India in 1991, the role of the Reserve Bank of India was once again shifted to its core central banking activities, which included banks' supervision and regulation, monetary policy, overseeing the payments system, and development of the financial markets.

1.6 Narsimham Committee &Banking Sector Reforms in India

We briefly discussed the Narsimham committee report while discussing the Liberalisation previously in this chapter. The report submitted by this committee in November 1991 served as the basis for reforms brought by the then Government of India in the banking sector (Gauba, 2012). Under the chairmanship of former Governor of Reserve Bank of India, Mr M. Narshimam, the committee was set up to study the problems prevalent in the Indian financial system and put forth suggestions for enhancing the competence and productivity of the Indian financial establishments. Among several pertinent issues confronted by the banking sector, which the committee highlighted in its report, were the requirement to maintain high liquid assets by the banks, directed credit program to suit the Government's policy, government-controlled interest rate, interest subsidy.

Though the Narasimham Committee Report-I contained several recommendations on reforms, only a few got the acceptance of the Government of India. Listed below are the significant recommendations of the committee.

1. Reduction in the Statutory Liquidity Ratio and Cash Reserve Ratio

The committee recommended a reduction in the rate of Statutory Liquidity Ratio (SLR) and the Cash Reserve Ratio, which were as high as 38.5% and 15%, respectively.

2. Abolition of Directed Credit Programme

The committee recommended abolishing the directed credit program imposed by the Government, reducing the banks' profitability.

3. Deregulated Interest Rate

The committee recommended market-regulated interest rates rather than those controlled by the authorities.

4. Reorganisations of the structure of the Indian Banking sector

The committee recommended significant structural changes in the Indian Banking sector. It also recommended a reduction in the numbers of public sector banks and liberal entry of foreign and private banks.

5. Assets Reconstruction Fund (ARF) Tribunal

Considering the alarming proportion of bad debts and Non-performing assets (NPA) of the public sector banks, the committee recommended the establishment of an Asset Reconstruction Fund (ARF).

6. Removal of Dual control

The committee recommended a single authority for controlling banks. The committee recommended the withdrawal of the Banking Division of the Ministry of Finance, Government of India, over India's banks' affairs.

7. Banking Autonomy

The committee recommended free and autonomous public sector banks to achieve competitiveness and efficiency.

In 1998, the Government again appointed Mr Narshimam as the chairman of another committee popularly known as the Banking Sector Committee. The purpose of this committee was to review the banking reform progress and suggest steps for further strengthening the Indian financial system. The committee's report, submitted in April 1998 to the Government of India, focused more on capital adequacy, bank merger, and legislation.

1.7 History of Banking in Sikkim

Sikkim was already solidified as a country in 1642 with its first ruler ChogyalPhuntsog Namgyal while neighbouring countries like India and Nepal were still divided into many princely states (Joshi, 2004). The common belief is that the society of Sikkim was initially a semi-nomadic type which later progressed to the feudal economy during Chogyal's reign. In the early 18th century, Sikkim came under British suzerainty due to the latter's interest to establish a trade route to Tibet (Jha, 1985). Sikkim's economy experienced significant progression only after installing British control, precisely after 1889 with Claude White's appointment as first Political Officer.

Sikkim, which now has almost all leading commercial banks, has a short banking history. Sikkim's economy entirely relied on agriculture during this period (Arha & Singh, 2008). The barter system was profusely in practice among its people for trade

(Bhattacharyya, 1984). Money revenue was not in existence before the entry of the British. The kingdom of Sikkim accepted the coins minted by Nepal for some time for trade and commerce with the permission of the British officials in 1849 AD (Shrestha, 2015). Later, with the British Government's consent, Sikkim also started to mint its copper coins engaging Newar Tradesman Lachimidas Pradhan (Kasaju) from 1882 (Shrestha, 2015). The coins minted in Sikkim were Dooba Paisa and Chepte Paisa (Bhattacharyya, 1984). The minting of coins was abolished in 1887 on its disapproval by the Nepal Government for its less weight (Debnath, 2009).

The first bank-like establishment to come to Sikkim was Messer Jetmull&Bhojraj in 1898, and it continued to remain there for more than 70 years (Government of Sikkim, 2013). Treaty of 1861 made Sikkim a British Protectorate (Jha, 1985), and post India's independence also Sikkim continued to remain as a protectorate of India till it got merged as 22nd State of Republic of India on May 16, 1975, with the passing of 38th Constitutional Amendment Bill by Indian Parliament (Pradhan, 2008). Before the merger, also Government of India had complete control over Sikkim's foreign policy and national defence. On February 20, 1966, the State Bank of India opened its first branch in Gangtok, the capital town of Sikkim, which initially limited itself only to treasury work of the government of India (Government of Sikkim, 2013). Sikkim's first bank with the name State Bank of Sikkim, came into existence in 1968 and Sikkim State Co-operative Bank in 1999. State Bank of Sikkim and SISCO are the only two state-owned banks of Sikkim to date, with few other financial institutions. As of 31.03.2020, around thirty-two banks are in operation in the state of Sikkim.

1.8 Research Design

A research design is a detailed approach adopted by the researcher to conduct a scientific study. Formulation of appropriate research design is an essential task of the researcher as it ensures efficient handling of the research problem. The study is descriptive, analytical, and empirical research and uses the published data of the selected banks. The study follows the hypothetic-deductive logic as it identifies the hypotheses first and then attempts to test those hypotheses (Lee, 1989). It is pertinent to mention here that this section presents only a brief of the research methodology followed in this study. Chapter 3 deals discuss in detail the research design followed by this study.

1.8.1 Statement of the Problem

The banks took up for the study handle a significant portion of the governmental transactions and cater to the banking need of many sections of the people of the state of Sikkim. Failure of these state-owned banks may adversely impact the state's economy and its people. With the entry of public sector, private, and foreign banks to the state, the local banking market has become very competitive, reducing the share of the state-owned banks in the business. Unless it remains profitable, efficient, and productive, the banks taken up for study shall cease to exist in today's competitive banking market. This paper is motivated by the significance these state-owned banks carry to the state and its people. Therefore, the study attempts to assess the financial performance, efficiency, and productivity of the state-owned banks of Sikkim to help them realise their strengths and weaknesses and suggest corrective measures needed to remain in the market.

1.8.2 Objectives of the Study

1. To trace the origin and evolution of the Banking System in Sikkim with a particular reference to the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank Ltd (SISCO).

2. To assess and compare the financial performance of the state-owned banks of Sikkim.
3. To assess and compare the efficiency and productivity performance of the state-owned banks of Sikkim.
4. To assess the impact of demonetisation on the productivity of the state-owned banks of Sikkim.
5. To compare the productivity performance of the state-owned banks of Sikkim with the commercial banks in India.

1.8.3 Scope of the Study

This research probes the financial performance, efficiency, and productivity performance of the two state-owned banks of Sikkim, namely the State Bank of Sikkim and the Sikkim State Cooperative Bank Ltd. The study also attempts to trace the origin and evolution of the Banking System in Sikkim.

1.8.4 Period of Study

For comparison of efficiency and performance among the state-owned banks, the study covers a period from 2010-11 to 2019-20, representing the period of intensified competition from several public sector banks, private banks, and foreign banks. The study also compares the productivity performance of state-owned banks with national banks for the period of 2014-15 to 2019-20.

1.8.5 Banks under Study

Sikkim has two state-owned banks and few financial institutions. This study considers state-owned banks, namely the SBS and the SISCO. The study also has considered18 Public Sector Banks, 18 private banks, and 31 foreign banks to compare the productivity performance of the state-owned banks.

1.8.6 Sources and Collection of Data

The study is done based on secondary data. Data are collected from the annual reports published by the banks under investigation. Data were also collected from the Annual publications/website of RBI, Annual reports of the Cooperation department, Audit reports, General/Governing Body Meetings' proceedings, State Level Banker's Committee (SLPC) reports, and proceedings, books, and journals relevant to the study.

1.8.7 Tools and Techniques for Analysis and Interpretation

IN THE EARLY SEVENTIES, the U.S. Federal Regulators first introduced the CAMEL rating system to examine and rate its banks. Under the CAMEL rating system, the banks are evaluated based on five (now six CAMELS) critical factors relating to their operation and performance. These critical factors are capital adequacy, assets quality, management efficiency, earning ability, liquidity, and the sixth is sensitivity to the market risk. This study investigates and compares the financial health of the selected banks through the CAMEL Ranking model. The study also applies CCR & BCC models of Data Envelopment Analysis for estimating efficiency and DEA-based Malmquist to analyse the productivity change of the selected banks. An independent t-test has been considered for testing the hypotheses based on previous studies.

1.8.8 Hypothesis

This study formulates the following six hypotheses for testing.

Capital Adequacy

Ho1: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Capital Adequacy.

Asset Quality

Ho2: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Asset Quality.

Management Quality

Ho3: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Management Quality.

Earnings Ability

Ho4: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Earnings Ability.

Liquidity

Ho5: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning liquidity.

Efficiency & Productivity

Ho6: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Efficiency and Productivity.

1.9 Plan of the Study

The study is presented through a total of nine chapters as follows:

Chapter 1: An Introduction to Analysis of Performance of Banks

This chapter introduces the research topic and briefly summarises the world history of banks, the history of banking in India, the Reserve Bank of India, and the history of banking in Sikkim.

Chapter 2: Review of Literature

This chapter reviews earlier research studies on analysing the banks' financial performance, efficiency, and productivity.

Chapter 3: Research Design

This chapter highlights the research methodology applied in this study.

Chapter 4: Origin and Evolution of Banking System in Sikkim

This chapter gives an account of how banking originated and evolved in Sikkim.

Chapter 5: Financial Performance Analysis

Applying the CAMEL model, this chapter analyses the financial performance of the state-owned banks of Sikkim.

Chapter 6: Efficiency and Productivity Analysis

This chapter applying the Data Envelopment Analysis and Malmquist Index, examines and compares the efficiency and productivity of the state-owned banks of Sikkim.

Chapter 7: Productivity Performance Analysis: Sikkim's Banks vs Commercial Banks in India

This chapter compares the productivity performance of the state-owned banks of Sikkim with the national level banks.

Chapter 8: Analysis and Interpretation

This chapter shall test the hypotheses formulated for the study.

Chapter 9: Summary, Conclusions, Suggestions, and Policy Implications

This chapter highlights the key findings of the study and incorporates suggestions.

1.10 Limitations and Avenues for Future Research

The main limitation of this study is the limited period of study for comparison between the state-owned banks and for comparison of state-owned banks with the national level commercial banks. Secondly, the study focuses only on two state-owned banks of Sikkim, hence does not capture the entire banking scenario in the state. This study paves the way for further research on factors explaining the performance of state-owned banks as against national-level banks. Further, the branch-level study of the state-owned banks might throw a better picture on their performance, efficiency, and productivity.

1.11 Conclusions

Apart from introducing the topic of the study, this chapter entails the world history of banks, the history of banking in India, the history of the Reserve Bank of India, and the banking history of Sikkim. This chapter presents the history of banking in India in three different eras, i.e., the Medival era, the colonial era, and the post-independence era. While giving the post-independence history of banking in India, the chapter pays special attention to significant events in banking history like the first nationalisation in 1969, the second nationalisation in 1980, liberalisation in 1990, and mergers of banks between 2000 to 2020. Narsimham Committee & Banking Sector Reforms in India are also mentioned in this chapter. A brief account on the history of banking in Sikkim given in this chapter suggests the presence of only four banks, namely State Bank of India (1966), State Bank of Sikkim (1968), UCO Bank (1981), and Central Bank of India (1982) till the end of 1992. This chapter also briefly discusses the research methodology followed in the study. While doing so, it lists out the five objectives of the research and hypotheses to be tested. The author presents the research work through nine chapters which are also briefly discussed in the previous section of this chapter. This chapter lays a foundation for chapters to follow in this study.

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CHAPTER 2

Review of Literature

2.1 Introduction

The CAMEL-rating model introduced by the U.S. supervisory authorities in the 1980s for onsite examination of their banking institutions has been widely used by researchers, academicians, and professionals to examine the performance of the banks (Agyei, 2016). CAMEL model became very popular in assessing the performance of banks across the globe because of its simplicity and easy application. Besides conventional financial ratios, several alternative frontier techniques have been used extensively by researchers, academicians, and institutions to analyse differences in efficiency across banks (Kumar et al., 2008). The world of literature on the analysis of efficiency and productivity of financial institutions through Data Envelopment Analysis (DEA) contains a large number of articles. In India's context, a reasonable number of studies analysing the efficiency of banks are available (Suresh et al., 2019). Apart from studies on the efficiency of banks, a fair amount of studies investigating the productivity of the Indian banks are also available. This chapter provides brief details of previous studies relevant to this research. Studies, especially applying the CAMEL model, Data Envelopment Analysis, and DEA-based Malmquist Index, are included in this chapter.

2.2 Review of Literature

Adjei-Frimpong et al. (2014) examined the efficiency and productivity changes of the New Zealand banking industry using the Data Envelopment Analysis and Malmquist productivity index. The period of study of 2007 to 2011 represents the U.S. subprime mortgage crisis period. Finding suggests that the Newzland banks experienced an overall mean efficiency score of 0.955 during the period of study, which indicates that the relative wastage of inputs was less in the case of Newzealand retail banks. The study suggests that the overall technical inefficiency obtained by the New Zealand banking industry was due to scale inefficiency and not due to pure technical inefficiency. Results also indicate that New Zealand banks were able to experience modest growth in productivity from 2007 to 2011, and the change is attributable to technological progress.

Aftab et al. (2015) had attempted to analyse the performance of the Pakistani banking industry, while in private hands vis-à-vis when the banks were nationalised, through CAMEL parameters and to assess the impact of the dictatorship and democracy on the performance of the Pakistani banks selected for the study. The study reveals that when Pakistani banks were in private ownership, their profitability was positively related to the quality of their assets and management efficiency. It negatively correlated with capital adequacy and liquidity. When the banks were under the government of Pakistan, the quality of the bank's assets and liquidity became almost irrelevant to the profitability. However, the capital adequacy and management efficiency continued to impact the bank's profitability. No visible difference was found in the profitability of the banks selected for the study with a change in political regime, i.e., from democratic to dictatorial government and otherwise.

Agyei, J. (2016), in their study, evaluated seven banks listed on Ghana Stock Exchange, namely CAL, EBG, GCB, HFC, SH-GH, SCB, and UTB, and ranked them based on their performance adjudged by the CAMEL Rating Model. The study finds that based on the overall performance evaluation, SCB stood in the first place, CAL secured the second position, and the EBG occupied third place. The rest of the banks that follow the order of merit based on their performance are HCF, SH-GH, GCB, and UTB. The study suggests that the banks need to develop strategies that will enable them to garner sufficient equity. The study also suggests improvement in credit assessment, monitoring of loans, and recovery.

Ahooja, A. (2018) has attempted to see if there is an improvement in the performance of public and private sector banks in India post Liberalisation. The study covers the period from 1991 to 2009. The study also tries to find out if there is any significant difference in the performance of public and private sector banks. Among various findings, finding on NPA shows that both the public and private sector banks are not free from the growing problem of Non-Performing Assets (NPA). The study reveals that the profitability of both private and public sector banks have been dented by the Non- performing assets. Among many, the study finds the cause of a rise in NPA's are liberal lending norms, cyclical changes in heavy industries, excessive corporate borrowings, and global recession in the market in banks of both sectors.

Ahsan, Md. K. (2016), based on the CAMEL Rating model, evaluated the financial performance, over eight years, i.e., from 2007-2014, of three selected Islamic Banks of Bangladesh, namely Export-Import Bank of Bangladesh Limited, Islami Bank Bangladesh Limited, and, Shahjalal Islami Bank Limited. The study finds that all three banks selected for the study are sound in all five aspects of CAMEL, i.e., Capital Adequacy, Asset Quality, Management Efficiency, earning ability, and liquidity condition.

Alemu, F. Z. (2016), in his study, evaluated the technical efficiency of Ethiopian commercial banks using DEA from 2011 to 2014. The study relied on three input variables: deposit, interest expense, and operating expenses and included three output variables: loans, interest income, and non-interest income. Analysis of the result reveals that the cooperative bank of Oromia (CBO), Berhan international bank (BrIB), and Dashen bank (D.B.) were the most efficient commercial banks under constant returns to scale. In contrast, banks, namely BrIB, CBO, and NIB international bank (NIB), were efficient under the variable returns to scale. Result also reveals that two banks, namely CBO and D.B., were efficient based on scale efficiency. The rest of the commercial banks under study recorded both pure technical inefficiency and scale inefficiency.

Babu, M.R. & Kumar, M.A. (2017) analysed the performance of five public sector banks and five private sector banks, chosen based on market capitalisation, from 2013-14 to 2015-16 through five parameters of the CAMEL model. Their findings reveal State Bank of India to have the best capital adequacy ratio among public sector banks under study. The study also suggests that the Bank of Baroda is better in terms of credit decision whereas, Management Efficiency and Business per Employee are better in the case of IDBI bank. The study finds the Kotak Mahindra Bank to have the highest Capital Adequacy among private sector banks. In contrast, Axis Bank has better quality assets, the highest business per employee, and better Management Efficiency. The study also observes that the HDFC bank has better earnings than selected private banks, and the ICICI bank is the most liquid.

Barr, R. S., & Siems, T. F. (1997) applied a new failure-prediction model to detect the bank's troubled status concerning solvency up to two years before the banks became insolvent utilising publicly available data. The study has used Data Envelopment Analysis to assess the quality of the management that takes the bank as a unit with many inputs and transforms it into several outputs. The study highlights the importance of Management Quality for the survival of the banks, so the study develops the management quality metric and uses it as a proxy for M in the CAMEL. The result of the models used in the study indicates that any bank to have successful operation needs efficient management. To confirm that the author removed the management variable from the model, the same gave an inferior result. The study concludes with a suggestion to use the early warning model developed by the regulators to identify the weakest banks so that the corrective measures could be taken well on time.

Barr et al. (1994) observed that most failure prediction model that uses CAMEL variables are not effective as the Management Efficiency in CAMEL model does not truly reflect the efficiency of the management. Hence, this study has used a new approach, i.e., Data Envelopment Analysis, to quantify the bank's managerial efficiency. Result reveals that the new model with DEA outshines other model likes Martin, Hanweck, Panalone & Platt models without DEA in predicting the failure of the banks both in one year and two years ahead models. The study concludes with a finding that the multiple-output DEA model presented in the research is effective in quantifying the management quality.

Bawaneh, A. A., & Dahiyat, A. (2019) evaluated thirteen commercial banks of Jordan listed on the Amman Stock exchange for the period of seven years from 2012-2018 using six parameters of the CAMEL rating system, i.e., Capital Adequacy, Assets Quality, Management Efficiency, Earning Quality, Liquidity, and Sensitivity to Market risk. The study also attempted to understand how the six parameters of CAMEL affect the banks' performance under investigation. The study results show that the effects of CAMEL parameters like management efficiency, earning quality, liquidity, and risk sensitivity on the performance of the banks are statistically significant. However, the study reveals no statistically significant effect of parameters like capital adequacy and asset quality on the performance of the Jordanian banks under investigation.

Bhattacharyya, P. K. (1984) documented the coin minting history of the erstwhile kingdom, Sikkim, in his book titled *Aspects of Cultural History of Sikkim*. In his work, he mentions coins named Dooba Paisa and Chepte Paisa to be in circulation in Sikkim for some time in the past.

Birhanie, D. (2020), in his research, endeavoured to measure the financial performance of five private banks of Ethiopia, namely Abay Bank, Abyssinia Bank, Dahan Bank, Addis International Bank, and Awash international Bank. The result shows Addis international bank to be at the top of the table in terms of capital adequacy, which indicates the bank is safe for the depositors and creditors. Abay Bank, Dashen bank, and Abyssinia bank were relatively safe and adequate capital. Concerning the asset quality, the Awash international bank is at the top of the table, followed by Abyssinia and Addis international bank. The Addis International bank's management was relatively efficient in utilising its assets to generate income. In the case of the bank's earning quality, the awash international bank did better than others, whereas, in the liquidity position, Abay bank outperformed the rest of the banks under study.

Boateng, K. (2019) endeavoured to assess the performance of ten Ghanaian banks for seven years using the CAMELS parameters, which include parameters like capital adequacy, assets quality, management efficiency, earning capacity, liquidity, and sensitivity. The study also attempts to understand the relationship between various CAMELS components on the performance of the Ghanaian banks through standard multiple regression. The result reveals that the banks' earnings under study are highly significant factors that affect the banks' performance. Further analysis of the results indicates that a percentage change in earning improved the bank's performance by 82.5 percent, measured in Return on Equity (ROE). The findings also suggest that the other components of the CAMEL model viz Capital adequacy, assets quality, management efficiency, and liquidity also significantly affect the performance of Ghanaian banks under study. However, the study finds a parameter, namely sensitivity, to be insignificant in affecting the performance of banks in Ghana.

Bodla, B. S., & Verma, R. (2006), in their study, attempted to find out the key determinants of profitability of Public Sector Banks in India for 13 years from 1991-92 to 2003-04. The study has used variables like Non-Interest Income (NII), Credit/Deposit Ratio (C/D), NPA as a percentage to Net Advances (NPA), Provision and Contingencies (P&C), Operating Expenses (O.E.), Business per Employee (BPE) and Profit per Employee (PPE) to understand how it impacts the profitability of the banks. The result of the study reveals variables with high explanatory power are Non-Interest Income (NII), Operating Expenses (O.E.), Provision and Contingencies (P&C), and Spread, whereas, variables namely Credit/Deposit Ratio (C/D), NPA as a percentage to Net Advances (NPA) & Business per Employee (BPE) has low explanatory power.

Bothra, P. & Puruhit, A. (2018) examined the performance of the top two banks, each from the public and private sector, namely State Bank of India and ICICI Bank. The study reveals that the State Bank of India outperformed ICICI bank in composite capital adequacy and assets quality. ICICI bank, study shows, compared to State Bank of India observed to have better Earning capacity and Management efficiency. State Bank of India also found lagging in liquidity as well. The study recommends that ICICI bank improve their Capital adequacy and Asset Quality. The study suggests improvement in Management Efficiency, Earning Capacity, and Liquidity of the State Bank of India.

Brindadevi, V. (2013) analysed various private sector banks in India based on their performances in profitability ratios like interest spread, net profit margin, return on long-term funds, return on net worth & return on asset. In her study, she found out that there is a significant difference in the mean value of interest spread, net profit margin, return on long term funds and return on the net worth of the private banks. However, there is no difference in the mean value of return on assets among the various private sector banks under study.

Channaveere et al. (2013) have attempted to rank the various commercial banks operating in India based on their performance on multiple parameters of the CAMEL. The study considers 59 banks, including 15 foreign banks, 18 private, and 26 public sector banks. Statistically, the study observes a significant difference among the various banks selected for the study regarding earning capacity, liquidity, and management soundness.

Coelli, T. (1996) developed a computer program, namely DEAP, and wrote a guide for calculation of efficiency index and Malmquist Productivity index with the help of DEAP. This program constructs DEA frontiers and helps calculate technical and cost efficiencies and the Malmquist TFP Indices. The DEAP 2.1 offers both input and output orientation except for the cost efficiencies option. The program as its output provides technical, scale, allocative, and cost efficiency estimates; slacks; peers; and TFP indices.

Curry et al. (2008) attempted to quantify the short-term and long-term impact of bank supervision measured using CAMEL composite and component ratings on different categories of loan growth viz commercial and industrial loans, consumer loans, and real estate loans. From 1985 to 1993, they found that business lending is the most sensitive to changes in CAMEL ratings (both the composite and the components) out of three loan categories. The study further reveals that the other loan categories also show some sensitivity to changes in CAMEL ratings. During another set of periods, they found little evidence of CAMEL ratings (the composite or its components) having any systematic effect on loan growth for any loan categories considered for the study.

Dahiyat, A. (2012) attempted to suggest an alternate rating framework based on the CAMEL Rating System to effectively evaluate the performances of the Jordanian securities commission and brokerage firms. The study successfully suggests an improved rating system for assessing brokerage firms based on the CAMEL rating system. The study recommends further improvement in brokerage firms' ranking system to boost the investors' confidence in the Jordanian financial market.

Dang, U. (2011) attempted to analyse the performance of a Vietnamese bank founded in March 1988 from 2007 through 2010. The study finds that the bank taken study has a CRAR slightly lower than the required minimum level but has performed well in terms of other ratios of Capital Adequacy. The study finds the bank studied to be the second-largest bank in Vietnam regarding assets and quality. The study found the Board of Directors of the bank to be effective, whereas the net income after tax of the bank was ranked only 4^{th} in the country. The bank is earning less than expected, and even its Return on Assets fails to meet the target. The study reveals the overall liquidity situation of the bank to be well-managed but finds the robust lending to be a matter of great concern.

Debnath, J. C. (2009) reports the economic history and development of the erstwhile Kingdom Sikkim. He also validates the belief that Lepchas migrated from the Assam-Burma in the 13th century, ruling Sikkim's kingdom before the Chogyal Dynasty came to power in Sikkim.

Farandy et al. (2017) measured the efficiency of Islamic commercial banks in Indonesia through the two-stage data envelopment analysis (DEA) method. The study analyses ten Islamic commercial banks in Indonesia from 2011 to 2014. The study additionally uses the Tobit model after the Data Envelopment Analysis. The study finds the average efficiency of Islamic commercial banks in Indonesia pretty good. The study estimates their average efficiency score to be 91.82 percent, meaning the banks under investigation could have saved inputs to produce similar outputs. The results from the Tobit model show a significant effect on the efficiency of the Islamic commercial banks of the variables such as assets, ROA, and the number of bank branches. The results also suggest that the variables, namely CAR and NPF, do not significantly affect the efficiency of the Islamic banks under study.

Ferrouhi, E. M. (2014) has analysed the performance of six Moroccan Banks from 2001-2011, applying the CAMEL model. Analysis of banks based on five parameters of CAMEL, i.e., Capital Adequacy, Assets Quality, Management Efficiency, Earning Quality, and Liquidity, has been done in the study. Based on the performance of banks in all five parameters, the study assigns a composite ranking. The composite ranking reveals that the BANQUE MAROCAINE DUCOMMERCE EXTERIEUR (BMCE BANK) is at the top of the table followed by BANQUE MAROCAINE POUR LE COMMERCE ET L'INDUSTRIE (BMCI), CREDIT AGRICOLE DU MAROC (CAM), ATTIJARIWAFA BANK (AWB), BANQUE CENTRALE POPULAIRE (BCP), and CREDIT DU MAROC (CDM).

Galab, S., & Bhavanarayana, V. (2018) endeavoured to analyse the variations in total factor productivity of the Regional Rural Banks of the undivided State of Andhra Pradesh and Karnataka during the period of amalgamation. The study uses Data Envelopment Analysis to estimate the efficiency score of the RRBs and Bootstrapped Malmquist Productivity Index (MPI) to analyse the productivity change. The findings suggest an indifferent impact of amalgamation on the RRBs of Karnataka and Undivided A.P. regarding financial efficiency and financial inclusion.

Galagadera, D. U., & Edirisuriya, P. (2004) investigated the efficiency and productivity growth of Indian commercial banks using data envelopment analysis and

DEA-based Malmquist index, respectively from 1995 through 2002. The study uses two inputs, namely total deposits and operating expenses, and two outputs, namely loans and other earning assets, to analyse efficiency and productivity growth. The study observes no significant growth in productivity of the commercial banks during the sampled period. The study finds the smaller banks to be less efficient, and the bank with higher equity to assets and higher return on assets is the most efficient banks. The study reveals a modest productivity growth in the case of public sector banks, whereas the private banks experience productivity decline during the study period.

Gupta, J. & Jain, S. (2012) studied some of the successful cooperative banks of Delhi to understand the loan practices of the cooperative banks. The study considers a sample size of 200 respondents for drawing the result of the study. The result reflects that around 32 percent of the respondents availed themselves of a housing loan. Sixty-two percent of the population represented by the respondents preferred the long-term loan of more than three years. The study also supports the belief that easy repayment and fewer formalities for sanction and disbursal of loans are the major factors that help the customers decide on a bank for a loan. The study finds that the banks under investigation successfully provide quality service to their customers. The study also reveals that the loan processing time of the banks under study is less than seven days.

Gupta, R. (2014) attempted to evaluate the performance of public sector banks in India using the CAMEL model for five years period, i.e., from 2009-13. In her study, she found a significant difference in the CAMEL ratios among the Public Sector Banks in India. The author suggests that the lower-ranking banks improve their performance to achieve the desired standards.

Hadad et al. (2008) studied Indonesian banks' efficiency and productivity changes from January 2006 to July 2007 with Data Envelopment Analysis and DEA-based

Malmquist Total Factor Productivity Index. Results obtained from the DEA following the intermediation approach suggest that the efficiency of the Indonesian banks was reasonably stable, ranging between 70% and 82% during the period of study. The result reveals that 92 out of 130 banks have efficiency scores of over 70%, and only ten banks scored super efficiency scores, i.e., score above unity. The Malmquist productivity index approach suggests that the productivity changes of the Indonesian banks are mainly attributable to technological progress.

Henriques et al. (2018), while examining the Brazilian banks through Data Envelopment Analysis, found out that the larger banks did well in pure technical efficiency but failed to operate at an efficient scale level, which led to impairment of their overall technical efficiency. The findings also suggest that the larger Brazilian banks face decreasing returns to scale, whereas small banks face increasing returns to scale. The result concludes that the smaller Brazilian banks are the efficient ones.

Hildreth, R. (1996) highlights the emergence of banks in the context of the world. The book provides a detailed history of the rise of the banking system worldwide. He describes how a chamber of loans created to raise the fund for the war turned to be the Bank of Venice.

Ishaq et al. (2016) have studied the performance of ten Pakistani commercial banks for seven years from 2007-2013 through CAMEL parameters. They have also attempted to understand how various ratios of CAMEL affect the banks' overall performance, represented by the earnings per share. The result of the study indicates a strong but negative correlation between variables such as non-performing loans to gross advances, total deposit to equity, gross advances to total deposits ratio, and administrative expenditure to interest income ratio with the dependent variable, i.e., earning per share. On the other hand, variables like return on assets (RoA) and return on equity (RoE) were significantly and positively correlated with earnings per share. Further analysis of the result indicates that the interest income to total assets ratio and cash ratio is statistically significant with the bank's performance.

Islam et al. (2014) analysed and compared, applying the CAMEL model, the performance of 47 banks operational in Bangladesh, which includes 4 State-Owned Commercial Banks (SCBs), 4 Development Financial Institutions (DFIs), 30 Private Commercial banks (PCBs), and 9 Foreign Commercial Banks (FCBs. Among the four-category of banks operating in Bangladesh, the study finds the DFIs more vulnerable than other banking categories. The result also suggests FCBs and PCBs are well-functioning banks and SCBs in an improving trend.

Jayaraman, A. R., & Srinivasan, M. R. (2014) measured the profit efficiency of forty-three banks in India between 2005 and 2012 through the Nerlovian profit indicator approach. Using the directional distance function, the study decomposes the profit inefficiency into technical and allocation inefficiency. The study results state that the impact of technical inefficiency on the profit inefficiency is minimal, and the profit inefficiency experienced by the banks is mainly due to allocative inefficiency. As the banks under study face allocative inefficiency, the study suggests enhancing profit efficiency through optimal utilisation of input-output mix.

Jean-Marc, H. (2012) introduces a Data Envelopment Analysis (DEA), a performance measurement technique, in an elaborated way. The author claims the guide to be appropriate for decision-makers, scholars, and academicians with very little or no background in economics and operational research to measure and interpret the efficiency of the firms. The guide developed by the author adopts a solid practical approach and allows to conduct efficiency analysis and to interpret results easily

Karri et al. (2015) studied the financial position and performance of the Bank of Baroda and Punjab National Bank based on the CAMELS' various ratios. The study attempts to understand if the investigated banks differ in 6 CAMEL parameters. The result reveals that the capital of both the banks is more than that of BASEL accord norms. Result also shows that the Bank of Baroda is better than the Punjab National Bank regarding management efficiency, earnings, and liquidity. In contrast, Punjab National Bank exceeds the Bank of Baroda in terms of Assets quality. Statistical analysis of the data reveals no significant difference between Bank of Baroda and Punjab National Bank regarding their financial position and performance.

Karthick, C. & Banupriya, L. (2017) has studied the performance of three leading private sector banks of India, namely AXIS Bank, ICICI Bank, and HDFC Bank, for five years from 2012-2016 using CAMEL Model. Detailed findings of the study include HDFC bank securing top position in Debt-Equity ratio followed by AXIS bank and ICICI bank, HDFC bank securing top place also in Advances to Assets ratio followed by AXIS and ICICI bank. Analysis of all the parameters of CAMEL reveals ICICI Bank and HDFC Bank to be better off than AXIS Bank because of its low scoring in factors like poor management efficiency, low capital adequacy, and poor assets & earning quality.

Kaur, R., & Aggarwal, M. (2016) endeavoured to study the origin of the Malmquist Productivity Index. The study observes its application area to be vast, making it popular in assessing productivity change in various sectors. The paper thoroughly discusses the mathematical modelling of the Malmquist Productivity Index and its decompositions into technical change, pure technical efficiency change, and change in scale efficiency. The study concludes that the Malmquist Productivity Index is appropriate for assessing the productivity change with the panel data.

Kumar, A., & Alam, M. (2018) attempted to analyse the financial position and performance of 5 selected Public Sector banks of India through the CAMEL model for five years, i.e., from 2012 to 2016. As per the overall composite CAMEL rating, the Bank of Baroda has topped the table, followed by Punjab National Bank, Union Bank of India, Canara Bank, and Central Bank of India. The study results reveal no statistically significant difference in the financial performance and position of the five selected public sector banks under study between 2012 and 2016.

Kumar, M. (2018) tried to examine the Kashi Gomti Samyut Gramin Bank (KGSG bank) for ten years from 2005-06 to 2014-15. Based on the CAMEL model, this study assesses KGSG's capital adequacy, evaluates its quality of assets, studies the efficiency of the bank's management, measures the bank's earnings quality and capacity, and inspects the bank's liquidity position. The study also suggests measures to improve the bank's financial health under investigation. The research study additionally presents a general overview of the Regional Rural Banks of India in terms of their overall performance.

Kumar et al. (2012) analysed the performance of 12 public and private sector banks over eleven years (2000-2011) in the Indian banking sector using the CAMEL approach. They found that the Public sector banks like Union Bank and SBI have taken a backseat and display low economic soundness in comparison.

Kumar, S., & Gulati, R. (2008), with the help of data envelopment analysis (DEA), attempted to measure the extent of technical, pure technical, and scale efficiencies of twenty-seven Indian public sector banks (PSBs) during the year 2004 to 2005. The study's finding reveals that the public sector banks operate at 88.50% of the overall technical efficiency level. The public sector banks could have saved around 11.50% of their inputs without sacrificing the output. A result from the application of logistic regression suggests that the banks' exposure to off-balance sheet activities has a positive and robust impact on banks' overall technical efficiency.

Madhanagopal, R., & Chandrasekaran, R. (2014), applying data envelopment analysis (DEA) based Malmquist index, attempted to analyze the association between the Global economic crisis and growth in productivity of the Indian banking sector for the period of 2005 to 2012. The study divides the study period into three periods: the pre-crisis period, crisis period, and post-crisis period. The empirical result of the study shows that the total factor productivity (TFP) regressed by 7 percent and 0.6 percent during the pre-crises period and crisis period, respectively. The study records slight progress of 0.3 percent during the post-crisis period.

Maqbool, S. & Zameer, M. N. (2018) examined 28 Indian Commercial banks listed on the Stock Exchange for ten years from 2007-2016, of which 15 were public sector and 13 private sector banks. The study endeavours to examine the relationship between Corporate Social Responsibility (CSR) and the financial performance of commercial banks in India. The result shows that CSR positively impacts profitability and stock return, which means that the institutions' corporate social responsibility activities pay off. The study suggests that the banks can use CSR as a valuable resource to edge their competitors. Considering the impact of CSR on financial performance, it deserves an adequate concern of the institution and must avoid seeing it as an optional activity. The study suggests the integration of CSR with the long-run business strategies of the firm.

Mathiraj, S. P. & Ramaya, V. (2014) evaluated the performance of five private sector banks of India, namely HDFC Bank, AXIS Bank, ICICI Bank, KOTAK MAHINDRA Bank, and ING VYSYA for a period of five years from 2007-2011. The result of the study highlights that the CRAR of all the five banks is at a level higher than the prescribed level of 10%; however, Kotak Mahindra bank was successful in maintaining the highest CRAR across the period of five years considered for the study. Such a higher CRAR of the bank indicates a strong possibility of its survival in a challenging future situation and exhibits its prospect of expansion. Out of 20 ratios of the CAMEL model exercised in the study, Kotak Mahindra Bank secured top position in 6 ratios and HDFC Bank in 5 ratios. The study proves Kotak Mahindra Bank to be the best bank among the selected private sector banks for study. Statistical analysis of the data reveals a statistically significant difference in the earning quality of the selected five banks. However, it finds no statistically significant difference in other parameters of CAMEL.

Meena, G. L. (2016) evaluated the financial performance of 20 public and private sector banks of India with the help of various parameters available in the CAMEL model. The study considers return on assets as the dependent variable and applies stepwise regression analysis to find the most dominant factors out of 17 factors put to use in the study. The study reveals that out of 17 variables used in the study, factors such as profit per employee, total assets-to-total deposits ratio, debt-equity ratio and, Net NPAs to total advances are the major dependent factors to impact the financial performance, represented by return on assets, of the 20 banks under study.

Mishra R.K., & Kiranmai, J. (2007) found that the State Bank of Sikkim needs to improve its competitiveness and outreach just like J&K Bank Ltd. Bank requires technological up-gradation and the removal of asset-liability mismatch, writing off accumulated losses, employee training.

Monea, M. **(2011)** compared two Romanian commercial banks for 2009 & 2010 using several profitability indicators. The study shows different trends of the analyzed elements from income statements with a better situation for the bank having majority Romanian shareholders than the bank having majority Greek shareholders because of Greek crisis and vulnerability, influencing customers’ confidence.

Muarief, R. (2019) aimed to measure the relative efficiency of conventional Indonesian commercial banks applying Data Envelopment Analysis (DEA) following an intermediation approach. The study considers five leading Indonesian banks, namely BNI, Mandiri, BRI, BTN, and BCA. The results suggest that the overall technical, pure technical, and scale efficiencies of the banks under study are satisfactory.

Muralidhara, P., & Lingam, C. (2017), in their research paper titled 'Camel Model as an Effective Measure of Financial Performance of Nationalized Banks' examined the performance of five nationalized banks of India, namely Bank of Baroda, Punjab National Bank, Bank of India, Central Bank Of India, Bank of Maharashtra over ten years, i.e., from 2006-07 to 2015-16 through CAMEL model. In the study, the Central Bank of India ranks no. 1, followed by Bank of Baroda, Bank of Maharashtra, Bank of India, and Punjab National Bank.

Natarajan, R. R. S., & Duraisamy, M. (2008), using the state-level data from a national sample survey, attempted to analyze the impact of the economic reforms on efficiency and productivity of the unorganized manufacturing sector in India for the period 1978–1979 to 2000– 2001. The study used the Malmquist total factor productivity index and its components to analyze the efficiency and productivity change during the study period. The findings suggest that the unorganized manufacturing sector as a whole registered positive growth during the period. The study also applies regression analysis to identify total factor productivity growth determinants. The results from regression analysis suggest that factors like ownership, farm growth, literacy, and infrastructure availability are the main determinants of the total productivity growth in the sector.

O'Donnell, C. J. (2011) outlines the methodological framework and provides instruction for the installation and running of the DIPIN program. In his guide, he introduces the Total Factor Productivity Index, discusses various components of Total Factor Productivity change, and explains estimation of productivity index using Data Envelopment Analysis. The guide also provides a reasonable amount of illustration on the decomposition of TFP indexes for easy readers' understanding.

Oludhe, J. (2011) studied the impact of credit risk management on the financial performance of 42 commercial banks in Kenya for the period of 5 years from 2006-2010. The study shows that the credit risk management substituted by CAMEL components has a substantial impact on the financial performance of the banks in Kenya. CAMEL components were able to explain variation in performance of the banks under study to 94.3 percent. Among five components, capital adequacy, assets quality, management efficiency, and liquidity have a weak relationship with the performance of the banks under study, whereas, Earning has a strong relationship with the performance of the Kenyan commercial banks.

Palecková, I. (2017) examined the efficiency change of Czech commercial banks with the Data Envelopment Analysis and Window Malmquist index approach from 2004 to 2013. The empirical result of the study reflects the efficiency score of the Czech commercial banks under constant return to scale to be 73 percent and 83 percent under the variable return to scale assumption. Results from Window Malmquist Index suggest that the Czech commercial banks recorded a positive efficiency growth from 2004 to 2013, and the growth is attributable to technological progress. The study also suggests that the larger Czech commercial banks operate at an inappropriate scale.

Rajeev, M., & Mahesh, H. P. (2010) examined the trends of NPAs in India from various dimensions. He explained how mere recognition of the problem and self-monitoring greatly reduced it. The study also shows that the public sector banks in India, which functions to some extent with welfare motives, have a good record in reducing Non-Performing Assets (NPAs) in comparison to their counterparts in the private sector. The study concludes that the NPA in the priority sector is higher than in the non-priority sector. The study also finds the small-scale industries' performance to be worst within the priority sector.

Raphael, G. (2013) studied the Productivity change for seven years, i.e., 2005 to 2011 of 21, of Tanzanian commercial banks. The author applied the Malmquist Productivity Index (MPI) to assess efficiency and productivity change. The findings suggest that most of the Tanzanian commercial banks experienced an improvement in efficiency over the period. The result also indicates that 13 out of 21 banks recorded growth in their productivity, and the main driver for their growth has been technological progress. The banking group-wise result of the productivity performance reports that small banks have the highest productivity growth during the study period, followed by large domestic and large foreign banks.

Rauf, A. L. (2016) evaluated the financial performances of 2 public r and two private sector Srilankan banks for ten years from 2005 to 2014. The study evaluates and compares the financial performances of the banks by applying the CAMEL model. Further, considering all the CAMEL parameters, i.e., Capital Adequacy, Asset Quality, Management Efficiency, Earning Quality and Liquidity as independent variables, the research aims to study its correlation and impact on the dependent variable financial performance represented by Return on Equity (RoE) and Return on Assets (RoA). The result of the study reveals that the selected private banks are better off than public sector banks in all the parameters of CAMEL. Analysis of data reveals that capital adequacy and assets quality are the variables with a more substantial influence on the financial performance of banks represented by RoE and RoA.

Rostami, M. (2015), in his paper titled 'Determination of Camels model on bank's performance,' analyzed the impact of CAMEL parameters on the performance of the Iranian banks represented by Q-Tobin's ratio. The result obtained on data analysis reveals a significant relation between CAMEL parameters: Capital Adequacy, Asset Quality, Management Efficiency, Earning Capacity, Liquidity, and Market risk over the performance of the Iranian banks represented by the TQ-Tobin's ratio.

Rostami, M. (2015), in his research work, attempted to examine the performance of 16 Iranian banks for six years, i.e., 2009-2014. The author then compares the performance of these 16 banks with an ideal Iranian bank, using six components of CAMEL, i.e., Capital Adequacy, assets quality, management Efficiency, Earning Capacity, Liquidity, and sensitivity. The study reveals that those 16 Iranian banks under study lag behind the ideal bank chosen for comparison in almost all aspects.

Rozzani, N. & Rahman, R.A. (2013) attempted to identify the determinants affecting the performance of 19 conventional and 16 Islamic banks in Malaysia from 2008-2011 and compare their performance. Analysis of the composite ratings indicates no significant difference in conventional and Islamic banks' performance. In the case of Conventional banks, factors like operational cost and credit risk have significant relation and no relation respectively with the performance of the banks, whereas, in the case of Islamic banks, the study finds no relation between operational cost and the performance of the banks.

Sharma, V. K., & Kumar, A. (2013) attempted to analyze the impact of banking sector reforms on all 26 public sector banks in India in the pre and post-reform period. The study's finding suggests that the banking sector reforms had a significant impact on the performance of public sector banks.

Siems, T. F., & Barr, R. S. (1998), using the constrained-multiplier data envelopment analysis (DEA) model, attempted to create a robust quantitative foundation to benchmark the efficiency of the banks of the United States. To benchmark, the authors have compared the volume of services rendered and resources utilized by each bank in comparison to all other banks. The authors also have compared the results obtained from the DEA with the CAMEL ratings assigned to the banks. The study's findings show that the most efficient banks hold a more significant amount of earning assets and are relatively successful in controlling costs. The result further reveals that efficient banks are the ones who earn a significantly higher return on assets, deals with less risky and smaller loan portfolios, and hold more capital. Comparing the relative efficiency scores obtained from the DEA with the CAMEL ratings, the study finds a close association among them

Sikkim Government (1968) outlines the incorporation of the State Bank of Sikkim, its management, regulation of the business of the bank, its funds, accounts and audit, and other miscellaneous articles.

Singh, A.K. & Jain, R. (2017) has attempted to explore the indicator(s) from various CAMEL parameters of financial performance of 16 private sector banks of India. The researchers used the WEKA data mining toolkit for analyzing the data and interpreting the result. The study concludes by observing the Kotak Mahindra Bank Ltd. with the highest CAR among the banks under study and Karur Vysya Bank Ltd leading the list concerning advances to assets ratio.

Sudha, B. (2014) analyzed ten public sector and ten private sector commercial banks of India. Banks from both the sectors chosen for the study include the top 5 and bottom five banks based on their assets. The study reveals no significant difference between the banks at the top five positions and bottom five positions in the case of most of the variables. Apart from analyzing the banks based on CAMEL rating, the research also aims for profitability analysis. Among public sector banks, the research finds Canara Bank, Punjab National Bank, and Vijaya Bank to have secured the best composite CAMEL rating, whereas Dena and Punjab and Sindh Bank found the last place. From private sector banks HDFC Bank, Jammu and Kashmir Bank, and Nainital Bank secured the best composite CAMEL rating, banks like Dhanalakshmi Bank, Catholic Syrian Bank, and Development Credit Bank found the last place. In her research, she also found a strong correlation of independent variables like profit per employee, coverage ratio with the dependent variable Return on Assets in the case of many banks. The research additionally explains the strength of the relationship of the independent variables with the dependent variable in the case of various banks under study.

Suresh, D. C., & Tibor, T. A. R. N. O. C. Z. I. (2019) attempted to analyze the selected ten Indian banks' efficiency, of which 3 were foreign banks, three were public sector banks, and the remaining four were the Indian private banks. The study measures the efficiency of the Indian banking sector for the period between 2010-2016. The authors used the DEA (Data Envelopment Analysis) method to assess the selected banks' efficiency. The study finds three banks, namely PNB, DBS, and CITI Bank, efficient under the constant return to scale model. In contrast, it finds five banks, namely SBI, PNB, Standard Chartered Bank, and CITI bank, to be efficient under the variable return to scale model.

Susmitha, M. & Mouneswari, V. (2017) has attempted to analyze the financial position and performance using the CAMEL model of the Syndicate bank for the period of five years from 2013-2017. The study results show that the Syndicate will sustain unforeseen losses with adequate capital. Assets quality of the bank, the study finds suitable along with sound and efficient management. Earning capacity of the bank, which reflects its sustainability and growth in profitability in the future, also appeared to be satisfactory. However, the study finds that the banks lack management of their liquidity.

Tadesse, B. (2018) tried to study the impact of ATM service on Customer satisfaction. The study used 25 attributes of ATM banking, categorizing them into five dimensions of service quality. The result shows that out of 25 ATM banking attributes, attributes namely ATMs not out of order, the ATM fees charged, the accuracy of ATM transactions, cleanliness of ATMs, readable slips, employee accessibility to solve ATM problems are the key factors that influence customers' satisfaction concerning ATM banking. The study further finds attributes like ease of access to ATMs, convenient location, employee speed in solving ATM issues, ease of application process for ATM cards, privacy at ATM stations, and cash availability in ATMs are also likely to influence customers' satisfaction.

Tahir et al. (2009) estimated the overall technical efficiencies, pure technical efficiencies, and scale efficiencies of Malaysian commercial banks using the Data Envelopment Analysis (DEA) from 2000 to 2006. The results suggest that domestic banks be relatively efficient than foreign banks. The results further suggest that the domestic banks' inefficiency was attributed to pure technical inefficiency, whereas the inefficiency of the foreign banks was attributed to scale inefficiency. The results also suggest that domestic and foreign banks had access to the same technology until 2004; after that, they had access to different technology.

The State Bank of Sikkim (2018), in their souvenir published on the occasion of the golden jubilee of the bank, records a history of banking of the erstwhile kingdom of Sikkim. It compiles important documents and pictures on the establishment of the State Bank of Sikkim. It notes Sikkim's journey from the barter system economy to establishing the only state-owned bank of the kingdom, the State Bank of Sikkim, in 1968.

Trivedi, K. R. (2013) evaluated the performance of the lone scheduled cooperative bank of Gujarat, namely *Surat People Co-operative Bank*, with 28 different CAMEL ratios for ten years, i.e., from 2002-03 to 2011-12. The study finds the overall capital adequacy of the banks under study to be satisfactory; however, the lower coverage ratio suggests that the bank cannot generate sufficient operating income to meet its obligations. The study also finds the Asset quality of the bank to be satisfactory, and low NPA suggests efficient recovery management of the bank. Overall Management Efficiency and Earning Capacity bank also observed to be satisfactory. Liquidity is only the principal concern of the bank, as is revealed by the study.

Yilmaz, A., & Güneş, N. (2015) endeavoured to measure and compare the overall technical (T.E.), pure technical (PTE), and scale efficiencies (S.E.) of 4 Islamic Participation Banks (P.B.s) and 28 Conventional Deposit Banks in Turkey applying Data Envelopment Analysis (DEA) covering the period of 2007-2013. The study's result reveals a broad scope for improvement in the performance of inefficient Participation Banks and Deposit Banks by picking a correct input-output mix and preferring appropriate scale size.

Yuksel et al. (2015) have studied the relationship between credit ratings ascertained by the credit rating agencies and ratios of CAMELS components of 21 Turkish banks. To establish the relationship, around 21 ratios representing various components of CAMELS for ten years, from 2004 to 2014, have been analyzed; and the authors applied the multinominal logistic regression method. The research results reveal that the components like Asset Quality, Management Quality, and Sensitivity to Market Risk of CAMELS affect credit ratings. On the other hand, the ratios related to Capital

Adequacy and Earnings do not affect credit ratings assigned to the banks by the rating agencies. The result further reveals that all ratios of Sensitivity to Market Risk used in the study affect credit ratings of Turkish banks under study.

Yuva, S., & Saminathan, P. (2016) examined the performance of twenty-five Public Sector, eighteen Private Sector, and eight Foreign banks in their study and ranked them based on five parameters of CAMEL, namely Capital Adequacy, Assets Quality, Management Efficiency, Earnings Quality, and Liquidity. The results on the financial performance of the public sector banks show UCO, Andhra Bank, Allahabad Bank, Punjab National Bank, Bank of Baroda, State Bank of Bikaner, and Jaipur occupying the top positions. Among the private sector banks, the banks to top the table are Tamilnad Merchantile Bank, Citi Union Bank, Kotak Mahindra Bank, Axis Bank, Karur Vysya HDFC Bank, ICICI Bank, and IndusInd Bank. In the case of foreign banks, Bank of Bahrain & Kuwait, the Royal Bank of Scotland, Deutsche Bank, HSBC Bank, Citi Bank, DBS Bank, and CTBS Bank occupied the top position during the period under study.

Zafar et al. (2020) studied 15 commercial banks of Pakistan listed at the Karachi Stock Exchange to evaluate the impact of CAMELS ratios on the performance of the banks by applying a regression model. Analysis carried out in the study reveals that nearly all larger banks are at the top, which means they are better performing and efficient than smaller banks. Among the other recommendations, one of the recommendations in the study is to use the CAMEL as a regulatory rating system to supervise the banks of Pakistan.

Zelenyuk et al. (2021) endeavoured to give an overview of various methods available for analysis of the performance of the banks through an extensive review of the literature. The study briefly discusses the primary ratio analysis method for measuring banks' performance which is still very popular because of its simplicity. Then the study discusses popular methods for productivity and efficiency analysis such as data envelopment analysis (DEA) and stochastic frontier analysis (SFA). The study also briefly reviews the leading econometric technique of causal inference, including difference-in-differences (D.D.) and regression discontinuity design (RDD).

2.3 Conclusions

This chapter provides a brief of various previous studies on the analysis of the performance of the banks. We now know the presence of a substantial amount of studies on the analysis of the performance of the banks in India and abroad using ratio based CAMEL model. The popularity of the CAMEL model in assessing the performance of banks is because of its simplicity and adoption by the financial regulators of various countries across the globe for monitoring their financial institutions. Usage of non-parametric tools, namely data envelopment analysis (DEA), for assessing the efficiency and productivity of the banks has long been in practice in developed countries and has contributed immensely to the banking literature. A reasonable amount of studies assessing the efficiency and productivity of the banks through data envelopment analysis are available in India. Realizing the bank's importance to the nation's economic growth and development, it has always been a subject for study by researchers and professionals. State-owned banks of Sikkim, the subject of this study, have never been studied concerning their performance and efficiency. This study, comprehending the unavailability of the study of the state-owned banks' performance, efficiency, and productivity, thus analyses their performance and compares it with various banks in India.

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CHAPTER 3

Research Design

3.1 Introduction

A research design is a detailed approach adopted by the researcher to conduct a scientific study. Formulating an appropriate research design is an essential task of the researcher as it ensures efficient handling of the research problem. The present study is descriptive, analytical, and empirical research and performed using the published data of the selected banks. The study intends to assess the financial performance of the selected banks through the CAMEL ranking model and gauge banks' efficiency and productivity change through Data Envelopment Analysis (DEA). With the research gap identified in the previous chapter, the study follows a hypothetic-deductive logic where we identify the hypotheses first and then attempt to test those hypotheses (Lee, 1989).

3.2 Research Design

3.2.1 Statement of the Problem

Compared to the rest of the country, Sikkim's banking history is not very old. Sikkim was without a formal bank until it established one in 1968, while by then, India as a nation had grown matured in terms of banking. The state has two state-owned banks, namely the State Bank of Sikkim (1968) and SISCO (1998). These state-owned banks taken up for the study handle a significant portion of the governmental transactions and cater to the banking need of almost all sections of the state's people. Failure of these state-owned banks may adversely impact the state's economy and its people. Unless they remain profitable, efficient, and productive, these banks shall cease to exist in today's fiercely competitive banking market. This study, which aims to assess state-owned banks' financial performance, efficiency, and productivity, is motivated by the significance these state-owned banks carry to the state and its people. This study has become more relevant now because all the leading public banks, private banks, and foreign banks present in the state are giving tough competition for mere existence to the state-owned banks of Sikkim.

3.2.2 Objectives of the study

1. To trace the origin and evolution of the Banking System in Sikkim with a particular reference to the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank Ltd (SISCO).
2. To assess and compare the financial performance of the state-owned banks.
3. To assess and compare the efficiency and total factor productivity change of the state-owned banks of Sikkim over time.
4. To assess the impact of demonetization on the productivity performance of the state-owned banks of Sikkim.
5. To compare the productivity performance of the state-owned banks of Sikkim with the commercial banks in India.

3.2.3 Scope of the Study

This research performs a comparative study of the financial performance of the state-owned banks of Sikkim, namely the State Bank of Sikkim (1968) and the Sikkim State Cooperative Bank Ltd (1999), through the CAMEL ranking model. The study also does a comparative analysis of the efficiency and productivity changes of the state-owned banks through Data Envelopment Analysis. This study also makes an effort to assess the impact of demonetization on the state-owned banks' productivity performance and compare their productivity performance with the rest of the banks in India. Apart from empirical analysis, the study also traces the origin and evolution of the banking system in Sikkim.

3.2.4 Period of Study

The study, to perform a comparative analysis among the state-owned banks of Sikkim concerning their financial performance, efficiency, and productivity, covers a period of nine years from 2011-12 to 2019-20, representing the period of intensified competition because of entry of the majority of nationalized banks, private banks, and foreign banks to the state. The study, however, for comparison of the productivity performance of Sikkim's state-owned banks with the national level banks in India, considers a period of 2014-2020. While tracing the origin and evolution of banking of the erstwhile kingdom of Sikkim, the study takes note of various developments from 1898 onwards.

3.2.5 Banks under Study

This study primarily focuses on studying the performance of the two state-owned banks, namely the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank Ltd. (SISCO). The study additionally considers 18 public sector banks, 18 private banks, and 31 foreign banks for assessing the performance of the state-owned banks at a national level. The banks merged post-March 31, 2020, are considered separate banks for this study.

3.2.5.1 State Bank of Sikkim (SBS)

State Bank of Sikkim, which was much in the news after the demonetization of high-value currency by the Government of India, is the oldest state-owned bank of the state. The State Bank of Sikkim was established under the State Bank of Sikkim Proclamation, 1968. The SBS is the only bank in the country that the Reserve Bank of India does not directly regulate; however, the bank follows the prudent banking norms prescribed through various guidelines by the Reserve Bank of India wherever necessary. Apart from its statutory audit prescribed in the Proclamation, it annually gets its accounts audited by the Accountant General (Audit), Sikkim. The bank has its headquarter at Gangtok, the capital town of Sikkim. The bank operates within the jurisdiction of the State of Sikkim. The Board of Directors governs the bank, and the Managing Director functions as the bank's Chief Executive officer. As per the Banking Regulation Act [Section 5(b)], a financial institution to qualify to be termed as a bank needs to accept deposits from the public, repay on demand, or otherwise, for lending and investment. Apart from carrying out activities needed to qualify as a bank, the State Bank of Sikkim additionally functions as a banker to the Government of Sikkim. SBS, therefore, is similar to any other regional commercial bank of the country; however, it still manages to remain out of the purview of the RBI due to constitutional provisions.

3.2.5.2 Sikkim State Cooperative Bank Ltd. (SISCO)

The Sikkim State Cooperative Bank Ltd. is the first and only registered cooperative bank in Sikkim. The bank came into existence in 1999 to serve as the central nerve for all cooperative societies in Sikkim and raise deposits and lending in both farm and non-farm segments. The bank has 634 cooperative societies as its member. Besides deposit mobilization, the bank also implements Kishan Credit Card Scheme and Crop Insurance Scheme in the state. SISCO Bank has its branches at all district headquarters and a few sub-divisions.

3.2.6 Sources and Collection of Data

The study is based on the secondary data collected from the annual reports published by the selected banks, Annual publications and website of RBI, Annual reports of Cooperation department of Government of Sikkim, Banks' Audit reports, General/Governing Body Meetings' proceedings, State Level Banker's Committee (SLPC) reports and proceedings, websites, books, and journals relevant to the study.

3.2.7 Tools and Techniques of the study

This research applies the CAMEL model for off-site analysis of the financial performance of the state-owned banks of Sikkim. Technical efficiency decomposed further into pure technical efficiency, and scale efficiency is estimated using the constant return to scale (CRS) and variable return to scale (VRS) model of the data envelopment analysis (DEA). Malmquist DEA has also been applied to the panel data to analyze the selected banks' efficiency and productivity changes. The study applies an independent t-test, also known as a two-sample t-test, to test the hypotheses formulated for the study. The subsequent sections shall discuss the tools and techniques used in this study in detail.

3.2.7.1 An overview of CAMEL Model

Banks have now become the spine of every nation's financial system. They mobilise the resources and facilitate the proper utilization of the country's resources. Financial institutions now operate in rapidly changing environmental settings and intensely competitive markets. The banks had to develop various specialized services to cater to their customers' financial needs. With such diversified banking and allied services, rapid expansion, and cut-throat competition, the banks' exposure to the risk has increased manifold. It will not be incorrect to say that the banking institutions work in risks and uncertainties. Such a situation demands timely evaluation of the performance and efficiency of the banks through established tools and techniques.

One of such established tools to assess the overall performance of the banks is CAMEL. The CAMEL rating system assesses parameters like capital adequacy, assets quality, management efficiency, earning ability, liquidity, and sensitivity to market risk. It was introduced by the U.S. supervisory authorities to examine and rate their commercial banks. Under this model, the banks are evaluated based on five (now six CAMELS) critical factors relating to their operation and performance.

The CAMEL rating system is being widely used across the globe to evaluate banking performance. Evaluation of the overall performance of the banks through the implementation of the regulatory banking supervision framework assumes great importance in today's world. The CAMEL model was one such supervisory framework implemented in the U.S. in 1979 and now is in use by three supervisory agencies of the United States, i.e., the Federal Reserve System, Office of the Comptroller of the Currency (OCC), and Federal Deposit Insurance Corporation (FDIC). The financial crisis of 2008 in the U.S. re-endorsed use of the CAMEL model as a tool for assessing the financial health of the banks.

Uniform Financial Institutions Rating System (UFIRS), implemented in 1979 by the banking regulators of the United States to regulate its banking institutions went global and is internationally known as CAMEL (Siems & Barr, 1998). The model developed intending to assess commercial banks' financial and managerial soundness in the U.S is now adopted by central banks of several countries. With the development of the CAMEL model, the U.S. banking supervisory authority got a common yardstick to measure the overall efficiency of its banks. The CAMEL rating system was later revised in the year 1996 by adding yet another essential component, 'S,' which stands for "sensitivity" to market risk.' The addition of the Sensitivity component transformed CAMEL to 'CAMELS.' S. Padmanaban Committee recommended using the CAMEL rating system for supervision of banks in India (Sudha,2014).

3.2.7.1.1 Components of CAMEL Model

CAMEL is an acronym and consists of five vital components that reflect banking institutions' financial health and efficiency. The five vital components of CAMEL are as under:

i. C -Capital adequacy
ii. A - Asset quality
iii. M - Management efficiency
iv. E - Earning quality
v. L - Liquidity

All five elements are equally crucial for assessing the efficiency and financial soundness of the banks. These five components, though, are different but are interdependent and interrelated. It means that all the components of the CAMEL influence each component. The nature of the study and the problems at hand decide which components shall assume greater importance than the rest of the components.

It is important to note that the CAMEL is principally based on ratios. Five components of the CAMEL model have been explained individually in pages to follow.

Figure 3.1
Five Elements of CAMEL Model

Source: Created by the author

3.2.7.1.2 Capital Adequacy

Capital perhaps is the life-blood of any institution, but it assumes greater importance in the case of financial institutions. The capital of any financial institution acts as a foundation for the confidence of its depositors (Karri et al., 2015). It reflects the internal strength or weakness of the financial institution. Institutions with adequate capital will be better positioned to absorb unforeseen shocks. Capital adequacy shows the level of the financial soundness of a bank. It also signifies the capability of the management to garner additional capital. Adequate capital helps the bank prevent the situation of bankruptcy and acts as an indicator of bank leverage. In other words, capital adequacy influences the overall performance, whether it is a bank's expansion through the opening of new branches, lending in profitable areas with relatively higher risk, meeting staffing requirements, or diversification of business. Realizing the importance of capital adequacy, RBI determines the capital adequacy ratio for Indian banks from time to time. The current Capital Adequacy ratio recommended by the RBI is 9.00 percent. We apply the following ratios to assess the banks' capital adequacy based on previous studies.

(i) **Capital Adequacy ratio**

CAR measures the capacity of a bank to sustain losses arising out of risk assets. Higher CAR signifies better financial soundness of the bank (Sudha, 2014).

(ii) **Debt-equity ratio**

This ratio indicates the financial leverage of a bank. There is no standard Debt to Equity ratio for financial institutions as in industries from other sectors. Unlike CAR, lower this ratio is better for the bank (Ferrouhi, 2014).

(iii) **Equity Capital to Total Assets Ratio**

The equity to assets ratio indicates the volume of assets financed by the shareholders' money. This ratio shows the investors' stake in the bank's business (Dang, 2011).

3.2.7.1.3 Asset Quality

The second but equally important component of the CAMEL model is Asset Quality which assesses the quality of an asset held by the banks. The quality of assets reflects the soundness of the institution's financial health. The bank's assets comprise loans, advances, and investments, and their quality has a significant bearing on its financial health. The quality of the assets varies across the banks due to varying lending and investment policies and procedures. The worsening quality of the assets of the Indian banks from the last decade has been the country's serious concern (RBI, 2017). It demands honest efforts on the part of the bank to improvise the same. Increasing assets' value represents the bank's financial health, whereas dipping assets' value reflects poor lending and investment policy, which will gradually lead the bank to fail.

Wearying value of assets also affects the earning capacity as it erodes the profit earned by the bank. Considering the importance of asset quality to any financial institution, the Reserve Bank of India made the bank disclose its assets into three categories: standard assets, sub-standard assets, and doubtful and loss assets. All such sub-standard and doubtful assets or advances of the bank that ceases to earn interest or generate income are non-performing assets of the bank, requiring an adequate provision to set off the likely losses that might incur from such NPAs. RBI has recorded a sharp increase in NPAs from 2015 onwards, which remained more or less unchanged after the global financial crisis (RBI, 2018).

The Reserve bank of India in 2015 undertook the Asset Quality Review (AQR), intending to encourage banks for proactive asset quality recognition (RBI, 2021). Accumulation of non-performing assets may ultimately result in insolvency, so it requires timely resolution.

This study has used the following ratios to measure the quality of the banks' assets under study.

(i) **NPAs to gross Loan Ratio**

It helps the management understand the quality of the bank’s loan (Ishaq et al., 2016).

(ii) **Total Investments to Total Assets Ratio**

It reflects the extent of deployment of a bank’s assets in investment (Mathiraj et al., 2014).

(iii) **Government Securities to Total Investment Ratio**

Government Securities to total investments ratio reflects risk in a bank’s investment (Sudha, 2014).

(iv) **NPA to Equity Ratio**

The non-performing assets to equity ratio reflect the sufficiency of the equity to absorb the losses arising from non-performing assets of the bank (Dang, 2011)

3.2.7.1.4 Management Efficiency

Management efficiency is the third component of the CAMEL rating model. Managerial efficiency reflects the efficiency and effectiveness of the board of directors and the management to identify, measure, monitor, and control the risks involved in the activities carried out by the financial institution. Efficient management ensures safe and sound operations of the bank, compliance with laws and regulations in vogue, ensures effective utilization of physical resources, safeguards its assets, promotes innovation in the processes and services, builds confidence among its customers and other stakeholders, and foresees and manages risks from both internal and external factors. Financial institutions characterized by efficient management shall have adequate capital, good asset quality, high productivity and profitability, sound liquidity, and market sensitivity. Management efficiency, therefore, is an essential component that affects all other components of the CAMEL. There are no confined parameters to measure the management efficiency; however, the studies generally consider the following ratios to measure the efficiency of the management.

(i) **Business per Employee**

Business per employee reflects how efficiently the bank's management can utilize its employees. A bank with a higher rate of business per employee is more productive than the one with lower business per employee. Increasing business per employee shows the ability of the bank to get more revenue/sales out of each employee (Kumar&Alam, 2018).

(ii) **Profit per Employee**

The profit per employee ratio reflects the surplus by each employee. This ratio is arrived at by dividing the profit earned after tax by the bank’s total employees. Higher profit per employee of the bank indicates efficient Management (Sudha,2014).

(iii) **Credit to Total Deposit**

This ratio reflects the management’s ability to convert the deposits into high-yielding loans and advances. Here total deposits include savings bank deposits, demand deposits, term deposits, and deposits from other banks. Total advances also include receivables for calculating this ratio (Kari et al., 2015).

3.2.7.1.5 Earning quality

Earning quality is the fourth but equally important element of the CAMEL model. It aims to determine the earning ability of a bank and measures the consistency in earning of a bank. Earning quality of any financial institution assumes an important place as it reflects the ability to achieve sustainability in future earnings growth, which helps the bank absorb losses caused by bad loans and investments. Improved earnings will also lead to higher rewards to the stakeholders. The study uses the following ratios to determine the earning quality of a bank:

(i) **Return on Asset**

We get the RoA by dividing the net profit after tax by total assets. This ratio reflects the return earned on assets deployed by the bank (Agyei, 2016).

(ii) **Spread to Total Assets Ratio**

Income spread or net interest margin to total asset ratio is calculated by dividing net interest margin (Interest Income Earned *minus* Interest Income expended) by total assets. This ratio indicates how much a bank can earn from every rupee invested in its assets (Sudha, 2014).

(iii) **Operating Profit to Total Assets Ratio**

We calculate it by dividing operating profit by the total assets. It indicates how much a bank can earn from its operations after meeting its operating expenses on every rupee invested in the asset (Bothra & Purohit, 2018).

(iv) **Operating Cost to Income Ratio**

The operating cost to total income ratio measures the banks' ability to meet its operating expenses from the income it generates (Dang, 2011).

3.2.7.1.6 Liquidity

Liquidity was the last component before the sensitivity became the sixth component of the CAMEL model. A financial institution's liquidity reflects the degree to which it can fulfil its payment obligations. Liquidity is an essential aspect of any financial institution as it indicates a bank’s capacity to meet financial obligations. Cash and balance with RBI and other banks are the most liquid assets among all other assets held by the bank. A higher level of liquidity indicates the ability to meet its financial obligations better; however, higher than the ideal liquidity hints underutilization of its resources, leading to declined profit. If liquidity is too low, then the bank may not be able to meet its current financial liabilities, which may negatively impact the confidence of its customer/creditor in the bank.

On the other hand, if liquidity is too high, the banks are not utilizing their cash optimally. It is, therefore, necessary for the financial institutions to strike a balance in terms of their liquidity, which will allow them to generate higher income and at the same time help them be in a comfortable situation to meet all their current obligations. The ratios to assess the liquidity of a bank used in the study are as follows.

(i) **Liquid Asset to Total Assets Ratio**

This ratio is calculated by dividing the liquid assets by their total assets. Liquid assets include cash in hand, balance with the RBI and other banks, and money at call and short notice. This ratio indicates the overall liquidity position of the bank (Sudha, 2014).

(ii) **Liquid Asset to Demand Deposits Ratio**

The liquid asset to demand deposits ratio measures the ability of the bank to meet its obligations towards its customers who have availed demand deposits scheme of the bank (Kumar, 2018).

(iii) **Loan to Deposit Ratio**

The liquid asset to deposits ratio measures the volume of deposits converted into the loan by the bank (Dang, 2011).

(iv) **Cash to Total Assets Ratio**

Cash is required to meet up daily withdrawal requests of the customers; hence, maintenance of adequate cash is essential for the bank (Yuksel et al., 2015).

The above five parameters of the universally accepted CAMEL model help assess the financial soundness of a financial institution. The CAMEL rating system is a scientific tool to determine the financial institutions' strengths and weaknesses and suggest measures for improvement, says Bothra and Purohit (2008). It helps the supervisory authority of a country to rate the banks in terms of their performance (Rostami, 2015). Periodical assessment of the financial institutions has become highly significant considering the ever-changing global financial markets. In his degree thesis, Dang (2011) observes the CAMEL rating system as an excellent tool to reflect the banks' conditions and performances for on-site and off-site banks' examination. According to Rostami (2015), CAMEL is an accurate, effective, and efficient performance measurement tool and provides consistent information on a bank's financial condition and operations. With the worldwide banking crisis in the recent past, CAMEL has evolved as a valuable tool to inspect the safety and soundness of the banks and helps to ease the possible risks which may result in bank's failure (Dang, 2011). To deal with the global financial crisis of 2008 and decide upon financial assistance to the financial institutions, the U.S. government made use of the CAMELS rating system, says Bawaneh & Dahiyat (2019).

In the CAMEL model, examiners assign the ratings to the institutions based on various financial ratios and the examiner's qualitative judgment. The ratings ranging from 1 to

5 signifies the state of the financial health and operational efficiency of the financial institutions.

Rating 1

Institutions falling under this category have solid performance and risk management practices. Financial institutions with such ratings will be able to sustain unforeseen losses and have no problem in complying with laws and regulations laid out by the supervisory authority.

Rating 2

Banks with satisfactory performance and risk management practices fall under this range. Banks falling under this category can survive business fluctuations quite well but have minor weaknesses that can be corrected. Banks under this category largely comply with the supervisory authority’s laws and regulations; however, minor areas of weakness may be present, developing into conditions of more significant concern if not handled in time.

Rating 3

Banks falling under this rating category have minor flaws in their performance and are of concern to the supervisory authority. The risk management abilities of banks of this category are not up to the mark and are not so resistant to the effect of adverse business conditions. These banks generally are significant non-compliers of laws and regulations.

Rating 4

This rating refers to banks with poor performance and is of severe supervisory concern. Such banks are significant non-compliers of laws and regulations. Banks falling under this category may have improper risk management practices, requiring close supervisory attention.

Rating 5

Banks falling under this rating are characterized with highly unsatisfactory performance and need immediate remedial attention. Banks and financial institutions falling under this group are the ones that are likely to fail and require liquidation, merger, acquisition, and other emergency measures.

3.2.7.2 Data Envelopment Analysis (DEA)

This study applies the CAMEL model to assess and compare the selected banks' overall financial health, liquidity, solvency, and profitability. Additionally, the study also applies data envelopment analysis (DEA) to assess the efficiency and productivity performance of the banks under study. DEA is a linear programming-based technique that converts each bank's multiple inputs and outputs into a scalar measure of relative productive efficiency. The study additionally apples the DEA to check if the bank performing well in CAMEL parameters is also the efficient and productive one in the DEA. Chapters 7 & 8 outlines a detailed framework of the data envelopment analysis. Empirical analysis, applying the data envelopment analysis, has been done in chapters 7 & 8.

Data Envelopment Analysis is a mathematical programming method that measures the efficiency of decision-making unit (DMU) relative to other similar DMUs with a constraint that all DMUs either lie below or lie on the efficiency frontier (Palecková, 2017). It also identifies the inefficient DMU and reflects the level of inefficiency and its source. The DEA approach handles multiple inputs and output, requires no specification of the functional form of the production function, and does not need an assumption as to the relative importance of the inputs and output. This study uses input-oriented DEA measures of efficiency as the management of the banks has more control over its input than its output.

To understand, let us assume that there are n DMUs to be assessed. From the DMUs to be evaluated, DMUj consumes xij amounts of input to produce yrj amounts of output. It presumes that these inputs, xij, and outputs, yrj, are non-negative, and each DMU has at least one positive input and output value. We can write the productivity of a DMU in the equation given below.

$$h_j = \frac{\sum_{r=1}^{s} u_r y_{rk}}{\sum_{i=1}^{m} v_i x_{ik}} \qquad \text{Equation 3.1}$$

In this equation, u and v are the weights assigned to each input and output. By using mathematical programming techniques, DEA optimally assigns the weights for each DMU subject to the constraint that no other DMU has efficiency greater than one if it uses the exact weights, implying that efficient DMUs will have a ratio value of 1. The objective function of DMU is the ratio of the total weighted output divided by the total weighted input.

Where *h0* indicates the technical efficiency of DMU0 to be estimated, *ur* and *vi* represents weights to be optimized, *yrj* is the observed amount of output for the *jth* DMU of the *rth* type, whereas *xij* is the observed amount of input for the *jth* DMU of the *ith* type, *r* is the *s* different outputs, *i* represents the *m* different inputs, and *j* indicates the *n* different DMUs.

$$\max h_0(u,v) = \frac{\sum_{r=1}^{s} u_r y_{r0}}{\sum_{i=1}^{m} v_i x_{i0}} \qquad \text{Equation 3.2}$$

$$\text{Subject to} \quad \frac{\sum_{r=1}^{s} u_r y_{rk}}{\sum_{i=1}^{m} v_i x_{ik}} \leq 1, k = 1, 2\ldots, k_0, \ldots., \text{n}, \qquad \text{Equation 3.3}$$

$$u_r \geq 0, r = 1,2, \ldots, s, \qquad \text{Equation 3.4}$$

$$v_i \geq 0, i = 1,2, \ldots, m, \qquad \text{Equation 3.5}$$

As DEA cannot capture the shift of the frontier over time to account for shifts in the production frontier, this study also applies the DEA-based Malmquist Total Factor

Productivity Change Index. The DEA-based Malmquist index (MI) is one of the well-known indexes for assessing the relative productivity change of DMUs in multiple periods (Palecková, 2017).

$$M_I(y^s x^s y^t x^t) = \left[\frac{D_I^t(y^s x^s)}{D_I^t(y^t x^t)} * \frac{D_I^s(y^s x^s)}{D_I^s(y^t x^t)}\right]^{\frac{1}{2}} \quad \text{Equation 3.6}$$

Where *MI* is the input-oriented Malmquist Index, and *DtI (ys, xs)* indicates the distance function reflecting a maximal proportional reduction of the observed period *s* inputs under the period *t* technology.

3.2.7.3 Independent t-test

An Independent (unpaired) two-tailed t-test, also referred to as a two-sample t-test or independent sample t-test, has been used to test hypotheses. A T-test is a statistical method to determine the difference in means of two unrelated independent groups. It compares the means of two variables or groups. The formula for the t-test is as may be seen in equation 3.7. A detailed framework of the t-test and other related tests is found in chapter-9.

$$t = \frac{m_A - m_A}{\sqrt{\frac{S^2}{n_A} + \frac{S^2}{n_B}}} \quad \text{Equation 3.7}$$

Where,

m_A and m_B are the means of groups A and B,

n_A and n_B are the sizes of groups A and B

S^2 is an estimator of the pooled variance of groups A and B

3.2.8 Hypotheses of the Study

Based on the objectives, the study formulates six hypotheses for testing.

Capital Adequacy

Ho1: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Capital Adequacy.

Asset Quality

Ho2: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Asset Quality.

Management Quality

Ho3: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Management Quality.

Earnings Ability

Ho4: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Earnings Ability.

Liquidity

Ho5: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning liquidity.

Efficiency & Productivity

Ho6: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Efficiency and Productivity.

3.2.9 Plan of the Study

The study has been presented through nine chapters as follows.

Chapter 1: An Introduction to Analysis of Performance of Banks

The topic of the study is introduced in this chapter for the readers. It also briefly summarises the world history of banks, the history of the Indian Banking industry, the history of the Reserve Bank of India, discusses the Narsimham Committee Report, recent mergers of banks, and Sikkim's banking history. The chapter also briefly outlines the research method followed in the study.

Chapter 2: Review of Literature

Previous studies on analyzing banks' performance, especially applying the CAMEL model, Data Envelopment Analysis, and DEA-based Malmquist Index, have briefly been discussed in this chapter.

Chapter 3: Research Design

This chapter provides details of the research method followed in the study. It discusses the research problem, objectives of the study, data collection and its source, banks under study, study period, tools and techniques used for the study, and hypotheses formulated for testing.

Chapter 4: Origin and Evaluation of Banking System in Sikkim

This chapter discusses the origin of the money economy and banking system in the erstwhile kingdom of Sikkim. It also presents the history of establishing the State Bank of Sikkim (SBS) and Sikkim Cooperative Bank Ltd. (SISCO) and how various nationalized, private and foreign banks entered the Sikkim, pre, and post-merger.

Chapter 5: Financial Performance Analysis

This chapter analyses and compares the financial performance of the state-owned banks based on five components of CAMEL, i.e., Capital Adequacy, Asset Quality, Management Efficiency, Earning Quality, and Liquidity. This chapter also presents the trends in various variables of the selected banks.

Chapter 6: Efficiency and Productivity Analysis

This chapter estimates and compares the efficiency of the state-owned banks of Sikkim using data envelopment analysis. It also estimates and analyses the total factor productivity change of the selected banks over nine years through the Malmquist Index. It also briefly discusses the impact of demonetization on the productivity performance of the state-owned banks of Sikkim.

Chapter 7: Productivity Performance Analysis: Sikkim's Banks vs. Commercial Banks in India

This chapter compares the productivity performance of the state-owned banks with 18 nationalized banks, 18 private banks, and 31 foreign banks. It also draws an overall ranking of 69 banks under study, based on the productivity performance assessed through the Malmquist productivity index.

Chapter 8: Analysis and Interpretation

After providing a detailed framework of t-test and other relevant statistical tools, this chapter tests the hypotheses formulated for the study.

Chapter 9: Summary, Conclusions, Suggestions, and Policy Implications.

This chapter presents the study's findings and offers suggestions based on the empirical results.

3.3 Limitations and Avenues for Future Research

This study is also not without a limitation. The main limitation of this study is the limited period of study, i.e., from 2011-12 to 2019-20 for comparison between the state-owned banks and 2014-15 to 2019-20 for comparison of state-owned banks with the national level commercial banks. Increased duration, though, would have given more insights but was not possible for mainly two reasons, i.e., unavailability of the data and constraint of time. Secondly, the study focuses only on two state-owned banks of Sikkim, hence does not capture the entire banking scenario in the state. This study paves the way for further research on factors explaining the performance of state-owned banks as against national-level banks. Further, the branch-level study of the state-owned banks might throw a better picture on their performance, efficiency, and productivity.

3.4 Conclusions

In this chapter, we discussed, at length, the research method followed in the study. The chapter observes the unavailability of the previous study on the performance of the state-owned banks of Sikkim. It also highlights the importance that these banks carry to the state of Sikkim and its people. The chapter also sets out the study's objectives, defines the study's scope, and formulates the hypotheses to be tested. We also discussed the data collection method and its source, study period, banks selected for study, and tools and techniques in this chapter. Finally, the chapter briefly introduces all nine chapters of the study.

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CHAPTER 4

Origin and Evolution of Banking System in Sikkim

4.1 Introduction

Sikkim was already solidified as a country in 1642 with its first ruler Chogyal Phuntsog Namgyal while neighbouring countries like India and Nepal were still divided into many princely states (Joshi, 2004). The common belief is that the society of Sikkim was initially a semi-nomadic type which later progressed to the feudal economy during Chogyal's reign. In the early 18th century, Sikkim came under British suzerainty due to the latter's interest to establish a trade route to Tibet (Jha, 1985). Sikkim's economy experienced significant progression only after establishing British control, precisely after 1889 with Claude White's appointment as first Political Officer. Sikkim does not have a very long banking history. State Bank of Sikkim, established before the merger of Sikkim with India, still does not fall under RBI's regulation as the constitution protects it. The government of Sikkim later in 1999 established its second state-owned bank with the name Sikkim State Cooperative Bank Ltd.

4.2 Genesis of Banking System in Sikkim

Sikkim, which now has almost all leading commercial banks, has a short banking history. Sikkim being an agricultural state, its economy entirely relied on it (Arha & Singh., 2008). The barter system was profusely in practice among its people for trade (Bhattacharyya, 1984). A common belief is that the money revenue was not in existence before the entry of the British. The kingdom of Sikkim accepted the coins minted by Nepal for trade and commerce with the permission of the British officials in 1849 AD (Shrestha, 2015). Later, with the British Government's consent, Sikkim also started to mint its copper coins engaging Newar Tradesman Lachimidas Pradhan (Kasaju) from 1882 (Shrestha, 2015). The coins minted in Sikkim were Dooba Paisa and Chepte Paisa

(Bhattacharyya, 1984). The minting of coins was abolished in 1887 on disapproval by the Nepal Government because of its less weight (Debnath, 2009).

The first bank-like establishment to come to Sikkim was Messer Jetmull & Bhojraj in 1898, and it continued to remain there for more than 70 years (Government of Sikkim, 2013). The Treaty of 1861 made Sikkim a British Protectorate (Jha, 1985). After India's independence, Sikkim remained as a protectorate (as an Associate state during 1974) of India until it got merged as the 22nd State of Republic of India on May 16, 1975, with the passing of the Thirty-sixth Amendment Act by the Indian Parliament. Before the merger, India's Government had complete control over Sikkim's foreign policy and national defence. On February 20, 1966, the State Bank of India opened its first branch in the capital town of Sikkim, i.e., Gangtok, which initially limited itself only to treasury work of the Government of India (Government of Sikkim, 2013). Sikkim was finally able to establish its first bank with the name State Bank of Sikkim in 1968, and later in 1999, it established Sikkim State Co-operative Bank. State Bank of Sikkim and Sikkim State Co-operative Bank are the only two state-owned banks of Sikkim to date with few financial institutions. As of 31.03.2020, around thirty-two banks are in operation in the state of Sikkim.

4.3 Establishment of the First State's Bank: State Bank of Sikkim

By 1856 AD, Messer Jetmull & Bhoraj had already started to function as a bank in the hills of Darjeeling, but Sikkim was still without the banking services. In 1898, John Claude White invited them to open their branch in Sikkim, and with the signing of an agreement between the Monarch and M/s Jetmull & Bhojraj, the latter was to act as the banker to the kingdom of Sikkim (SBS, 2018). The firm sent Bastiramji and Sreeram Sharma to start the branch in Sikkim. The firm opened several branches in the erstwhile kingdom, including one at Yatung, now in Tibet Autonomous Region of China (SBS, 2018). As a banker to the government of Sikkim, M/s Jetmull & Bhoraj were to collect government revenue and taxes and make payments on their behalf.

Being a single operator throughout the kingdom, M/s Jetmull & Bhoraj enjoyed a monopoly over Sikkim's banking market for a substantially long time. Several problems that were bound to arise with a monopoly of a single firm started to surface out by the middle of the 20th century. Even the firm's financial soundness came under the scanner mentioned in one of the letters written by the Principal Administrative Officer to Chogyal (King) to the then Indian Political Officer stationed at Gangtok. The government's suspicion over the firm's financial soundness kept on growing then.

As Sikkim was growing as a nation, the need for an organized banking system was felt, which would also help it reduce its dependency on a single firm handling all its financial affairs. Though the idea of opening up of state's bank was noble, lack of required expertise, skilled workforce and financial literacy among its people were significant hurdles to overcome. With a lot of efforts establishment of the state's bank with the name State Bank of Sikkim was finally successful with the passing of the State Bank of Sikkim Proclamation, 1968. In chapter-I, Clause 2 (d), the Proclamation recognizes Messer Jetmull & Bhojraj as the partnership firm, consisting of Sarvashri Davedayal Sukhani and Pratap Chandra Sukhani, carrying on business as bankers and merchants. Messer Jetmull & Bhojraj assisted the State Bank of Sikkim until the latter opened its branch. During this period, Sikkim had established High Court (1955), Sikkim Nationalized Transport (1944), and even Five-year plans (1954-60 & 1961-65) of the Government of India were in operation in Sikkim (Subba, 2008).

Establishing the State Bank of Sikkim was not an easy task as it required the mentorship of an institution already in the banking business. Sikkim's decision to unite with the United Commercial Bank to establish a state bank required permission of the

Government of India as it was a scheduled bank regulated by the Central bank of India. Reserve Bank of India initially did not agree to the request for Sikkim's association with United Commercial Bank Ltd. in the proposed opening of the state's bank. The matter was also taken up with the then Indian Foreign Secretary during his visit to Sikkim in 1966. With the interventions from all corners, including one from the Indian Political Officer to Sikkim, a meeting of officials representing the kingdom of Sikkim with the RBI was finally possible at Reserve Bank of India, Bombay, on January 11, 1967 (SBS, 2018).

The government of India did not want to dilute the supremacy it had enjoyed over the kingdom bestowed upon it by Indo Sikkim Treaty, 1950 (Sidhu, 2018). The result of this made the Chogyal agree to insert Article 19(4) in the said Proclamation, which reads as '*no provisions of the State Bank of Sikkim, Proclamation shall affect or abrogate Article IV of the Indo Sikkim Treaty signed on 1950, and if any provision(s) of the said Proclamation is/are contrary to or inconsistent with the Articles of the said Treaty, the provisions(s) shall not affect.'* The charter for the State Bank of Sikkim drafted by the Reserve Bank of India was more or less in line with the charters governing the Indian Scheduled banks (Nadkarni, 1968). The State Bank of India, which already existed from 1966, was restricted to carrying out the treasury work of the Government of India only (Government of Sikkim, 2013).

The State Bank of Sikkim Proclamation, 1968, which governs the bank's overall functioning, was published in Sikkim Darbar Gazette on June 24, 1968. The Proclamation contains VII chapters and 47 Articles. Proclamation advocates holding 51 percent of the bank's share, at all times, by the Government of Sikkim, 20 percent by United Commercial Bank, and balance to for issue to the individuals. The Chogyal finally inaugurated the State Bank of Sikkim on September 9, 1968, and the inauguration program witnessed the attendance of around 500 people (Government of Sikkim, 1968). Rai Bahadur T.D Densapa shouldered the responsibility of the bank's first Chairman with Sh. Gangadhar Atmaram Randive as its first Managing Director (SBS, 2018). State Bank of Sikkim, with more than 52000 accounts (State Bank of Sikkim, 2021), still functions without being regulated by the Indian Banking Regulation Act, 1961, as it enjoys constitutional protection extended by the Constitution of India through Article 371 (F) (Singh, 2018).

4.4 Establishment of HAMRO BANK: Sikkim State Cooperative Bank Ltd (SISCO Bank)

The state's Cooperative Societies Act governs the establishment of cooperative banks in the states. These are generally small-sized banks that function within a given area: state, district, or village. Like any other commercial bank, Cooperative banks are also regulated by the Reserve Bank of India.

The Sikkim State Cooperative Bank Ltd, having its Head Office at Gangtok, is the only cooperative bank of the state. It obtained registration from the Cooperation Department, Government of Sikkim in 1997. After obtaining a license from the Reserve Bank of India in 1997, it started its operation in 1999. SISCO, the apex state cooperative bank, is regulated by various agencies such as the National Bank for Agriculture and Rural Development (NABARD), the Reserve Bank of India (RBI), and the Co-operation Department of the government of Sikkim. The bank aims to raise deposits and share capital to maximize lending to member-cooperative societies and other individuals. It finances viable projects and schemes both in farm and non-farm sectors. SISCO Bank, the Apex State Cooperative bank, has the membership of primary cooperatives spread across the state. Till the end of the financial year 2019-20, around 393 primary cooperative Societies and 6371 individuals were their members (Government of

Sikkim, 2019). SISCO Bank Ltd presently has 14 branches and 14 ATMs installed at various places across the state (SISCO, 2020). The lone cooperative bank of the state has been a consistent performer and a recipient of several awards over the years.

4.5 Entry of Banks to Sikkim: Pre and Post Merger

Before the merger of Sikkim with the Republic of India in 1975, the only Indian bank to enter the erstwhile kingdom was the State Bank of India during the year 1966 (Government of Sikkim, 2013). Sikkim also established its bank, namely the State Bank of Sikkim, in 1968 with its head office at Gangtok. The nineties saw an entry of 5 Public Sector Banks to the state and the establishment of the first state's cooperative bank with the name SISCO by the Government of Sikkim. During the eighties, two more public sector banks entered the state of Sikkim, namely UCO Bank and Central Bank of India. Five banks to enter the state of Sikkim during the nineties were Bank of Baroda, Canara Bank, Vijaya Bank, Bank of India, and Union Bank of India. Around 14 banks comprising mainly the private banks entered the state during 2000-2010 in Sikkim. Post-2010, Sikkim saw the entry of 8 banks, with the last bank to enter the state as Karnataka Bank.

The banking history of Sikkim has been explored very little; therefore, Table 4.1 provides a list of banks with their date of entry to the state of Sikkim or establishment for reference for future studies.

Table 4.1
Entry and establishment of banks in Sikkim as of 31.03.2020

Sl. No.	Name of the bank	Date of opening of branches/establishment
1	SBI, GANGTOK	21.02.1966
2	STATE BANK OF SIKKIM	09.09. 1968
3	UCO, GANGTOK	03.06.1981
4	CBI, RONGLI	15.01.1982
5	BANK OF BARODA, GANGTOK	19.03.1993

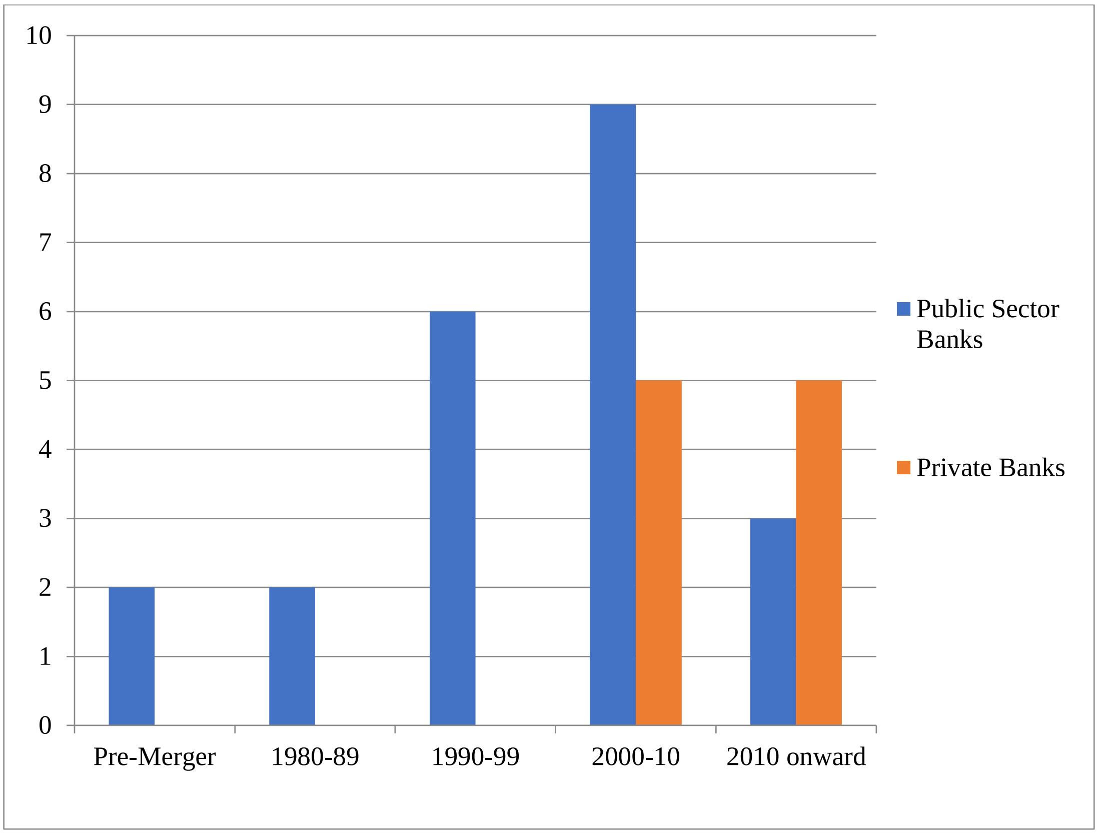
Sl. No.	Name of the bank	Date of opening of branches/establishment
6	CANARA BANK, GANGTOK	03.06.1993
7	VIJAYA BANK[1]	10.11.1993
8	BANK OF INDIA GANGTOK	13.06.1994
9	SISCO GTK	12.12.1998
10	UNION BANK, GANGTOK	01.04.1999
11	PUNJAB NATIONAL BANK, GANGTOK	18.09.2000
12	AXIS BANK, GTK	02.04.2002
13	OBC, GANGTOK	12.06.2003
14	IDBI BANK, GANGTOK	20.08.2004
15	CORPORATION BANK	10.12.2004
16	HDFC BANK (MG Marg)	22.12.2004
17	ALLAHABAD BANK, GANGTOK	07.01.2005
18	INDUSIND BANK, TADONG	14.03.2005
19	SYNDICATE BANK, GANGTOK	26.03.2006
20	IOB, GANGTOK	11.04.2006
21	UNITED BANK, DEORALI	27.06.2006
22	ANDHRA BANK	11.01.2007
23	ICICI BANK, GANGTOK	23.03.2007
24	DENA BANK[2]	01.05.2009
25	BANK OF MAHARASHTRA	16.09.2010
26	YES BANK	25.01.2011
27	PUNJAB & SIND BANK	15.07.2013
28	KOTAK MAHINDRA BANK GANGTOK	15.03.2014
29	BHARATIYA MAHILA BANK TADONG[3]	31.03.2014
30	SOUTH INDIAN BANK LTD	01.12.2014
31	BANDHAN BANK LTD., GANGTOK	23.09.2015
32	KARNATAKA BANK	18.05.2017

Source: SLBC, Sikkim

[1]Now Merged with the Bank of Baroda
[2]Now Merged with the Bank of Baroda
[3]Now merged with the State Bank of India

Figure 4.1

Entry/ establishment of Banks to/in the state of Sikkim in different decades



Source: Created from SLBC, Sikkim data

4.6 Bank Branches of various banks in the State of Sikkim

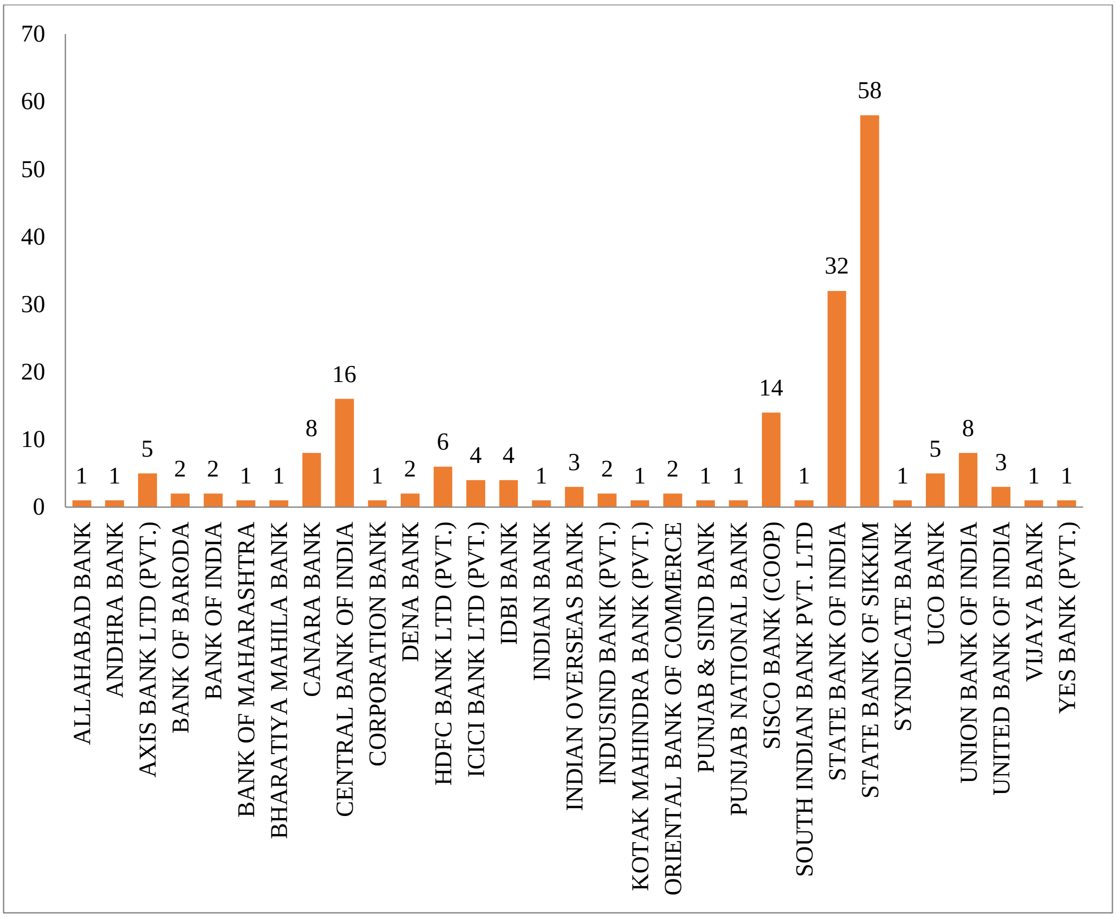
The number of bank branches reflects the presence of banks in a market. The volume of business and number of branches are generally positively correlated. A study of details of branches of various banks given in table 4.2 reveals that the State Banks of Sikkim with 52 branches is at the top of the table, followed by State Bank of India with 32 branches. Central Bank of India stands third, and SISCO bank is in the fourth position based on the number of bank branches. HDFC bank with six branches is at the top among private banks, followed by AXIS Bank with five branches. It is pertinent to point out that only one district, i.e., East District, has around 56 percent of the banks' branches.

Table 4.2
District wise Bank Branches as on 31.03.2020

Name of the Bank	No. of Branches District-Wise North	East	South	West	Total	Rank
STATE BANK OF SIKKIM	7	26	7	12	52	1st
STATE BANK OF INDIA	5	16	9	2	32	2nd
CENTRAL BANK OF INDIA	1	8	1	6	16	3rd
SISCO BANK (COOP)	1	5	4	4	14	4th
CANARA BANK	1	4	2	1	8	5th
UNION BANK OF INDIA	1	4	2	1	8	5th
HDFC BANK LTD (PVT.)	0	4	2	0	6	6th
AXIS BANK LTD (PVT.)	0	3	1	1	5	7th
UCO BANK	0	4	1	0	5	7th
ICICI BANK LTD (PVT.)	0	2	1	1	4	8th
IDBI BANK	1	2	1	0	4	8th
INDIAN OVERSEAS BANK	0	2	1	0	3	9th
UNITED BANK OF INDIA	0	2	1	0	3	9th
BANK OF BARODA	0	2	0	0	2	10th
BANK OF INDIA	0	2	0	0	2	10th
DENA BANK	0	1	1	0	2	10th
INDUSIND BANK (PVT.)	0	1	1	0	2	10th
ORIENTAL BANK OF COM.	0	2	0	0	2	10th
ALLAHABAD BANK	0	1	0	0	1	11th
ANDHRA BANK	0	1	0	0	1	11th
BANK OF MAHARASHTRA	0	1	0	0	1	11th
BHARATIYA MAHILA BANK	0	1	0	0	1	11th
CORPORATION BANK	0	1	0	0	1	11th
INDIAN BANK	0	1	0	0	1	11th
KOTAK MAHINDRA BANK	0	1	0	0	1	11th
PUNJAB & SIND BANK	0	1	0	0	1	11th
PUNJAB NATIONAL BANK	0	1	0	0	1	11th
SOUTH INDIAN BANK (PVT)	0	1	0	0	1	11th
SYNDICATE BANK	0	1	0	0	1	11th
VIJAYA BANK	0	1	0	0	1	11th
YES BANK (PVT.)	0	1	0	0	1	11th
TOTAL (Nos.)	**17**	**103**	**35**	**28**	**183**	
TOTAL(%)	**9**	**56**	**19**	**15**	**100**	

Source: SLBC, Sikkim

Figure 4.2
Bank Branches of various banks in Sikkim as on 31.03.2020



Source: Created from SLBC, Sikkim data

4.7 ATM Network of various banks in Sikkim

Automated Teller Machine (ATM) service is among the essential services provided by the banks, and it acts as bank cashiers. Like a bank’s teller, it dispenses and accepts cash to and from the user’s bank account. It helps the holder to do away with the hassle of carrying cash. John Shepherd-Barron invented the very first ATM in 1960, who was working in De La Rue Instruments as managing director (Tadesse, B., 2018). ATM’s network has increased manifold in our country and so in the state of Sikkim. Table 4.3 suggests that East Sikkim has the highest number of ATM installations, and North Sikkim has the lowest installations of ATMs.

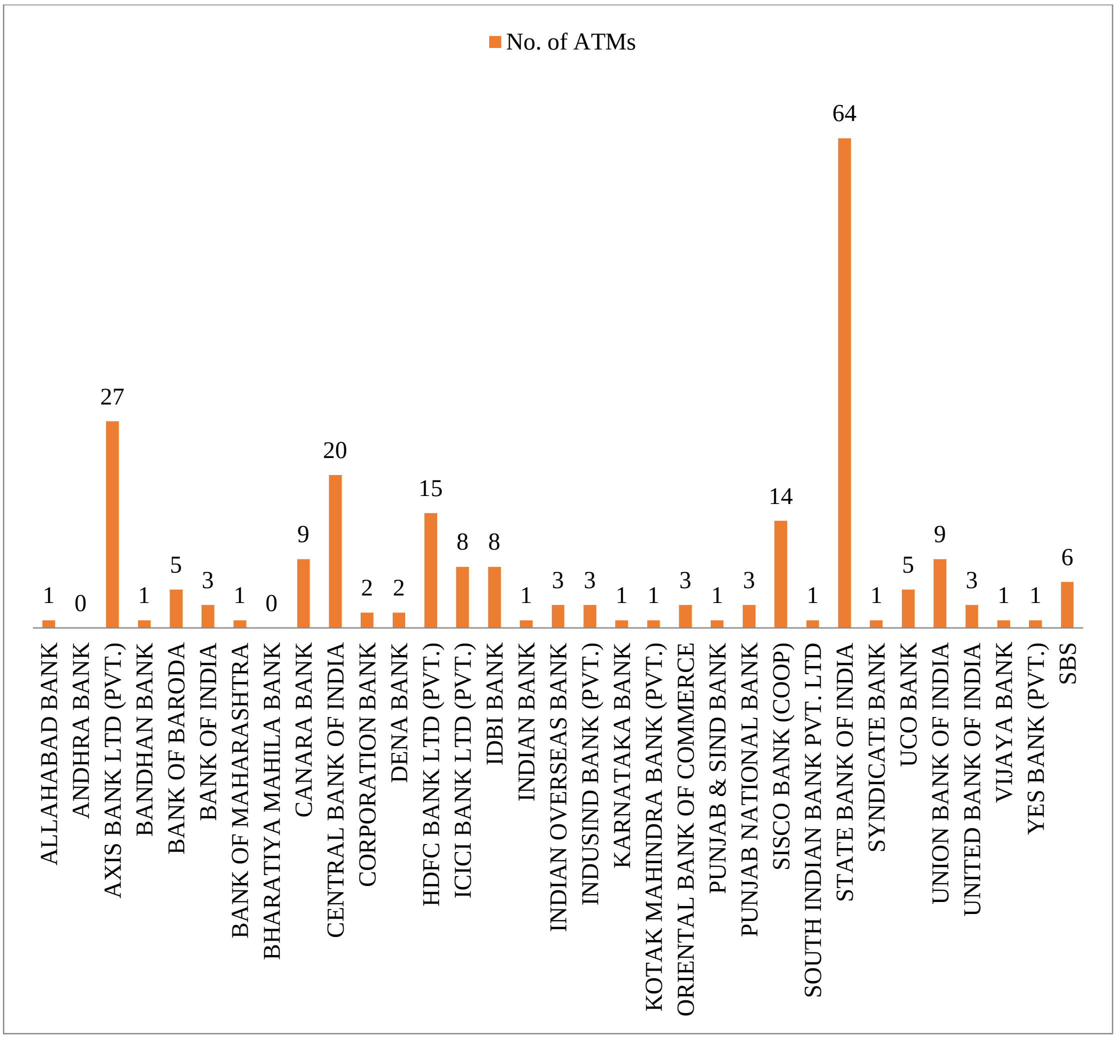
Table 4.3
ATM installation by various banks in Sikkim as on 31.03.2020

Name of Bank	No. of ATMs					Rank
	North	East	South	West	Total	
STATE BANK OF INDIA	5	43	12	4	64	1st
AXIS BANK LTD (P)	1	21	4	1	27	2nd
CENTRAL BANK OF INDIA	2	9	2	7	20	3rd
HDFC BANK LTD (P)	0	12	3	0	15	4th
SISCO BANK (COOP)	1	5	4	4	14	5th
CANARA BANK	1	5	2	1	9	6th
UNION BANK OF INDIA	1	4	3	1	9	6th
ICICI BANK LTD (P)	0	5	3	0	8	7th
IDBI BANK	2	4	1	1	8	7th
SBS	1	3	1	1	6	8th
BANK OF BARODA	0	5	0	0	5	9th
UCO BANK	1	4	0	0	5	9th
BANK OF INDIA	0	3	0	0	3	10th
INDIAN OVERSEAS BANK	0	2	1	0	3	10th
INDUSIND BANK (P)	0	2	1	0	3	10th
OBC	0	3	0	0	3	10th
PUNJAB NATIONAL BANK	0	2	1	0	3	10th
UNITED BANK OF INDIA	0	2	1	0	3	10th
CORPORATION BANK	0	2	0	0	2	11th
DENA BANK	0	1	1	0	2	11th
ALLAHABAD BANK	0	1	0	0	1	12th
BANDHAN BANK	0	1	0	0	1	12th
BANK OF MAHARASHTRA	0	1	0	0	1	12th
INDIAN BANK	0	1	0	0	1	12th
KARNATAKA BANK	0	1	0	0	1	12th
KOTAK MAHINDRA BANK (P)	0	1	0	0	1	12th
PUNJAB & SIND BANK	0	1	0	0	1	12th
SOUTH INDIAN BANK (P)	0	1	0	0	1	12th
SYNDICATE BANK	0	1	0	0	1	12th
VIJAYA BANK	0	1	0	0	1	12th
YES BANK (P)	0	1	0	0	1	12th
TOTAL (Nos.)	**15**	**148**	**40**	**20**	**223**	
TOTAL (%)	**7**	**66**	**18**		**100**	

Source: SLBC, Sikkim

Figure 4.3

ATM installation by various banks in Sikkim as on 31.03.2020



Source: Created from SLBC, Sikkim data

State Bank of India, with 64 ATMs, outnumbers all the other banks present in Sikkim. Central Bank of India stands second in public sector banks with 20 ATMs. AXIS Bank, among private banks, stands tall with the installation of 27 ATMs. The presence of only six ATMs despite having the highest nos. of branches highlights the need for improvement in the techno-driven services of the State Bank of Sikkim. East District accounts for 66 percent of the ATM installation, whereas North District records only seven percent of the total ATMs installed in the state.

4.8 Business of the banks in Sikkim

Business for a bank means a total of credit and deposit. The volume of the business is essential for the banks as it is directly related to the profit they make. The size of a bank's business reflects its operational efficiency, and operational efficiency indicates the efficiency of the management. How efficiently the bank management can garner deposits and lend profitably can be understood with the volume of the bank's business. Further, the credit to deposit ratio (CD ratio), also known as a loan-to-deposit ratio (LDR), indicates the volume of deposits the bank can convert into earning assets. It compares the bank's total loans to its total deposits for the same period (Sethi & Bajaj, 2013). RBI does not stipulate a minimum or maximum level, but banks with too high a CD ratio hint at insufficient liquidity to cover any unforeseen fund requirement. On the contrary, if the ratio is on the lower side, the bank may not earn as much as it could earn. Table 4.4 exhibits the volume of business of various banks present in Sikkim and their credit to deposit ratio.

Table 4.4
Business of the Banks in Sikkim as on 31.03.2020

(Rupees in Lakhs)

Name of the Bank	Deposit (Rs.)	Credit (Rs.)	Total Business (Rs.)	Business in (%)	C:D Ratio (%)
State Bank of India	276683.9	182914.4	459598.3	27.00	66.10
Central Bank of India	30961.37	7463.58	38424.95	2.26	24.10
UCO Bank	18831.92	3763.08	22595	1.33	20.00
Canara Bank	51620.16	13587.79	65207.95	3.83	26.30
Bank of Baroda	39838.83	24915.76	64754.59	3.80	62.50
Bank of India	15681.06	2122.36	17803.42	1.05	13.50
Union Bank of India	21302.97	9772.62	31075.59	1.83	45.90
Punjab National Bank	11868.78	7126	18994.78	1.12	60.00
Oriental Bank of Comm.	1801	732.18	2533.18	0.15	40.70
Corporation Bank	3554.39	2067.8	5622.19	0.33	58.20
IDBI Bank	25797.26	6261.21	32058.47	1.88	24.30
Allahabad Bank	5529.62	1726.98	7256.6	0.43	31.20

United Bank of India	5362.89	7648.81	13011.7	0.76	142.60
Indian Overseas Bank	1920.17	1748.82	3668.99	0.22	91.10
Syndicate Bank	13355.56	937.15	14292.71	0.84	7.00
Andhra Bank	1915.23	1215.42	3130.65	0.18	63.50
Bank of Maharashtra	1396.42	489.96	1886.38	0.11	35.10
Total of PSBs[4]	**527421.53**	**274493.9**	**801915.4**	**47.11**	**52.90**
AXIS Bank Ltd.	12170.91	6341.11	18512.02	1.09	52.10
HDFC Bank	113519	27121.55	140640.6	8.26	23.90
ICICI Bank	47333.2	5128.53	52461.73	3.08	10.80
YES Bank	1636.41	308.66	1945.07	0.11	18.90
Kotak Mahindra Bank	5276.04	14.95	5290.99	0.31	0.30
Bandhan Bank	6269	7759	14028	0.82	123.80
Karnataka Bank Ltd.	1625	2057	3682	0.22	126.60
Total of Pvt. Banks	**187829.56**	**48730.8**	**236560.4**	**13.90**	**25.90**
SISCO Bank Ltd.	103317.06	69240.43	172557.5	10.14	67.00
State Bank of Sikkim	271742.04	219381	491123.1	28.85	80.70
Total of SoBsS[5]	**375059.1**	**288621.5**	**663680.6**	**38.99**	**77.00**
GRAND TOTAL	**1090310.2**	**611846.2**	**1702156**	**100.00**	**56.10**

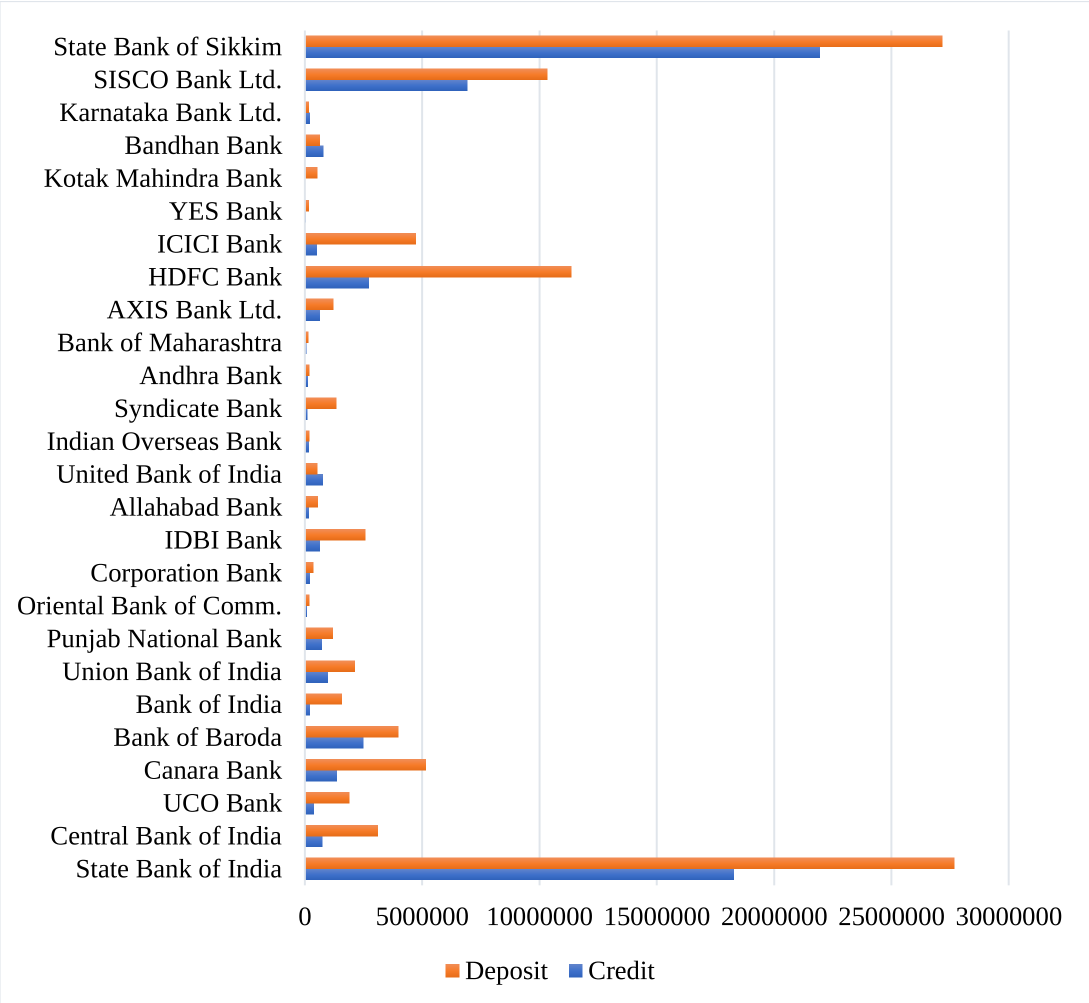
Source: SLBC, Sikkim

Public sector banks held 47.11 percent of the total business in Sikkim, with State Bank of India individually contributing more than 55 percent of it during 2019-20. Private sector banks only accounted for 13.90 percent of the total business. Among private banks, HDFC Bank, with 8.26 percent of the total business, is far ahead of others. Sikkim's state-owned banks accounted for 38.99 percent of the total business during 2019-20. The two largest banks in Sikkim in terms of volume of business, namely State Bank of Sikkim and State Bank of India, accounted for 56.00 percent of the total business in Sikkim. A study of banking group-wise credit to deposit ratio indicates that the state-owned banks of Sikkim lent maximum compared to others. State-owned banks lent 77.00 percent of their deposits, public sector banks lent 52.90 percent of their deposits, and private banks lent only 25.90 percent of their deposits during the year.

[4]PSBs: Public Sector banks
[5]SoBsS: State-owned banks of Sikkim

State Bank of India, with 32 branches, is ahead of the State Bank of Sikkim, having 52 branches in terms of deposits. It is noteworthy to mention that from 30 plus banks present in the state of Sikkim, SBI and SBS alone shares 50.30 percent of the total deposits and 65.75 percent of the total lending in the state Sikkim. Credit plays a crucial role in creating additional purchasing power in the hands of the people; hence, banks need to lend sufficiently from their deposits to keep the economy growing. Though there is no stipulated CD ratio, the range of 65 percent to 75 percent is generally considered an ideal CD ratio. A bank-wise study of the CD ratio reveals that only SISCO Bank and State Bank of India fall in an ideal range.

Figure 4.4
Credit and Deposits of the various Banks in Sikkim



Source: Created from SLBC, Sikkim data

4.9 Conclusions

Sikkim does not have a very long banking history. The money economy itself is believed to have come only with the entry of the British government during the 18th century. State Bank of Sikkim, established before the merger of Sikkim with India, is still out of the purview of the RBI regulations as the old laws protect it. Though the deposits figure of the State Bank of Sikkim is encouraging, a significant portion of its deposits comes from the Government of Sikkim. The volume of deposits of the SBS with 52 branches is equal to SBI having 32 branches which hints at a low per branch business. SBS needs to improvise on its I.T. services to garner more business, especially from the individuals and the business firms. It also seriously needs to raise its capital which presently stands severely low. Though SISCO bank has been performing well, it may plan to expand its business by opening more branches in areas with the prospect. Leaving few banks, all banks present in the state need to improve their lending back to the society.

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CHAPTER 5

Analysis of Financial Performance

5.1 Introduction

To review the existing banking supervision system, the Reserve Bank of India set up a working group under the chairmanship of Shri. S. Padmanaban in the year 1995. Shri. S. Padmanaban leading the committee, felt an urgent need for a shift in the attention of the Central bank of India towards essential factors indicating the overall health of the financial institutions viz financial soundness, Managerial competence, operational efficiency, and firmness of the bank. The committee, in its report, recommended the adoption of the CAMEL rating system for on-site assessment of the Indian banks (Sudha, 2014). Reserve Bank of India conducts a periodical on-site examination of the banks using the CAMEL model.

The CAMEL rating recommended by the Padmanaban committee to assess the Indian banks was developed initially by the US Federal Regulators in the early 1970s (Barr et al., 1994). The CAMEL was adopted later on November 13, 1979, by the Federal Financial Institution Examination Council and the National Credit Union Administration sometime in October 1987 (Dang, 2011). CAMEL rating was to act as a structured tool in the hand of Federal Regulators to assess the health of the financial institutions. In the CAMEL rating system, the examiner assigns an overall rating to the banks under examination based on their performance in Capital adequacy, Asset quality, Management quality, Earnings ability, and Liquidity position. Owing to its simplicity and use by federal authorities, the CAMEL rating system went widespread and started to be employed worldwide (Ishaq et al., 2016). The sixth element, namely sensitivity, was added in the CAMEL, making it CAMELS by the Federal Deposit

Insurance Corporation (FDIC) in the year 1997 to ensure assessment of the overall health of the financial institutions (Boateng, 2019)

In this chapter, we assess the Capital Adequacy, Assets Quality, Management Efficiency, Earning Quality and Liquidity of the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank Ltd (SISCO). In addition to assessing the bank's financial performance through the CAMEL model, we also try to understand the trends in various variables over 2011-12 to 2019-20.

5.2 Capital Adequacy

Capital adequacy indicates the reasonable level of the capital expected to be maintained by the banks to balance various risks arising from internal and external factors such as credit, market, and operational risk. It enables the financial institutions to absorb the potential losses arising from various risks, as mentioned above and helps protect the interest of debt holders of the institution (Dang, 2011). Maintaining adequate capital is critical for every financial institution as the confidence of its customers is substantially affected by the same. It also affects a bank's performance in many ways, like opening new branches, lending decisions in high-risk but profitable areas, strengthening the workforce through fresh recruitment, and business diversification through specially designated branches or subsidiaries (Sudha, 2014).

We use the following ratios to assess the banks' capital adequacy under study based on the previous studies. These ratios reflect the inner strength of the banks to stand steady in the days of the crisis. The selection of these ratios has been made based on the previous studies done by various researchers and regulators across the globe.

1. Capital Adequacy Ratio (CAR) (Sudha, 2014);
2. Debt-equity Ratio (Ferrouhi, 2014); and
3. Equity Capital to Total Assets Ratio (Dang, 2011)

Apart from analyzing Capital Adequacy through various ratios, we have also analyzed the trend of equity capital, reserve & surplus, total capital (Equity plus reserve & surplus), and debt of the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank Ltd. (SISCO), for the period of 2011-12 to 2019-20. We present the trends in various variables through graphs and tables.

5.2.1 Trends in Share Capital

Share Capital is the portion of a bank's equity raised by the issue of shares to shareholders. The shareholders are the actual owner of the banks, and they participate in the overall bank's management. Share capital does not create any charge on the bank's assets, and the shareholders take part in the bank's profit by way of the dividend. For banks under study, the shareholders consist of individuals, cooperative societies, banks, and the Government of Sikkim. The higher the share capital, the better the bank's financial health.

5.2.1.1 Authorized Share Capital:

Authorized capital is the maximum level of capital a bank can raise through the issue of shares to the shareholders. It is also known as nominal or registered capital. Trends in the authorized capital of the banks under study may be seen in table 5.1 and figure 5.1.

Table 5.1
Trends in Authorized Share Capital

(Rupees in Lakhs)

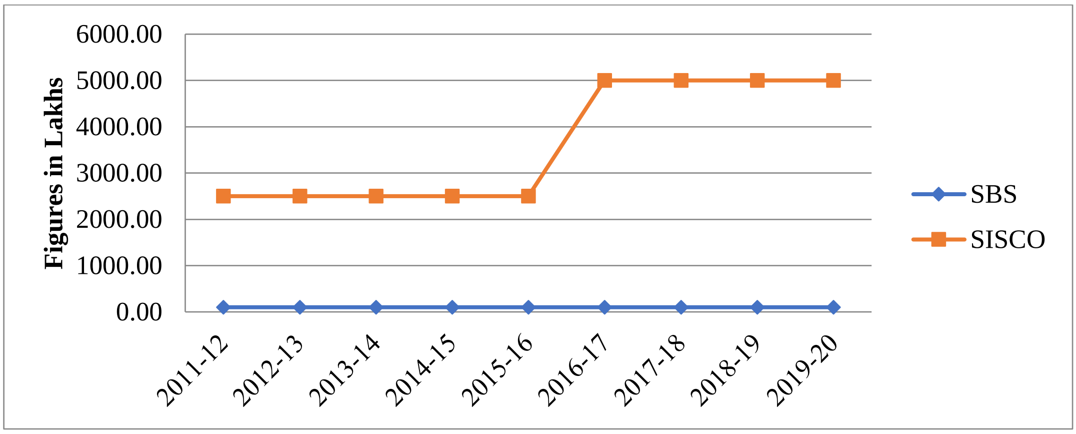
Year	SBS		SISCO	
	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %
2011-12	100.00	-	2500.00	-
2012-13	100.00	0.00	2500.00	0.00
2013-14	100.00	0.00	2500.00	0.00
2014-15	100.00	0.00	2500.00	0.00
2015-16	100.00	0.00	2500.00	0.00
2016-17	100.00	0.00	5000.00	100.00
2017-18	100.00	0.00	5000.00	0.00

Year	SBS		SISCO	
	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %
2018-19	100.00	0.00	5000.00	0.00
2019-20	100.00	0.00	5000.00	0.00
CAGR %	0		8	
MEAN	100.00		3750.00	
MEDIAN	100.00		3750.00	
STD. DEV	0		1317.61	
MIN.	100.00		2500.00	
MAX.	100		5000	

Source: Computed using data from annual accounts of SBS & SISCO

The State Bank of Sikkim, established in the erstwhile kingdom during 1968, is yet to revise its authorized share capital. The flat line of the State Bank of Sikkim in figure 5.1 shows no change in the authorized share capital during the period under study. Similarly, the authorized share capital of SISCO also remained unchanged from the date of its establishment till 2015-16. During 2016-17, SISCO had a 100 percent increase in their authorized share capital, increasing it from Rs. 2500.00 lakhs to Rs. 5000.00 lakhs. Post-2016-17, SISCO records no change in their authorized share capital. In comparison, the SISCO's authorized capital was 25 times higher than that of SBS till 2015-16 and 50 times higher from 2016-17 onwards. SISCO records a cumulative average growth rate (CAGR) of 8 percent per annum, whereas the SBS has recorded no increase during the study period.

Figure 5.1
Trends in Authorized Share Capital



Source: Created using data from annual accounts of SBS & SISCO

5.2.1.2 Subscribed Capital:

Subscribed capital is the part of issued capital that has been subscribed to by the shareholders. If fully paid up, subscribed capital is the actual money that a bank has drawn from its shareholders. The trend in the subscribed share capital of both the banks is in the table and figure 5.2.

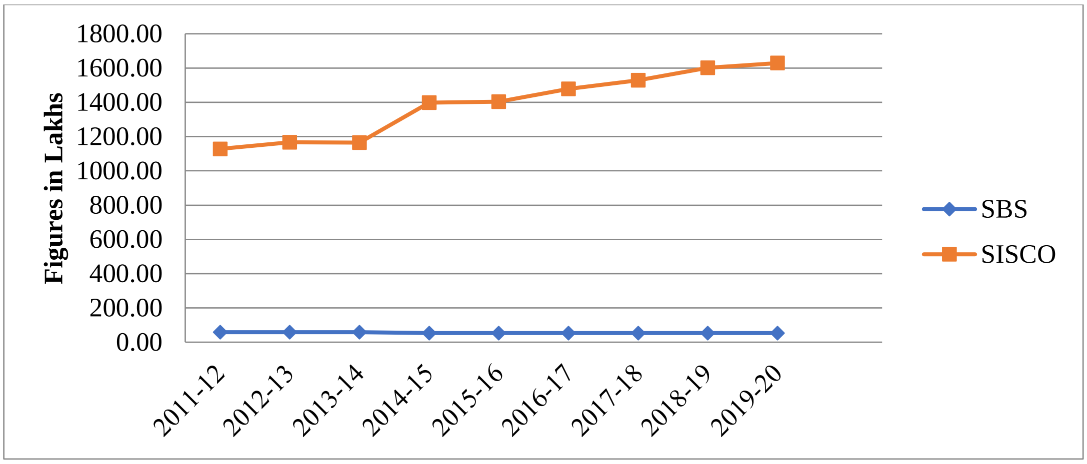
Table 5.2
Trends in Subscribed Share Capital

(Rupees in Lakhs)

Year	SBS		SISCO	
	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %
2011-12	58.38	-	1128.15	-
2012-13	58.38	0.00	1167.06	3.45
2013-14	58.38	0.00	1164.37	-0.23
2014-15	53.38	-8.56	1398.09	20.07
2015-16	53.38	0.00	1404.28	0.44
2016-17	53.38	0.00	1478.95	5.32
2017-18	53.38	0.00	1528.63	3.36
2018-19	53.38	0.00	1600.94	4.73
2019-20	53.38	0.00	1628.75	1.74
CAGR%	-0.99		4.16	
MEAN	55.05		1388.80	
MEDIAN	53.38		1404.28	
STD. DEV	2.50		193.02	
MIN.	53.38		1128.15	
MAX.	58.38		1628.754	

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.2
Trends in Subscribed Share Capital



Source: Created using data from annual accounts of SBS & SISCO

The subscribed capital of the SBS also remained unchanged from its inception till 2013-14. During 2014-15, the bank refunded Rs. 5,00,000/- to the UCO Bank on failure to pay calls-in-arrear of Rs. 5/- each on 10,000 shares held by them. The authorized capital of the SBS itself is tiny, and a subscription of only 53.38% reflects a poor effort on the part of the bank to improvise its capital. SISCO, which had a subscribed capital of Rs. 1128.15 lakhs during 2011-12 saw an increase of 3.45 percent during 2012-13, which got reduced by 0.23 percent in the subsequent financial year. SISCO saw a generous growth of 20.07 percent in its subscribed capital during 2014-15, mainly due to increased individual subscriptions. During 2015-16 a nominal increase of 0.44 percent was recorded, followed by 5.32 percent during 2016-17, 3.36 percent during 2017-18, 4.73 percent during 2018-19, and 1.74 percent during 2019-20.

Shareholders of the SISCO bank include individuals, societies, and the state government of Sikkim, whereas the government of Sikkim holds total shares of the SBS. SBS has a negative cumulative growth rate (CAGR) of 0.99%, whereas SISCO's cumulative growth rate (CAGR) during the last nine years is 4.16%. The average business of the SBS for the last nine years is 135 percent more as compared to that of SISCO bank, while its paid-up capital is just 3.28 percent of SISCO bank's paid-up capital.

5.2.2 Trends in Reserve & Surplus

Reserve & Surplus are the cumulative retained earnings of the bank and forms a part of the shareholder's equity. Banks set aside a part of their profit as reserve & surplus to meet specific purposes like covering bad debts, purchasing fixed assets, expanding bank branches, bringing technological advancement, and some reserves are to comply with the statutory requirements. Banks maintain their reserve fund based on the provisions of the Banking Regulation Act and guidelines issued from time to time by the Reserve bank of India. Reserve and Surplus consist of the general reserve, capital reserve, capital reserve, and dividend reserve. We present the trends in reserve & surplus of both the banks through the table & figure 5.3.

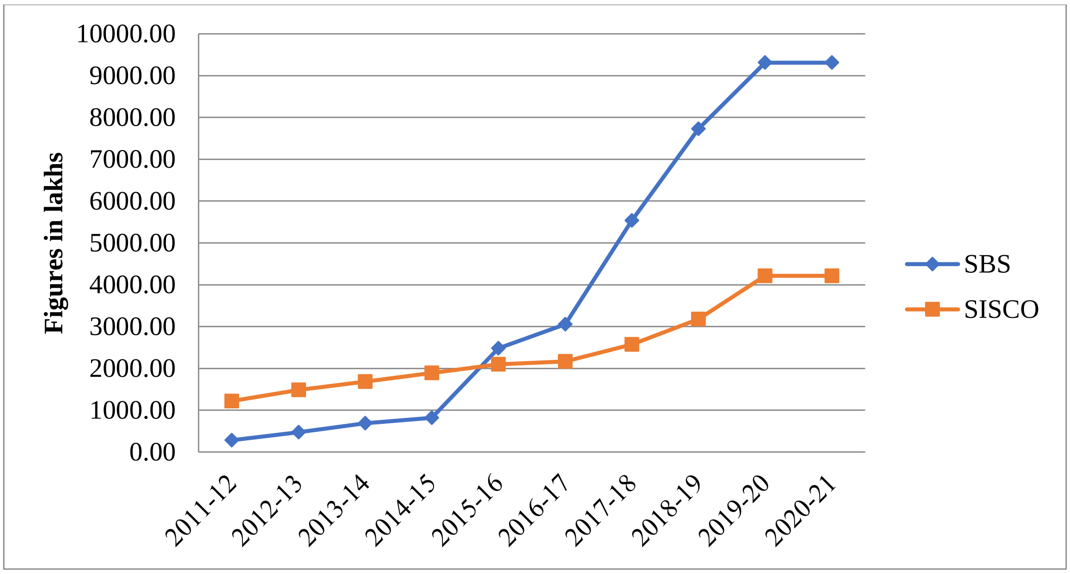
Table 5.3
Trends in Reserve & Surplus

(Rupees in Lakhs)

Year	SBS		SISCO	
	Amount (Rs.)	**Growth %**	**Amount (Rs.)**	**Growth %**
2011-12	282.42	-	1218.62	-
2012-13	476.77	68.82	1485.78	21.92
2013-14	689.51	44.62	1680.92	13.13
2014-15	815.18	18.23	1886.85	12.25
2015-16	2482.92	204.59	2099.16	11.25
2016-17	3056.22	23.09	2168.09	3.28
2017-18	5533.55	81.06	2568.99	18.49
2018-19	7724.51	39.59	3175.85	23.62
2019-20	9309.43	20.52	4213.90	32.69
CAGR%	47.46		14.78	
MEAN	3374.50		2277.57	
MEDIAN	2482.92		2099.16	
STD. DEV	3380.47		931.53	
MIN.	282.42		1218.62	
MAX.	9309.43		4213.90168	

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.3
Trends in Reserve & Surplus



Source: Created using data from annual accounts of SBS & SISCO

The SBS had a meagre reserve & surplus till 2011-12 but recorded an improvement from 2012-13 onwards. During 2012-13 it saw an increase of around 68.82 percent; during 2013-14 and 2014-15, it recorded an increase of 44.62 percent and 18.23 percent, respectively. The unprecedented increase of 204.59 percent in the reserve & surplus recorded by the SBS in 2015-16 is mainly due to an increase in their revenue reserve of Rs. 1496.99 lakhs. Post-2015-16 also, the reserve and surplus of the SBS increased at an encouraging pace, which led it to reach Rs. 9309.43 lakhs by 2019-20. On the other hand, SISCO bank recorded steady growth in the reserve and surplus throughout the last nine years. During 2012-13, SISCO bank witnessed a growth of 21.92 percent in its reserve & surplus, 13.13 percent during 2013-14, 12.25 percent during 2014-15, 11.25 percent during 2015-16, 3.28 percent during 2016-17, 18.49 percent during 2017-18 and 23.62 percent during 2018-19. The bank recorded the highest growth of 32.69 percent in their reserve and surplus during 2019-20.

State Bank of Sikkim (SBS), which had 4.3 times lesser reserve & surplus than that of SISCO in 2011-12, was able to take the lead from 2015-16 onwards. The reserve & surplus of the SBS now stands 2.2 times higher than that of SISCO. SBS recorded a higher cumulative growth rate (CAGR) of 47.4 percent per annum compared to 14.78 percent per annum of SISCO during the study period.

5.2.3 Trends in Net Worth

The amount by which assets exceed the liabilities is the Net worth. Net worth includes Equity Capital and Reserve & Surplus (Bothra & Purohit, 2018). In simple words, we can understand Net Worth as the difference between what we own and what we owe. Net worth indicates an institution's financial position at a certain point in time. It is a measure of the wealth of an institution. Higher the net-worth better would be the financial standing of an institution. For banks, net worth is significant as it gives a feeling of confidence to the customers. It provides a bank fund to absorb unexpected losses and grow in the future. Table and figure 5.4 present the trends in net worth over the study period of Sikkim's state-owned banks.

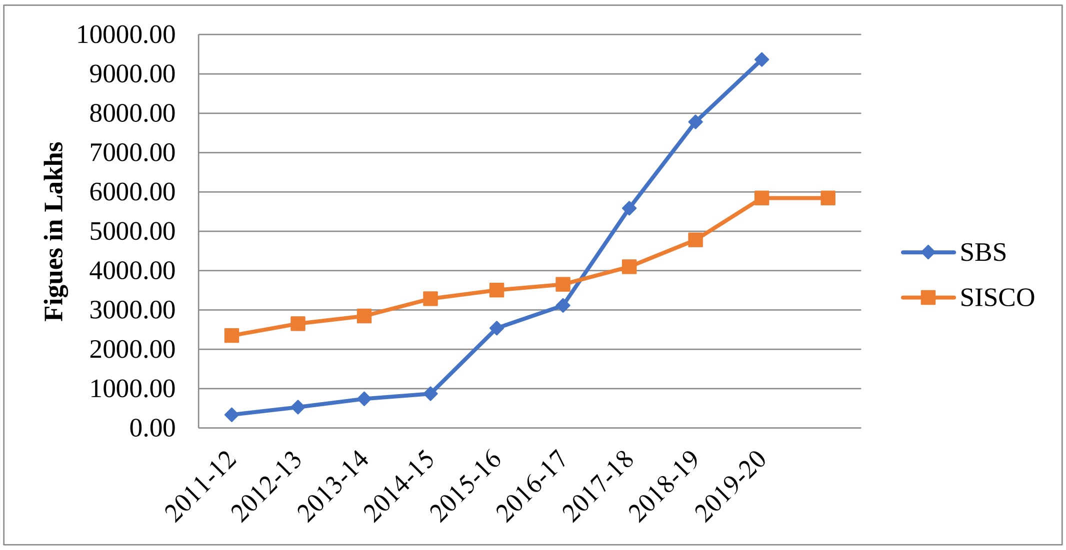
Table 5.4
Trends in Net Worth

(Rupees in Lakhs)

Year	SBS		SISCO	
	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %
2011-12	335.80	-	2346.77	-
2012-13	530.15	57.88	2652.84	13.04
2013-14	742.89	40.13	2845.30	7.25
2014-15	868.56	16.92	3284.94	15.45
2015-16	2536.30	192.01	3503.43	6.65
2016-17	3109.60	22.60	3647.04	4.10
2017-18	5586.93	79.67	4097.62	12.35
2018-19	7777.89	39.22	4776.79	16.57
2019-20	9362.81	20.38	5842.66	22.31
CAGR%	44.74		10.67	
MEAN	3427.88		3666.38	
MEDIAN	2536.30		3503.43	
STD. DEV	3380.47		1105.12	
MIN.	335.80		2346.77	
MAX.	9362.81		5842.65	

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.4
Trends in Net Worth



Source: Created using data from annual accounts of SBS & SISCO

Table 5.4 suggests that both the banks have grown over the last nine years in terms of their net worth. SBS's growth during 2012-13 was 57.88 percent, which grew by 40.13 percent in 2013-14, and during 2014-15 by 16.92 percent. Like in the case of reserve & surplus, SBS recorded the highest growth of 192.01 percent during 2015-16 which followed by yearly growth of 22.60 percent, 79.60 percent, 39.22 percent & 20.38 percent during 2016-17, 2017-18, 2018-19 & 2019-20 respectively. In the case of SISCO bank, we can observe an increasing trend in its net worth. The net worth of the SISCO bank was more than that of SBS till 2016-17; however, from 2017-18 onward, SBS's is in a leading position. Though not as large as SBS in absolute value, SISCO Bank's growth in net worth had been consistent throughout the study period.

5.2.4 Capital Adequacy Ratio (CAR)

Whether a bank's capital is adequate or not is determined based on the bank's total risk-weighted assets. The banks in India are to maintain their capital adequacy ratio (CAR) based on the advisory issued by the Reserve Bank of India from time to time. The ratio to be maintained in various countries varies based on what is being prescribed by their banking regulator. We calculate the CAR by dividing the sum of Tier-I and Tier-II capitals by the aggregate of risk-weighted assets (RWA). Tier-I capital includes equity capital and free reserves. Tier-II capital encompasses subordinate debt of 5-7 years' tenure, hybrid debt capital instruments, revaluation reserves, undisclosed reserves, and cumulative perpetual preference shares. As against the 8 percent CAR set by the Bank for International Settlement (BIS) (Dang, 2011), the Reserve Bank of India has prescribed a CAR of 9 percent for Indian banks (Bothra & Purohit, 2018). Higher CAR indicates a more substantial bank in terms of capital adequacy. Symbolically, Capital Adequacy Ratio (CAR) is arrived at using the following formula.

$$CRAR = \frac{Tier\ 1\ Capital + Tier\ 2\ Capital}{\text{Risk} - \text{weighted assets}}$$

The CRAR for the State Bank of Sikkim is calculated from 2014-15 onwards only. Before 2014-15, the bank did not calculate their CRAR. As its calculation requires lots of essential inputs, which are generally not available in the annual accounts in the form and to the extent it requires, calculation of CRAR was not possible. To overcome the problem of unavailability of CRAR for three years, i.e., 2011-12, 2012-13 & 2013-14 and SISCO for the year 2011-12, Excel's Statistical formula, namely TREND, has been used to predict the unknown CRAR for those years. TREND function uses equation 5.1 to calculate the unknown variables.

$$y = mx + b \qquad \text{Equation - 5.1}$$

Where,

y=known Capital variables

x=known CAR variables

m= slope of the line

b=intercept of the line

Before applying the TREND to predict the unknown CARs, we tried to establish the correlation between known CAPITAL (2014-15 to 2019-20) and CAR (2014-15 to 2019-20) through equation 5.2. The result of 0.901783 substantiated a strong correlation between CAPITAL (X) and CAR (Y).

$$Correl(X,Y) = \frac{\sum (x-\bar{x})(y-\bar{y})}{\sqrt{\sum (x-\bar{x})^2 \sum (y-\bar{y})^2}} \qquad \text{Equation - 5.2}$$

Where, x and y are the samples means AVERAGE (array1) and AVERAGE (array2).

Table and figure 5.5 present the trend in the Capital Adequacy Ratio of Sikkim's state-owned banks. Figure 5.5 reveals the difference between the two banks in their CAR. SISCO has maintained its capital against the risk-weighted assets above the level of 9 percent prescribed by the Reserve Bank of India throughout the last nine years. On the other hand, SBS had a very low CAR throughout the study, best being 6.29 percent during 2018-19, which is still less than the minimum level of 9 percent prescribed by the Reserve Bank of India. Though at a slower rate, the CAR of the SBS recorded some growth post-2014-15. Whereas, SISCO bank records fluctuating CAR with the lowest CAR being 9.08 percent during 2016-17 and highest being 40.83 percent during 2019-20.

SISCO bank tops the table with an average CAR of 20.51 percent for the last nine years. With an average Capital Adequacy Ratio of 2.46 percent, SBS is nowhere near the SISCO Bank. Low CAR of the SBS seeks the immediate attention of the management. Deteriorating CAR if not taken care of on time may turn out to be fatal for the bank's survival. The lower CAR of the SBS indicates its weaker inner strength to absorb losses arising from risk assets, and it reduces the possibility for expansion in the future.

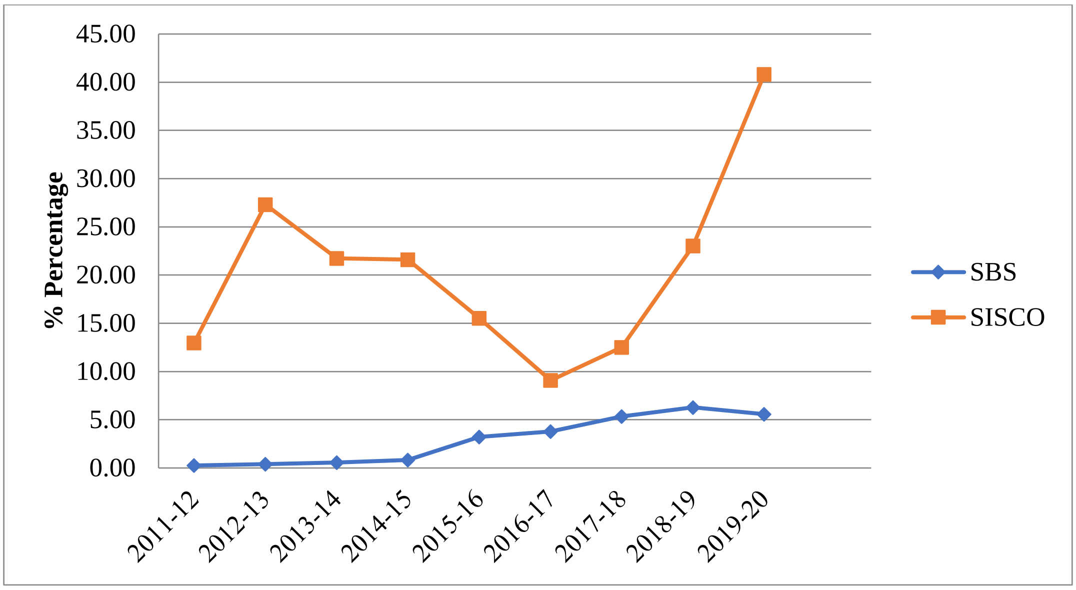
Table 5.5
Capital to Risk-Weighted Assets Ratio (CAR)

(Figures in %)

Year	SBS	SISCO
2011-12	0.26	12.98
2012-13	0.41	27.30
2013-14	0.57	21.73
2014-15	0.84	21.6
2015-16	3.22	15.53
2016-17	3.78	9.08
2017-18	5.33	12.53
2018-19	6.29	23.02
2019-20	5.57	40.83
MEAN	2.92	20.51
STD. DEV	2.46	9.64
MIN.	0.26	9.08
MAX.	6.29	40.83
RANK	**II**	**I**

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.5
Capital to Risk-Weighted Assets Ratio (CAR)



Source: Created using data from annual accounts of SBS & SISCO

5.2.5 Debt to Equity Ratio

Debt- Equity ratio indicates how much of the bank's business is financed through equity and debt. It measures the degree of leverage and is the proportion of total outside liability to net worth. This ratio helps to understand the relative claims of the outsiders and the owners against the bank's assets. Greater dependence on internal equities than on external funds for acquiring assets indicates that the interests of the creditors are safeguarded. On the other hand, higher dependence on debt to equity indicates the availability of lesser protection for the depositors and creditors. The ideal debt-equity ratio for the manufacturing sector is 2:1. In the case of banks, there is no such standard norm for the debt to equity ratio; however, lower debt to equity ratio represents a better financial condition of the bank. We use the following formula to calculate the debt-equity ratio.

$$Debt\ to\ Equity\ Ratio = \frac{Total\ Debt.}{\text{Equity}}$$

Total debt includes deposits and borrowings, and equity includes paid-up capital and reserve & surplus. Table 5.6 and figure 5.6 presents the debt to equity ratio of both the banks for the last nine years, i.e., from 2011-12 to 2019-20, and its' trend.

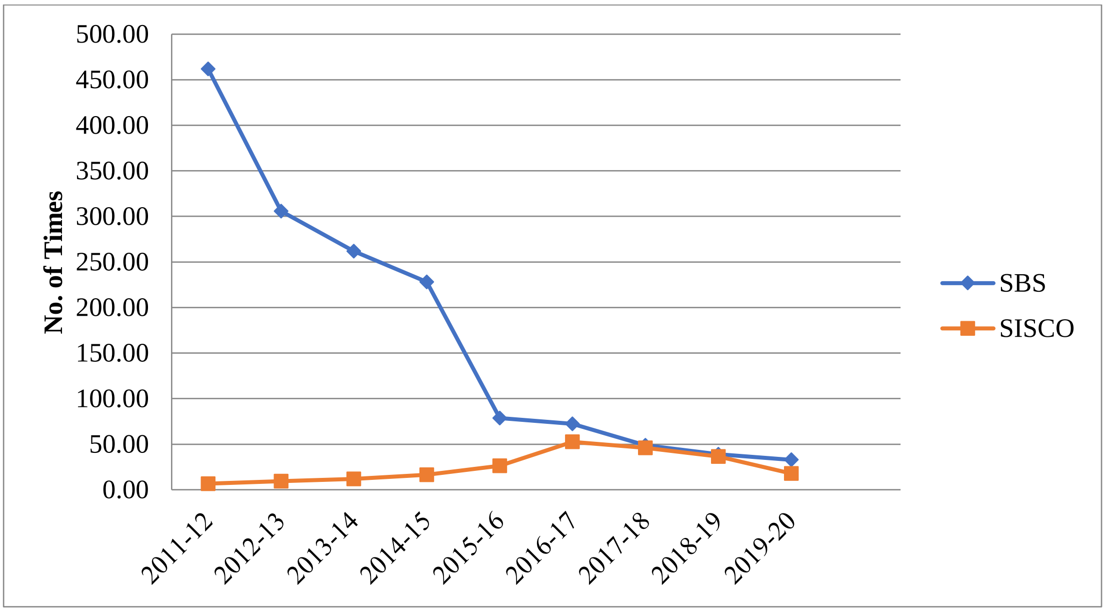
Table 5.6
Debt to Equity Ratio

(No .of times)

Year	SBS	SISCO
2011-12	461.92	6.68
2012-13	305.80	9.58
2013-14	261.75	11.70
2014-15	227.95	16.42
2015-16	78.50	26.13
2016-17	72.45	52.51
2017-18	48.81	46.03
2018-19	38.97	36.56
2019-20	32.81	17.79
MEAN	169.88	24.82
STD. DEV	151.66	16.62
MIN.	32.81	6.68
MAX.	461.92	52.51
RANK	**II**	**I**

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.6
Debt to Equity Ratio



Source: Created using data from annual accounts of SBS & SISCO

The debt-equity ratio of the SBS, though, started to decrease from 2012-13 onwards, but it remains way higher than that of SISCO bank. Such exuberantly high debt to equity ratio in the case of SBS is due to the low subscribed capital of the bank right from its establishment in the year 1968. We observe a sharp decrease in the debt-equity ratio from 2015-16 onward, in the case of SBS.

The sharp decrease recorded by the SBS in their debt to equity ratio during 2015-16 was due to a substantial increase in the bank's reserve and surplus. Though the present debt to equity ratio is still on a higher side, the decreasing trend in the SBS debt to equity ratio is encouraging. Conversely, SISCO bank maintained its debt to equity ratio at a much lower level than SBS. SISCO records the highest debt to equity ratio during 2016-17, which gradually reduced after that.

5.2.6 Equity Capital to Total Assets Ratio

The equity to assets ratio determines how much the shareholders' money finances the business assets. The ratio shows the investors' stake in the business of the bank. We calculate the ratio by dividing total equity by the bank's total assets. A higher ratio is ideally better for the banks as it indicates the business to be less risky. In his study, an ideal range of equity capital to total assets suggested by Dang (2011) is within 4 percent to 6 percent. The formula to arrive at the Equity to Total Assets ratio is as follows.

$$Equity\ to\ Total\ Assets\ Ratio = \frac{Equity}{\text{Total Assets}}$$

Table 5.7 highlights the banks' equity to total assets ratios from 2011-12 to 2019-20.

Table 5.7
Equity to Total Assets Ratio

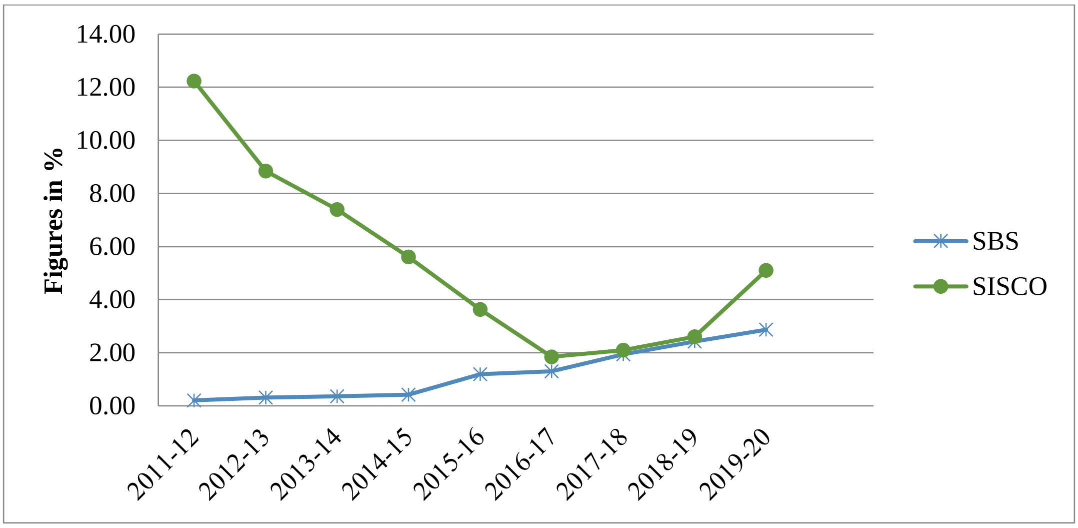
(Figures in %)

Year	SBS	SISCO
2011-12	0.21	12.24
2012-13	0.31	8.84

Year	SBS	SISCO
2013-14	0.36	7.40
2014-15	0.41	5.61
2015-16	1.20	3.63
2016-17	1.30	1.85
2017-18	1.94	2.10
2018-19	2.42	2.60
2019-20	2.87	5.10
MEAN	1.22	5.48
STD. DEV	1.00	3.48
MIN.	0.21	1.85
MAX.	2.87	12.24
RANK	**II**	**I**

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.7
Equity to Total Assets Ratio



Source: Created using data from annual accounts of SBS & SISCO

The average equity capital to total assets ratio of the SBS is nowhere near the ideal level of 4 percent to 6 percent. In contrast, we find SISCO bank above the minimum level of 4 percent throughout the study period except for a few years. The low equity to total assets ratio signifies that the SBS's shareholders have a minimal stake in the bank's assets. The average equity to total assets ratio of SBS is 1.22 percent per annum. In comparison, SISCO has maintained its average ratio at 5.48 percent per annum, higher than the above minimum level of 4 percent. We present the equity to total assets ratio's trend of both the banks for the last nine years in Figure 5.7. Though the SISCO bank has maintained its average equity to total assets ratio above the minimum level, it decreased very sharply till 2016-17. The SISCO bank's equity to total assets ratio reached its lowest level of 1.85 percent during 2016-17; after that, it started to increase but not at the pace it decreased before that.

On the other hand, SBS had an equity to total Assets ratio lower than the minimum level of 4 percent throughout the study period. However, with the increasing trend in the equity to total assets ratio in recent years, SBS will soon attain the minimum level. SBS, which had less than 0.50 percent equity to total assets ratio until 2014-15, recorded a substantial increase in 2015-16 and gradually increased after that. The equity to total assets ratio reached its maximum, i.e., 2.87 percent during 2019-20.

5.2.7 Composite Capital Adequacy Ranking

Based on the average ranking obtained by the banks in all three capital adequacy ratios, we assign a composite ranking to the banks under study as follows.

Table 5.8
Composite Capital Adequacy Ranking

	SBS		SISCO	
Ratios to measure Assets Quality	**Avg.**	**Rank**	**Avg.**	**Rank**
CRAR	2.92 %	2	20.51 %	1
Debt. to Equity Ratio	169.88	2	24.82	1
Equity to Total Assets Ratio	1.22 %	2	5.48 %	1
Group Average		2		1
Group Rank	**2nd**		**1st**	

Source: Computed using data from annual accounts of SBS & SISCO

With better performance in all the capital adequacy ratios, SISCO bank has been ranked no.1 in the composite capital adequacy ranking. Table 5.8 shows that the SISCO bank has outperformed the SBS in all three ratios and secured the first position in overall capital adequacy. The average CAR of the SISCO bank is 20.51 percent which is way higher than the 9 percent as prescribed by the Reserve Bank of India. SBS's average CAR for the last nine years is just 2.92 percent and demands a lot of effort from the management to bring it to the level prescribed by the RBI. The SISCO bank's average debt to equity ratio of 24.82 times is less than SBS but comparatively higher than that of Public Sector banks in India. SBS, however, needs to increase their paid-up capital and reserve & surplus to arrive at a respectable position in respect of the debt to equity ratio. In the case of the equity to total assets ratio, the SISCO bank has been able to exceed the minimum level of 4 percent.

In contrast, with an average equity to total assets ratio of 1.22 percent, SBS is left far behind. Inspection of the various ratios as depicted in the Composite Capital Adequacy table 5.8, SISCO bank is a clear winner in the first parameter of CAMEL, i.e., Capital Adequacy. Figures 5.8, 5.9 & 5.10 presents the comparison of the average of all three capital adequacy ratios.

Figure 5.8
Capital to Risk-Weighted Assets (CRAR)

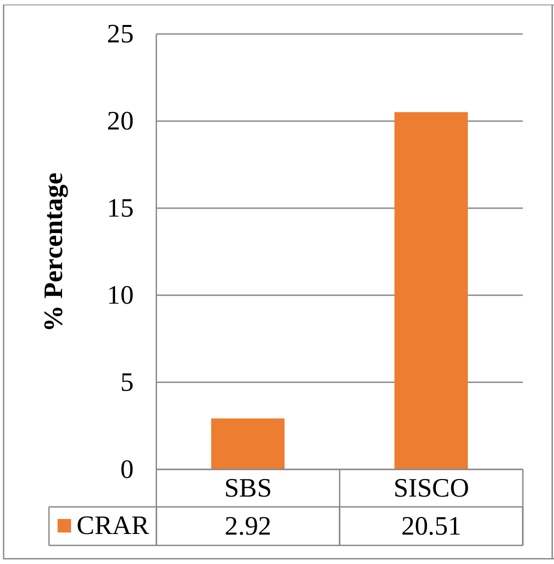
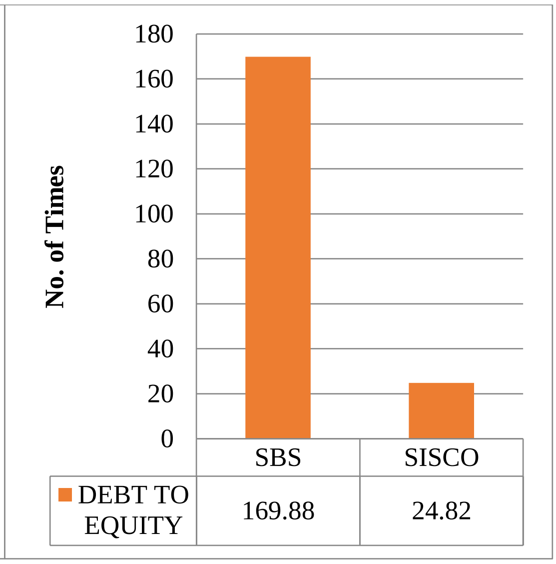
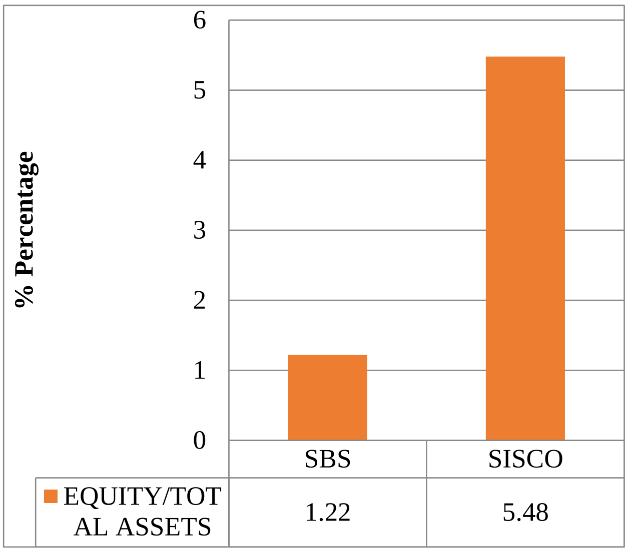


Figure 5.9
Debt to Equity Ratio



Source: Created using data from annual accounts of SBS & SISCO

Figure 5.10
Equity/Total Assets



Source: Created using data from annual accounts of SBS & SISCO

5.3 Assets Quality

Assets quality is the second and vital component of the CAMEL model. The quality of assets is an imperative parameter to determine a bank's financial strength. Possessing enormous assets does not depict good health, but the quality of the assets certainly does. Banks with small-sized but good quality assets are better than those with huge assets with high non-performing assets. It is the quantum of good quality assets that reflects a bank's wellbeing. The Asset quality component of CAMEL attempts to reflect the quality of a bank's assets in terms of loss in its value, and it also shows how good or bad the debtors of the bank are. The primary source of problems for all the banks is the weakening value of their assets which quickly spreads to all other areas. Losses caused due to weakening of assets expose the bank's profit and shall have to be eventually written-off against its capital. The level and severity of a bank's non-performing assets, recovery rates, adequate provisioning for impaired loans, and judicious distribution of assets determine the quality of a bank's assets. Reserve Bank of India guidelines directs the banks to disclose their assets in a classified manner so that their customers, investors, and other stakeholders are well informed about the quality of their assets. As per the guidelines of the RBI, the banks need to categorize their assets into the following four categories.

Standard Assets

Standard assets generate continuous income, and repayment of principal and interest is on time. The standard asset is a performing asset, thus carries only a standard risk. No special provisions are required to be maintained by the bank for Standard Assets.

Sub-Standard Assets

Sub-standard assets are the ones that are considered non-performing for a period of less than or equal to 18 months. As per guidelines, the bank needs to create a provision of 15 percent of total outstanding sub-standard assets; however, if the sub-standard assets are unsecured, then an additional provision of 10 percent needs to be made.

Doubtful Assets

Doubtful assets are the assets that remained non-performing for a period exceeding 18 months. RBI guideline advocates the provision of 40 percent on doubtful assets up to 3 years and 100 percent if the doubtful assets are older than three years.

Loss Assets

Loss assets are those assets that have been identified as loss assets by the bank's internal auditor or the external auditor or by the RBI during its inspection but not written off wholly from the bank's balance sheet. The bank has to make 100% provision against such loss assets.

The assets quality measures Non-Performing Assets (NPAs) as a percentage of the bank's total assets. Quality of assets indicates the types of advances the bank has made over time to generate its interest income. In addition to analyzing the quality of the banks' assets, we also analyze the trends in total assets, loans & advances, gross NPAs, and investments. Ratios chosen for assessing the quality of the assets are as follows.

1. NPA to Gross Loans Ratio (Ishaq et al., 2016)
2. NPA to Equity Ratio (Dang, 2011)
3. Government Securities to Total Investments Ratio (Sudha, 2014)
4. Total Investments to Total Assets Ratio (Mathiraj & Ramya, 2014)

5.3.1 Trends in Total Assets

The volume of assets is the indicator of the financial health and the size of a financial institution. Total assets of a bank include cash and bank balance, balance with other banks, investments, loans & advances, bills & interest receivable, fixed assets, and other assets. The trends in total assets of the banks under study may be seen in table 5.9 and figure 5.11.

SISCO bank records high growth in its total assets from 2011-12 till 2016-17, within which their total assets increased by more than ten times. SISCO has recorded the highest growth during 2016-17, the year of demonetization. During 2017-18 the bank recorded negative growth of 0.96 percent, and the negative growth continued till 2019-20. Declining trends in total assets of SISCO in recent years is a matter of concern that demands an early introspection. On the other hand, SBS had moderate growth in its total assets throughout the study period. The SBS recorded the highest growth of 19.95 percent in its total assets during 2017-18. Unlike SISCO, SBS did not record any negative growth in its total assets during the study period. Though the size of the total assets of SBS is almost three times that of SISCO, however, with a CAGR of 21.96 percent per annum, SISCO is far ahead of SBS, which recorded a CAGR of 8.01 percent per annum.

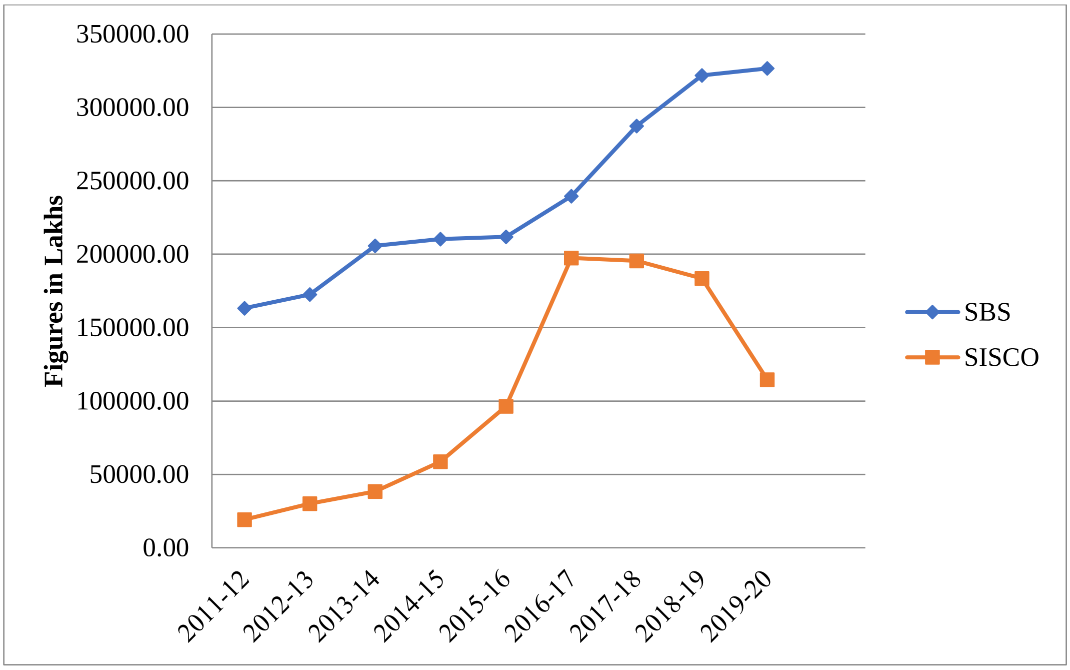
Table 5.9
Trends in Total Assets

(Rupees in lakhs)

	SBS		SISCO	
Year	**Amount (Rs.)**	**Growth %**	**Amount (Rs.)**	**Growth %**
2011-12	163248.35	-	19180.47	-
2012-13	172619.11	5.74	30005.71	56.44
2013-14	205671.88	19.15	38459.39	28.17
2014-15	210294.62	2.25	58601.01	52.37
2015-16	211969.08	0.80	96425.67	64.55
2016-17	239650.04	13.06	197451.08	104.77
2017-18	287467.81	19.95	195565.17	-0.96
2018-19	321748.77	11.93	183442.13	-6.20
2019-20	326591.26	1.51	114465.99	-37.60
CAGR%	8.01		21.96	
MEAN	237695.66		103732.96	
MEDIAN	211969.08		96425.67	
STD. DEV	60893.34		72990.37	
MIN.	163248.35		19180.47	
MAX.	326591.26		197451.08	

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.11
Trends in Total Assets



Source: Created using data from annual accounts of SBS & SISCO

5.3.2 Trends in Gross Advances

Loans and advances, generally termed as advances, are the most critical assets of any bank as they are among the bank's highest interest-generating assets. Advances could be short-term, medium-term, and long-term based on their periodicity, and they could be secured and unsecured based on whether it is backed by collateral or not. Though the advances generate a higher interest rate, if not sanctioned carefully, they may turn to be the potential source of a bank's failure.

Table 5.10
Trends in Gross Advances

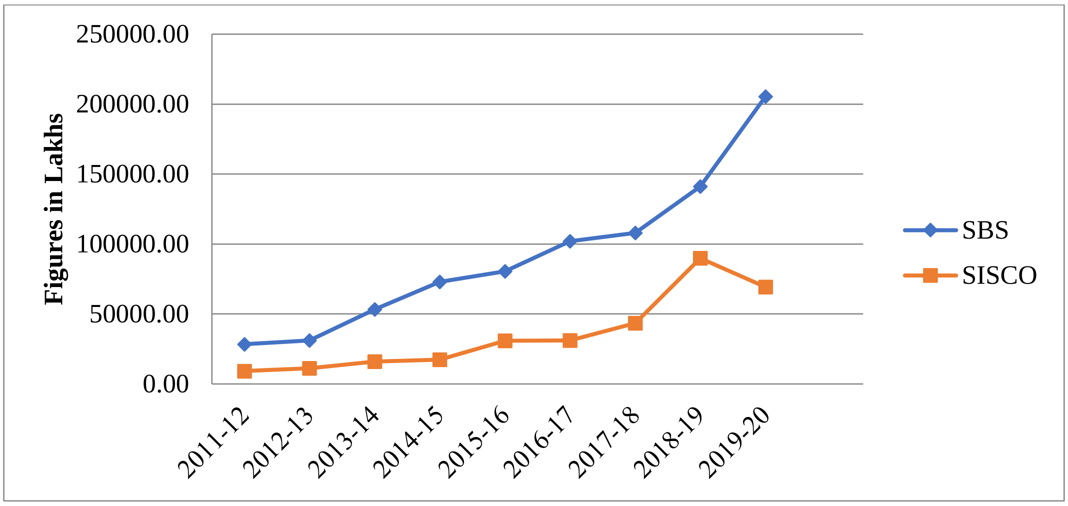
(Figures in lakhs)

	SBS		SISCO	
Year	**Amount (Rs.)**	**Growth %**	**Amount (Rs.)**	**Growth %**
2011-12	28422.64	-	9263.46	-
2012-13	31092.59	9.39	11266.82	21.63
2013-14	53269.39	71.33	15995.87	41.97
2014-15	73085.25	37.20	17428.17	8.95
2015-16	80533.45	10.19	30772.33	76.57
2016-17	102085.89	26.76	31108.96	1.09
2017-18	107855.01	5.65	43376.15	39.43
2018-19	141032.54	30.76	89848.95	107.14
2019-20	205405.07	45.64	69240.43	-22.94
CAGR%	24.58		25.04	
MEAN	91420.20		35366.79	
MEDIAN	80533.45		30772.33	
STD. DEV	56298.41		27790.14	
MIN.	28422.64		9263.46	
MAX.	205405.07		89848.95	

Source: Computed using data from annual accounts of SBS & SISCO

Advances of both the banks observed to have been growing over the years. The gross advances of SBS have grown by almost 8.5 times over the last nine years, whereas advances of SISCO have grown by 7.4 times in the last years. The highest growth of 71.33 percent in advances was recorded by SBS during 2013-14, followed by 45.64 percent during 2019-20 and 37.20 percent during 2014-15. SISCO records the highest growth in its gross advances of 107.14 percent during 2018-19, followed by 76.57 percent in 2015-16, 41.97 percent during 2013-14, and 39.43 percent during 2017-18. SISCO also recorded a decline of 22.94 percent in its gross advances during 2019-20. With a CAGR of 24.58 percent, SBS is not far behind SISCO's growth in its gross advances. With a higher CAGR of 25.04 percent, SISCO is slightly better in terms of growth in gross loans.

Figure 5.12
Trends in Gross Advances



Source: Created using data from annual accounts of SBS & SISCO

5.3.3 Trends in Non Performing Assets

In simple words, we can understand the Non-performing assets (NPA) as the money or assets lent as loans by the banks that have remained unpaid by their borrowers for some time. Such asset ceases to earn interest for the bank. The Reserve Bank of India defines NPA as a bank credit on which the interest or instalment has remained due for a specific time. By issuing circulars from time to time, RBI clarifies the period for declaring assets as NPA by the banks. RBI's circular of 2009 clarifies that the Non-Performing Assets is the amount of loan and advances on which interest or instalment amount is overdue for more than 90 days. NPA has been a severe problem for all the banks, specifically public sector banks in India. RBI report suggests that the overall NPA of the public sector banks amounts to rupees four lakhs crores which accounts for 90 percent of the non-performing assets of the country. Gross NPA, which we consider for this study, is the overall amount of NPA of the bank. We present the trends in Gross NPA of the banks under study in table & figure 5.11 & 5.13.

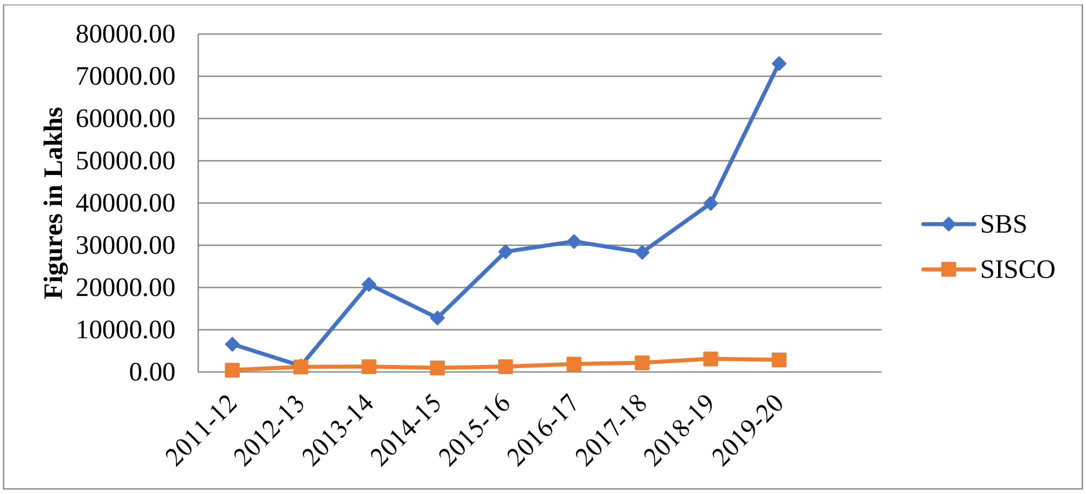
Table 5.11
Trends in Gross Non-Performing Assets

(Figures in lakhs)

Year	SBS		SISCO	
	Amount	Growth %	Amount	Growth %
2011-12	6579.64		464.56	
2012-13	1453.04	-77.92	1181.21	154.26
2013-14	20739.16	1327.29	1253.72	6.14
2014-15	12824.63	-38.16	1010.28	-19.42
2015-16	28504.71	122.27	1299.00	28.58
2016-17	30869.87	8.30	1894.00	45.80
2017-18	28302.96	-8.32	2154.83	13.77
2018-19	39954.04	41.17	3126.49	45.09
2019-20	73054.50	82.85	2893.71	-7.45
CAGR%	30.67		22.54	
MEAN	26920.28		1697.53	
MEDIAN	28302.96		1299.00	
STD. DEV	21264.65		889.90	
MIN.	1453.04		464.56	
MAX.	73054.5		3126.49	

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.13
Trends in Gross Non-Performing Assets



Source: Created using data from annual accounts of SBS & SISCO

Growing NPA is a grave concern for the SBS, which has increased by almost 14 times during the last nine years. SBS, which had its NPA of just Rs. 6579.64 lakhs during 2011-12, recorded substantial growth in succeeding years and reached a gigantic figure of Rs. 73054.50 lakhs by 2019-20. The SBS witnessed significant growth in the NPAs during 2013-14, 2015-16, 2018-19, and 2019-20 when it grew by 1327.29 percent, 122.27 percent, 41.17 percent, and 82.85 percent, respectively. SISCO has also recorded high growth in its NPAs, leading it to go from Rs. 464.56 lakhs during 2011-12 to Rs. 2893.71 lakhs by 2019-20. The SISCO recorded a substantial increase in NPA during 2012-13, 2016-17, and 2018-19 when it grew by 154.26 percent, 45.80 percent, and 45.09 percent, respectively.

Based on the size of its total assets, SBS is only three times of the SISCO during 2019-20, whereas SBS's NPAs amounts to more than 25 times of the SISCO's NPAs during that year. Such a high accumulation of NPAs explains the SBS's deteriorating quality of assets. With a lower CAGR of 22.54 percent of NPAs, SISCO bank is better than the SBS.

5.3.4 Trends in Total Investments

Banks usually make money by borrowing money from their depositors at a lower rate and lending it to borrowers at a higher rate. Apart from this primary lending activity, banks are also involved in investments and make good money. Besides being an additional source of income to the banks, investments also help the banks diversify their risk arising from their core lending activity. As per RBI, banks can invest in Government Securities, other approved securities, subsidiaries/ joint ventures, debentures and bonds, share, mutual funds. The trends in the SBS and the SISCO's investments have been presented in the table and figure 5.12 & 5.14.

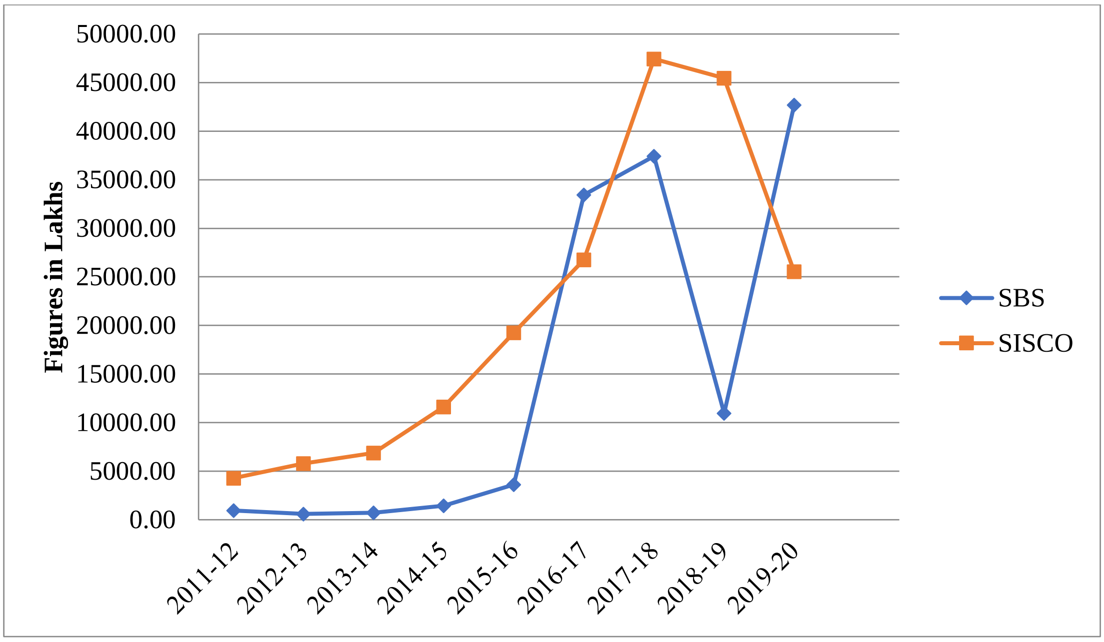
Table 5.12
Trends in Total Investments

(Rupees in lakhs)

Year	SBS		SISCO	
	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %
2011-12	945.00	-	4281.87	-
2012-13	600.00	-36.51	5781.87	35.03
2013-14	715.52	19.25	6877.93	18.96
2014-15	1440.05	101.26	11600.84	68.67
2015-16	3622.89	151.58	19240.69	65.86
2016-17	33447.70	823.23	26750.47	39.03
2017-18	37410.78	11.85	47439.35	77.34
2018-19	10945.05	-70.74	45472.76	-4.15
2019-20	42692.11	290.06	25553.05	-43.81
CAGR%	52.71		21.96	
MEAN	14646.57		21444.31	
MEDIAN	3622.89		19240.69	
STD. DEV	17843.04		16400.98	
MIN.	600.00		4281.87	
MAX.	42692.11		47439.35	

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.14
Trends in Total Investments



Source: Created using data from annual accounts of SBS & SISCO

Both the banks have recorded substantial growth in their total investments over the last nine years. SBS started to witness growth in its total investments from 2013-14 onwards. Highest growth 101.26 percent, 151.58 percent, 823.23 percent & 290.06 percent was recorded by the SBS during 2014-15, 2015-16, 2016-17 & 2019-20 respectively. During the last nine years, SBS also recorded a decline in its total investment once in 2012-13 by 36.51 percent. SISCO, which had a total investment of Rs. 4281.87 lakhs only during 2011-12 reached its peak of Rs. 47439.35 lakhs during 2017-18. After reaching the pinnacle of their total investments during 2016-17, SISCO witnessed a decline in its total investment after that. SISCO recorded a decline of 4.15 percent during 2018-19 and 43.81 percent during 2019-20, making its graph fall sharply. With a better CAGR of 52.71 percent, SBS is ahead of SISCO in total investments.

5.3.5 NPA to Gross Advances Ratio

The non-performing loans to gross advances ratio measures the rate of non-performing loans to gross advances of the bank. It reflects the quality of credit portfolio management of a bank. Non-performing assets are the ones that cease to generate interest and are the main concern for the banks, their promoters, and the government. Lowering the NPA to Gross Advances ratio better is the quality of the bank's assets. Dang (2011) suggests the ratio of $\leq$1percent to be the ideal gross non-performing loans to total loans level in his study.

$$NPA\ to\ Gross\ Advances\ Ratio = \frac{NPA}{\text{Gross Advances}}$$

Table 5.13
Gross NPA to Gross Loan Ratio

(Figures in %)

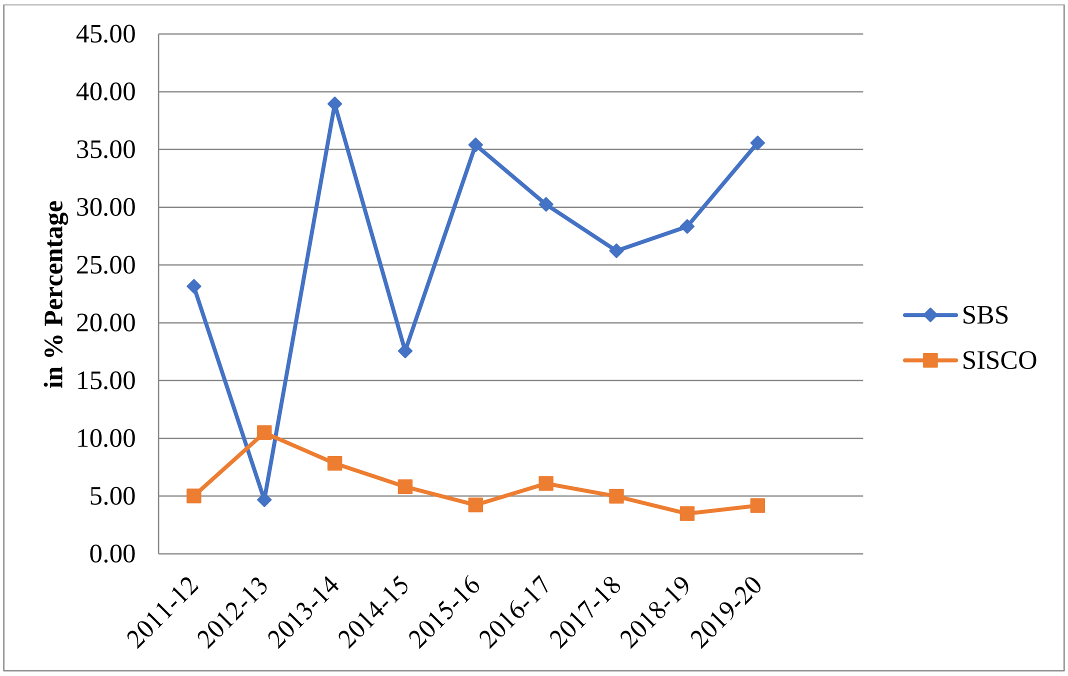
Year	SBS	SISCO
2011-12	23.15	5.01

Year	SBS	SISCO
2012-13	4.67	10.48
2013-14	38.93	7.84
2014-15	17.55	5.80
2015-16	35.39	4.22
2016-17	30.24	6.09
2017-18	26.24	4.97
2018-19	28.33	3.48
2019-20	35.57	4.18
MEAN	26.67	5.79
STD. DEV	10.61	2.18
MIN.	4.67	3.48
MAX.	38.93	10.48
RANK	**II**	**I**

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.15

Gross NPA to Gross Loan Ratio



Source: Created using data from annual accounts of SBS & SISCO

The average NPA to Gross Advances ratio of 26.67 percent of the SBS is on the significantly higher side, and if not dealt with on time, may even threaten the very survival of the bank. Save 2012-13, when the SBS recorded the lowest NPA to Gross Advances ratio of 4.67 percent, the bank recorded an abnormally high ratio throughout the study period. NPA to Gross Advances ratio of SBS went as high as 38.93 percent during 2013-14. Out of the last nine years, SBS recorded an NPA ratio of above 35 percent in four years and above 20 percent in 7 out of 9 years. The susceptible position of the bank in terms of its NPAs demands immediate review of its lending policy, recovery policy, and provisioning policy for bad loans.

SISCO could not maintain an ideal ratio of ≤1 percent in terms of its NPA to gross advances ratio but has maintained a reasonable average ratio of 5.79 percent during the last nine years under study. Proper provisioning towards bad loans has helped the SISCO keep its ratio under control. Though SISCO has a comparatively better NPA to gross advances ratio, it needs to remain vigilant. It should direct its efforts towards bringing the ratio further down to the desired level.

5.3.6 Total Investments to Total Assets Ratio

The total investments to total assets ratio measure the proportion of total investments in the bank's total assets and show the extent to which the bank's assets are deployed in investments against its advances. Investments conventionally do not form a part of the core income-generating activity of the bank, and this ratio helps to understand the percentage of total assets of a bank locked up in such investments.

The ratio is arrived at by dividing the bank's total investments by its total assets. Higher total investments to total assets ratio show that the bank has conservatively set aside a higher cushion of investments to safeguard its non-performing assets.

$$Investments\ to\ Total\ Assets\ Ratio = \frac{Investments}{\text{Total Assets}}$$

Table 5.14
Total Investments to Total Assets Ratio

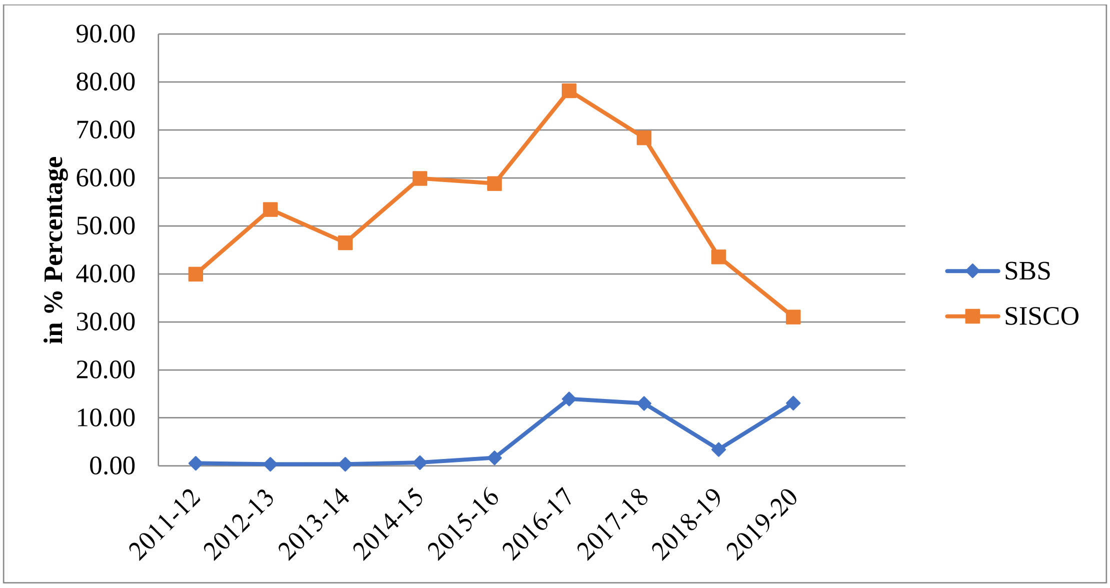
(Figures in %)

Year	SBS	SISCO
2011-12	0.58	39.95
2012-13	0.35	53.49
2013-14	0.35	46.53
2014-15	0.68	59.90
2015-16	1.71	58.84
2016-17	13.96	78.22
2017-18	13.01	68.38
2018-19	3.40	43.60
2019-20	13.07	31.06
MEAN	5.23	53.33
STD. DEV	6.16	14.73
MIN.	0.35	31.06
MAX.	13.96	78.22
RANK	**II**	**I**

Source: Computed using data from annual accounts of SBS & SISCO

With an average total investment to total assets ratio of 53.33 percent compared to 5.23 percent of SBS, SISCO stands as a clear winner. SISCO's investments reached as high as 78.22 percent during the year of demonetization, i.e., 2016-17, and its ratio has never gone below 30.00 percent throughout the study period. A higher investment to total assets ratio shows that the bank keeps a good cushion of investments against its non-performing assets. Till 2014-15, SBS recorded total investments of less than 1.00 percent of its total assets, which increased to 1.71 percent during 2015-16. From 2016-17 onwards, SBS recorded a substantial increase in its total investments to total assets ratio and recorded over 13.00 percent except for 2018-19 when it fell to 3.40 percent. It is prudent for the SBS to revisit its investments policy to ease itself from the risk of a high NPA of the bank.

Figure 5.16
Total Investments to Total Assets Ratio



Source: Created using data from annual accounts of SBS & SISCO

5.3.7 NPA to Equity Ratio

The non-performing assets to equity ratio indicate equity's sufficiency to absorb losses from the bank's non-performing assets. This ratio is arrived at by dividing the gross non-performing assets by equity. Equity includes paid-up capital of the bank with reserve and surplus. A lower NPA to equity ratio is better as it enables a bank to absorb its NPA losses through the owner's fund.

$$Gross\ NPA\ to\ Equity\ Ratio = \frac{NPA}{\text{Equity}}$$

Table 5.15 presents both banks' gross NPA to equity ratios for the last nine years. SISCO had kept its NPA below 60.00 percent of its equity throughout the study period, except during 2018-19 when it recorded its NPA to equity ratio of 65.45 percent. The last nine years' average of NPA to equity ratio of 43.97 percent of SISCO suggests that the bank's equity size is double the size of its NPAs, or we may say that the bank's equity is sufficient enough to absorb its entire NPAs.

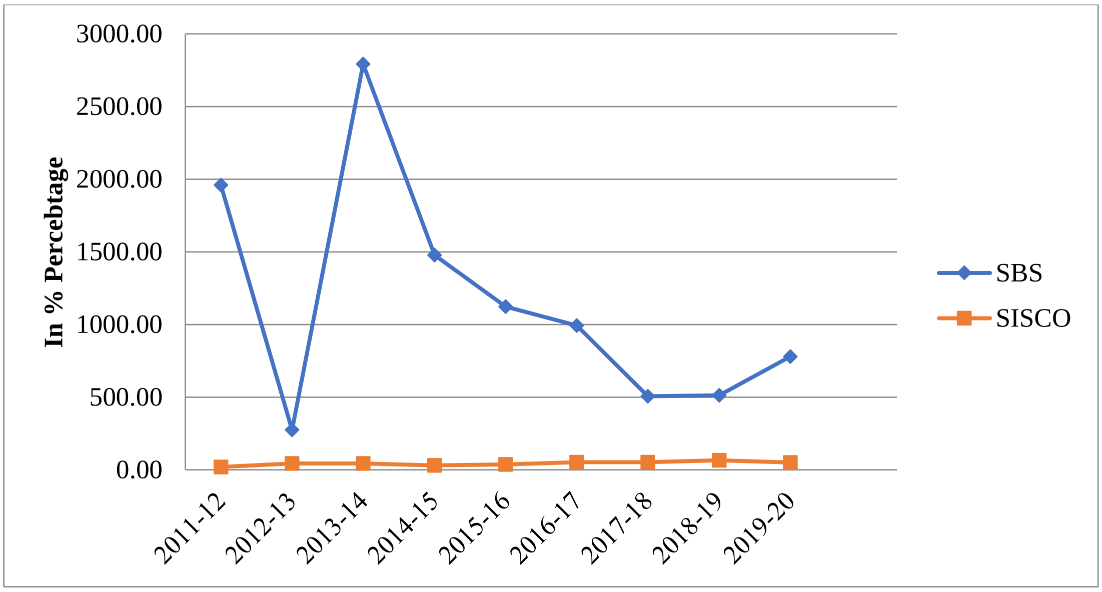
Table 5.15
Gross NPA to Equity Ratio

(Figures in %)

Year	SBS	SISCO
2011-12	1959.39	19.80
2012-13	274.08	44.53
2013-14	2791.69	44.06
2014-15	1476.54	30.75
2015-16	1123.87	37.08
2016-17	992.73	51.93
2017-18	506.59	52.59
2018-19	513.69	65.45
2019-20	780.26	49.53
MEAN	1157.65	43.97
STD. DEV	806.58	13.40
MIN.	274.08	19.80
MAX.	2791.69	65.45
RANK	**II**	**I**

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.17
Gross NPA to Equity Ratio



Source: Created using data from annual accounts of SBS & SISCO

On the other hand, SBS's NPA to equity ratio is exceptionally high throughout the study period. The ratio went as high as 2791.69 percent during 2013-14, and even its lowest ratio of 274.08 percent during 2012-13 is on the significantly higher side. The average

NPA to equity ratio of SBS is 1157.65 percent which is extremely high. With its average NPA to equity ratio of 43.97 percent, SISCO is once again a clear winner.

5.3.8 Government Securities to Total Investments Ratio

Government securities to total investments ratio reflect the involvement of risk in bank's investment. Though it carries a meagre return, Government Securities are the safest debt instrument available to a bank. Government securities being free of risk, higher investment in the Government Securities makes a bank's investments substantially safe. The higher the government securities to total investments ratio, the lower is the risk involved in a bank's investment. This ratio is arrived at by dividing the amount invested by a bank in government securities by its total investment. Table 5.16 presents the government securities to total investments ratios of the banks under study, and figure 5.18 presents the trend in the ratio.

$$Govt. Sec. to\ Investments\ Ratio = \frac{Govt. Securities}{\text{Total Investments}}$$

Table 5.16
Government Securities to Total Investments Ratio

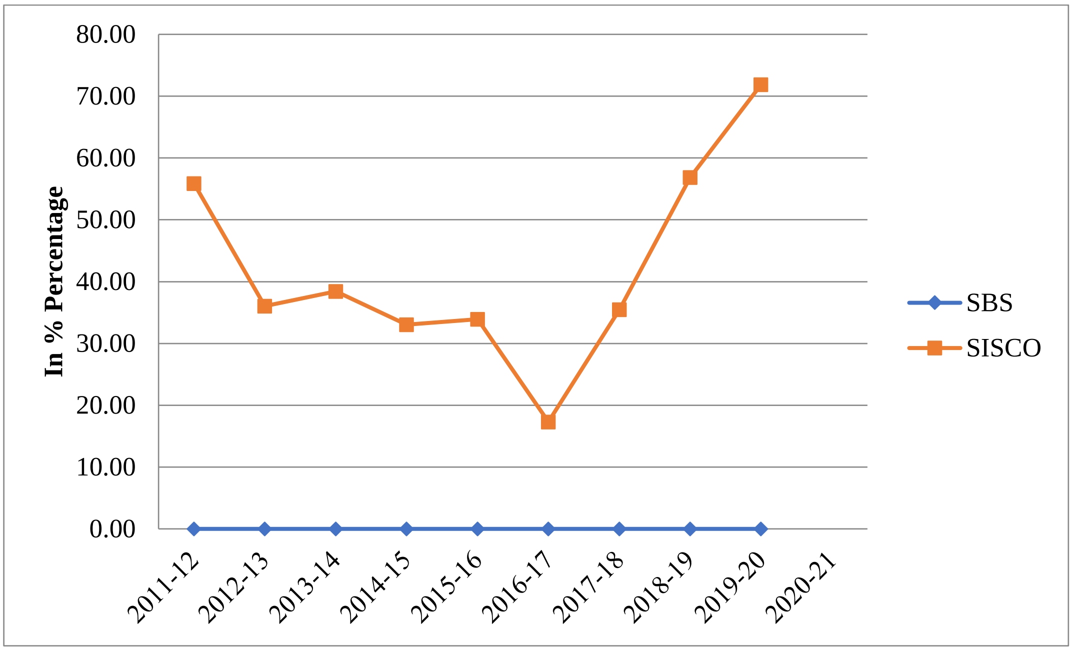
(Figures in %)

Year	SBS	SISCO
2011-12	0.00	55.87
2012-13	0.00	36.02
2013-14	0.00	38.43
2014-15	0.00	33.05
2015-16	0.00	33.91
2016-17	0.00	17.32
2017-18	0.00	35.47
2018-19	0.00	56.86
2019-20	0.00	71.87
MEAN	0.00	42.09
STD. DEV	0.00	16.40
MIN.	0.00	17.32
MAX.	0.00	71.87
RANK	**II**	**I**

Source: Computed using data from annual accounts of SBS & SISCO

Until 2016-17, SISCO bank witnessed a declining trend in its government securities to total investments ratio; after that, it grew at an increasing rate. From 17.32 percent during 2016-17, it increased to 35.47 percent in 2017-18, 56.86 percent in 2018-19, and as high as 71.87 percent during 2019-20. SISCO maintained a very high average ratio of government securities to total investments of 42.09 percent. The high average ratio of SISCO suggests that the bank's investment is very safe. On the other hand, SBS records zero investments in government securities throughout the study period, making its investments highly risky.

Figure 5.18
Government Securities to Total Investments Ratio



Source: Created using data from annual accounts of SBS & SISCO

5.3.9 Composite Assets Quality Ranking

Based on the average ranking obtained by the banks in all four Assets quality ratios, we assign a composite ranking to the banks under study as follows. Table 5.17 presents the composite ranking obtained by both the banks based on their scores in assets quality ratios.

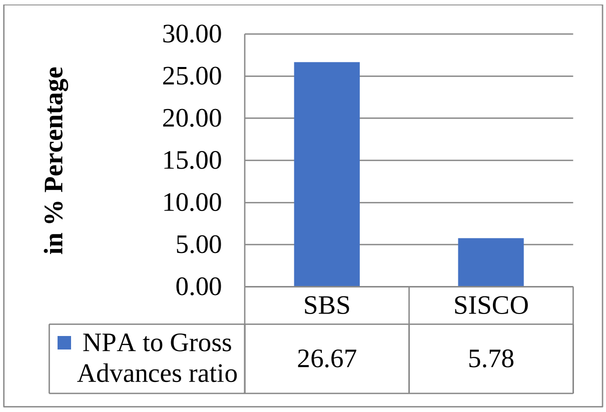
Table 5.17
Composite Assets Quality Ranking

	SBS		SISCO	
Ratios to measure Assets Quality	**Avg.**	**Rank**	**Avg.**	**Rank**
NPA to Gross Advances ratio	26.67%	2	5.78%	1
Investments to Total Assets ratio	5.23%	2	53.33%	1
NPA to Equity ratio	1157.65%	2	43.96%	1
G. Sec. to Investments ratio	0.00%	2	42.09%	1
Group Average		2.00		1.00
Group Rank	**2nd**		**1st**	

Source: Computed using data from annual accounts of SBS & SISCO

Table 5.17 shows that the SISCO bank has once again outperformed the SBS in all four assets quality ratios and secured the first position in the assets quality component of the CAMEL. The average NPA to Gross Advances ratio of SBS is alarming at 26.67 percent and requires urgent attention. SISCO bank, though, has a comparatively lower NPA to gross advances ratio but is still very high compared to the desired level of 1 percent suggested by Dang (2011) in his study. Investment of the SBS only accounts for 5.23 percent of its total assets, making its loans and advances riskier as it loses the opportunity to get compensated from the investments in case of loans turning bad. NPA of the SBS is 1158 percent of its total equity, which reflects insufficient equity to cover the losses arising from the NPAs. SBS records zero investment in the government securities throughout the study period, against which SISCO records an average investment in government securities of 42.09 percent of their total investments. Based on the performances in all four assets quality ratios, SISCO, as in capital adequacy, is a clear winner in the assets quality component.

Figure 5.19
NPA to Gross Advances ratio



Source: Created using data from annual accounts of SBS & SISCO

Figure 5.20
Investments to Total Assets ratio

Source: Created using data from annual accounts of SBS & SISCO

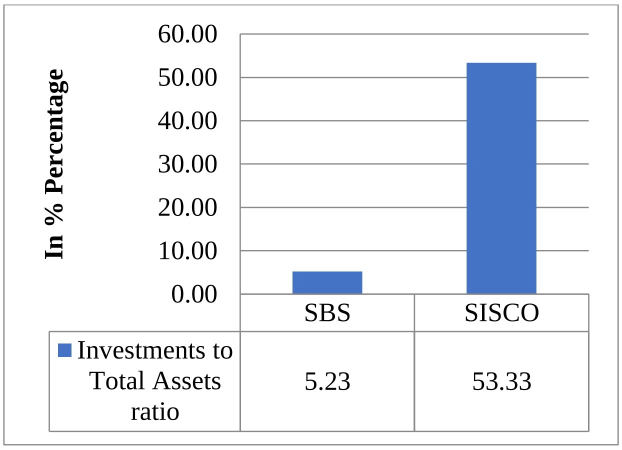
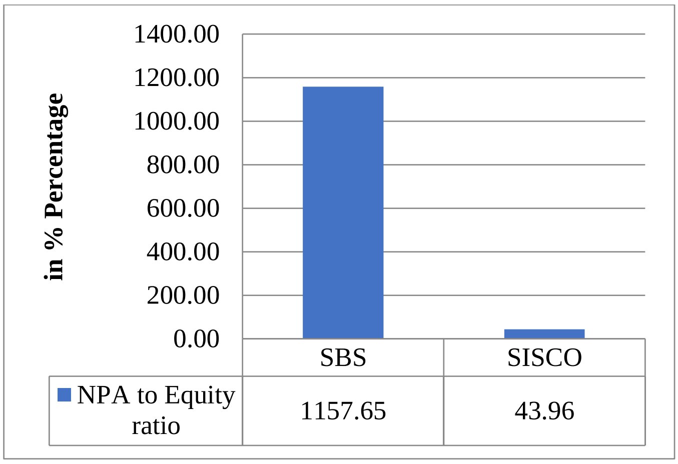
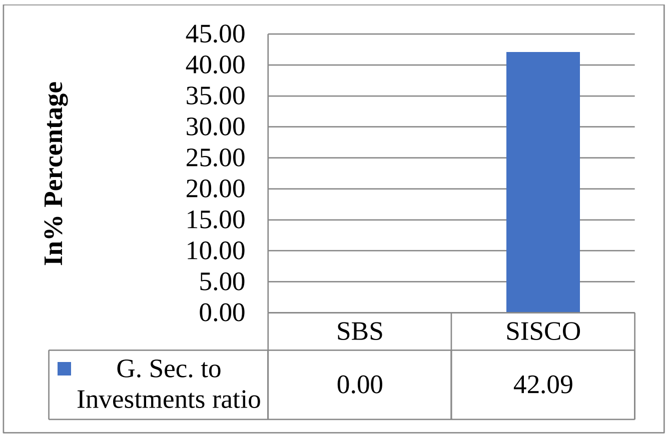


Figure 5.21
NPA to Equity ratio



Source: Created using data from annual accounts of SBS & SISCO

Figure 5.22
Govt. Sec. to Investments ratio



Source: Created using data from annual accounts of SBS & SISCO

5.4 Management Efficiency

For any financial institution, sound management can be considered the most crucial factor for success. As the other efficiencies of the bank are strongly related to the management's efficiency, it can well be considered one of the most crucial aspects that deserve the thorough attention of the bank.

Management quality is often considered the yardstick to distinguish better quality banks from poorly performing ones. Management quality is reflected by the bank's board of directors and management's capability to identify, measure, and control the bank's risk caused by its operation and ensure safe, sound, and efficient operation in compliance with rules, regulations, and directives of their regulators. Grier (2007) suggests in his study that management capability can be considered the single most crucial element in the CAMEL rating system as it plays a significant role in the bank's success.

Adjudging the quality of the management of a bank is not an easy task as it requires knowledge of the intricacies of that bank. Management quality is not just assessed by the ability of a bank to garner business. However, it also relies on other essential factors like maximizing profit, increasing net worth, and minimizing credit risk. Management capability can adequately be understood only through the subjective assessment of the Management system, organizational culture, and control mechanisms of the financial institution. However, various ratios have been in use by researchers, professionals, and regulators for off-site assessment of the efficiency of the management for a long time. Understanding the efficiency of a bank's management requires assessing its ability to deploy its resources in low-risk and high-profit areas, maximization of income, productive utilization of bank's facilities, and reduction of operational costs.

We consider the following ratios appropriate for assessing the Management efficiency of the banks under study.

1. Credit to Deposit Ratio (Kari et al., 2015)
2. Business per Employee (Kumar & Alam, 2018)
3. Profit per Employee (Sudha, 2014)

Before analyzing the Managerial efficiency of the banks under study through various ratios, we also analyze the trends of deposit, credit, bank's business, and profit for the last nine years, i.e., from 2011-12 to 2019-20). The trend in various variables, as mentioned above, has been presented through graphs and tables.

5.4.1 Trends in Total Deposit

Deposit is the money kept by the depositors for safekeeping in the bank. The depositors shall have the right to withdraw based on the deposit account's terms and conditions. As the deposits are the liability owed by the bank to its depositors, they are not entirely the actual fund available with the bank as it is subject to withdrawal by their depositors. Banks are the intermediaries between depositors and borrowers. Though the banks are involved in several other activities, the primary role of the banks is to accept deposits. The bank lends the amount it accepts as the deposit to the borrower, and the difference in interest earned and expended forms its profit. More the deposit, more money will be at the bank's disposal for lending and investments. Bank accepts deposits mainly in three forms, i.e., demand deposits, savings bank deposits, and term deposits. To examine the trends, we have included deposits of all forms.

Table 5.18
Trends in Total Deposits

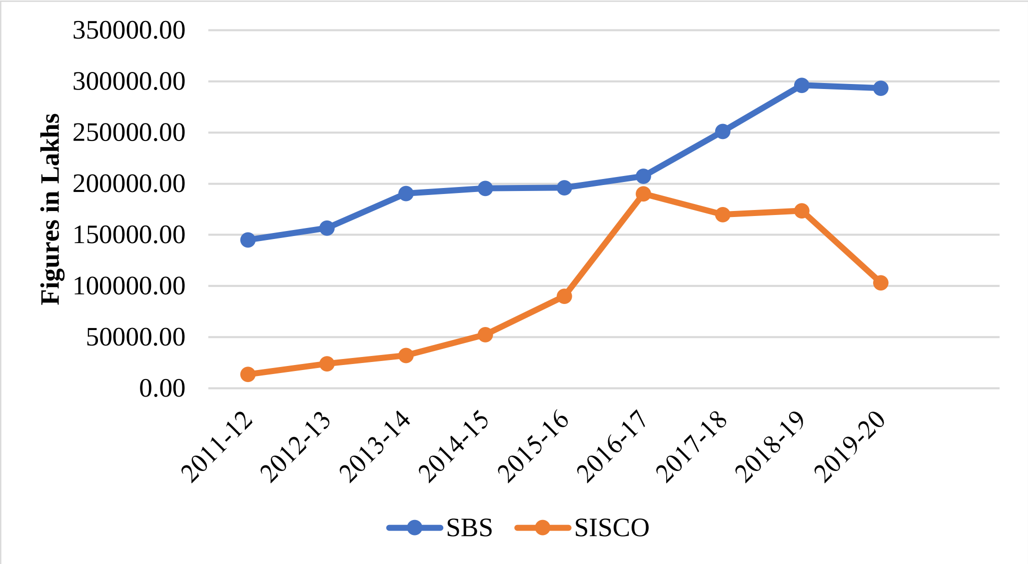
(Rupees in Lakhs)

Year	SBS		SISCO	
	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %
2011-12	145067.10	-	13577.58	-
2012-13	156627.40	7.97	24045.40	77.10
2013-14	190415.13	21.57	32078.31	33.41
2014-15	195556.88	2.70	52637.67	64.09
2015-16	196008.75	0.23	89993.25	70.97
2016-17	207468.80	5.85	190154.75	111.30
2017-18	251251.43	21.10	169759.82	-10.73
2018-19	296305.33	17.93	173706.33	2.32
2019-20	293475.00	-0.96	103317.97	-40.52
CAGR%	8.14		25.29	
MEAN	214686.20		94363.45	
MEDIAN	196008.75		89993.25	
STD. DEV	54520.60		69233.86	
MIN.	145067.10		13577.58	
MAX.	296305.33		190154.75	

Source: Computed using data from annual accounts of SBS & SISCO

Tables 5.18 & figure 5.23 show that the SISCO bank had a sharp growth in its total deposits till 2016-17. SISCO, which had a total deposit of Rs. 13577.58 lakhs during the year 2011-12 increased it by 77.10 percent to Rs. 24045.40 lakhs in 2012-13, it again grew by 33.41 percent to Rs. 32078.31 lakhs in 2013-14, it increased by 64.09 percent to Rs. 52637.67 lakhs during 2014-15, and it further increased by 70.97 percent during 2015-16 to Rs. 89993.25 lakhs. During 2016-17, SISCO bank witnessed an unprecedented increase of 111.30 percent increasing its total deposits from Rs. 89993.25 during 2015-16 to Rs. 190154.75 lakhs. The substantial increase in SISCO's deposit during 2016-17 is because of the demonetization of high-value currency on November 8, 2016. SISCO bank's deposits post-2016-17 have a decreasing trend, and they slipped to Rs. 103317.97 lakhs during 2019-20, which amounts to a decrease of 40.52 percent.

Figure 5.23
Trends in Total Deposits



Source: Created using data from annual accounts of SBS & SISCO

On the other hand, SBS maintained growth in their total deposits but not with the SISCO bank's intensity during the study period. SBS also witnessed a trivial decrease in its deposit of 0.96 percent during the year 2019-20. One of the reasons for stability in the total deposits of the SBS is due to the reason that the Government of Sikkim is the biggest customer of the SBS, contributing a significant share of its total deposits. With a CAGR of 25.29 percent, SISCO takes the lead over SBS having a CAGR of 8.14 percent.

5.4.2 Trends in Deposit Mix

Studying trends in total deposits is essential, so is the studying of trends in deposit mix as it directly bears the deposit costs of a bank. As stated in the previous section, deposits are of different types, and they differ in the interest rate and withdrawal conditions. We present the trends in the deposit mix of these two banks in tables and figures 5.19 & 5.24.

Table 5.19
Trends in Deposit Mix-SBS

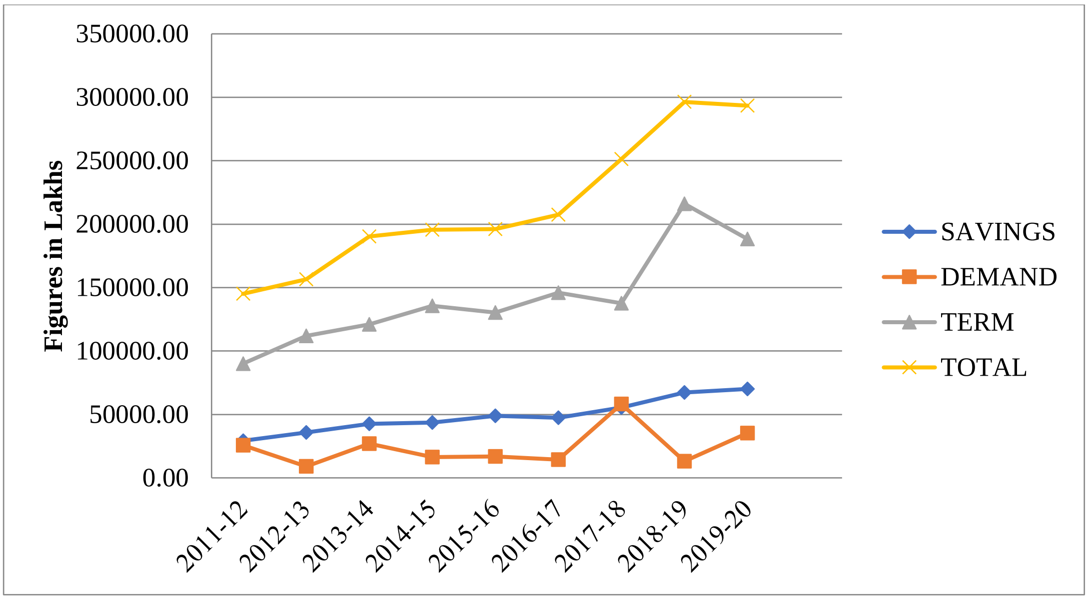
(Rupees in Lakhs)

Year	SAVINGS		DEMAND		TERM	
	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %
2011-12	29244.85	-	25772.51	-	90049.74	-
2012-13	35749.17	22.24	8977.63	-65.17	111900.60	24.27
2013-14	42487.24	18.85	27043.38	201.23	120884.51	8.03
2014-15	43661.07	2.76	16347.32	-39.55	135548.49	12.13
2015-16	48884.53	11.96	16806.89	2.81	130317.33	-3.86
2016-17	47437.42	-2.96	14221.70	-15.38	145809.68	11.89
2017-18	55450.25	16.89	58175.22	309.06	137625.96	-5.61
2018-19	67285.27	21.34	12996.38	-77.66	216023.68	56.96
2019-20	70085.41	4.16	35211.42	170.93	188178.17	12.89
CAGR%	10.20		3.53		8.53	
MEAN	48920.58		23950.27		141815.35	
MEDIAN	47437.42		16806.89		135548.49	
STD. DEV	13507.96		15242.60		38526.03	
MIN.	29244.85		8977.63		90049.74	
MAX.	70085.41		58175.22		216023.68	
D.MIX*	**22.93%**		**11.27%**		**65.80%**	

Source: Computed using data from annual accounts of SBS & SISCO

**D-MIX: Deposit Mixture*

Figure 5.24
Trends in Deposit Mix-SBS



Source: Created using data from annual accounts of SBS & SISCO

Table 5.20
Trends in Deposit Mix-SISCO

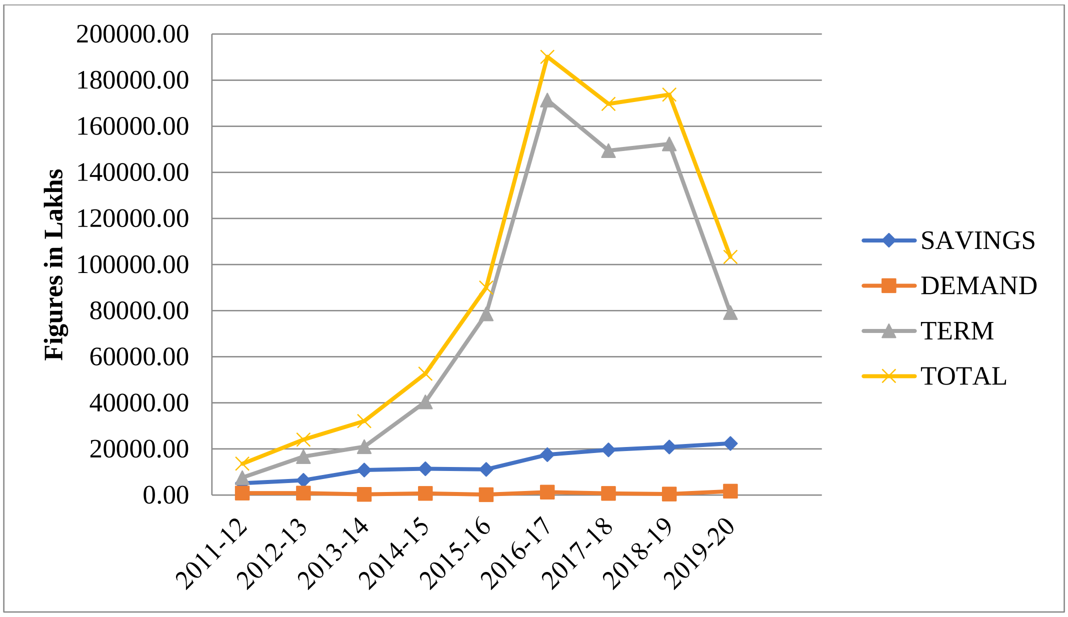
(Rupees in Lakhs)

Year	SAVINGS		DEMAND		TERM	
	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %
2011-12	5143.58	-	835.62	-	7598.38	-
2012-13	6381.82	24.07	901.74	7.91	16761.85	120.60
2013-14	10861.19	70.19	261.00	-71.06	20956.12	25.02
2014-15	11444.29	5.37	720.75	176.15	40472.63	93.13
2015-16	11162.64	-2.46	219.85	-69.50	78610.76	94.23
2016-17	17487.92	56.66	1293.67	488.42	171373.16	118.00
2017-18	19562.51	11.86	702.48	-45.70	149494.82	-12.77
2018-19	20876.08	6.71	495.62	-29.45	152334.63	1.90
2019-20	22438.72	7.49	1658.12	234.55	79217.12	-48.00
CAGR%	17.78		7.91		29.75	
MEAN	13928.75		787.65		79646.61	
MEDIAN	11444.29		720.75		78610.76	
STD. DEV	6348.83		464.47		63935.47	
MIN.	5143.58		219.85		7598.38	
MAX.	22438.72		1658.12		171373.16	
D.MIX*	**15.52%**		**0.92%**		**83.57%**	

Source: Computed using data from annual accounts of SBS & SISCO

**D-MIX: Deposit Mixture*

Trends in Deposit Mix-SISCO
Figure 5.25



Source: Created using data from annual accounts of SBS & SISCO

Analysis of the trends in deposit mix at figures 5.24 & 5.25 reflects that the sharp increase in total deposits in the case of both the banks is because of high growth in the term deposit. A decrease in the term deposits also led the total deposits of both banks to fall. Savings deposits of both banks have increased over the years, but SISCO, with a CAGR of 17.78 percent, prevails over SBS. Even in the case of demand deposits, SBS with a CAGR of 3.53 percent is in second place compared to SISCO, which has a CAGR of 7.91 percent. A mixture of deposits of SBS shows that out of total deposits, 23 percent is in the form of savings deposits, 11 percent in the form of demand deposits, and 66 percent in the form of term deposits. On the other hand, SISCO's total deposits comprise 15 percent of savings deposits, 1 percent of demand deposits, and balance 84 percent of term deposits.

One percent of demand deposits indicate that the SISCO bank is not so successful in attracting low-cost deposits to the bank. With the higher savings and demand deposits, the SBS has access to cheaper funds. In contrast, SISCO bank enjoys a certainty of the period of availability of the fund for investments and lending with more term deposits.

5.4.3 Trends in Credit

The credit in this study comprises loans and advances of the bank. The deposits accepted by the bank have a cost; hence, the amount has to be judiciously invested in loans & advances, investments, and government securities to generate a higher return, and it also minimizes their risks. Table and figure 5.21 & 5.26 present the trends in credit for both the banks.

As shown by table 5.21, CAGRs of 24.57 percent and 25.04 percent of the SBS and SISCO suggest that both the banks grew equally in credit over the last nine years. SBS recorded an annual growth rate of over 10 percent in six out of nine years, i.e., during 2013-14, 2014-15, 2015-16, 2017-18, 2018-19, and 2019-20.

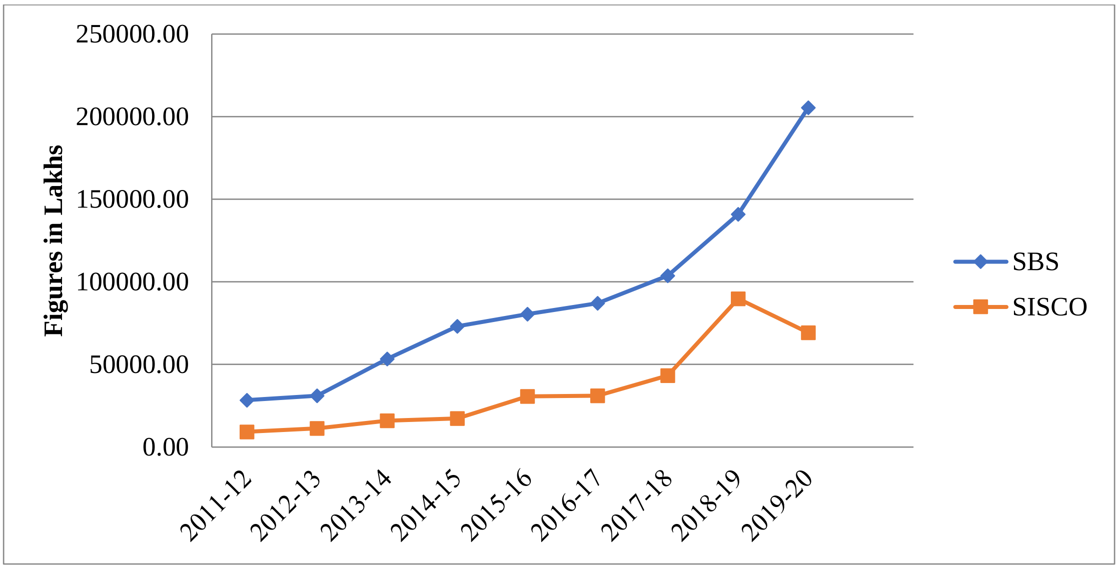
Table 5.21
Trends in Credit

(Rupees in Lakhs)

Year	SBS		SISCO	
	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %
2011-12	28430.04	-	9263.46	-
2012-13	31100.05	9.39	11256.85	21.52
2013-14	53276.76	71.31	15996.22	42.10
2014-15	73092.64	37.19	17428.17	8.95
2015-16	80540.84	10.19	30772.33	76.57
2016-17	87121.24	8.17	31108.96	1.09
2017-18	103726.79	19.06	43376.15	39.43
2018-19	141032.54	35.97	89848.95	107.14
2019-20	205405.07	45.64	69240.43	-22.94
CAGR%	24.57		25.04	
MEAN	89302.89		35365.72	
MEDIAN	80540.84		30772.33	
STD. DEV	56012.26		27791.19	
MIN.	28430.04		9263.46	
MAX.	205405.07		89848.95	

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.26
Trends in Credit



Source: Created using data from annual accounts of SBS & SISCO

On the other hand, SISCO bank recorded exceptional growth in its credit of 107.14 percent during 2018-19. SISCO banks also record a negative growth rate in their credit during 2019-20 of around 23 percent. The difference in the volume of the credit of both the banks is maximum during the year 2019-20.

5.4.4 Trends in size of the Business

Business for a bank means the total of credit and deposit. The volume of the business is vital for the banks as it is directly related to the profit they make. The size of a bank's business reflects its operational efficiency, and operational efficiency indicates the efficiency of the management. The volume of business of the bank reflects the efficiency with which the bank's management can garner deposits and lend profitably. The table and figures 5.22 & 5.27 reflect the trends in the banks' business under study.

Table 5.22
Trends in Size of Business

(Rupees in Lakhs)

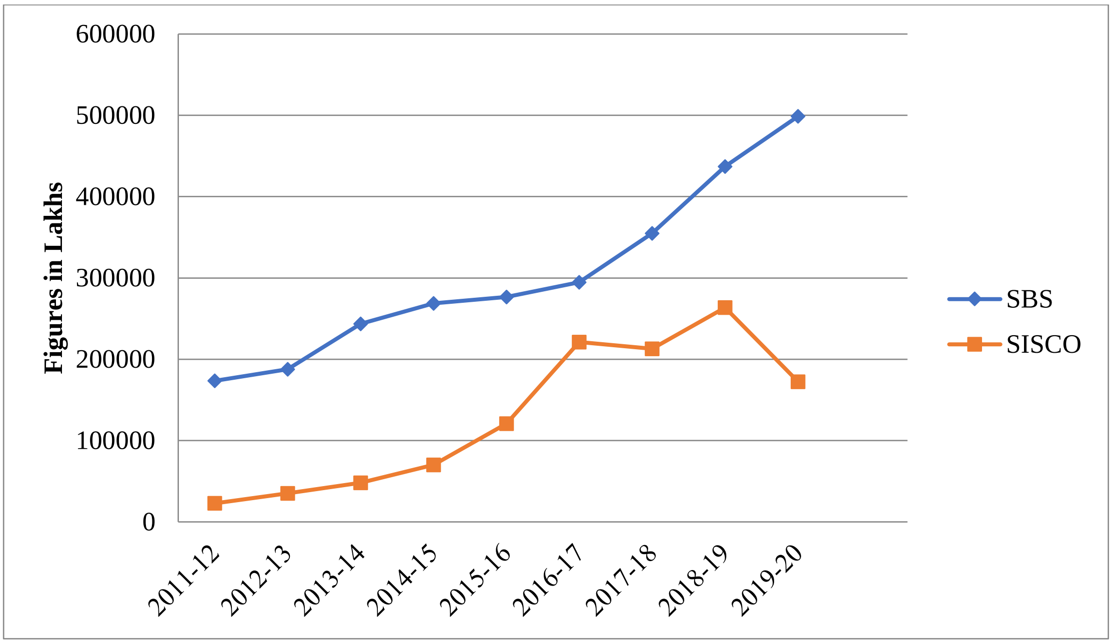
Year	SBS		SISCO	
	Amount (Rs.)	**Growth %**	**Amount (Rs.)**	**Growth %**
2011-12	173497.14		22841.03924	
2012-13	187727.45	8.20	35302.25498	54.56
2013-14	243691.89	29.81	48074.53467	36.18
2014-15	268649.52	10.24	70065.83772	45.74
2015-16	276549.59	2.94	120765.5841	72.36
2016-17	294590.04	6.52	221263.7056	83.22
2017-18	354978.22	20.50	213135.9713	-3.67
2018-19	437337.87	23.20	263555.2805	23.66
2019-20	498880.07	14.07	172558.4022	-34.53
CAGR%	12.45		25.19	
MEAN	303989.09		129729.18	
MEDIAN	276549.59		120765.58	
STD. DEV	108762.99		90642.22	
MIN.	173497.14		22841.04	
MAX.	498880.07		263555.28	

Source: Computed using data from annual accounts of SBS & SISCO

The size of the present business of the SBS is almost 2.9 times that of the SISCO. The difference in the size of the business is because the SBS came into business 30 years before the SISCO. SBS has been in the banking business since 1968 and still handles the majority of the government business, whereas SISCO was established only in 1999. It can be seen from table 5.22 and figure 5.27 that the SBS is successful in maintaining steady growth throughout the period under study. A significant jump of the SBS during 2013-14, 2017-18, 2018-19, and 2019-20 led to the difference in the volume of their business increase. On the other hand, SISCO had a very high growth rate until 2016-17, which led its business to grow by almost 300 percent by 2019-20. SISCO bank, however, records a decline in its business during 2017-18 & 2019-20 by 3.67 percent and 34.53 percent, respectively.

With a higher CAGR of 25.19 percent, SISCO bank is ahead of SBS, but its declining business trend in recent years is a matter of grave concern.

Figure 5.27
Trends in Size of Business



Source: Created using data from annual accounts of SBS & SISCO

5.4.5 Trends in Profit

Earning profit is essential for any business to remain in the business. Higher profit increases the morale of the institution to work harder. The profit of a bank, like all other businesses, is the surplus of its income over expenditure. Bank's efficiency, if needed to be measured by a single yardstick, profit would undoubtedly be the most appropriate one. A significant portion of a bank's profit comes from the interest it earns on its assets and fees it charges for its services. Bank's significant expenditure usually is on the interests it pays on its liabilities. We present the trends in profit after tax of both the banks in table & figure 5.23 & 5.28.

Table 5.23
Trends in Profit

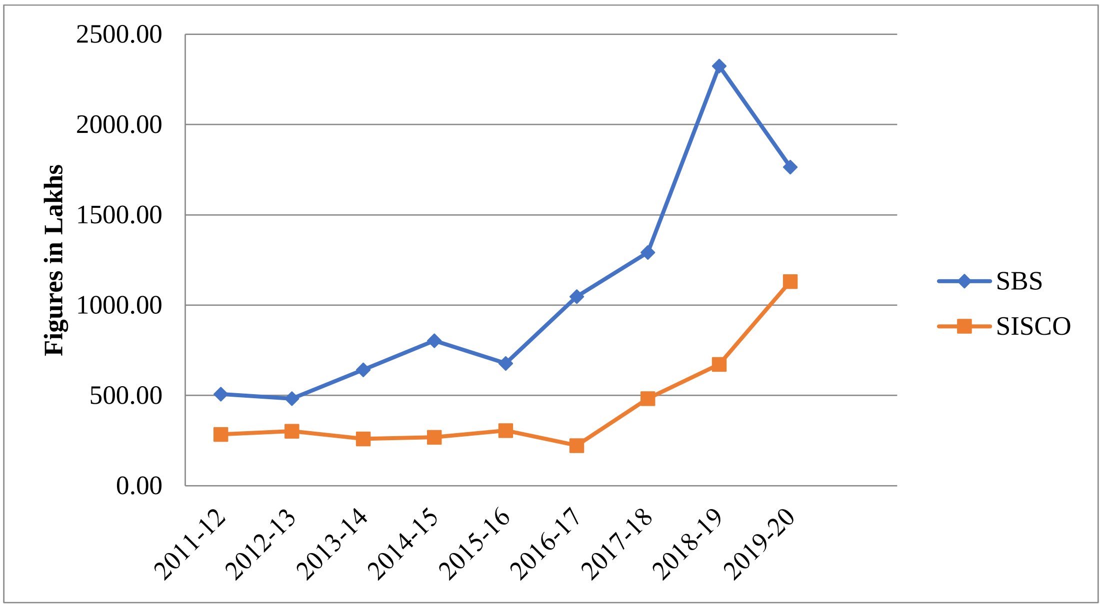
(Rupees in Lakhs)

Year	SBS		SISCO	
	Amount (Rs.)	**Growth %**	**Amount (Rs.)**	**Growth %**
2011-12	507.30	-	285.26	-
2012-13	482.47	-4.89	302.43	6.02
2013-14	641.81	33.03	259.54	-14.18
2014-15	804.33	25.32	269.75	3.93
2015-16	678.68	-15.62	306.73	13.71
2016-17	1047.91	54.40	223.39	-27.17
2017-18	1292.03	23.30	483.15	116.28
2018-19	2324.43	79.91	671.96	39.08
2019-20	1765.01	-24.07	1131.52	68.39
CAGR%	14.86		16.54	
MEAN	1060.44		437.08	
MEDIAN	804.33		302.43	
STD. DEV	629.93		296.41	
MIN.	482.47		223.39	
MAX.	2324.43		1131.52	

Source: Computed using data from annual accounts of SBS & SISCO

SBS recorded a decline of 4.89 percent in its profit during 2012-13, but it maintained an excellent growth rate of 33.03 percent and 25.32 percent in its profit during 2013-14 & 2014-15, respectively. During 2015-16 SBS again recorded a slip of 15.62 percent, but it bounced back with a very high growth rate of 54.40 percent, 23.30 percent, and 79.91 percent during 2016-17, 2017-18 & 2018-19, respectively. A sudden decline of 24.07 percent in its profit during 2019-20, after high growth in three previous, must be inquired into by the SBS. SISCO bank's trends in profit also reflect similar fluctuation, with the highest growth rate being 116.28 percent during 2017-18 and the highest decline of 27.17 percent in 2016-17. Based on CAGR, SISCO bank is again in a better position with a CAGR of 16.54 percent compared to SBS, which records a CAGR of 14.86 percent.

Figure 5.28
Trends in Profit



Source: Created using data from annual accounts of SBS & SISCO

5.4.6 Credit to Deposit Ratio

This ratio is one of the important ratios to measure managerial efficiency as it shows the volume of loans and advances made by the bank against its total deposits. It reflects the ability of the bank to convert the deposits at its disposal into earning loans and advances. The bank's management must maintain a balance between deposits and loans to generate higher income and maintain adequate liquidity to honour the customers' withdrawal requests. We calculate this ratio by dividing the loans and advances by total deposits of the bank. Total deposits include savings deposits, demand deposits, term deposits, and deposits from other banks, and credit includes bank loans & advances.

$$Credit - Deposit\ Ratio = \frac{Loans\ \&\ Advances}{\text{Total Deposits}}$$

Trends in credit-deposit ratios of the banks over the last nine years can be seen in the table and figure 5.24 & 5.29.

Table 5.24
Credit-Deposit Ratio (CDR)

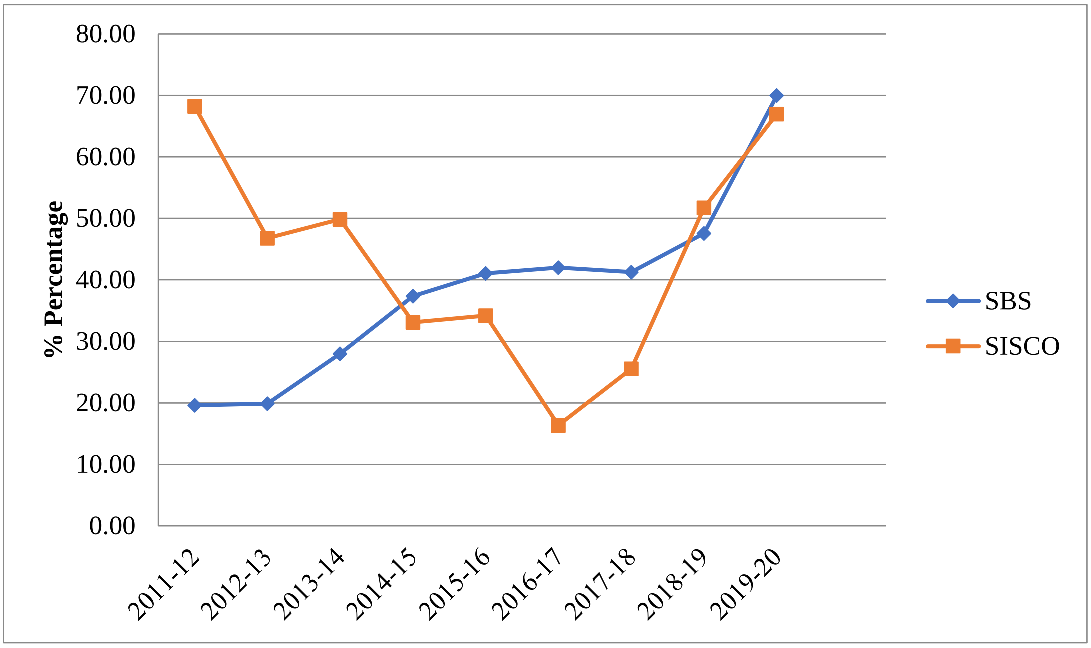
(Figures in %)

Year	SBS	SISCO
2011-12	19.60	68.23
2012-13	19.86	46.81
2013-14	27.98	49.87
2014-15	37.38	33.11
2015-16	41.09	34.19
2016-17	41.99	16.36
2017-18	41.28	25.55
2018-19	47.60	51.72
2019-20	69.99	67.02
MEAN	38.53	43.65
STD. DEV	15.48	17.81
MIN.	19.60	16.36
MAX.	69.99	68.23
RANK	**II**	**I**

Source: Computed using data from annual accounts of SBS & SISCO

The ideal credit to deposit ratio (CDR) is ≤ 80 percent (Dang, 2011). Throughout the study, both banks have a credit to deposit ratio of less than 80 percent. Too little a credit to deposit ratio indicates that the bank has not converted its deposits into loans and advances, making it forego interest it could have otherwise earned. CDR of SBS remained below 20 percent during 2011-12 & 2012-13, it remained below 30 percent during 2013-14, and from 2014-15 to 2018-19, it remained within 37 percent to 48 percent. Only during 2019-20 credit-deposit ratio of SBS increase considerably to 70 percent. In the case of SISCO, the credit-deposit ratio (CDR) remained below 40 percent during 2014-15 to 2017-18. From 2018-19 onward, SISCO increased its CDR considerably. Based on the average CAGR of the last nine years, SISCO bank, with an average growth rate of 43.65 percent per annum, stands first, and SBS, with a CAGR of 38.53 percent, stands second. Notably, the SBS has been improving over the years in terms of its credit-deposit ratio.

Figure 5.29
Credit-Deposit Ratio (CDR)



Source: Created using data from annual accounts of SBS & SISCO

5.4.7 Business per Employee

Banks fall under the service sector industry, where their human resources play a pivotal role in success. Banks are adjudged by the quality of services they provide to their customers, and the same has a direct impact on the volume of business it can garner. Business per employee of a bank is used as a yardstick to measure the efficiency of the bank's employees to generate business for the bank. Business per employee explains the productivity of a bank's human workforce. Higher the business per employee ratio better the performance of the management of a bank.

$$Business\ per\ Employee = \frac{Total\ Deposits + Total\ Advances}{\text{Total no. of Employees}}$$

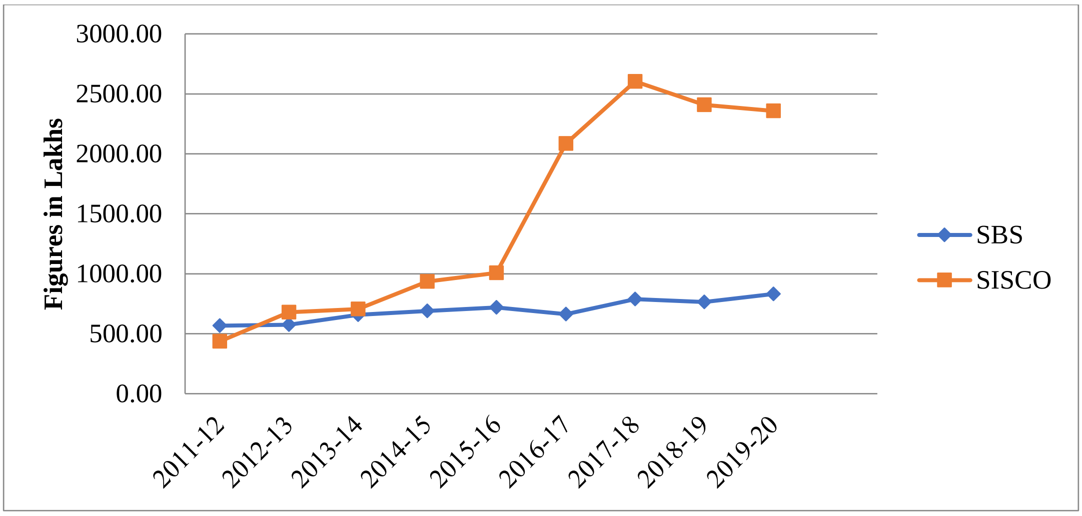
Table 5.25
Business per Employee

(Figures in Lakhs)

Year	SBS	SISCO
2011-12	566.98	435.55
2012-13	574.09	678.88
2013-14	656.85	706.98
2014-15	688.84	934.21
2015-16	720.18	1007.64
2016-17	662.00	2085.54
2017-18	788.84	2603.67
2018-19	763.24	2407.55
2019-20	831.47	2356.78
MEAN	694.72	1468.53
STD. DEV	91.04	873.82
MIN.	566.98	435.55
MAX.	831.47	2603.67
RANK	**II**	**I**

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.30
Business per Employee



Source: Created using data from Annual Accounts of SBS & SISCO

During 2011-12, SISCO was behind the SBS in their business per employee; after that, we observed SISCO leading throughout the study period. SISCO observed a significant growth in its business per employee after demonetization during 2016-17. Business per employee of SISCO recorded an unprecedented growth of 107 percent during 2016-17, possibly because of increased deposits due to demonetization announced by the

Government of India. On the other hand, SBS recorded a medium growth throughout the period under study. With an average business per employee of Rs. 1468.53 lakhs compared to Rs. 694.72 lakhs of SBS, SISCO remains triumphant in this ratio as well.

5.4.8 Profit per Employee

Profit is what helps the banks to remain in the business. To ensure its sustainability and growth, the bank must earn profit. Profit per employee measures the surplus earned per employee and reflects the efficiency of employees of a bank. It gives essential input on the strength of a bank's branch network. We calculate the profit per employee by dividing the Profit after Tax (PAT) by the total number of bank employees. The higher profit per employee ratio indicates better efficiency of the management of a bank. Higher business per employee may sometimes not lead to higher profit per employee; hence, profit per employee also needs to be assessed to understand the efficiency of the management.

$$Profit\ per\ Employee = \frac{Profit\ after\ Tax}{\text{Total no. of Employees}}$$

Table 5.26
Profit per Employee

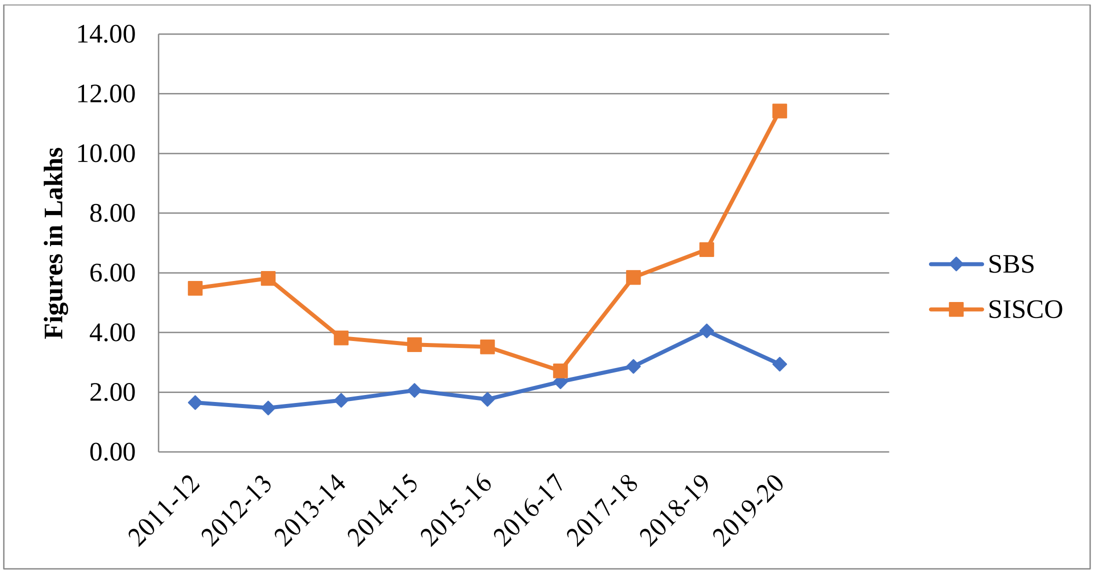
(Figures in Lakhs)

Year	SBS	SISCO
2011-12	1.66	5.49
2012-13	1.48	5.82
2013-14	1.73	3.82
2014-15	2.06	3.60
2015-16	1.77	3.52
2016-17	2.35	2.72
2017-18	2.87	5.85
2018-19	4.06	6.78
2019-20	2.94	11.43
MEAN	2.32	5.45
STD. DEV	0.84	2.62
MIN.	1.48	2.72
MAX.	4.06	11.43
RANK	**II**	**I**

Source: Computed using data from annual accounts of SBS & SISCO

With a bit of strength of employees, SISCO recorded a very high profit per employee during the initial years of the study, which gradually decreased till 2015-16 with an increase in its total no. of employees. Deposits of the SISCO had increased manifold during 2016-17, which generally should have increased the profit per employee. However, during 2016-17, SISCO recorded the lowest profit per employee of Rs. 2.72 lakhs that is possibly due to increased expenditure on interest led by increased deposits due to demonetization announced by the government of India towards the end of the financial year. During 2017-18, SISCO recorded a straight jump of 215 percent in its profit per employee due to the availability of hefty deposits for lending and investments, collected during the year of demonetization, i.e., 2016-17. SBS recorded nominal growth in its profit per employee throughout the study except during 2018-19, when it recorded the highest profit per employee of Rs.4.06 lakhs, mainly due to a high surge in its business volume. With an average profit per employee of Rs. 5.45 lakhs, SISCO is once again ahead of SBS, which records an average profit per employee of Rs. 2.32 lakhs only.

Figure 5.31
Profit per Employee



Source: Created using data from annual accounts of SBS & SISCO

5.4.9 Composite Management Efficiency Ranking

Based on the average ranking obtained by the banks in all three management efficiency ratios, we assign a composite ranking has to the banks. Table 5.27 presents the composite ranking obtained by the banks in the composite management component of the CAMEL model.

Table 5.27
Composite Management Efficiency Ranking

Ratios to measure	**SBS**		**SISCO**	
Liquidity	**Avg.**	**Rank**	**Avg.**	**Rank**
Credit to Deposit	38.53 %	2	43.65%	1
Business per Employee	694.72 lakhs	2	1468.53 lakhs	1
Profit per Employee	2.32 lakhs	2	5.44 Lakhs	1
Group Average		2		1
Group Rank	**2nd**		**1st**	

Source: Computed using data from annual accounts of SBS & SISCO

SISCO bank performing better in all three ratios secures no.1 position in composite Management Efficiency ranking. SISCO converted 43.65 percent of its deposits into credit, whereas SBS could lend and invest only 38.53 percent of its deposits. In the case of business per employee, we observe SISCO bank doing better than the SBS. Similarly, in the case of profit per employee, SISCO has made two times more profit per employee than the profit contributed by each employee of the SBS.

Figure 5.32
Credit to Deposit Ratio

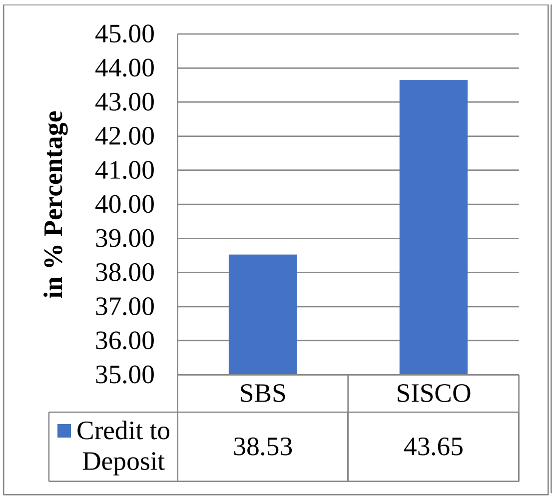
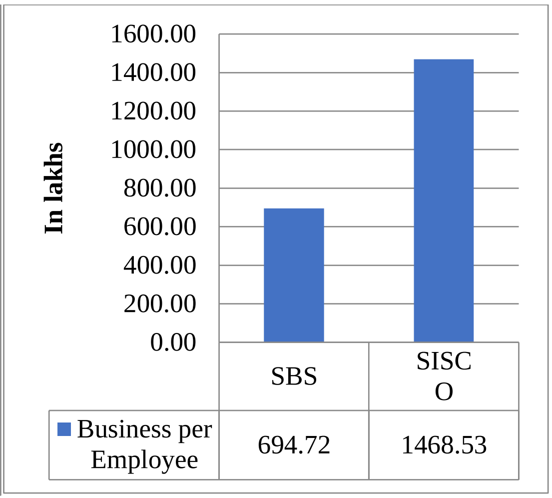
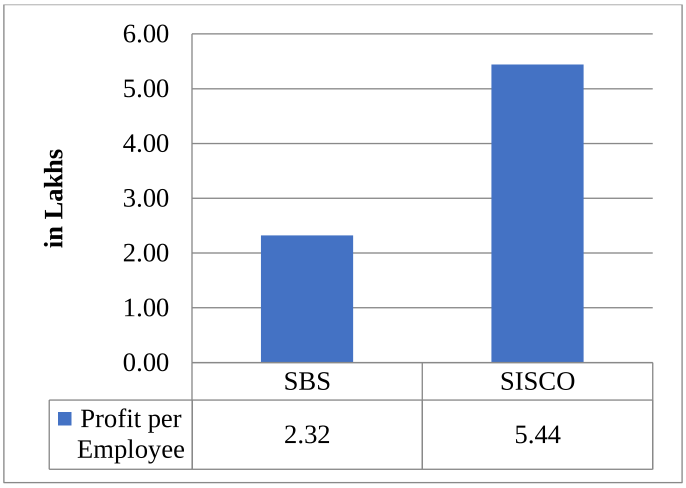


Figure 5.33
Business per Employee



Source: Created using data from annual accounts of SBS & SISCO

Figure 5.34
Profit per Employee



Source: Created using data from annual accounts of SBS & SISCO

5.5 Earning Quality

Earning has always been a convenient means for measuring the performance of any business establishment. Higher the amount of earning better the performance is a true statement for any organization, including banks.

The earning quality is the fourth parameter of the CAMEL model, and it determines the ability of a bank to earn consistently. It indicates a bank's profitability and explains sustainability and growth in future earnings. Sustainability and quality of earnings, if not more, are certainly no less important than the volume of earnings. The bank's improper credit risk management affects both the quality and quantity of earnings. Bank competent to maintain vigorous quality and quantity of earnings will provide a sustainable return to its shareholders. The bank would be better positioned to absorb unexpected shocks and losses from different risks with better quality and higher earnings. Earnings and profitability also increase the banks' capital base and impact its interest rate policies and adequacy of provisioning against bad loans. It also reflects the ability of the bank to support its present and future operations. In short, the earning quality of a bank determines its capacity to absorb unexpected losses, finance expansion and development projects, pay higher dividends to its shareholders, and maintain a sufficient level of its capital. Adequate earning is essential for any financial institution to survive in the competitive business environment.

Grier (2007) opines that the consistent profit favourably affects the public's confidence in the bank and helps banks absorb loan losses and provide sufficient provisions. Earnings are necessary for a balanced financial structure and reward the bank's shareholders in dividends. The sustainability of the banking institutions momentously relies on consistent and healthy earnings.

Banks earn performing activities categorized as core and non-core activities. Earnings made through lending are considered from core activities, whereas earnings from investments, corporate advisory services, and treasury operations are from non-core activities. The volume of earnings made by the bank through core activities determines its earning quality. The following ratios explain the earning quality of the banks better.

1. Return on Assets (RoA) (Agyei,2016)
2. Spread to Total Assets (Sudha, 2014)
3. Operating Cost to Income Ratio (Dang, 2011)
4. Operating Profit to Total Assets Ratio (Bothra & Purohit, 2018)

Apart from examining the earning quality of the banks under study through various ratios mentioned above, we also analyze the trends in operating income, operating cost, operating profit, and net interest margin of both the banks over the last nine years.

5.5.1 Trends in Operating Income

The operating income of a bank includes both interest income and non-interest income. Interest income includes income from interest-bearing assets, interest on lending, and income from dividends on shares and participations whereas, non-interest income includes fees and commissions. The trends in the banks' operating income under study are in table & figure 5.28 & 5.35.

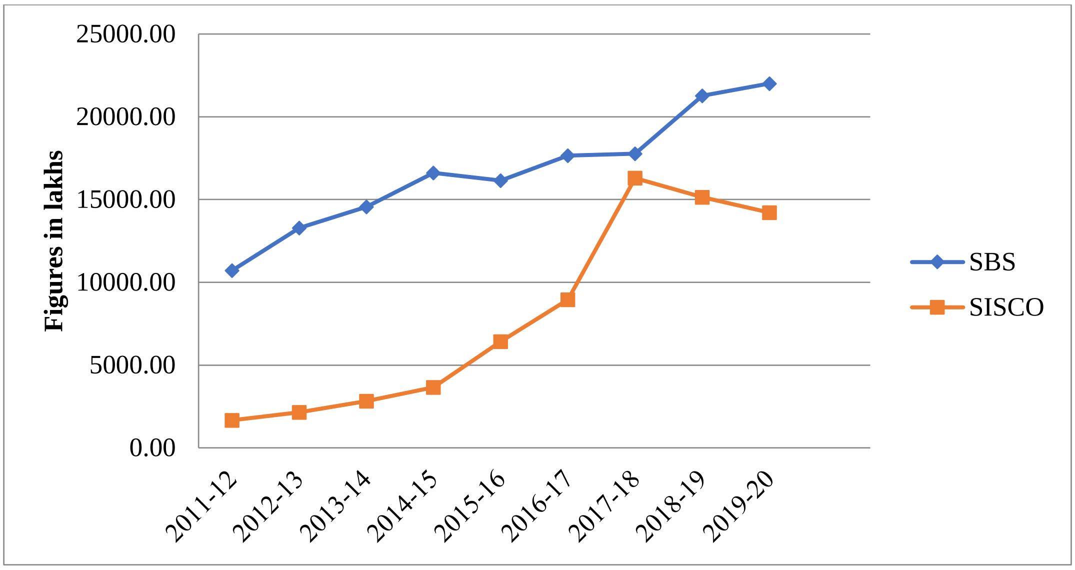
Table 5.28
Trends in Operating Income

(Figures in lakhs)

Year	SBS		SISCO	
	Amount (Rs.)	**Growth %**	**Amount (Rs.)**	**Growth %**
2011-12	10714.21	-	1667.80	-
2012-13	13277.73	23.93	2143.11	28.50
2013-14	14553.18	9.61	2816.70	31.43
2014-15	16602.73	14.08	3653.43	29.71
2015-16	16144.00	-2.76	6419.95	75.72
2016-17	17648.75	9.32	8962.08	39.60
2017-18	17776.41	0.72	16292.92	81.80
2018-19	21272.21	19.67	15138.58	-7.08
2019-20	22011.58	3.48	14204.82	-6.17
CAGR%	8.33		26.87	
MEAN	16666.76		7922.15	
MEDIAN	16602.73		6419.95	
STD. DEV	3599.23		5934.63	
MIN.	10714.21		1667.80	
MAX.	22011.58		16292.92	

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.35
Trends in Operating Income



Source: Created using data from annual accounts of SBS & SISCO

The income of the SBS has not been steady over the last nine years. SBS recorded a growth of 23.93 percent in 2012-13 and 9.61 percent & 14.08 percent growth in the two subsequent years; however, income declined by 2.76 percent during 2015-16. During 2016-17, it recorded 9.32 percent growth, 0.72 percent growth in 2017-18, growth of 19.67 percent in 2018-19, and it recorded a nominal growth of 3.48 percent during 2019-20. On the other hand, SISCO bank recorded a very high growth till 2017-18, which made its income grow from Rs.1667.80 lakhs during 2011-12 to Rs.16292.92 lakhs in 2017-18. The matter of concern to SISCO bank is the decline in their operating income during recent years, i.e., 2018-19 & 2019-20 at the rate of 7.08 percent & 6.17 percent, respectively. Based on CAGR, SISCO bank is a clear winner in generating operating income.

5.5.2 Trends in Operating Expenses

A bank's operating expenses include interest and non-interest expenditures like staff costs, property costs, and others. Financial institutions need to keep their operational expenditure under control as it directly affects their operating profit. The trends in the operating expenses of the banks under study may be in table & figure 5.29 & 5.36.

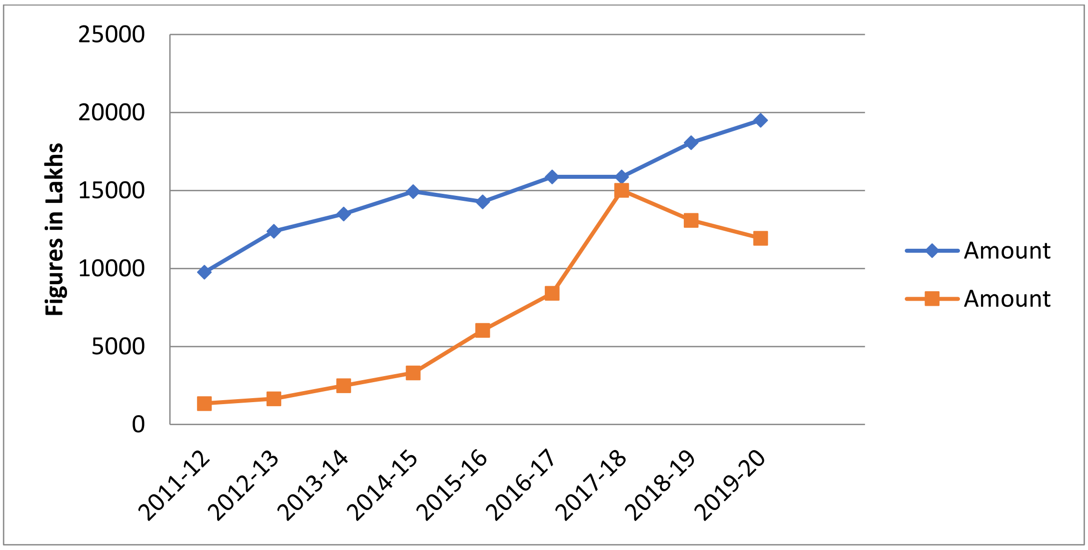
Table 5.29
Trends in Operating Expenses

(Figures in lakhs)

Year	SBS		SISCO	
	Amount (Rs.)	**Growth %**	**Amount (Rs.)**	**Growth %**
2011-12	9761.97		1351.01	
2012-13	12400.77	27.03	1649.73	22.11
2013-14	13506.36	8.92	2481.4	50.41
2014-15	14925.41	10.51	3317.43	33.69
2015-16	14273.77	-4.37	6047.19	82.29
2016-17	15886.59	11.30	8408.72	39.05
2017-18	15884.38	-0.01	15007.32	78.47
2018-19	18075.82	13.80	13092.78	-12.76
2019-20	19506.57	7.92	11934.56	-8.85
CAGR%	8.00		27.39	
MEAN	14913.52		7032.24	
MEDIAN	14925.41		6047.19	
STD. DEV	2920.35		5279.53	
MIN.	9761.97		1351.01	
MAX.	19506.57		15007.32	

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.36
Trends in Operating Expenses



Source: Created using data from annual accounts of SBS & SISCO

Figure 5.36 suggests that the SISCO bank's operating expenses increased at a very high rate from 2011-12 to 2017-18, making its operating expenses grow from just Rs. 1351.01 lakhs in 2011-12 to Rs. 15007.32 lakhs in 2017-18. SISCO bank successfully limited its operating expenses during 2018-19 & 2019-20 when it recorded a decline of 12.76 percent and 8.85 percent, respectively. SBS's operating expenses also increased over the years but not at the rate of SISCO bank. SBS also recorded a nominal decline in its operating expenses twice during the last nine years, i.e., in 2015-16 & 2017-18 at the rate of 3.76 percent & 0.01 percent, respectively. With average operating expenses of 8.00 percent, SBS has been way successful in containing its operating expenses compared to SISCO, which records a CAGR of 27.39 percent.

5.5.3 Trends in Operating Profit

Bank earns an operating profit by performing core banking activities. Profit from non-core activities like investment, corporate advisory, and treasury operations does not form part of the bank's operating profit. Operating profit reflects the real earning power of the bank to generate profit by carrying its core activities. Hence, operating profit is an indicator of the profitability of a bank and the potentiality of its business. Operating profit is arrived at by deducting the bank's operating expenses from its operating income. The banks' operating profit trends may be seen in the table and figure 5.30 & 5.37.

Table 5.30
Trends in Operating Profit

(Rupees in lakhs)

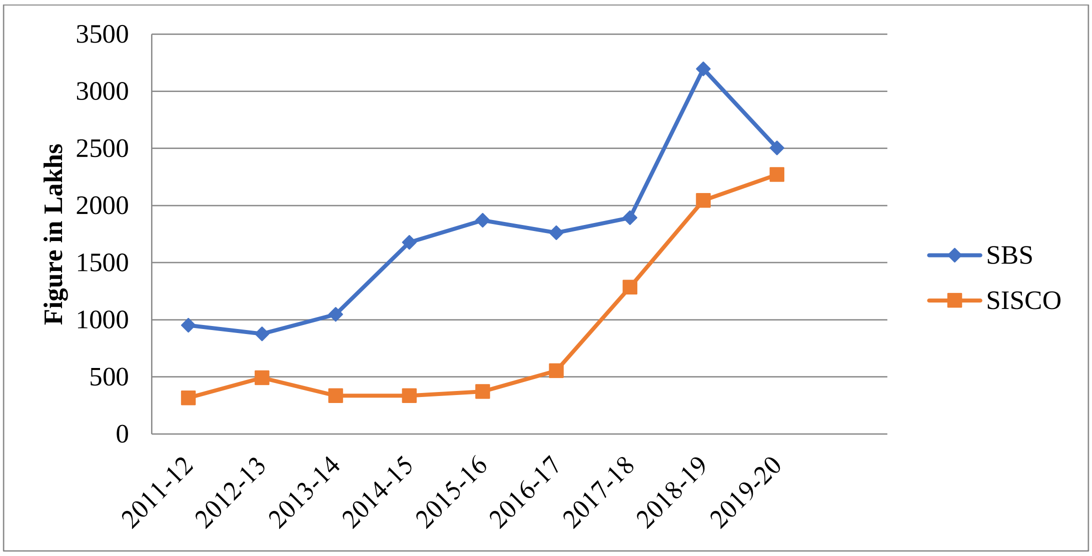
Year	SBS		SISCO	
	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %
2011-12	952.24		316.79	
2012-13	876.96	-7.91	493.38	55.74
2013-14	1046.82	19.37	335.30	-32.04
2014-15	1677.32	60.23	336.00	0.21
2015-16	1870.23	11.50	372.76	10.94

Year	SBS		SISCO	
	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %
2016-17	1762.16	-5.78	553.36	48.45
2017-18	1892.03	7.37	1285.60	132.33
2018-19	3196.39	68.94	2045.80	59.13
2019-20	2505.01	-21.63	2270.26	10.97
CAGR%	11.35		24.46	
MEAN	1753.24		889.92	
MEDIAN	1762.16		493.38	
STD. DEV	757.89		780.93	
MIN.	876.96		316.79	
MAX.	3196.39		2270.26	

Source: Computed using data from annual accounts of SBS & SISCO

SISCO has achieved consistent growth in its operating profit throughout the last nine years except in 2013-14, wherein it recorded a decline of 32.04 percent in its operating profit. SISCO had a very high growth rate in its operating profit of 55.74 percent, 48.45 percent, 132.33 percent & 59.13 percent during 2013-14, 2016-17, 2017-18 & 2018-19. SBS recorded a decline in its operating profit in three years, i.e., during 2012-13, 2016-17, and 2019-20 by 7.91 percent, 5.78 percent, and 21.63 percent, respectively in the last nine years. The SBS recorded 60.23 percent and 68.94 percent growth during 2014-15 and 2018-19.

Figure 5.37
Trends in Operating Profit



Source: Created using data from annual accounts of SBS & SISCO

The trends in operating profit of SISCO suggest consistent upward movement from 2015-16 onward, whereas SBS's growth in operating profit is not consistent. With a CAGR of 24.46 percent as compared to 11.35 percent of SBS, SISCO is far ahead in the race of earning operating profit.

5.5.4 Trends in Net-Interest Margin

The difference between the interest income and the interest expended is the net interest margin or spread (Kumar & Alam, 2018). We express the net interest margin (NIM) as a percentage of the total assets. Maintaining higher NIM or spread should be the goal of the financial institution. It is the difference in the interest earned by a bank on loans and advances, investment and balance with other banks, and interest expended on deposits and borrowings. Net interest margin is dependent on factors like rate of deposits, rate of investments, rate of borrowings, and rate of advances. The growth in net interest margin shows the quality of earnings of a bank. A higher net interest margin is better for the quality of earnings. The trends of the banks under study have been reflected in the table and figure 5.31 & 5.38.

Table 5.31
Trends in Net Interest Margin/Spread

(Rupees in lakhs)

Year	SBS		SISCO	
	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %
2011-12	3793.51		718.65	
2012-13	3679.78	-3.00	946.47	31.70
2013-14	2359.14	-35.89	875.36	-7.51
2014-15	2856.09	21.06	989.17	13.00
2015-16	3272.38	14.58	1118.36	13.06
2016-17	3818.35	16.68	1631.16	45.85
2017-18	4152.32	8.75	2485.10	52.35
2018-19	5466.08	31.64	3598.04	44.78
2019-20	5680.53	3.92	3404.57	-5.38
CAGR%	4.59		18.87	
MEAN	3897.58		1751.88	
MEDIAN	3793.51		1118.36	

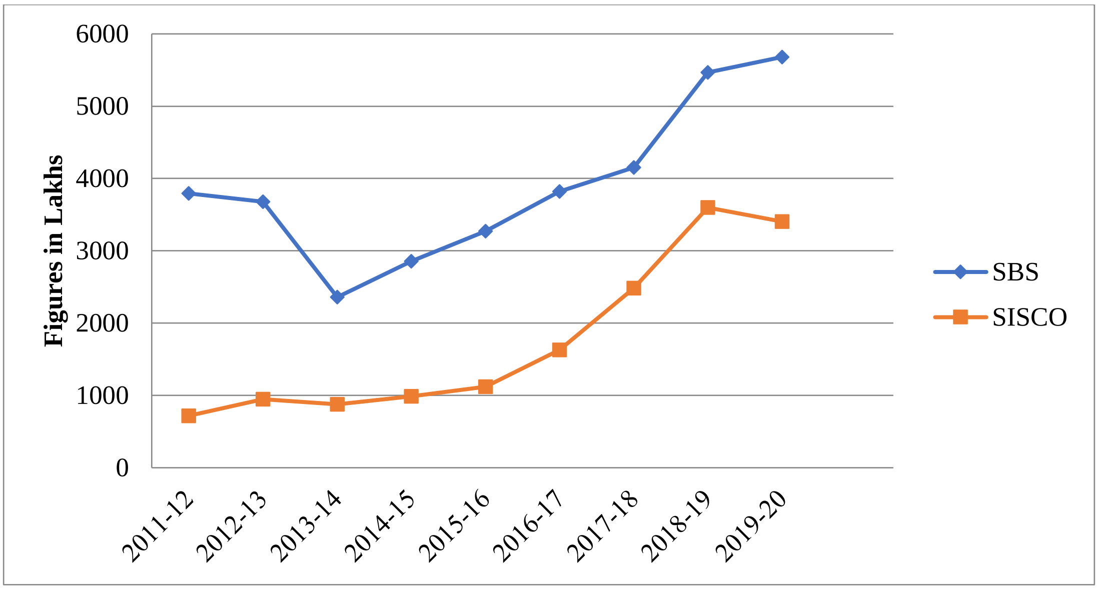
Year	SBS		SISCO	
	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %
STD. DEV	1096.07		1126.91	
MIN.	2359.14		718.65	
MAX.	5680.53		3598.04	

Source: Computed using data from annual accounts of SBS & SISCO

SBS recorded a decline in its NIM or Spread during the first two years of study, i.e., during 2012-13 & 2013-14 by 3.00 percent and 35.89 percent respectively. From 2014-15 onwards, the SBS recorded an excellent growth rate in its NIM till 2018-19, and during 2019-20 it recorded growth but at a lesser rate of 3.92 percent. Improvement in the growth rate of NIM/Spread of the SBS post-2013-14 is quite encouraging. On the other hand, SISCO recorded a very high growth rate during 2012-13, 2014-15, 2015-16, 2016-17, 2017-18 & 2018-19, which made its NIM grow to Rs. 3404.57 lakhs in 2018-19 from Rs. 718.65 lakhs in 2011-12. SISCO also recorded a decline in its NIM/Spread during 2013-14 & 2019-20 by 7.51 percent & 5.38 percent, respectively. With a higher CAGR of 18.97 percent, SISCO is a clear winner compared to CAGR of 4.59 percent of SBS.

Figure 5.38

Trends in Net Interest Margin/Spread



Source: Created using data from Annual Accounts of SBS & SISCO

5.5.5 Return on Assets (ROA)

Return on Assets (ROA), a net income after taxes to total assets ratio, is the single best measure to assess the earning efficiency of the banks. It also explains that a bank's profitability is relative to its total assets (Sudha, 2014). ROA also indicates how efficient the bank's management has been using its assets to generate earnings. In other words, we may say that the return on assets reflects the efficiency of the banks in generating a profit by utilizing their assets. ROA is arrived at by dividing the net profit after tax by the total assets. The ratio, thus, measures the return on assets employed by the bank. A higher return on assets indicates a better-earning quality and explains the bank's overall efficiency. Dang (2011) suggests an ideal range of Return on Assets (ROA) of $\geq 1\%$ (). The formula for calculating Return on Assets is as follows.

$$Return\ on\ Assets\ (ROA) = \frac{Net\ Profit\ after\ Tax}{\text{Total Assets}}$$

The table and figure 5.32 & 5.39 present the performance of the banks in terms of ROA.

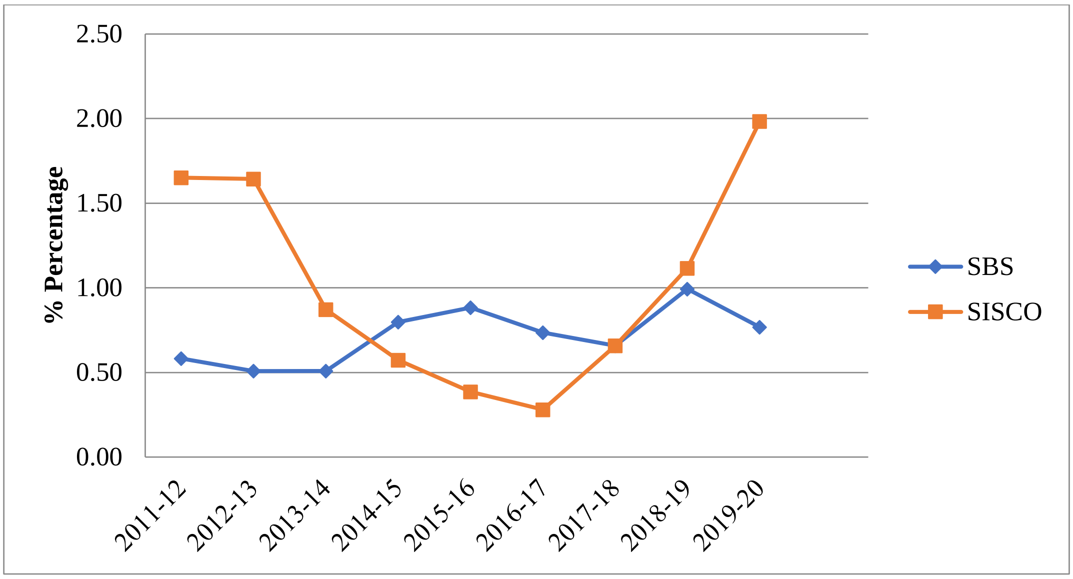
Table 5.32
Return on Assets (ROA)

(Figures in %)

Year	SBS	SISCO
2011-12	0.58	1.65
2012-13	0.51	1.64
2013-14	0.51	0.87
2014-15	0.80	0.57
2015-16	0.88	0.39
2016-17	0.74	0.28
2017-18	0.66	0.66
2018-19	0.99	1.12
2019-20	0.77	1.98
MEAN	0.71	1.02
STD. DEV	0.17	0.62
MIN.	0.51	0.28
MAX.	0.99	1.98
RANK	**II**	**I**

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.39
Return on Assets (ROA)



Source: Created using data from annual accounts of SBS & SISCO

SBS has never achieved an ideal ROA of ≥1 percent over the last nine years. SBS consistently recorded its ROA within the range of 0.50 percent to 0.90 percent, except during 2018-19 when it recorded its highest return on assets of 0.99 percent. Lesser ROA of the SBS indicates that the bank has not deployed its assets to the maximum possible limit. Improvement in ROA of the SBS after 2013-14 is due to improved credit to deposits ratio (CDR), as highlighted previously in table 5.32. During the initial two years of the study, SISCO recorded a return on assets ratio of more than 1 percent; after that, it recorded a gradual decline until it reached the lowest level of 0.11 percent during 2016-17. From 2017-18 onwards, the SISCO recorded gradual growth in the ROA, and during 2019-20 it recorded the highest growth of 1.98 percent. Comparison of the average ROA of both the banks reveals that the SISCO with an average growth rate of 0.63 percent, against the average growth rate of 0.42 percent of SBS, is a winner in terms of return on assets.

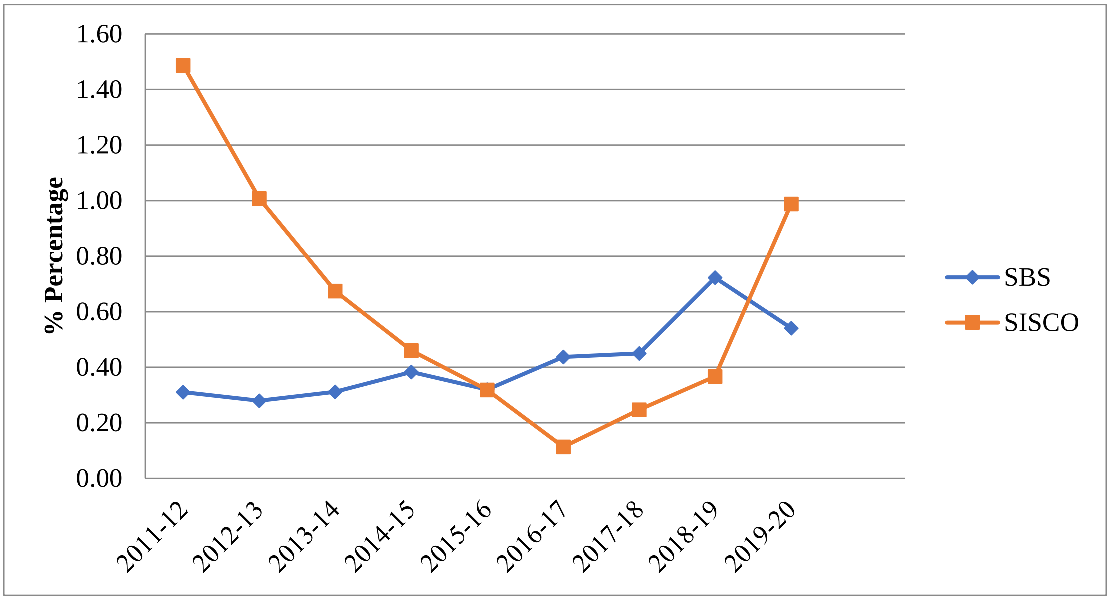
5.5.6 Operating Profit to Total Assets Ratio (OPP/TA)

The operating profit to total assets ratio indicates how much profit a bank can earn from its operations from every rupee it invested in its assets. It measures the ratio between operating profit and total assets of the bank. We calculate the operating profit to total assets ratio using the following formula.

$$Op. Profit\ to\ Total\ Assets = \frac{Operating\ Profit}{\text{Total Assets}}$$

The table and figures 5.33 & 5.40 present the banks' operating profit to total assets ratio.

Figure 5.40
Operating Profit to Total Assets Ratio



Source: Created using data from annual accounts of SBS & SISCO

Table 5.33
Operating Profit to Total Assets Ratio

(Figures in %)

Year	SBS	SISCO
2011-12	0.31	1.49
2012-13	0.28	1.01
2013-14	0.31	0.67
2014-15	0.38	0.46
2015-16	0.32	0.32
2016-17	0.44	0.11

Year	SBS	SISCO
2017-18	0.45	0.25
2018-19	0.72	0.37
2019-20	0.54	0.99
MEAN	0.42	0.63
STD. DEV	0.14	0.45
MIN.	0.28	0.11
MAX.	0.72	1.49
RANK	**II**	**I**

Source: Computed using data from annual accounts of SBS & SISCO

The operating profit to total assets ratio of the SBS has been consistently growing throughout the study but has never reached the level of 1.00 percent. SBS achieved a growth rate in operating profit to total assets ratio of over 0.50 percent only during two years, i.e., 2018-19 and 2019-20. On the other hand, SISCO had a ratio of more than 1 percent during 2011-12 & 2012-13; after that, it started to deteriorate and reached its lowest level of 0.11 percent during 2016-17. From 2017-18 onwards operating profit to total assets ratio of SISCO once again started to grow, and it reached 0.99 percent during 2019-20. SISCO bank has maintained an average growth of 0.63 percent in its operating profit to total assets ratio during the period under study. In contrast, SBS records an average growth of only 0.42 percent. Based on the average growth rate of operating profit to total assets ratio, SISCO bank again secured rank number one.

5.5.7 Operating Cost to Total Income Ratio

The operating cost to total income ratio measures the banks' ability to meet its operating expenses from its income. It is the ratio of operating expenses to the bank's total income. Unlike the other ratios for assessing the earning quality of a bank, we consider the lower of this ratio to be better for the bank.

$$Op.\,Cost\ to\ Total\ Income = \frac{Operating\ Profit}{\text{Total Income}}$$

Table 5.34
Operating Cost to Total Income Ratio

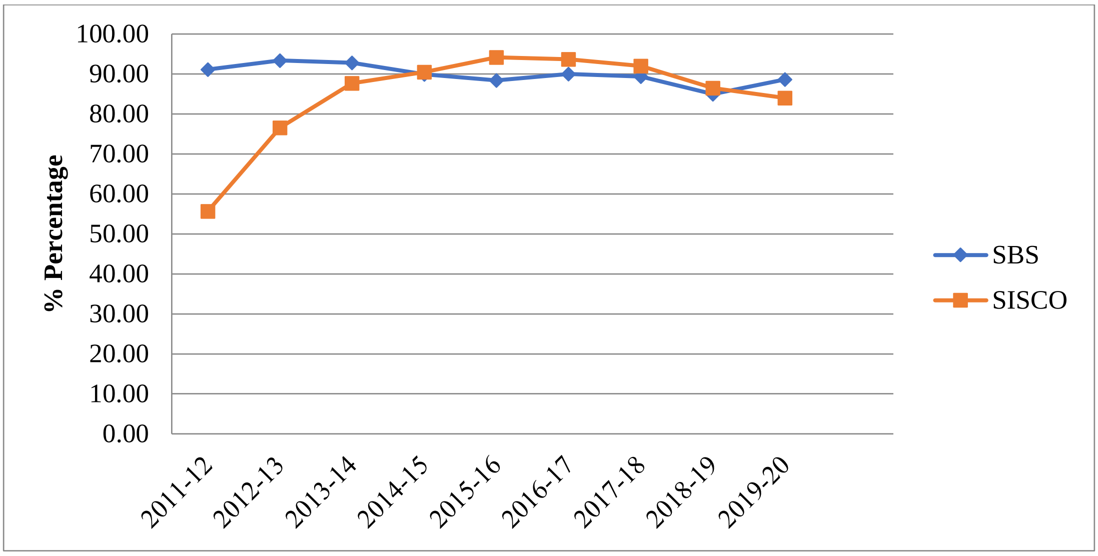
(Figures in %)

Year	SBS	SISCO
2011-12	91.11	55.67
2012-13	93.40	76.53
2013-14	92.81	87.70
2014-15	89.90	90.45
2015-16	88.42	94.17
2016-17	90.02	93.70
2017-18	89.36	92.03
2018-19	84.97	86.49
2019-20	88.62	84.02
MEAN	89.84	84.53
STD. DEV	2.51	12.14
MIN.	84.97	55.67
MAX.	93.40	94.17
RANK	**II**	**I**

Source: Computed using data from annual accounts of SBS & SISCO

The operating cost of the SBS shown in table 5.34 consumes almost 90% of its total income throughout the period under study. The lowest operating cost to the total income of SBS itself was 88.42 percent during 2015-16. Though the average ratio of SBS is over 90 percent, it has been decreasing gradually over the years. SISCO, which had recorded a lower operating cost to total income ratio during 2011-12 & 2012-13, started to experience considerable growth in the succeeding years. The highest operating cost to the total income of 90.45 percent, 94.17 percent 93.70 percent, and 92.70 percent was recorded by the bank during 2014-15, 2015-16, 2016-17, and 2017-18 respectively. With the lower average operating cost to total income ratio, SISCO again secures no. 1 rank.

Figure 5.41
Operating Cost to Total Income Ratio



Source: Created using data from annual accounts of SBS & SISCO

5.5.8 Net Interest Margin to Total Assets

Net Interest Margin is the difference between the interest earned and the interest expended by the bank. We express the net interest margin as a percentage of the bank's total assets. With a given total asset, a higher spread indicates better earnings ability of the bank. Dang (2011) suggests that the net interest margin should be >4.50% of the total assets.

Table 5.35
Net Interest Margin to Total Assets Ratio

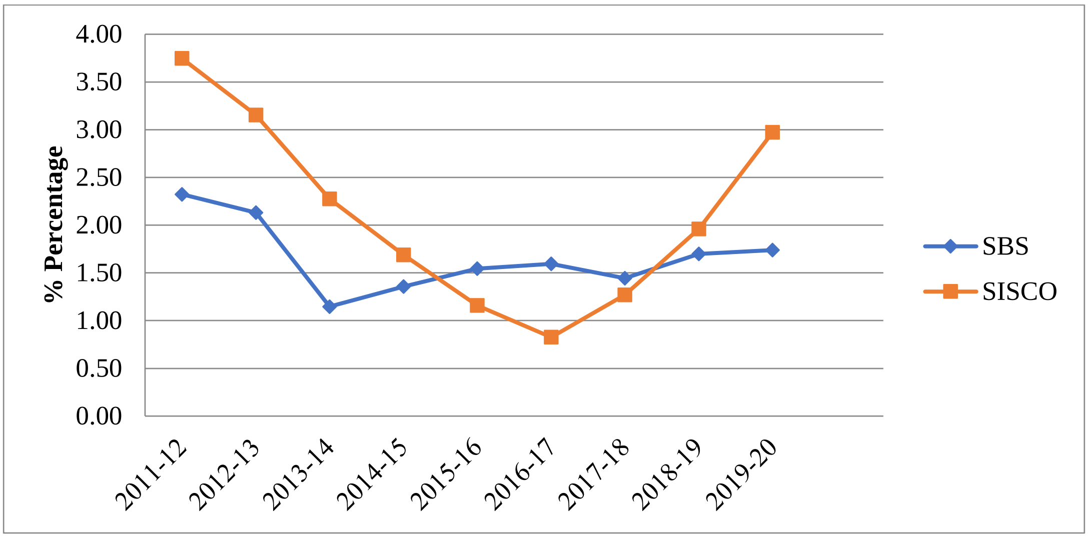
(Figures in %)

Year	SBS	SISCO
2011-12	2.32	3.75
2012-13	2.13	3.15
2013-14	1.15	2.28
2014-15	1.36	1.69
2015-16	1.54	1.16
2016-17	1.59	0.83
2017-18	1.44	1.27
2018-19	1.70	1.96
2019-20	1.74	2.97
MEAN	1.66	2.12
STD. DEV	0.37	1.00

Year	SBS	SISCO
MIN.	1.15	0.83
MAX.	2.32	3.75
RANK	**II**	**I**

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.42
Net Interest Margin to Total Assets Ratio



Source: Created using data from annual accounts of SBS & SISCO

Both the banks appear to be below the ideal ratio of >4.50%, suggested in his study by Dang (2011), concerning NIM to total assets throughout the study period. SBS, which had its NIM to Total Assets ratio above 2.00% during 2011-12 & 2012-13, recorded a decline after that and could not reach 2.00 percent again during the rest of the study period. 2018-19 onwards, slight growth has been noticed in the ratio of SBS. SISCO having NIM to total assets ratio of 3.75 percent during 2011-12, also started to record decline after that and reached its lowest level of 0.83 percent during 2016-17. 2017-18 onwards, SISCO also recorded a nominal growth in its ratio, and by 2019-20 it reached 2.97 percent. During 2014-15 to 2016-17, the NIM to Total Assets ratios of SISCO was below the SBS's ratios. The average growth rate of the net interest to total assets ratio of SBS of 1.66 percent stands below the average ratio of SISCO of 2.12 percent; hence, SISCO has once again stood first in this ratio as well.

5.5.9 Composite Earning Quality Ranking

Based on the average ranking obtained by the banks in four Earning Quality ratios, we assigned the composite ranking to the banks under study in table 5.36.

Table 5.36
Composite Earning Quality Ranking

Ratios to measure Earning Quality	SBS Avg. (%)	SBS Rank	SISCO Avg. (%)	SISCO Rank
Return on Assets	0.71 %	2	1.02 %	1
Operating Profit to Total Assets	0.42 %	2	0.63 %	1
Operating Cost to Total Income	89.84 %	2	84.53 %	1
Net Interest Margin to Total Assets	1.66 %	2	2.12 %	1
Group Average	-	2	-	1
Group Rank	-	**2nd**	-	**1st**

Source: Computed using data from annual accounts of SBS & SISCO

Performing better in all the four ratios, SISCO bank has secured no.1 position in composite earning quality ranking. SISCO records an average ROA of 1.02 percent, whereas SBS records only 0.71 percent. The operating profit to total assets ratio of SISCO of 0.63 percent is also better than SBS. SISCO records comparatively lesser operating cost to total income ratio, and it records a higher NIM to total assets ratio than SBS.

Figure 5.43
Return on Assets Ratio

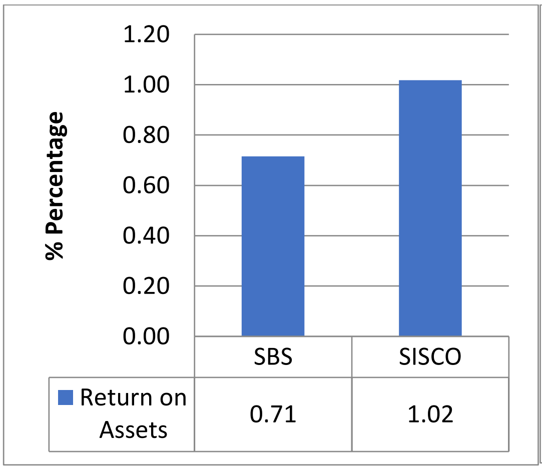
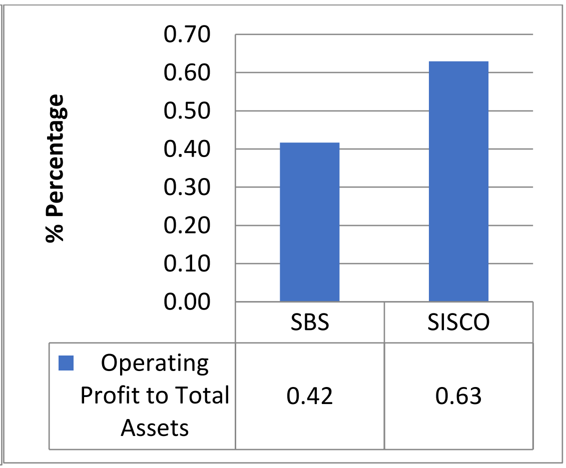


Figure 5.44
Operating Profit to Total Assets Ratio



Source: Created using data from annual accounts of SBS & SISCO

Figure 5.45
Operating Cost to Total Income Ratio

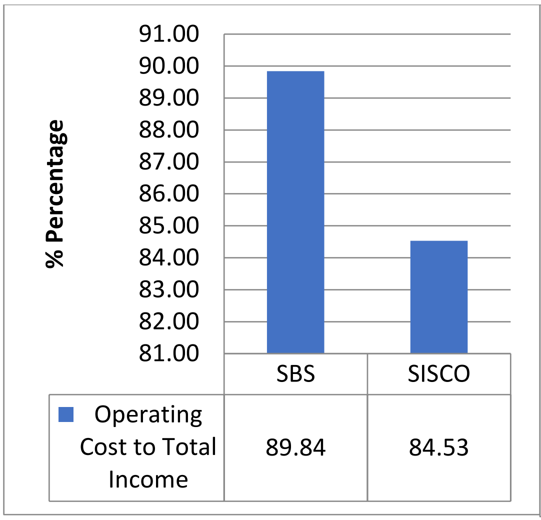
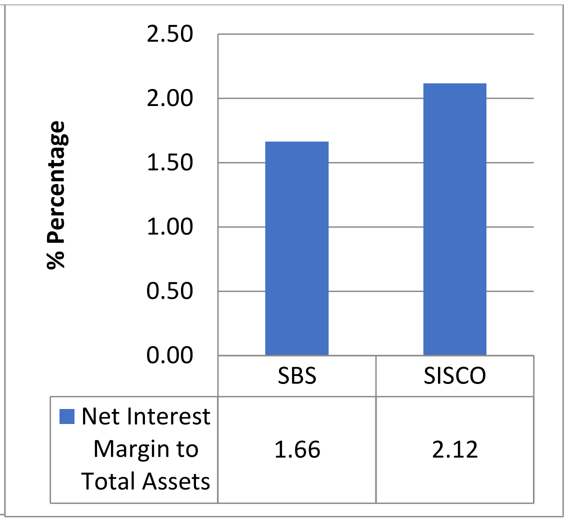


Figure 5.46
Net Interest Margin to Total Assets



Source: Computed using data from annual accounts of SBS & SISCO

5.6 Liquidity

The liquidity of a bank expresses the degree to which it can fulfil its repayment obligations. Banks use their deposits for investments and lending purposes for a longer time to earn interest at a higher rate; hence, the banks need to maintain liquidity to honour the withdrawal requests of their customers.

Banks are in such a business where liquidity cannot be compromised. Cash and balance with banks are the most liquid of all the bank's assets. Banks are said to be adequately liquid when it is in a position to obtain sufficient funds either by increasing their liabilities or quickly converting their assets at a reasonable cost. The liquidity issue is a curse for the bank as it tarnishes its image, sometimes irrevocably. A bank must avoid the liquidity risk, but at the same time, it should invest a good amount of its funds in higher return generating activities. The banks should see that they can generate a reasonable profit, keeping adequate provision for liquidity (Sudha,2014).

Maintaining an appropriate level of liquidity is not an easy task as it depends on several factors. The degree of liquidity requirement varies from institution to institution. Financial institutions that do not mobilize savings from the public need not maintain a very high level of liquidity; whereas, institutions like commercial banks that accept public deposits need to maintain an adequate level of liquidity.

1. Monetary policy of the government;
2. Directives and guidelines of the central bank(s);
3. Nature of customer base and accounts;
4. Short-term cash requirement of the bank;
5. Liquidity of bank's assets;
6. Available lines of credit; and
7. Image of the bank in the market;

Gadhia (2015), in his Ph.D. thesis, describes fall in rupee, volatility in oil prices, volatility in bullion and security markets in India, instability of Greece and euro in the European Market and Sub-Prime crisis in the United States to be the examples of mismanagement of liquidity by the banks across the globe and government's failure to manage the monetary and Fiscal policies (Gadhia,2015). Considering the above factors, banks need to decide on their liquidity requirement and, once decided, must ensure its maintenance. We use the following ratios to assess the banks' liquidity under study.

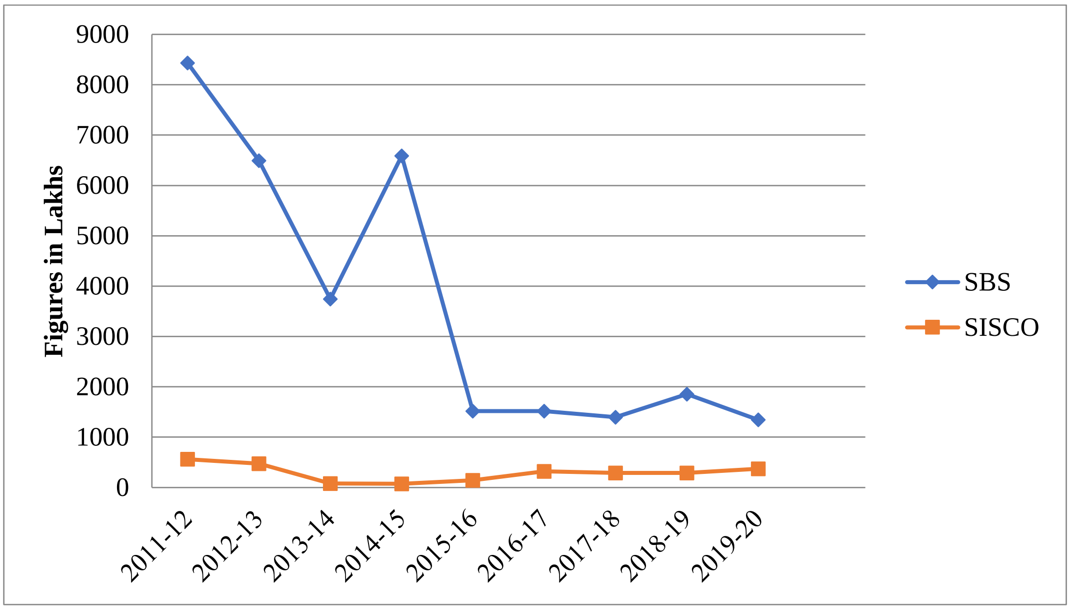
1. Cash to Total Assets Ratio (Sudha, 2014)
2. Liquid Assets to Demand Deposit Ratio (Kumar & Alam, 2018)
3. Liquid Assets to Total Assets Ratio (Yuksel et al., 2015)
4. Loan to Deposit Ratio (Dang, 2011)

Apart from calculating and comparing the above ratios to assess the banks' liquidity positions, we also made an effort to understand the trends in various variables like cash reserves, liquid assets, and total assets.

5.6.1 Trends in Cash Reserves

Cash is the most liquid among all the assets of the bank. To honour the withdrawal requests from demand deposits, savings account, and term deposits, the bank needs to maintain a sufficient amount of cash. The bank has to work out the daily cash requirement based on their experience in the recent past and several other factors. Failure to honour the customers' withdrawal requests may severely impact the bank's image. The cash reserves maintained by both the banks may be seen in the table and figure 5.37 & 5.47.

Figure 5.47
Trends in Cash Reserves



Source: Created using data from annual accounts of SBS & SISCO

Table 5.37
Trends in Cash Reserves

(Rupees in lakhs)

Year	SBS		SISCO	
	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %
2011-12	8433.09	-	561.85	-
2012-13	6490.49	-23.04	471.96	-16.00
2013-14	3746.93	-42.27	82.36	-82.55
2014-15	6588.85	75.85	74.93	-9.02
2015-16	1519.93	-76.93	143.71	91.79
2016-17	1519.93	0.00	319.5	122.32

Year	SBS		SISCO	
	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %
2017-18	1398.69	-7.98	292.25	-8.53
2018-19	1853.66	32.53	293.35	0.38
2019-20	1343.82	-27.50	374.79	27.76
CAGR%	-18.46		-4.40	
MEAN	3655.04		290.52	
MEDIAN	1853.66		293.35	
STD. DEV	2790.17		168.02	
MIN.	1343.82		74.93	
MAX	8433.09		561.85	

Source: Computed using data from annual accounts of SBS & SISCO

SBS, which had a very high cash reserve during 2011-12, gradually started to decrease it, and by 2015-16, the bank's cash reserve reached Rs.1519.93 lakhs which is 5.5 times lesser as compared to that of 2011-12. During 2016-17 SBS retained the same amount of cash as 2015-16, but it reduced by 7.98 percent during 2017-18. The bank recorded a sudden increase of 32.53 percent during 2018-19 in its cash reserve, which declined during 2019-20 by 27.50 percent. The trends in cash reserve of the SBS have been in declining mode during the last nine years except in two years when it recorded some growth. During 2011-12 to 2014-15, SISCO recorded a decline in its cash reserve but recorded substantial growth of 91.79 percent and 122.32 percent in the succeeding two years. During 2017-18, SISCO recorded a slight decline of 8.53 percent in its cash reserve, growing again by 0.38 and 27.76 percent during 2018-19 and 2019-20, respectively. A negative CAGR of18.46 percent & 4.40 percent suggest that both SBS and SISCO share a declining trend in their cash reserve during the last nine years. SBS recorded a sharper decline, possibly because of the bank's effort to reach the level of cash reserve, which is just adequate so that it has more funds at its disposal for lending and investment.

5.6.2 Trends in Liquid Assets

Liquid assets are those assets of the bank that can be converted into cash easily and quickly without losing value or without too much cost. For banks, liquid assets generally include cash in hand, balance with RBI, and balance with other banks in India or abroad. For this study, liquid assets comprise cash in hand of both the banks, their balance with RBI and other banks. Among all the assets, cash in hand is the most liquid asset. Maintaining adequate liquid assets is of utmost importance for banks as it reflects their ability to fulfil their repayment obligations.

Liquid Assets of the SBS has declined over the year. The average deposit of SBS for the last nine years is nearly four times that of SISCO, whereas, average Liquid assets of the bank for nine years appear to be around 16 times higher than that of SISCO.

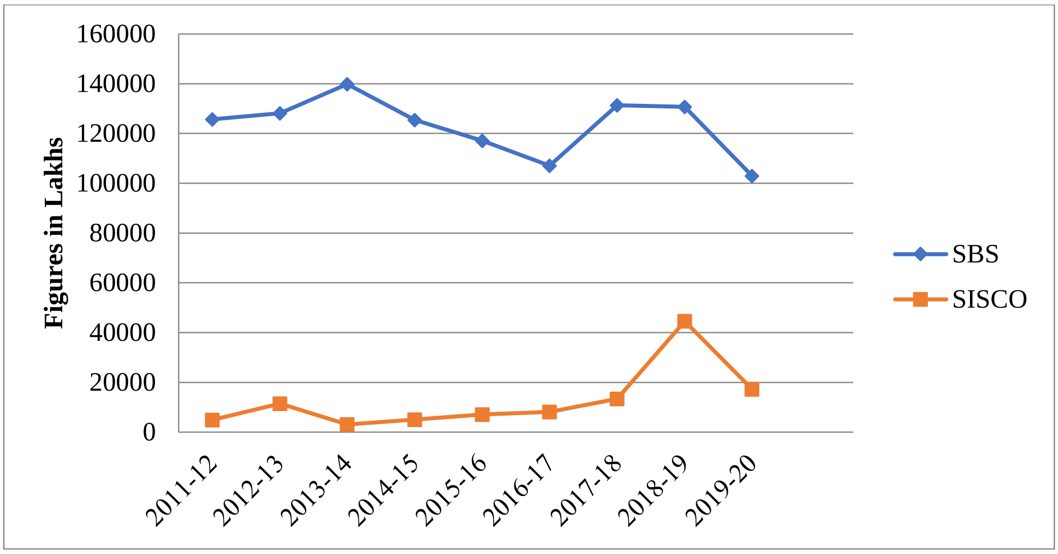
Table 5.38
Trends in Liquid Assets

(Rupees in lakhs)

Year	SBS		SISCO	
	Amount (Rs.)	Growth %	Amount (Rs.)	Growth %
2011-12	125697	-	4954.82	-
2012-13	128177	1.97	11410	130.28
2013-14	139851	9.11	3083.82	-72.97
2014-15	125420	-10.32	5062.48	64.16
2015-16	117118	-6.62	7040.59	39.07
2016-17	107011	-8.63	8136.2	15.56
2017-18	131378	22.77	13439.5	65.18
2018-19	130774	-0.46	44559	231.55
2019-20	102941	-21.28	17310.7	-61.15
CAGR%	-2.19		14.91	
MEAN	123151.73		12777.46	
MEDIAN	125696.93		8136.2	
STD. DEV	11973.39		12757.65	
MIN.	102941.19		3083.82	
MAX.	139850.87		44559.02	

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.48
Trends in Liquid Assets



Source: Created using data from annual accounts of SBS & SISCO

Maintaining liquid assets at such a higher rate by the SBS has undoubtedly made its liquidity position stronger. However, at the same time, it has adversely affected its operating profit as the same is almost similar to that of SISCO despite having deposits of 4 times higher than the SISCO. SBS recorded a decline in its liquid assets five times during the last nine years, i.e., during 2014-15, 2015-16, 2016-17, 2018-19 & 2019-20 by 10.32 percent, 6.62 percent, 8.63 percent, 0.46 percent, and 21.28 percent respectively. SBS also records growth in its liquid assets by 1.97 percent, 9.11 percent, 22.77 percent during 2012-13, 2014-15, and 2017-18.

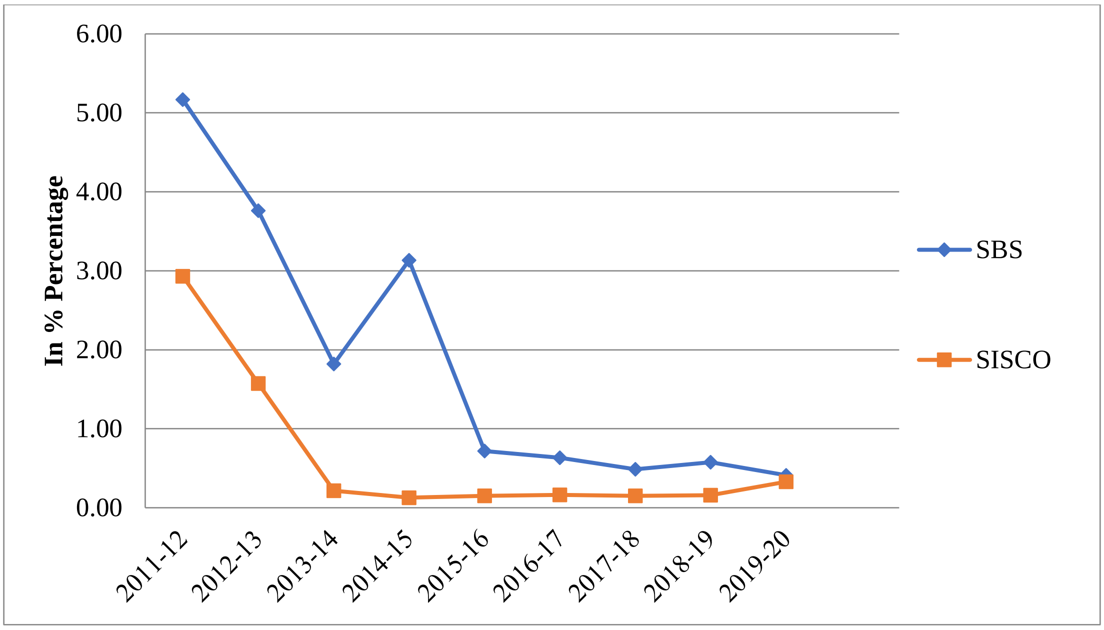
On the other hand, SISCO records an increasing trend in its liquid assets during the last nine years. During 2012-13 & 2018-19, SISCO recorded the highest growth in its liquid assets of 130.28 percent and 231.55 percent. During the rest of the years, SISCO recorded substantial growth in its liquid assets except during 2013-14 & 2019-20 when it recorded a decline in its liquid assets. SISCO has a positive CAGR of 14.91 percent, whereas SBS's CAGR has gone negative by 2.19 percent.

5.6.3 Cash to Total Assets Ratio

Cash is the most liquid asset among all the assets held by the bank. Cash is required to meet up daily withdrawal requests of the customers; hence, the banks need to maintain adequate cash. Higher the cash to total assets ratio more liquid the bank is. This ratio is arrived at by dividing the cash by the bank's total assets.

$$Cash\ to\ Total\ Assets = \frac{Cash}{\text{Total Assets}}$$

Figure 5.49
Cash to Total Assets Ratio



Source: Created using data from annual accounts of SBS & SISCO

Table 5.39
Cash to Total Assets Ratio

(Figures in %)

Year	SBS	SISCO
2011-12	5.17	2.93
2012-13	3.76	1.57
2013-14	1.82	0.21
2014-15	3.13	0.13
2015-16	0.72	0.15
2016-17	0.63	0.16
2017-18	0.49	0.15
2018-19	0.58	0.16
2019-20	0.41	0.33

Year	SBS	SISCO
MEAN	1.86	0.64
STD. DEV	1.75	0.97
MIN.	0.41	0.13
MAX.	5.17	2.93
RANK	**I**	**II**

Source: Computed using data from annual accounts of SBS & SISCO

The cash to total assets ratio of the SBS was as high as 5.17 percent during 2011-12, which gradually started to decline after that. During 2012-13 it declined to 3.76 percent from 5.17 percent of 2011-12; during 2013-14, it again declined and reached a new low level of 1.82 percent; however, during 2014-15, it recorded sudden growth in its ratio making it to reach 3.13 percent. From 2015-16 onward, SBS recorded a consecutive decrease in its cash to total assets ratio, and it reached its lowest level of 0.41 percent during 2019-20.

SISCO had a 2.93 percent cash to total assets ratio during 2011-12, which started to decline after that, like in the case of SBS. From 1.57 percent of 2012-13, it declined to 0.21 percent in 2013-14 and declined further to its lowest level of 0.13 percent during 2014-15. From 2014-15 onward, the SISCO bank's cash to total assets ratio remained within the range of 0.15 percent to 0.16 percent until 2018-19. During 2019-20 the SISCO recorded nominal growth in its cash to total assets ratio, leading it to reach 0.33 percent.

From the table and figure 5.39 & 5.49, it is apparent that both banks' cash to total assets ratios have declined over the years. SBS records a severe decline in its ratio as compared to that of SISCO. Based on the average cash to total assets ratio of nine years, SBS stands in a better liquidity position than the SISCO.

5.6.4. Liquid Assets to Total Assets Ratio

The liquid asset to total assets ratio measures the ability of a bank to meet its financial obligations effectively and reflects its overall liquidity conditions. It indicates the availability of liquid assets for depositors. As stated earlier, at the start of the liquidity component of CAMEL, the liquid assets include cash in hand, balances with other banks, balances with RBI, and money at call or short notice. A higher ratio of liquid assets to total assets is suitable for the bank as it indicates better liquidity position, and a lower liquid asset to total assets ratio indicates compromised liquidity position of the bank. This ratio is arrived at by dividing liquid assets by the bank's total assets.

$$Liquid\ Assets\ to\ Total\ Assets = \frac{Liquid\ Assets}{\text{Total Assets}}$$

Table 5.40
Liquid Asset to Total Assets Ratio

(Figures in %)

Year	SBS	SISCO
2011-12	77.00	25.83
2012-13	74.25	38.03
2013-14	68.00	8.02
2014-15	59.64	8.64
2015-16	55.25	7.30
2016-17	44.65	4.12
2017-18	45.70	6.87
2018-19	40.64	24.29
2019-20	31.52	15.12
2020-21		
MEAN	55.18	15.36
STD. DEV	15.79	11.54
MIN.	31.52	4.12
MAX.	77.00	38.03
RANK	**I**	**II**

Source: Computed using data from annual accounts of SBS & SISCO

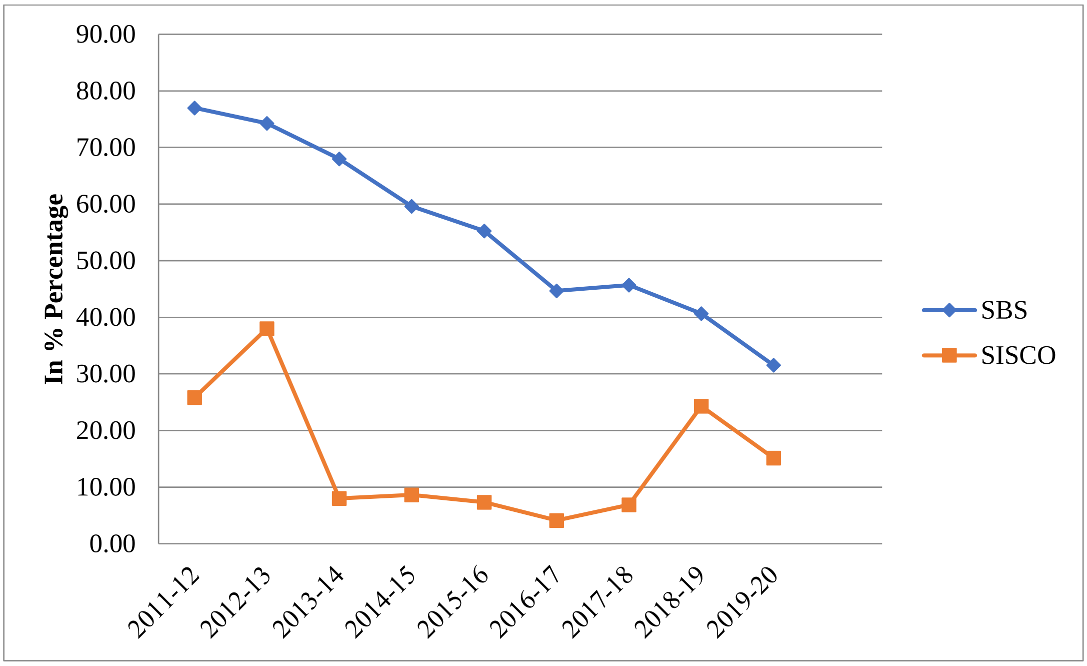
SBS had a very high liquid asset to total assets ratio throughout the study period; but, it has been gradually declining over the years. Against its total assets, SBS had a liquid asset of 77.00 percent during 2011-12, which declined to 74.25 percent, 68.00 percent, and 59.64 percent during the subsequent three years. With a gradual decrease, the liquid to total assets ratio of SBS reached its lowest level of 31.52 percent during 2019-20.

Throughout the study, SISCO comparatively has had a lower liquid asset to total assets ratio. The ratio of the SISCO went below 9.00 percent during 2013-14, 2014-5, 2015-19 & 2017-18. During 2018-19 the liquid assets to total assets ratio grew again to 24.29 percent, and after that, it recorded a decline in 2019-20 to 15.12 percent.

With an average liquid asset to total assets ratio of 55.18 percent, SBS is a more liquid bank compromising optimal lending and investments. SISCO stands second in the liquid asset to total assets ratio with an average ratio of 15.36 percent.

Figure 5.50

Liquid Asset to Total Assets Ratio



Source: Created using data from annual accounts of SBS & SISCO

5.6.5 Liquid Assets to Demand Deposits Ratio

Demand deposit demands maintenance of the liquidity by a bank, the reason being the freedom of withdrawal enjoyed by the depositors under the demand deposit scheme. Depositors availing of the demand deposit scheme can withdraw their cash anytime they wish. Due to such nature of the demand deposit, the bank has to maintain an adequate level of liquidity which obliges the bank to invest in highly liquid assets.

The liquid asset to demand deposits ratio measures the ability of the bank to meet its obligations towards its customers who have availed demand deposits scheme of the bank. We calculate the ratio by dividing the liquid assets by demand deposits.

$$Liquid\ Assets\ to\ Demand\ Deposits = \frac{Liquid\ Assets}{\text{Demand Deposits}}$$

Table 5.41
Liquid Assets to Demand Deposits Ratio

(No. of times)

Year	SBS	SISCO
2011-12	4.88	5.93
2012-13	14.28	12.65
2013-14	5.17	11.82
2014-15	7.67	7.02
2015-16	6.97	32.02
2016-17	7.52	6.29
2017-18	2.26	19.13
2018-19	10.06	89.90
2019-20	2.92	10.44
MEAN	6.86	21.69
STD. DEV	3.71	26.86
MIN.	2.26	5.93
MAX.	14.28	32.02
RANK	**II**	**I**

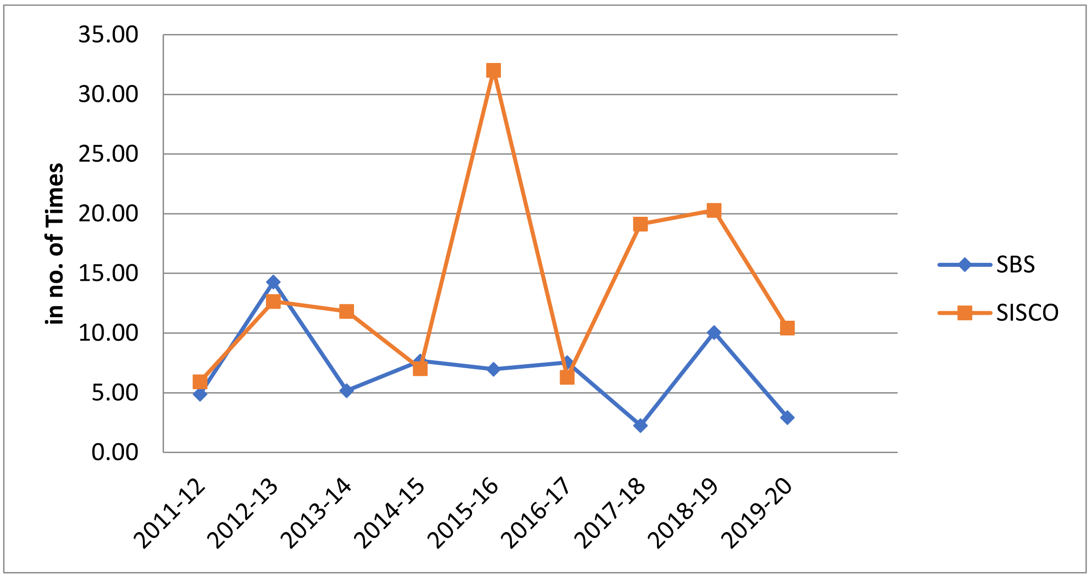
Source: Computed using data from annual accounts of SBS & SISCO

Table 5.41 indicates that the SISCO bank has had varied liquid assets to demand deposits ratio over the last nine years. During 2011-12, SISCO recorded liquid assets as 5.93 times of their demand deposits which grew to 12.65 times in 2012-13 and 11.82 times in 2013-14. During 2015-16 liquid assets were almost 32.02 times of its demand deposits, and in 2018-19 it reached almost 90 times of its demand deposits.

On the other hand, SBS also recorded variations in its liquid assets to total assets ratio over the period under study. However, it looked pretty consistent compared to that of SISCO bank. The SBS recorded the highest level of liquid assets to demand deposits of

14.28 times in 2012-13 and the lowest of 2.26 times during 2017-18. With the average liquid assets to demand deposits ratio of 21.69 times, SISCO bank secures the no.1 position, and SBS ranks second with an average ratio of 6.68 times. We present the liquid assets to demand deposits ratio trends in figure 5.51 below.

Figure 5.51
Liquid Assets to Demand Deposits Ratio



Source: Created using data from annual accounts of SBS & SISCO

5.6.6 Loan to Deposits Ratio

Loan to deposit ratio measures the volume of deposits used by the bank for lending. This ratio is arrived at by dividing the total loans by total deposits. An ideal loan to deposits ratio suggested in his study by Dang (2011) is ≤80%. A ratio higher than the maximum level of 80% suggests compromised bank liquidity position, whereas too little a loan to deposit ratio indicates lesser lending, which may affect the bank's interest income.

$$Loan\ to\ Total\ Deposits\ Ratio = \frac{Total\ Loans}{\text{Total Deposits}}$$

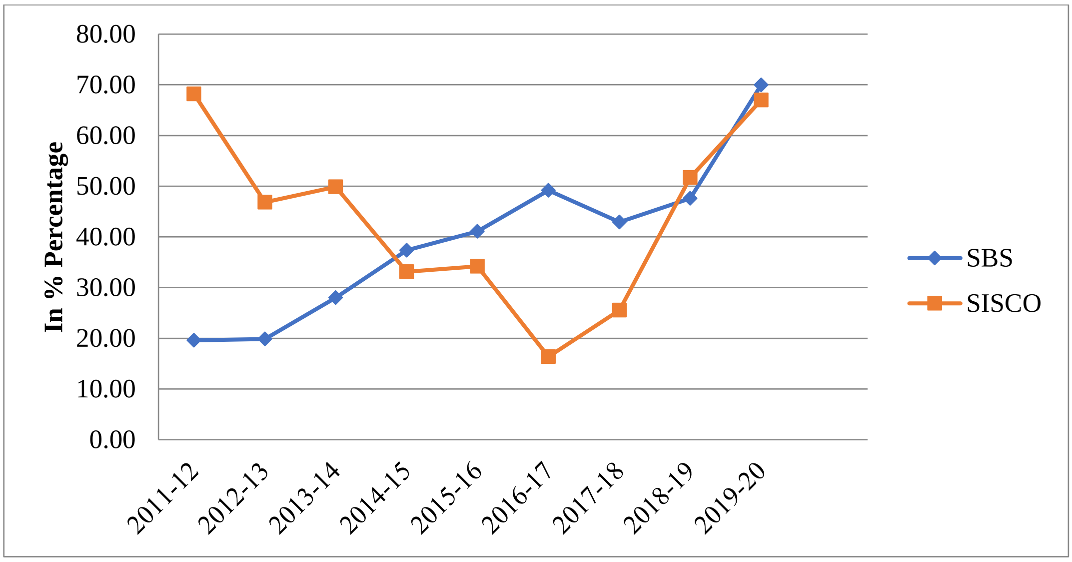
Table 5.42
Loan to Deposits Ratio

(Figures in %)

Year	SBS	SISCO
2011-12	19.59	68.23
2012-13	19.85	46.86
2013-14	27.98	49.87
2014-15	37.37	33.11
2015-16	41.09	34.19
2016-17	49.21	16.36
2017-18	42.93	25.55
2018-19	47.60	51.72
2019-20	69.99	67.02
MEAN	39.51	43.66
STD. DEV	15.90	17.81
MIN.	19.59	16.36
MAX.	69.99	68.23
RANK	**I**	**II**

Source: Computed using data from annual accounts of SBS & SISCO

Figure 5.52
Loan to Deposits Ratio



Source: Created using data from annual accounts of SBS & SISCO

During 2011-12 and 2012-13, SBS had 19.59% & 19.85% of the loan to total deposits ratio, which recorded a gradual growth after that. During 2015-16 SBS recorded, for the first time, the loan to deposit ratio over 40 percent, and it remained within 50.00

percent till 2018-19. Substantial growth in total loan to total deposits ratio was recorded during 2019-20 when the ratio reached an all-time high level of 69.99%.

SISCO bank, conversely, records a decline in its loan to deposit ratio till 2015-16. During 2016-17 SISCO's loan to deposit ratio reached its lowest level of 16.36 percent. The SISCO recorded the highest loan to deposit ratio of 68.23 percent during 2011-12 and 67.02 percent during 2019-20.

With an average loan to deposit ratio of 39.51 percent, SBS is more liquid than SISCO. The ratios for both the banks are well within the maximum limit of 80%; hence, we may say that both the banks are in a strong liquidity position.

5.6.7 Composite Liquidity Ranking

Based on the ranking obtained by the banks in Cash to Total Assets ratio, Liquid Assets to Total Assets ratio, Liquid Assets to Demand Deposits ratio, and Loan to Deposits ratio, we assigned a composite liquidity ranking to the banks under study in table 5.43 below.

Table 5.43
Composite Liquidity Ranking

Ratios to measure Earning Quality	**SBS**		**SISCO**	
	Avg.	**Rank**	**Avg.**	**Rank**
Cash to Total Assets	1.86 %	1	0.64 %	2
Liquid Assets to Total Assets	55.18 %	1	15.36 %	2
Liquid Assets to Demand Deposits	6.86 times	2	21.69 times	1
Loans to Deposits	39.51 %	1	43.66 %	2
Group Average		1.25		1.75
Group Rank		**1st**		**2nd**

Source: Computed using data from annual accounts of SBS & SISCO

Comparatively, SBS has performed better in three liquidity ratios: cash to total assets ratio, liquid to total assets ratio, and loan to total deposits ratio. At the same time, SISCO has done better in only one liquidity ratio, i.e., liquid assets to demand deposits. Based on the average of the ranking secured in all four liquidity ratios, SBS has stood no.1 in terms of liquidity.

Figure 5.53
Cash to Total Assets Ratio

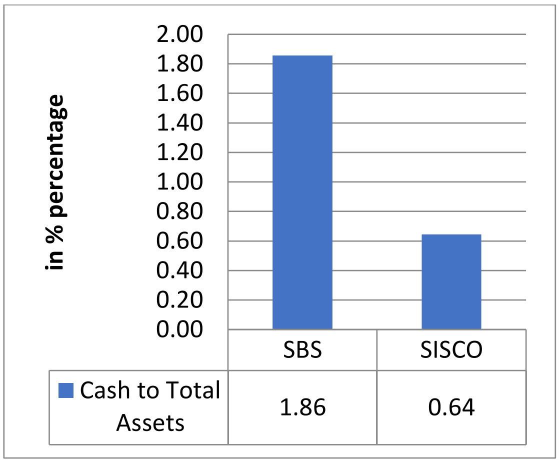
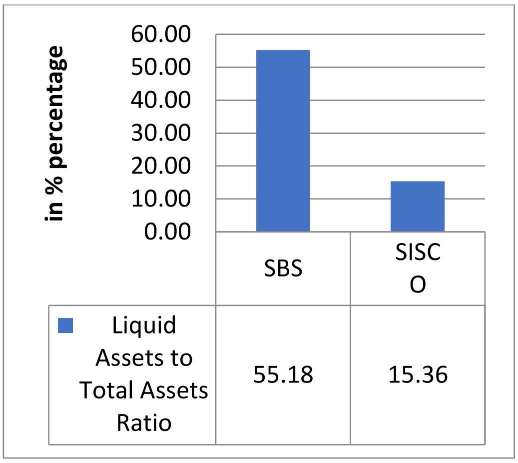


Figure 5.54
Liquid Assets to Total Assets Ratio



Source: Created using data from annual accounts of SBS & SISCO

Figure 5.55
Liquid Assets to Demand Deposits Ratio

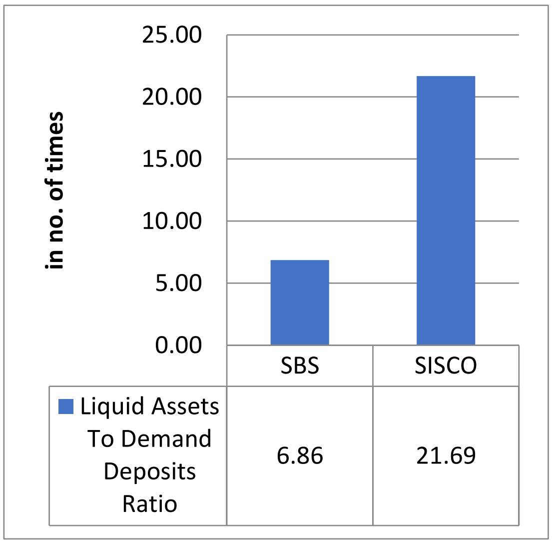
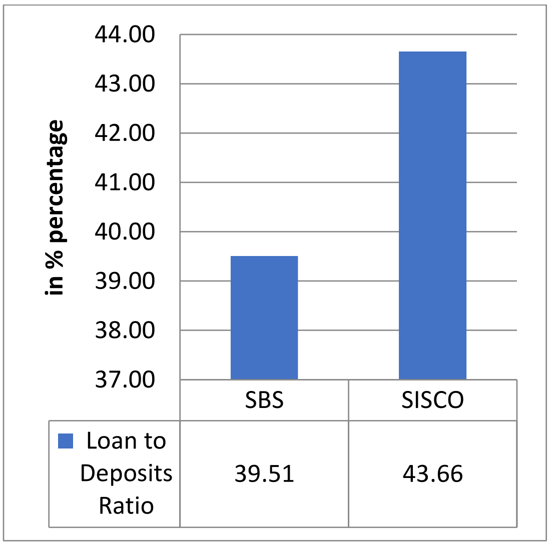


Figure 5.56
Liquid Assets to Demand Deposits Ratio



Source: Created using data from annual accounts of SBS & SISCO

5.7 Composite CAMEL Ranking

Based on various ratios, the component-wise ranking of the state-owned banks was obtained. Based on their performance on each component of the CAMEL, we assign a composite CAMEL ranking to the banks under study in table 5.44 below.

Table 5.44
Composite CAMEL Ranking

Sl. No.	CAMEL Component	Component-wise ranking	
		SBS	SISCO
1	Capital Adequacy	2	1
2	Assets Quality	2	1
3	Management Efficiency	2	1
4	Earning Quality	2	1
5	Liquidity	1	2
	Average	1.85	1.15
	Overall CAMEL Ranking	**2nd**	**1st**

Source: Computed using data from annual accounts of SBS & SISCO

SISCO bank, as it can be seen in table 5.44, securing no. 1 ranks in four out of five CAMEL components, i.e., capital adequacy, assets quality, management efficiency, and earning quality, stands 1st in the composite CAMEL ranking. SBS could secure rank one only in the 5th component of CAMEL, i.e., Liquidity, hence, stands second in the overall CAMEL ranking.

5.8 Conclusions

Analysis of the ratios to measure the capital adequacy of the banks under study suggests that the SBS needs to improve in all its capital adequacy ratios, whereas SISCO is doing relatively better. SISCO's average CRAR of 22.54 percent is better than the CRAR of 9 percent prescribed by the Reserve Bank of India; whereas, SBS's average CRAR of 3.18 percent is way lower than the prescribed level of 9%. Lower CRAR of SBS indicates its weaker inner strength to absorb losses arising from risk assets, hence, demands the immediate attention of the bank's management. Though both the banks' debt to equity ratio appears to be on the higher side, SBS's Debt to Equity ratio of 156 times is relatively higher than that of SISCO (25 times). Higher debt to equity ratio indicates higher claims of the outsiders on the bank's assets, and both the banks need to work on lowering the claims of the outsiders by either increasing equity or decreasing debt. The equity to total assets ratio of 5.45 percent of SISCO compared to 1.39 percent of SBS indicates higher control of the investors of SISCO on the bank's assets.

While analyzing the assets quality ratios, we understand that the SBS is lagging far behind SISCO in terms of the quality of its assets. NPA of the SBS has been facing an increasing trend from 2013-14 onward, and presently it amounts to Rs. 73054.50 lakhs which is almost 36% of its total loans. The alarming level of the NPA to gross advances ratio of SBS demands immediate review of the bank's lending policy, recovery policy, and provisioning policy for bad loans. Though SISCO also records a high average NPA of 5.78 percent but is relatively in a comfortable position than the SBS. Exuberantly high NPA to equity ratio of 1158 percent of SBS highlights the insufficiency of the bank's equity to absorb the losses arising from the non-performing assets. On the other hand, SISCO maintained its NPA to 44 percent of its equity. Further, SBS records a meagre investment to total assets ratio of 5.23 percent, whereas SISCO records an average investment to total assets ratio of 53.33 percent. The lower investment to total assets ratio of the SBS reflects an inadequate cushion of investments to safeguard the bank from its non-performing assets. SISCO's investments of 42 percent in government securities make its investments substantially safe compared to SBS, which has zero investments in government securities, making its investments a lot riskier.

Even in the management efficiency parameter, SISCO got a lead. On average, SBS successfully converted 38 percent of its deposits to earning assets, whereas SISCO converted 43 percent of its deposits to earning assets. The average credit to deposit ratio of SBS could reach 38 percent only because of improved credit to deposit ratio post-2015-16. Though SISCO has a relatively better credit to deposit ratio than SBS, both banks fall substantially short of an ideal credit to deposit ratio of 70 percent to 80 percent. SISCO records a higher average business per employee of Rs.1469 lakhs than SBS, which only records the average business per employee of Rs. 694.72 lakhs which is less than half of the SISCO's business per employee. Similarly, SISCO also performs better in profit per employee with an average profit per employee of Rs. 5.45 lakhs compared to Rs. 2.32 lakhs of the SBS.

SISCO is also leading in the earning quality parameter of the CAMEL model. Return on assets which is considered the single best measure to assess the earning efficiency of the banks, SISCO has outperformed the SBS with an average of 1.02 percent compared to 0.71 percent of the SBS. SISCO has maintained a higher operating profit to total assets ratio of 0.63 percent compared to 0.42 percent of the SBS. With the lower average operating cost to total income ratio of 84.53 percent, SISCO is a more cost-effective bank than SBS, which records an average operating cost to total income ratio of almost 90 percent. Even in net interest margin, which is the difference between the interest earned and the interest expended by the bank, SISCO records higher average NIM to total assets ratio of 2.12 percent compared to 1.66 percent of SBS. Performing better in all earning quality ratios, SISCO turns out to be a more earning efficient bank than the SBS.

Unlike in the first four parameters of the CAMEL, performing better in most of the liquidity ratios, SBS is a more liquid bank than the SBS. SBS's average cash to total assets ratio is 1.86 percent, against which SISCO records average cash to total assets of 0.64 percent. SBS is better positioned to honour the customers' withdrawal requests with a higher cash-to-total assets ratio. Similarly, SBS also leads in the liquid assets to total assets ratio with average liquid assets to total assets ratio of 55.18 percent compared to 15.36 percent of SISCO. Substantially high liquid assets to total assets ratio of SBS makes it the most liquid bank, but such a significant amount of idle assets have certainly impacted its earnings. Though it may be less liquid in other liquidity ratios, SISCO has recorded higher liquid assets to demand deposits than the SBS. With a lower loan to deposit ratio of 39 percent, SBS turns out to be more liquid than the SISCO; however, SBS must see that it maintains only adequate liquidity as higher than the adequate liquidity directly affects the bank's earnings. Analysis of trends of various variables done in this chapter suggests that the SBS has been consistently improving in a majority of the aspects from the last few years; however, NPA continues to remain as the source of major concern for the bank.

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CHAPTER 6

Efficiency and Productivity Analysis

6.1 Introduction

In the previous chapter, with the help of the CAMEL model, we analyzed the financial health and profitability of the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank Ltd. (SISCO) during the period under study. The US Federal Regulators developed the CAMEL model, a ratio-based tool to assess the health of financial institutions in the early 1970s (Barr et al., 1997). Though CAMEL provides an essential insight on the performance of the banks but gives an only one-dimensional view as it does not study trade-offs between multiple inputs and outputs, unlike DEA. Therefore, the study additionally uses the non-parametric tool, namely Data Envelopment Analysis (DEA), in this chapter to assess the efficiency and productivity change of the banks under investigation. Application of DEA, which allows multiple inputs and outputs for assessment of efficiency and productivity, apart from validating the results obtained from the CAMEL model, shall also help to suggest the area(s) to be improved upon by the inefficient bank(s). In their study, Siems et al. (1998) found a close association between the relative efficiency scores obtained from the DEA with the CAMEL ratings. Additional application of DEA is to validate if the bank performing well in CAMEL parameters is also the efficient one in DEA.

6.2 Empirical Strategy

The two common approaches for measuring the efficiency of the banks are parametric and non-parametric. Both the parametric and non-parametric approaches are widely used to measure the efficiency of the banks; however, consensus on which of these approaches is better is still divided (Erkoc, 2012). The two main methods used under parametric techniques are the Stochastic Frontier Approach (SFA) and the Distribution

Free Approach (DFA). The stochastic frontier approach (SFA), which is also known as the econometric frontier approach (EFA), was developed by Aigner et al. (1977). In SFA, the functional form for the cost, profit, or production frontier is specified, allowing random error. It modifies a standard production function to enable inefficiencies to be included in the error term. In the distribution-free approach (DFA), a functional form for the cost, profit, or production frontier is specified, but inefficiencies are separated from random error.

The second commonly used approach in analyzing the efficiency of the banks is the non-parametric method which does not assume any explicit functional form for the frontier instead constructs it from the observed input-output ratios using mathematical programming techniques. The leading non-parametric method frequently used worldwide is the Data Envelopment Analysis (DEA), proposed by Charnes et al. (1978). This method envelope observed input-output data without requiring an a priori specification of the functional form (Fare et al., 2011). Using linear programming methods, it empirically constructs a production frontier from the observed input-output data.

The application of DEA and Malmquist in this research work intends to help the bank's management, policymakers, and other stakeholders understand the efficiency scores of the selected banks and their efficiency & productivity changes over the period under study.

6.2.1 Data Envelopment Analysis (DEA)

The primary purpose of DEA is to construct a comparative efficiency frontier through the envelopment of the Decision-Making Units (DMUs), where the 'best practice' DMUs form the frontier (Hadad et al., 2008). Data Envelopment Analysis is a mathematical programming method that measures the efficiency of decision-making unit (DMU) relative to other similar DMUs with a constraint that all DMUs either lie below or lie on the efficiency frontier (Palecková,2017). It also identifies the inefficient DMU and reflects the level of inefficiency and its source.

The two DEA models which are very popular in assessing the efficiency of banks are CCR, named after Charnes, Cooper, and Rhodes (1978), and BCC, named after Banker, Charnes, and Cooper (1984). CCR model finds out the overall technical efficiency of DMUs. The CCR model presumes no significant relationship between the efficiency and the scale of operations by assuming constant returns to scale (CRS). The CRS assumption will hold well only when all DMUs under study are functioning at an optimal scale. Banker et al. (1984) extended the CCR model later by relaxing the CRS assumption, which resulted in the BCC model. This model is used to assess the efficiency of DMUs which are characterized by variable returns to scale (VRS). The BCC model measures pure technical efficiency (PTE), which measures technical efficiency without scale efficiency (SE) effects.

The DEA approach handles multiple inputs and output, requires no specification of the functional form of the production function, and does not need an assumption as to the relative importance of the inputs and output. This study uses input-oriented DEA measures of efficiency as the management of the banks has more control over its inputs than its outputs.

To understand it better, let us assume that there are *n* DMUs to be assessed. From *DMUs* to be evaluated, DMU_k consumes *xik* amounts of input to produce *yrk* amounts of output. It is presumed that these inputs, *xik*, and outputs, *yrk*, are non-negative, and each DMU has at least one positive input and output value. We can now write the productivity of a DMU in an equation given as follows.

$$h_j = \frac{\sum_{r=1}^{s} u_r y_{rk}}{\sum_{i=1}^{m} v_i x_{ik}} \qquad \text{Equation 1}$$

In this equation, *u* and *v* are the weights assigned to each input and output. Using the mathematical programming techniques, DEA optimally assigns the weights for each DMU, subject to the constraint that no other DMU has efficiency greater than one if it uses the exact weights, implying that efficient DMUs will have a ratio value of one. The objective function of DMU is the ratio of the total weighted output divided by the total weighted input.

$$\max h_0(u, v) = \frac{\sum_{r=1}^{s} u_r y_{r0}}{\sum_{i=1}^{m} v_i x_{i0}} \qquad \text{Equation 2}$$

$$\text{Subject to, } \frac{\sum_{r=1}^{s} u_r y_{rk}}{\sum_{i=1}^{m} v_i x_{ik}} \leq 1, k = 1, 2\ldots, k_0, \ldots, \text{n}, \qquad \text{Equation 3}$$

$$u_r \geq 0, r = 1,2, \ldots, s, \qquad \text{Equation 4}$$

$$v_i \geq 0, i = 1,2, \ldots, m, \qquad \text{Equation 5}$$

Where, h_0 indicates the technical efficiency of *DMU0* to be estimated, u_r and v_i represents weights to be optimized, y_{rk} is the observed amount of output for the k^{th} DMU of the r^{th} type, whereas x_{ik} is the observed amount of input for the k^{th} DMU of the i^{th} type, *r* is the *s* different outputs, *i* represents the *m* different inputs and *k* indicates the *n* different DMUs.

6.2.2 Selection of DEA Model

The result of the DEA relies on the selection of a model; hence, choosing an appropriate model for the study assumes greater importance. Several studies like Seiford and Zhu (1998), Svitalkova (2014), Yilmaz and Güneş (2015), and Stewart et al. (2016) applied both CCR and BCC models, and taking these studies as a guide, we followed input-oriented CCR and BCC models in this study. As there is no consensus in the literature as to which model is better in evaluating the bank's efficiency, the study applies both models to analyze the efficiency of the banks under study. The other reason for using both models is that it allows the author to decompose the overall efficiency (TE) into pure technical efficiency (PTE) and scale efficiency (SE). Decomposition of the overall technical efficiency (TE) allows one to understand whether a *DMU* is inefficient due to the managerial inefficiency or if the inefficiency is from the scale of the operation (Řepková, 2014), (Yilmaz & Güneş, 2015).

Technical efficiency, also known as overall efficiency, is obtained from the CCR model, while the BCC model results in an index known as Pure Technical Efficiency. Pure Technical Efficiency measures the efficiency of a DMU based on administrative capacity alone and disregards the impact of economies or diseconomies of scales on the overall efficiency (Řepková, 2014). Scale Efficiency (SE) index is arrived at by dividing TE by PTE, which helps understand the Scale Efficiency of a DMU.

The basic equations for the input-oriented CCR, BCC, and scale efficiency are presented below.

The equation for the input-oriented CCR model

$$\max h_k = \sum_{r=1}^{m} u_r y_{rk} \qquad \text{Equation 6}$$

Subject to,

$$\sum_{i=1}^{n} v_i x_{ik} = 1$$

$$\sum_{r=1}^{m} u_r y_{rj} - \sum_{i=1}^{n} v_i x_{ij} \leq 0, \forall\, j$$

$$u_r, v_i \geq 0, \forall, i$$

Where,

y = outputs; x = inputs

u,v = weights;

$r = 1,\ldots,m$; $i = 1,\ldots n$;

$j = 1,\ldots,N$

The equation for the input-oriented BCC model

$$\max h_k = \sum_{r=1}^{m} u_r y_{rk} - u_k \qquad \text{Equation 7}$$

Subject to,

$$\sum_{i=1}^{n} v_i x_{ik} = 1$$

$$\sum_{r=1}^{m} u_r y_{rj} - \sum_{i=1}^{n} v_i x_{ij} - u_k \leq 0$$

$$u_r, v_i \geq 0$$

Where,

y = outputs; x = inputs

u,v = weights;

$r = 1,\ldots,m$; $i = 1,\ldots n$;

$j = 1,\ldots,N$

The Equation for obtaining Scale Efficiency

SE = OTE/PTE Equation 8

Where,

*O*TE= overall efficiency calculated through equation 6.

PTE= Pure Technical Efficiency Calculated through equation7.

6.2.3 Malmquist index

The efficiency measured using DEA is stationary. However, efficiency frontiers are not static over time as the production technology may change, leading to a shift in best practices. As DEA cannot capture the shift of the frontier over time to account for shifts in the production frontier, this study applies the DEA-based Malmquist Total Factor Productivity Change Index.

Originally the idea of the Malmquist index was proposed by Malmquist (1953), which was later extended by Caves et al. (1982) by introducing the first type of the Malmquist, which assumed the constant returns to scale. Fare et al. (1994) made it possible to decompose the TFPC further to scale and pure technical efficiency by considering a variable return to scale. DEA-based Malmquist TFP index measures the TFP growth change between two data points by calculating the ratio of the distances of each data point relative to a standard technology (Natarajan, 2008). The Malmquist index allows total factor productivity changes to decompose into technological change and technical efficiency change, which further consists of scale efficiency change and pure technical efficiency change (Färe et al., 1992).

The DEA-based Malmquist index (MI) is one of the well-known indexes for assessing the relative productivity change of DMUs in multiple periods (Palecková, 2017). Malmquist index is the geometric mean of two TFPC indices, one evaluated concerning the technology (efficiency frontier) in the current period *t* and the other concerning the technology in the base period *s*. Following Fare et al. (1994), this study uses DEA to construct an input-based MI between period *t*, which is the base period and period *s*:

$$M_I(y^s x^s y^t x^t) = \left[\frac{D_I^t(y^s x^s)}{D_I^t(y^t x^t)} * \frac{D_I^s(y^s x^s)}{D_I^s(y^t x^t)}\right]^{\frac{1}{2}} \qquad \text{Equation 9}$$

M_I is the input-oriented Malmquist Index, and *DtI (ys, xs)* indicates the distance function reflecting a maximal proportional reduction of the observed period *s* inputs under the period *t* technology. The distance function is defined as follows:

$$D_I^t(y^s, x^s) = min\theta, \quad \text{Equation 10}$$

$$\theta, \lambda$$

Subject to,

$$yis \leq \lambda Y^t \quad \text{Equation 11}$$

$$\theta xis \geq \lambda Y^t \quad \text{Equation 12}$$

$$\lambda_i \geq 0, i = 1, \ldots n, \quad \text{Equation 13}$$

Where,

θ is a scalar, and;

λ is a vector of constants

The value of *θ* obtained reflects the component score of the *i-th* firm. *X* and *Y* represent input and output vectors, and *x* and *y* denote the amounts of the ith input consumed and output generated by the *DMU0*. Fare et al. (1992) explained that MI > 1 indicates productivity gain; when MI < 1, it indicates productivity loss; MI = 1 indicates no change in productivity from time t to s. Fare et al. (1992) relaxing Caves et al. (1982) assumption that *Dt I (yt, xt)* and *Ds I (yt, xt)* should equal to one allowed decomposition of the Malmquist productivity index into two components, i.e., Technical Efficiency Change (TEC) and Technological Change (TCC).

$$M_I = \left[\frac{D_I^t(y^s x^s)}{D_I^t(y^t x^t)} * \frac{D_I^s(y^s x^s)}{D_I^s(y^t x^t)}\right]^{\frac{1}{2}} \quad \text{Equation 14}$$

$$\frac{D_I^s(y^s x^s)}{D_I^t(y^t x^t)}\left[\frac{D_I^t(y^s x^s)}{D_I^s(y^s x^s)} * \frac{D_I^t(y^t x^t)}{D_I^s(y^t x^t)}\right]^{\frac{1}{2}}$$

Where,

$$TEC = \frac{D_I^s(y^s x^s)}{D_I^t(y^t x^t)}$$

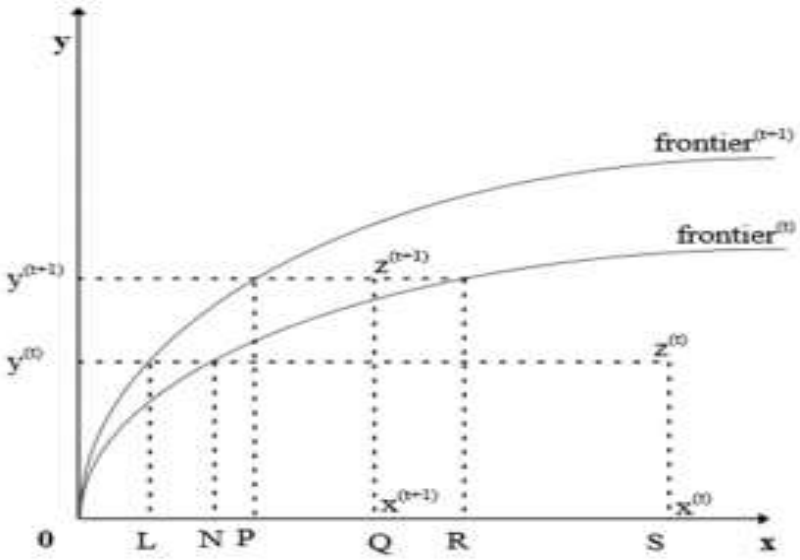
Measures the catching-up effect, which is technical Efficiency Change.

$$TCC = \left[\frac{D_I^t(y^s x^s)}{D_I^s(y^s x^s)} * \frac{D_I^t(y^t x^t)}{D_I^s(y^t x^t)}\right]^{\frac{1}{2}}$$

Measures the technological Frontier Shift, which is Technological Change between period *t* and *s*.

Fare et al. (1992) explain that when a value of TCC > 1 indicates a positive shift or technical progress, TCC < 1 indicates technical regress or a negative shift, when the value of TCC = 1, no shift in technology frontier is to be understood.

Figure 6.1
Malmquist Index and efficiency change over two periods



Source: Palecková, I. (2017)

Figure 6.1 presents a production frontier representing the efficient level of output (y) that can be produced with a given level of input (x). The efficiency change of DMU-A is measured by examining its efficiency in two time periods, i.e., t and t + 1, and also the technology shift from t to t + 1. The frontier of the current period is indicated by the frontier(t), and the frontier for a future period is reflected as frontier (t + 1). An input-based measure of the efficiency of the DMU-A can be inferred by the horizontal distance ratio 0N/0S. Fig. 6.1 shows that the DMU-A can reduce its input to achieve technical efficiency in period t. Inputs need to be multiplied by the distance ratio 0R/0Q to achieve comparable technical efficiency in period t + 1to that found in period t. 0R/0Q exceeds unity as the frontier has shifted, even though it is technically inefficient compared to the period t + 1 frontier.

6.2.4 Data Envelopment Analysis (Computer) Program (DEAP 2.1)

This study has used a computer program, namely DEAP, version 2.1, to calculate the efficiency index and Malmquist Productivity index. Coelli, T. J. (1996) wrote DEAP, and the program constructs DEA frontiers and helps calculate technical and cost efficiencies and the Malmquist TFP Indices. The program offers three DEA options to the researchers as under:

i) Standard CRS and VRS DEA models- These models help to calculate technical and scale efficiencies.

ii) The other model, which is an extension of the above models, evaluates cost and allocative efficiencies.

iii) Malmquist DEA- This can be applied to panel data to calculate indices of total factor productivity (TFP) change; technological change; technical efficiency change, and scale efficiency change

The DEAP 2.1 offers both input and output orientation in all methods above except cost efficiencies. The program as its output provides technical, scale, allocative, and cost efficiency estimates; slacks; peers; and TFP indices.

6.3 Data and Variables

The study in this chapter is based on secondary data. Required data for DEA has been obtained from the Annual Accounts for the financial year 2011-12 to 2020-21 published by the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank Ltd. (SISCO). To examine the impact of demonetization on banks' productivity, we divide the entire period into two: pre-demonetization period (2011-12 to 2015-16) and post-demonetization period (2016-17 to 2019-20). As the demonetization was announced in 2016, we treat this year as the cut-off year[6].

6.3.1 *Construction of Output and Input Variables*

The selection of variables is the next important step once the DEA model and orientation are defined. The literature suggests two main approaches for selecting variables concerning financial institutions, i.e., the Production approach and the Intermediation approach (Drake et al., 2009). The production approach treats banks as service providers to their customers; hence, it considers capital, labour, and materials as its inputs and services provided to the customers, such as deposits and loans as its outputs. The production approach is best suited for analyzing the efficiency of the bank branches rather than the bank as a unit (Yilmaz & Güneş, 2015). On the other hand, the intermediation approach suggests that using capital and labour, the bank's primary function is the collection of deposits and their conversion into loans and other profitable assets. This study follows an intermediation approach pioneered by Sealey and Lindley (1977). The selection of the intermediation approach over the production approach in this study has its foundation on the argument of Berger & Humphrey (1997). Berger & Humphrey (1997) find the intermediation approach to be appropriate when the entire bank is to be assessed as it includes interest expenses, which generally constitute 50% to 75% of the total costs of the bank[7]. The definition and construction of variables are presented in Table 6.1.

[6] As the demonetisation was launched at the end of 2016, we also checked the robustness of the findings related to productivity of the selected banks using 2017-18 as the cut-off year.
[7] Interest expenses of the banks under study constitute 80% of their total expenses.

Table 6.1
Construction of the Variables

Variables	Definition
Interest Income	Interest income is the amount a bank receives for lending its money or letting another entity use its funds.
Non-Interest Income	Non-Interest Income is the amount earned by the banks from their non-core activities.
Fixed Assets	Fixed assets refer to assets used in a bank's business operations.
Interest Expense	It is the cost incurred by an entity on borrowed funds.
Non-Interest Expense	It is an operating expense of a bank or financial institution.
Deposits and Borrowings	A deposit is a liability owed by the bank to the depositors. Borrowings mean borrowings from RBI, Government, other banks, and institutions.

Source: Created by the author

It is important to note here that there is no consensus on the ideal set of input-output variables that reflects the performance of the banks best (Casu & Girardone, 2002; Sathye, 2003). The ultimate objective of the bank is to increase its Interest Income and Non-Interest Income which guarantees its existence in today's competitive market. To achieve the desired output, the bank incurs two types of expenditure, namely Interest Expenses and Non-Interest Expenses, and uses its fixed assets. Deposits and borrowings have been included in the list of inputs as interest expenses do not always give a clear picture of the volume of a fund available with the bank for lending and investments, especially when the deposits are more in low interest yielding accounts. Based on the above argument, the study uses two input and four output variables in Table 6.2.

Table 6.2
Inputs and Outputs

Inputs	Outputs
1. Fixed Assets (y1)	1. Interest Income (x1)
2. Total Interest Expense (y2)	2. Non-Interest Income (x2)
3. Non-Interest Expense (y3)	
4. Deposits & Borrowings (y4)	

Source: Created by the author

Outputs: We consider two output variables, i.e., interest income and non-interest income (Kumar & Gulati, 2008). The interest income of the bank consists of interest earned from lending, deposits with other banks, and interest on investments. Non-interest income includes commission and exchange, bank charges, discount received on Govt. securities, profit on the sale of land and buildings, and other miscellaneous receipts.

Inputs: Following Siems et al. (1998), we consider four inputs, namely Fixed Assets, Interest Expenses, Non-Interest Expenses, and Deposits & Borrowings. Fixed assets include land & buildings, ATMs, computers, furniture & fixtures, and bank vehicles. Interests Expenses include interest paid on deposits and borrowed funds, whereas Non-Interest expenses cover all expenses other than interest expenses. Deposits and borrowed funds include deposits accepted from the customers and money borrowed from RBI, Government, other banks, and institutions.

Table 6.3
Descriptive Statistics (in absolute value)

		SBS			
Variables	**N**	**Mean**	**SD**	**Min.**	**Max.**
Output					
Interest Income	9	15263.4	2938.8	10075	19764
Non-Interest Income	9	1403.13	743.59	190.62	2456
Input					
Fixed Assets	9	1114.95	1101.8	279.18	2771.21
Interest Expenses	9	11662.5	1851.9	7756.9	14088
Non-Interest Expenses	9	3254.99	1276.5	2005.6	5423.2

Variables	N	Mean	SD	Min.	Max.
Deposits & Borrowings	9	224111	57319	155112	307150
			SISCO		
Variables	**N**	**Mean**	**SD**	**Min.**	**Max.**
Output					
Interest Income	9	7790.6	5812.7	1647.1	16239
Non-Interest Income	9	133.56	255.98	13.23	804.45
Input					
Fixed Assets	9	253.95	111.13	58.01	385.24
Interest Expenses	9	6038.7	4800.1	928.5	13754
Non-Interest Expenses	9	950.7	556.71	392.62	1910.4
Deposits & Borrowings	9	97622	71658	15672	191520

Table 6.4

Descriptive Statistics (in ratio)

			SBS		
Variables	**N**	**Mean(%)**	**SD**	**Min.(%)**	**Max.(%)**
Output					
Int. Income to TA	9	6.53	0.7	5.48	7.58
Non-Int. Income to TA	9	0.55	0.2	0.11	0.76
Input					
Fixed Assets to TA	9	0.4	0.32	0.15	0.88
Int. Expenses to TA	9	5.04	0.76	4.04	6
Non-Int. Expenses to TA	9	1.33	0.19	1.09	1.66
Deposits &Borrowings to TA	9	94.3	0.41	93.92	95.02
			SISCO		
Variables	**N**	**Mean(%)**	**SD**	**Min.(%)**	**Max.(%)**
Output					
Int. Income to TA	9	7.61	1.99	4.46	11.71
Non-Int. Income to TA	9	0.13	0.22	0.03	0.7
Input					
Fixed Assets to TA	9	0.44	0.43	0.1	1.28
Int. Expenses to TA	9	5.5	1.61	3.63	8.73
Non-Int. Expenses to TA	9	1.14	0.52	0.61	2.15
Deposits & Borrowings to TA	9	91.05	5.54	81.71	97

Source: Computed using data from the annual accounts of SBS and SISCO

We present the summary statistics for the output and input variables used in the analysis in table 6.3 in absolute figures and ratios of total assets in table 6.4. Similarly, we present the summary statistics graphically in Figure 6.2 and Figure 6.3. On average, interest income to total assets is higher in SISCO than SBS, whereas, average non-interest income to total assets of SBS is higher than SISCO. Regarding output variables, except for average interest expense to total assets, the average of all other variables is higher in SBS than SISCO.

Figure 6.2
Mean of Variables (Variables in absolute value)

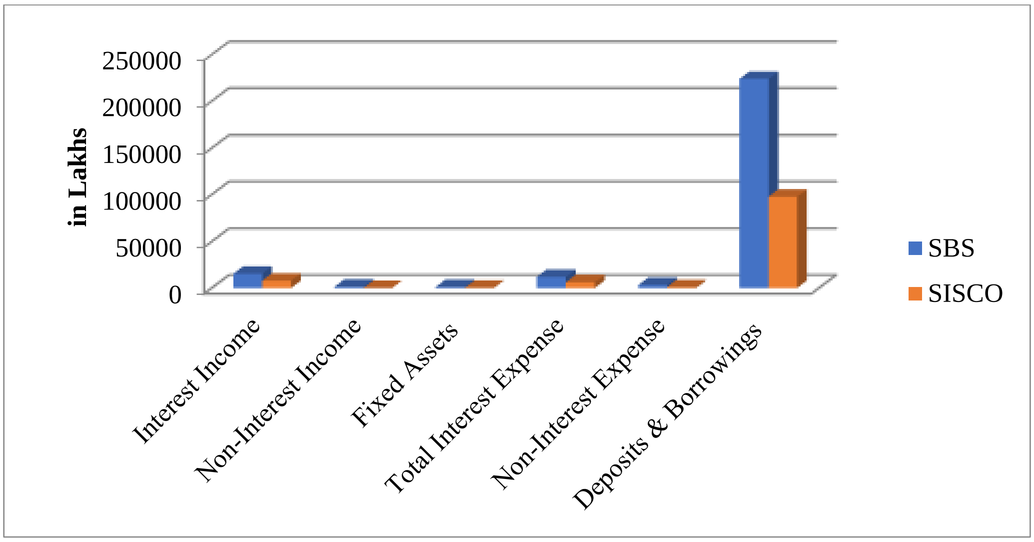
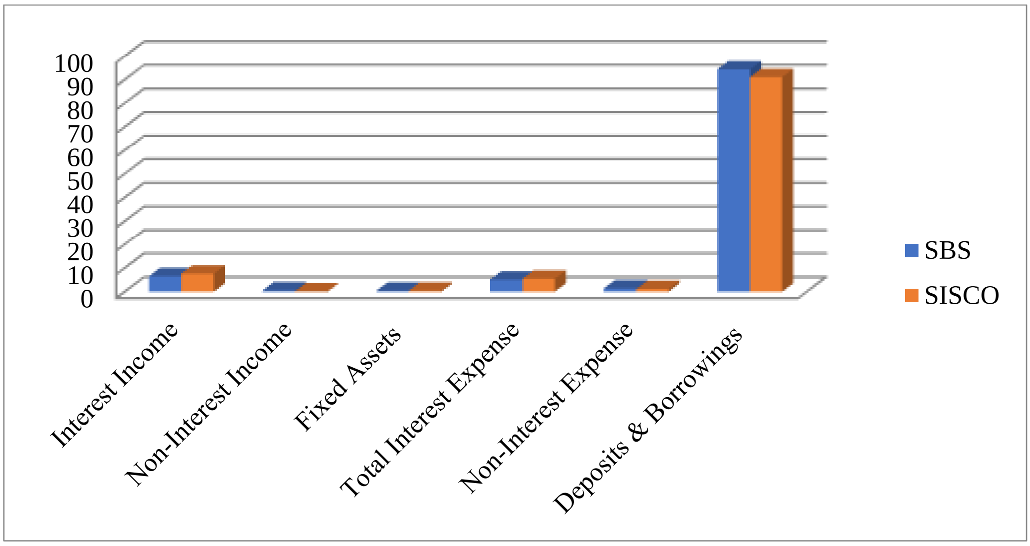


Figure 6.3
Mean of Variables (Variables in ratio)



Source: Created using data from annual accounts of SBS & SISCO

6.4 Efficiency Levels

In this section of the study, we estimate DEA efficiency scores using Input-oriented CCR (Constant Return to Scale) and BCC (Variable Return to Scale) models. Constant returns to scale technical efficiency (CRSTE) represent the global measure of a firm's performance which consists of 'pure' technical efficiency measure (to be captured by the variable returns to scale technical efficiency score) and a Scale efficiency measure (SE). Comparison between these two models discloses the source of inefficiency.

The banks under study are treated as separate DMUs each year while calculating the efficiency scores from both models. Table 6.5 reflects Technical Efficiency (TE), Pure Technical Efficiency (PTE), and Scale Efficiency (SE) and return to scale of the selected banks over the period under study.

Table 6.5
DEA score from CCR and BCC model (estimated with the absolute value of the variables[8]).

Year	SBS				SISCO			
	OTE	PTE	SE	NoRS	OTE	PTE	SE	NoRS
2011-12	0.942	0.955	0.986	DRS	1	1	1	CRS
2012-13	0.912	0.941	0.969	DRS	1	1	1	CRS
2013-14	1	1	1	CRS	0.923	0.938	0.984	IRS
2014-15	1	1	1	CRS	0.903	0.903	0.999	DRS
2015-16	1	1	1	CRS	0.928	0.952	0.975	IRS
2016-17	0.999	1	0.999	DRS	0.911	0.913	0.998	IRS
2017-18	0.958	0.958	1	CRS	1	1	1	CRS
2018-19	1	1	1	CRS	1	1	1	CRS
2019-20	0.97	1	0.97	DRS	1	1	1	CRS

Source: Computed using data from annual accounts of SBS and SISCO
OTE-Overall Technical Efficiency, PTE-Pure Technical Efficiency, SE-Scale Efficiency, and NoRS-Nature of Return to Scale.

Under the constant return to Scale (CCR) model, SBS remained efficient four out of nine years, whereas SISCO was efficient in five out of nine years. The banks remained efficient five out of nine years under the variable return to scale (BCC) model. We present the year-wise analysis of the efficiency score and sources of inefficiency below.

[8]The result estimated from ratio variables is similar to the result obtained from the variables in absolute value shown in table 6.5 above with the only exception during 2016-17, wherein SBS is found to be efficient.

6.4.1 Financial Year 2011-12

SBS has a Pure Technical efficiency (PTE) of 0.955 (95.5%) and the scale efficiency (SE) of 0.986 (98.6%), and it faces decreasing return to scale (DRS) or diseconomies of scale during the year. SBS could have saved 4.5% (1-0.955) of its inputs by improving its operation or managerial efficiency. Further, by adjusting its scale of operation to optimal size, SBS could have saved 1.4% (1-0.986) of its inputs. With an overall Technical Pure Technical Efficiency (PTE) score of 1 and Scale Efficiency score of 1, SISCO remained efficient during 2011-12.

The source of the inefficiency of an inefficient DMU (SBS in this case) can further be analyzed with the help of radial movement, slack movement, and projected value, as given in Figure 6.6. Radial Movement represents the shift of an inefficient DMU needed for locating itself on the frontier, and Slack Movement represents the additional movement a DMU located on a frontier segment running parallel to the axis needs to take to become efficient (Huguenin, 2012). Slacks that exist only for inefficient DMUs help detect the wastage of inputs (Kaur, 2016).

Table 6.6

Radial movement, slack movement, and the projected value of SBS during 2011-12.

(Rupees in Lakhs)

Variables	Original Value (Rs.)	Radial Movement (Rs.)	Slack Movement (Rs.)	Projected Value (Rs.)	Possible reduction/ increase (%)
Output					
Interest Income	10074.6	0.00	0.00	10074.6	0.00
Non-Interest Income	639.6	0.00	0.00	639.6	0.00
Input					
Fixed Assets	287.3	-12.9	0.00	274.4	-4.50
Interest Expenses	7756.8	-349.1	0.00	7407.7	-4.50
Non-Interest Expenses	2005.6	-90.2	-327.83	1587.4	-20.85
Deposits & Borrowings	155111.9	-6982.1	-61311.73	86818.0	-44.03

Source: Computed using data from annual accounts of SBS and SISCO

The difference between the original and projected values, caused by radial and slack movement, suggests that the SBS could produce the same output with fewer inputs. The estimates indicate that the SBS could have produced a similar level of outputs by employing Rs. 274.454 lakhs of fixed asset, i.e., 4.5 percent less than what was employed, Rs. 7407.72 lakhs of interest expenses that is 4.5 percent less than what was employed, Rs. 1587.48 lakhs of non-interest expenses (20.85 percent less than what was employed), and Rs. 86818.02 lakhs of Deposits & Borrowings (44.03 percent less than what was employed). The excess deployment of deposits and borrowings by 44.03% indicates that SBS could not convert its loanable funds into earning assets during the year to the extent possible.

6.4.2 Financial Year 2012-13

Table 6.7
Radial movement, slack movement, and the projected value of SBS during 2012-13.

(Rupees in Lakhs)

Variables	Original Value (Rs.)	Radial Movement (Rs.)	Slack Movement (Rs.)	Projected Value (Rs.)	Possible reduction/ increase (%)
Output					
Interest Income	13087.11	0.00	0.00	13087.11	0.00
Non-Interest Income	190.62	0.00	606.17	796.79	318.00
Input					
Fixed Assets	279.18	-16.48	0.00	262.70	-5.90
Interest Expenses	10356.90	-611.22	0.00	9745.68	-5.90
Non-Interest Expenses	2045.16	-120.69	-32.20	1892.26	-7.48
Deposits & Borrowings	162121.8	-9567.72	-49339.73	103214.3	-36.34

Source: Computed using data from annual accounts of SBS and SISCO

SBS has a Pure Technical efficiency (PTE) score of 0.941 (94.1%) and scale efficiency (SE) of 0.969 (96.9%), and it faces decreasing return to scale (DRS) or diseconomies of scale during the year. SBS could have saved 5.9% (1-0.941) of its inputs by improving its operation or managerial efficiency. Further, by adjusting its scale of operation to optimal size, SBS could have saved 3.1% (1-0.969) of its inputs. With a

Pure Technical Efficiency (PTE) score of 1 and Scale Efficiency score of 1, SISCO remained efficient during the year.

The estimates suggest that the SBS could have produced a similar level of interest income and an augmented level of non-interest income (318 percent more than its original value) by employing Rs. 262.70 lakhs of fixed assets (5.90 percent less than what was employed), employing Rs. 9745.68 lakhs of interest expenses (5.90 percent less than what was employed), Rs. 1892.26 lakhs of non-interest expenses (7.48 percent less than what was employed by the bank), and Rs. 103214.35 lakhs of deposits &borrowings (36.34 percent less than what was employed). The excess deployment of deposits and borrowings by 36.34% by the SBS during this year also indicates that they were not efficient in converting its loanable funds into earning assets to the extent possible.

6.4.3 Financial Year 2013-14

Table 6.8
Radial movement, slack movement, and the projected value of SISCO during 2013-14.

(Rupees in Lakhs)

Variables	Original Value (Rs.)	Radial Movement (Rs.)	Slack Movement (Rs.)	Projected Value (Rs.)	Possible reduction / increase (%)
Output					
Interest Income	2803.47	0.00	0.00	2803.47	0.00
Non-Interest Income	13.23	0.00	25.52	38.75	192.89
Input					
Fixed Assets	378.20	-23.51	-61.28	293.41	-22.42
Interest Expenses	1928.12	-119.85	0.00	1808.27	-6.22
Non-Interest Expenses	488.61	-30.37	0.00	458.24	-6.22
Deposits & Borrowings	33284.4	-2068.89	0.00	31215.5	-6.22

Source: Computed using data from annual accounts of SBS and SISCO

SBS with Pure Technical Efficiency (PTE) score of 1 and Scale Efficiency score of 1 remained efficient during the year. SISCO, on the other hand, has a Pure Technical efficiency (PTE) score of 0.938 (93.8%) and scale efficiency (SE) of 0.984 (98.4%) and it faces increasing return to scale (IRS) or economies of scale during the year. SISCO could have saved 6.2% (1-0.938) of its inputs by improving its operation or managerial efficiency. Further, by adjusting its scale of operation to optimal size, SISCO could have saved 1.6% (1-0.984) of its inputs.

The estimates suggest that the SISCO during 2013-14 could have produced similar interest income and augmented non-interest income (192.89 percent more than its original value) by employing reduced levels of inputs, i.e., Rs. 293.41 lakhs of fixed assets (22.42 percent less than what was employed), employing Rs. 1928.12 lakhs of interest expenses (6.22 percent less than what was employed), Rs. 458.24 lakhs of non-interest expenses (6.22 percent less than what was employed actually), and Rs. 31215.54 lakhs of deposits &borrowings (6.22 percent less than what was employed by the bank).

6.4.4 Financial Year 2014-15

Table 6.9
Radial movement, slack movement, and the projected value of SISCO during 2014-15.

(Rupees in Lakhs)

Variables	Original Value (Rs.)	Radial Movement (Rs.)	Slack Movement (Rs.)	Projected Value (Rs.)	Possible reduction/ increase
Output					
Interest Income	3638.61	0.00	0.00	3638.61	0.00
Non-Interest Income	14.79	0.00	21.27	36.06	143.81
Input					
Fixed Assets	379.71	-36.81	0.00	342.90	-9.69
Interest Expenses	2649.44	-256.84	0.00	2392.60	-9.69
Non-Interest Expenses	599.04	-58.07	0.00	540.97	-9.69
Deposits & Borrowings	53947.64	-5229.76	-6490.46	42227.42	-21.73

Source: Computed using data from annual accounts of SBS and SISCO

SBS with Pure Technical Efficiency (PTE) score of 1 and Scale Efficiency score of 1 remained efficient during the year. SISCO, on the other hand, has a Pure Technical efficiency (PTE) score of 0.903 (90.3%) and scale efficiency (SE) of 0.999 (99.9%) and it faces decreasing return to scale (DRS) or diseconomies of scale during the year. SISCO could have saved 9.7 percent (1-0.903) of its inputs by improving its operation or managerial efficiency. Further, by adjusting its scale of operation to optimal size, SISCO could have saved 0.1 percent (1-0.999) of its inputs.

The estimates suggest that the SISCO during 2014-15 could have produced a similar interest income and augmented level of non-interest income (143.81 percent more than its original value) by employing reduced fixed Assets of Rs. 342.90 lakhs (9.69 percent less than what was employed), employing Rs. 2392.60 lakhs of interest expenses (9.69 percent less than what was employed), Rs. 540.97 lakhs of non-interest expenses (9.69 percent less than what was employed by the bank), and Rs. 42227.42 lakhs of deposits &borrowings (21.73 percent less than what was employed actually). The excess deployment of deposits and borrowings by 36.34% by the SISCO during the year indicates that they were not efficient in converting their loanable funds into earning assets to the extent possible.

6.4.5 Financial Year 2015-16

SBS with Overall Technical Efficiency (OTE) score of 1 and Pure Technical Efficiency (PTE) score of 1remained efficient during the year. SISCO, on the other hand, has a Pure Technical efficiency (PTE) score of 0.952 (95.2%) and Scale efficiency (SE) of 0.975 (97.5%) and it faces increasing return to scale (IRS) or economies of scale during the year. By improving its operation or managerial efficiency, SISCO could have saved 4.8% (1-0.952) of its inputs. Further, by adjusting its scale of operation to optimal size, SISCO could have saved 2.5% (1-0.975) of its inputs.

Table 6.10
Radial movement, slack movement, and the projected value of SISCO during 2015-16.

(Rupees in Lakhs)

Variables	Original Value (Rs.)	Radial Moveme nt (Rs.)	Slack Movement (Rs.)	Projecte d Value (Rs.)	Possible reduction/ increase (%)
Output					
Interest Income	6395.83	0.00	0.00	6395.83	0.00
Non-Interest Income	24.13	0.00	21.27	33.49	38.79
Input					
Fixed Assets	162.96	-7.68	0.00	155.19	-4.77
Interest Expenses	5277.47	-251.56	0.00	5025.91	-4.77
Non-Interest Expenses	723.98	-34.51	0.00	689.47	-4.77
Deposits & Borrowings	91560.60	-4364.47	-14790.25	72405.8	-20.92

Source: Computed using data from annual accounts of SBS and SISCO

The estimates suggest that the SISCO during 2015-16 could have produced a similar interest income and augmented non-interest income (38.79 percent more than its original value) by employing a reduced level of inputs, i.e., Rs. 155.19 lakhs of fixed assets (4.77 percent less than what was employed actually), employing a reduced level of interest expenses of Rs. 5025.91 lakhs (4.77 percent less than what was employed), Rs. 689.47 lakhs of non-interest expenses (4.77 percent less than what was employed), and Rs. 72405.87 lakhs of deposits & borrowings (20.92 percent less than what was employed by the bank). The excess deployment of deposits and borrowings by 20.92% by the SISCO during the year indicates that they were not efficient in converting their loanable funds into earning assets to the extent possible.

6.4.6 Financial Year 2016-17

SBS has a Pure Technical efficiency (PTE) score of 1 (100%) and scale efficiency (SE) score of 0.999 (99.9%), and it faces decreasing return to scale (DRS) or diseconomies of scale during the year. SBS with a PTE score of 1 was efficient in its operation or management during the year; however, adjusting its scale to optimal size could have saved 0.1% (1-0.999) of its inputs. SISCO, on the other hand, has a Pure Technical efficiency (PTE) score of 0.913 (91.3%) and scale efficiency (SE) of 0.998 (99.8%) and it faces increasing return to scale (IRS) or economies of scale during the year. SISCO could have saved 8.7% (1-0.913) of its inputs by improving its operation or managerial efficiency. Further, by adjusting its scale of operation to optimal size, SISCO could have saved 0.2% (1-0.998) of its inputs.

Table 6.11
Radial movement, slack movement, and the projected value of SISCO during 2016-17.

(Rupees in Lakhs)

Variables	Original Value (Rs.)	Radial Movement (Rs.)	Slack Movement (Rs.)	Projected Value (Rs.)	Possible reduction/ increase (%)
Output					
Interest Income	8803.66	0.00	0.00	8803.66	0.00
Non-Interest Income	158.41	0.00	0.00	158.41	0.00
Input					
Fixed Assets	199.79	-17.48	0.00	182.31	-8.75
Interest Expenses	7172.51	-627.53	0.00	6544.98	-8.75
Non-Interest Expenses	1204.08	-105.34	0.00	1098.74	-8.75
Deposits & Borrowings	191519.6	-16756.0	-81141.8	93621.6	-51.12

Source: Computed using data from annual accounts of SBS and SISCO

The estimates suggest that during 2016-17 SISCO could have produced a similar level of outputs by employing a reduced level of fixed assets of Rs. 182.31 lakhs (8.75 percent less than what was employed), employing Rs. 6544.98 lakhs of interest expenses (8.75 percent less than what was employed), Rs. 1098.74 lakhs of non-interest expenses (8.75 percent less than what was employed), and Rs. 93621.63 lakhs of deposits & borrowings (51.12 percent less than what was employed by the bank).

An important point to note during this year is that the SISCO deployed deposits and borrowings by 51.12%. Such a sharp increase in deposits and borrowings could be because the Government announced the demonetization during the year. As the announcement of the demonetization was sudden, SISCO could not convert its deposits to earning assets which led to liquidity surplus, i.e., a situation of excess deployment of deposits and borrowings. Not to forget that during demonetization, withdrawal was limited, which must have added to the problem of liquidity surplus. On the other hand, SBS did not record abnormal growth in its deposits during the year; hence, slack and radial movement does not observe the demonetization's effect during 2016-17.

6.4.7 Financial Year 2017-18

SBS has a Pure Technical efficiency (PTE) score of 0.958 (95.8%) and scale efficiency (SE) score of 1 (100%), and it faces constant return to scale (CRS) during the year. It suggests that the inefficiency is not because of the scale of operation but only because of operational inefficiency. SBS could have saved 4.2% (1-0.958) of its inputs by improving its managerial efficiency. However, SISCO with Pure Technical Efficiency (PTE) score of 1 and Scale Efficiency score of 1 remained efficient during the year.

Table 6.12
Radial movement, slack movement, and the projected value of SBS during 2017-18.

(Rupees in Lakhs)

Variables	Original Value (Rs.)	Radial Movement (Rs.)	Slack Movement (Rs.)	Projected Value (Rs.)	Possible reduction/ increase (%)
<u>Output</u>					
Interest Income	15754.40	0.00	0.00	15754.40	0.00
Non-Interest Income	2020.02	0.00	0.00	2020.02	0.00
<u>Input</u>					
Fixed Assets	2523.90	-105.21	-105.21	2010.28	-20.35
Interest Expenses	11617.71	-484.29	0.00	11133.42	-4.17
Non-Interest Expenses	4284.20	-178.59	-152.78	3952.83	-7.73
Deposits & Borrowings	272711.8	-11368.1	9491.21	251852.4	-7.65

Source: Computed using data from annual accounts of SBS and SISCO

The estimates suggest that during 2016-17 SBS could have achieved a similar output level by employing reduced outputs, i.e., Rs. 2010.28 lakhs of fixed assets (20.35

percent less than what was employed), employing Rs. 11133.42 lakhs of interest expenses (4.17 percent less than what was employed actually), Rs. 3952.83 lakhs of non-interest expenses (7.73 percent less than what was employed by the bank), and Rs. 251852.48 lakhs of deposits &borrowings (7.65 percent less than what was employed).

6.4.8 Financial Year 2018-19

With the overall Technical Efficiency (TE) score of 1 and Pure Technical Efficiency score (PTE) of 1, both the banks remained efficient during the year.

6.4.9 Financial Year 2019-20

SBS has a Pure Technical efficiency (PTE) score of 1 (100%) and scale efficiency (SE) score of 0.970 (97.0%), and it faces decreasing return to scale (DRS) or diseconomies of scale during the year. By adjusting its scale of operation to optimal size, SBS could have saved 3.0% (1-0.970) of its inputs. On the other hand, SISCO, with the Overall Technical Efficiency (OTE) score of 1 and Pure Technical Efficiency (PTE) score of 1remained efficient during the year. SBS during 2019-20 was inefficient only because of the wrong scale of operation; hence, it records no slacks.

6.5 Productivity Changes

We now examine the productivity performance of banks for the period 2011-12 to 2019-20. As discussed earlier, we compute the productivity changes using the Malmquist index. Besides giving us the overall productivity improvement, the Malmquist index also decomposes the productivity change into two components, Efficiency Change (effch) and Technological Change (techch). Efficiency change that captures the change in technical efficiency over time is called ‘catch-up.’ The Technological change that captures the change in technology that occurs due to the movement of efficiency frontiers over time is called ‘frontier shift.’

6.5.1 Average Productivity Growth

The study of the average Malmquist index provides insights into the collective productivity growth of the banks under investigation. Analysis of the average Malmquist index substantiates that the demonetization impacted the productivity of the banks under investigation. Table 6.13 reports a decline in the average productivity of 27.8 percent during 2012-13, mainly due to higher Technological regress experienced by the SBS. During 2016-17 and 2017-18, we observed the highest productivity decline of 6 percent and 13 percent, respectively, due to liquidity surplus led by the demonetization. The average productivity recorded growth from the 2nd year of the demonetization, i.e., 2018-19. The mean of the average Malmquist index of the last nine years suggests that the banks collectively recorded productivity growth of 0.30 % during the period under study.

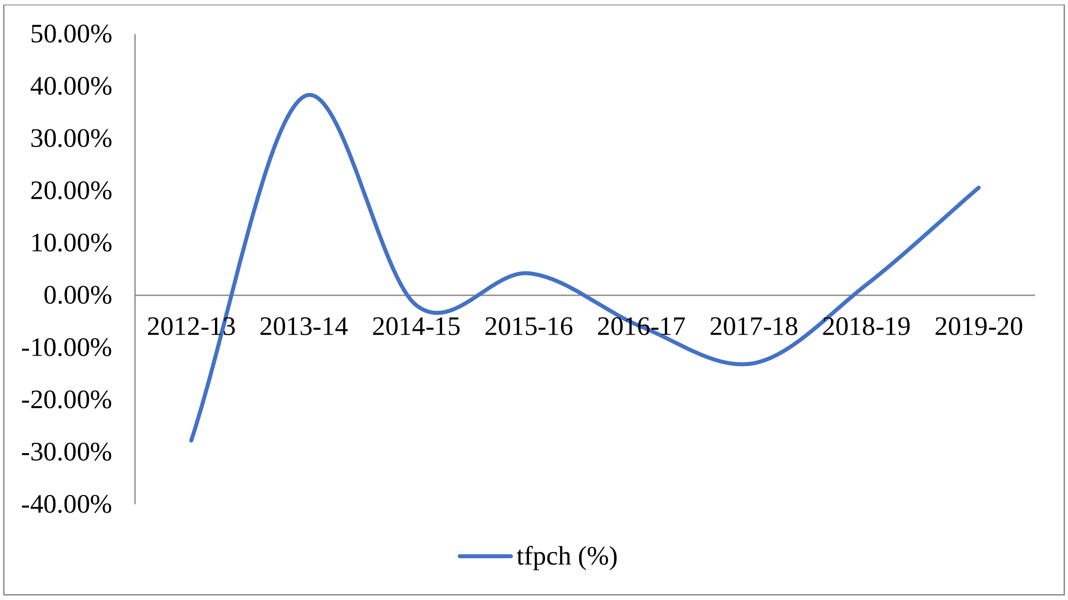
Table 6.13
Average Productivity Growth

Year	effch	techch	tfpch	tfpch (%)
2012-13	1	0.722	0.722	-27.8
2013-14	1	1.38	1.38	38
2014-15	1	0.981	0.981	-1.9
2015-16	1	1.042	1.042	4.2
2016-17	1	0.94	0.94	-6
2017-18	1	0.87	0.87	-13
2018-19	1	1.02	1.02	2
2019-20	1	1.206	1.206	20.6
MEAN	1	1.003	1.003	0.3

Source: Computed using data from annual accounts of SBS and SISCO

Effch- Efficiency change, Techch-Technological change, tfpch-Total Factor Productivity change, tfpch(%)-Total Factor Productivity change in percentage.

Figure 6.4
Average Productivity Growth



Source: Created using data from annual accounts of SBS and SISCO

6.5.2 Productivity Growth of SBS and SISCO

In this section, we study the individual productivity growth of the banks under study during 2011-12 to 2019-20. The results shown in table 6.14, table 6.15, and figure 6.5 suggests that the SBS recorded growth in its productivity during 2013-14, 2014-15, and 2018-19, whereas SISCO recorded growth in its productivity during 2015-16, 2017-18, and 2019-20. The result reveals that the technical progress or regress is the only reason for positive or negative productivity change for both the banks. Other factors like technical efficiency change and scale efficiency change have remained at unity throughout the period under study. The SBS recorded the highest productivity growth of 112.3 percent during 2013-14. Unusual growth of 570 percent in its non-interest income during 2013-14 led to the abnormal growth in productivity of the SBS. SBS recorded its highest productivity decline of -45.2 percent during 2012-13, attributable to the decrease in non-interest income by 70 percent during the year.

The SISCO recorded the highest productivity decline of 10.3 percent during 2013-14, caused by a sharp decline in its non-interest income. On the other hand, SISCO recorded the highest growth in productivity of 62.5 percent during 2019-20, which is also attributable to an unconventional increase of 825 percent in its non-interest income during the year. The finding highlights the importance of the non-interest income for the banks under study. A higher amount of non-interest income has led to productivity growth, and lower non-interest income has led to productivity decline in both banks. Further, it is also noteworthy to mention that the SISCO, which recorded a productivity growth of 11.4 percent during 2015-16, records a sudden productivity decline of 7.4 percent during 2016-17, possibly because of liquidity surplus condition led by the demonetization announced during that year by the Government of India.

Table 6.14
Productivity Growth (Variables in absolute value)

Year	SBS			SISCO		
	techch	tfpch	tfpch(%)	techch	tfpch	tfpch(%)
2012-13	0.548	0.548	-45%	0.952	0.952	-4.80
2013-14	2.123	2.123	112%	0.897	0.897	-10.30
2014-15	1.01	1.01	1%	0.953	0.953	-4.70
2015-16	0.974	0.974	-3%	1.114	1.114	11.40
2016-17	0.955	0.955	-5%	0.926	0.926	-7.40
2017-18	0.662	0.662	-34%	1.144	1.144	14.40
2018-19	1.147	1.147	15%	0.907	0.907	-9.30
2019-20	0.895	0.895	-11%	1.625	1.625	62.50
MEAN	0.963	0.963	-4%	1.045	1.045	4.50

Source: Computed using data from annual accounts of SBS and SISCO

Techch-Technological change, tfpch-Total Factor Productivity change, tfpch(%)-Total Factor Productivity change in percentage.

Table 6.15
Productivity Growth (Variables in ratio)

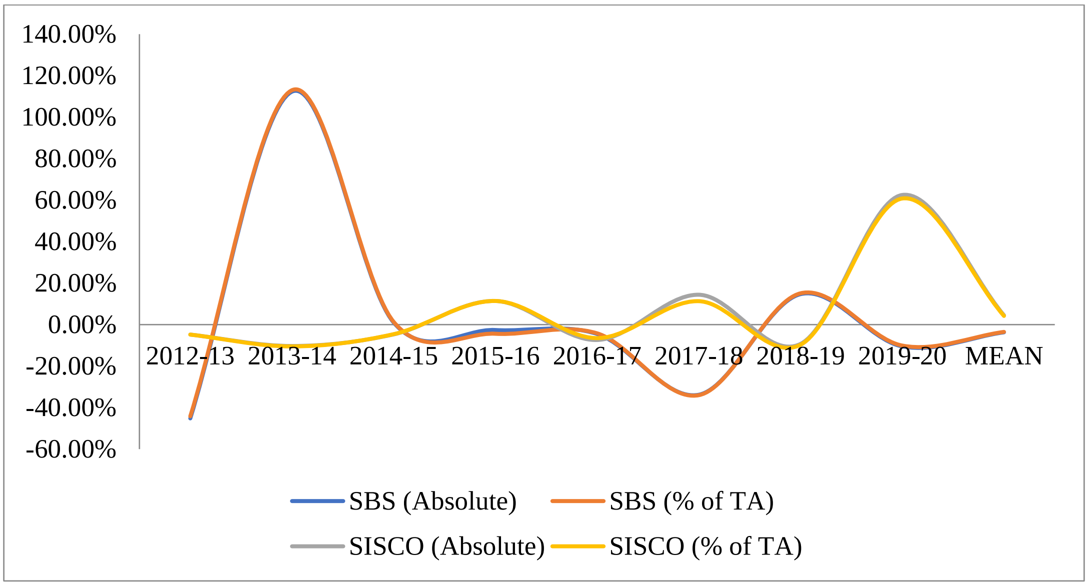
	SBS			SISCO		
Year	techch	tfpch	tfpch(%)	techch	tfpch	tfpch(%)
2012-13	0.558	0.558	-44%	0.952	0.952	-4.80
2013-14	2.13	2.13	113%	0.895	0.895	-10.50
2014-15	1.013	1.013	1%	0.954	0.954	-4.60

		SBS			SISCO	
Year	**techch**	**tfpch**	**tfpch(%)**	**techch**	**tfpch**	**tfpch(%)**
2015-16	0.956	0.956	-4%	1.114	1.114	11.40
2016-17	0.958	0.958	-4%	0.935	0.935	-6.50
2017-18	0.66	0.66	-34%	1.113	1.113	11.30
2018-19	1.151	1.151	15%	0.903	0.903	-9.70
2019-20	0.899	0.899	-10%	1.608	1.608	60.80
MEAN	0.965	0.965	-4%	1.042	1.042	4.20

Source: Computed using data from annual accounts of SBS and SISCO

It may be noted that the results obtained using variables in absolute value and ratios are alike, as can be seen in Figure 6.5. A study of a mean of Malmquist Indices of the selected banks (SBS-0.963 & SISCO-1.045) reveals that the SISCO reports a productivity growth of 4.5 percent (1.045-1 x 100); whereas, SBS reports a productivity decline of -3.7 percent (0.963-1 x 100) during the period under study. It may be recalled that the SISCO was a better performing bank based on results obtained from the CAMEL model in the previous chapter, and the results from the Malmquist Index approach have complimented the same.

Figure 6.5
Total Factor Productivity change in percentage



Source: Created using data from annual accounts of SBS and SISCO

6.5.3 Impact of demonetization on the productivity of the banks

The study of average productivity growth in table 6.13 reflects a decline in average productivity during demonetization and a year after. In this section, we attempt to understand the impact of demonetization on the productivity of the selected banks. The entire study period is divided into two periods, i.e., pre-demonetization and post-demonetization periods, with the year of demonetization as cut-off year, i.e., 2016-17.[9] The result highlighted in table 6.16 shows that SBS recorded a productivity growth of 3.4 percent during the pre-demonetization period; whereas, it recorded a decline in its productivity by -10.3 percent during the post-demonetization period. On the contrary, the SISCO's productivity declined during the pre-demonetization period by -2.4%, whereas; it recorded substantial growth of 11.8% in its productivity during the post-demonetization period. A study of the collective average productivity growth suggests that the banks' productivity declined from 0.50 percent during the pre-demonetization period to 0.20 percent during the post-demonetization period.

Table 6.16

Productivity change during Pre and post demonetizationperiod[1]

Period	SBS		SISCO		AVERAGE	
	tfpch	% Growth	tfpch	% Growth	tfpch	% Growth
Pre-Demonetization (2011-12 to 2015-16)	1.034	3.4	0.976	-2.4	1.00 5	0.50
Post-Demonetization (2016-17 to 2019-20)	0.897	-10.3	1.118	11.8	1.00 2	0.20

Source: Computed using data from annual accounts of SBS and SISCO

[9]Our results do not change even when we use 2017-18 as the cut-off year. We checked the robustness of our findings using this cut-off year as the demonetization was launched at the end of 2016 and our results are not affected by the selection of 2016-17 as the cut-off year.

6.6 Conclusions

In this study, we have estimated the efficiency scores of the selected banks based on the input-oriented CCR and BCC DEA model and estimated productivity growth with the Malmquist productivity index. Under the constant return to Scale (CCR) model, SBS remained efficient four out of nine years, whereas SISCO was efficient in five out of nine years. Under the variable return to scale (BCC) model, SBS remained efficient in five out of nine years, and SISCO also remained efficient in five out of nine years. Finding suggests that among many, the main reason for the inefficiency of SBS is the excess deployment of Deposits & Borrowings. In other words, we may say that the SBS could not convert its loanable funds to interest-earning assets to the extent possible during those years when it became inefficient. The result also suggests scope for a substantial increase in the Non-Interest Income for both the banks. The bank-wise average Malmquist index indicates that the productivity of SISCO grew by 4.5 percent during the period under study; whereas, SBS records a decline in its productivity by 3.7 percent during the study period.SISCO, securing no.1 rank in the composite ranking, was the better performing bank in the CAMEL model, and the bank-wise Malmquist productivity index has also complemented the same. The study also captures the effect of the demonetization on the SISCO bank during 2016-17, wherein it recorded excess deployment of Deposits & borrowings by over 51.00 percent. SBS records a productivity growth during the pre-demonetization; however, it records a decline during the post-demonetization period. Contrary to SBS, SISCO records a decline in productivity during the pre-demonetization period and growth in the post-demonetization period.

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CHAPTER 7

Productivity Performance Analysis: Sikkim's Banks vs. Commercial Banks in India

7.1 Introduction

The previous chapter compared the efficiency and productivity performance among the state-owned banks, i.e., between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank Ltd[10] (SISCO). Unless we equate the productivity performance of these state-owned banks of Sikkim with the rest of the country's commercial banks, we will not be able to comprehend their relative position in terms of productivity. This chapter thus compares the productivity performance of two state-owned banks of Sikkim with 67 commercial banks in India, including 18 nationalized banks, 18 private banks, 31 foreign banks for the period 2014-2020. This chapter will first assess the collective performance of the banks in India from 2014-2020 in terms of productivity growth and, after that, compares the productivity growth among the groups, namely public sector, private, foreign, and Sikkim's banks. The study will then assess the performance of individual banks within the group. Finally, we shall assign an overall rank to all the banks based on their average productivity growth during the study period.

7.2 Empirical Strategy

This chapter uses a non-parametric method, namely Data Envelopment Analysis (DEA) proposed by Charnes et al. (1978), to compare the state-owned banks of Sikkim with the rest of the banks in India. As the previous chapter discusses the Data Envelopment Analysis at length, we exclude it in this chapter. However, the DEA-based Malmquist

[10]Comparison of SISCO's (a cooperative bank) productivity with commercial banks in India are indicative for the purpose of this study to understand the relative ability of the former to deliver business in Sikkim.

Index this chapter relies upon to estimate the productivity changes of the banks under study, we have discussed hereunder.

7.2.1 Malmquist index

Over time efficiency frontiers are not static as the production technology may change, leading to a shift in best practice. As the DEA cannot capture the change in the frontier over time, this study applies the DEA-based Malmquist Total Factor Productivity Change Index to account for shifts in the production frontier. Initially, Malmquist (1953) proposed the Malmquist index, which was later extended by Caves et al. (1982) by introducing the first type of the Malmquist, which assumed the constant returns to scale. Fare et al. (1994) made it possible to decompose the TFPC further to scale and pure technical efficiency by considering a variable return to scale. The DEA-based Malmquist index (MI) is one of the well-known indexes for assessing the relative productivity change of DMUs in multiple periods (Palecková, 2017). Malmquist index is the geometric mean of two TFPC indices, one evaluated concerning the technology (efficiency frontier) in the current period *t* and the other concerning the technology in the base period *s*. Pursuing Fare et al. (1994). This study uses DEA to construct an input-based MI between period *t,* which is the base period and period *s*:

$$M_I(y^s x^s y^t x^t) = \left[\frac{D_I^t(y^s x^s)}{D_I^t(y^t x^t)} * \frac{D_I^s(y^s x^s)}{D_I^s(y^t x^t)}\right]^{\frac{1}{2}} \qquad \text{Equation -7.1}$$

M_I is the input-oriented Malmquist Index, and *DtI(ys, xs)* indicates the distance function reflecting a maximal proportional reduction of the observed period *s* inputs under the period *t* technology. The distance function is defined as follows:

$$D_I^t(y^s, x^s) = min\theta, \qquad \text{Equation -7.2}$$

$$\theta, \lambda$$

Subject to,

$$yis \leq \lambda Y^t \qquad \text{Equation -7.3}$$

$$\theta xis \geq \lambda Y^t \qquad \text{Equation -7.4}$$

$$\lambda_i \geq 0, i = 1, \ldots n, \qquad \text{Equation -7.5}$$

Where,

θ is a scalar, and;

λ is a vector of constants

The value of θ obtained reflects the component score of the *i-th* firm. *X* and *Y* represent input and output vectors, and *x* and *y* denote the amounts of the i^{th} input consumed and output generated by the DMU0. Fare et al. (1992) explained that when *MI > 1,* it indicates productivity gain; when *MI < 1,* it indicates productivity loss; *MI = 1* indicates no change in productivity from time t to s. Fare et al. (1992) relaxing Caves et al. (1982) assumption that *Dt I (yt, xt)* and *Ds I (yt, xt)* should equal to one allowed decomposition of the Malmquist productivity index into two components, i.e., Technical Efficiency Change (TEC) and Technological Change (TCC).

$$M_I = \left[\frac{D_I^t(y^s x^s)}{D_I^t(y^t x^t)} * \frac{D_I^s(y^s x^s)}{D_I^s(y^t x^t)}\right]^{\frac{1}{2}} \qquad \text{Equation -7.6}$$

$$\frac{D_I^s(y^s x^s)}{D_I^t(y^t x^t)}\left[\frac{D_I^t(y^s x^s)}{D_I^s(y^s x^s)} * \frac{D_I^t(y^t x^t)}{D_I^s(y^t x^t)}\right]^{\frac{1}{2}}$$

Where,

$$TEC = \frac{D_I^s(y^s x^s)}{D_I^t(y^t x^t)}$$

Technical Efficiency Change Measures the catching-up effect.

$$TCC = \left[\frac{D_I^t(y^s x^s)}{D_I^s(y^s x^s)} * \frac{D_I^t(y^t x^t)}{D_I^s(y^t x^t)}\right]^{\frac{1}{2}}$$

Measures the technological Frontier Shift, which is Technological Change between period *t* and *s*.

Fare et al. (1992) explain that when a value of TCC > 1 indicates a positive shift or technical progress, TCC < 1 indicates technological regress or a negative shift, when the value of TCC = 1, no change in technology frontier is to be understood.

7.3 Data and Variables

The study in this chapter is based on secondary data. Data, except for the state-owned banks of Sikkim, are drawn from the website of the Reserve Bank of India. Data for the state-owned banks are from their published annual accounts published. As the banks under study vary in scale, we convert all input and output variables into a proportion of their total assets. A total of 69 banks are taken up for the study, including 18 public sector banks, 18 private banks, 31 foreign banks, and two state-owned banks of Sikkim. The banks' selection was based on the data's completeness and existence throughout the study period. As the status of the IDBI bank ltd was changed from public sector to private bank from 2019, we grouped IDBI bank under private banks for our study. In the case of State Bank of India and Bank of Baroda, variables of their associate banks and banks merged with them later have been added back for the period before the merger to study the productivity changes.

7.3.1 *Construction of Output and Input Variables*

The selection of variables is the next important step once the DEA model and orientation are defined. The literature suggests two main approaches for selecting variables concerning financial institutions, i.e., the Production approach and the Intermediation approach (Drake et al., 2009). The production approach treats banks as the service provider to their customers; hence, it considers capital, labour, and materials as its inputs and services provided to the customers, such as deposits and loans as its outputs. The production approach is best suited for analyzing the efficiency of the bank branches rather than the bank as a unit (Yilmaz et al.,2015). On the other hand, the intermediation approach suggests that using capital and labour, the bank's primary function is the collection of deposits and their conversion into loans and other profitable assets. This study follows an intermediation approach pioneered by Sealey and Lindley (1977). The selection of the intermediation approach over the production approach in this study has its foundation on the argument of Berger et al. (1997). Berger et al. (1997) find the intermediation approach appropriate when the entire bank is assessed. It includes interest expenses, which generally constitute 50% to 75% of the bank's total costs[11]. We present the definition and construction of variables in Table 7.1.

Table 7.1
Construction of the Variables[12]

Variables	Definition
Interest Income	Interest income is the amount a bank receives for lending its money or letting another entity use its funds.
Non-Interest Income	Non-Interest is the income earned by the banks from their non-core activities.
Fixed Assets	Fixed assets refer to assets used in a bank's business operations.
Interest Expense	It is the cost incurred by an entity on borrowed funds.
Non-Interest Expense	It is an operating expense of a bank or financial institution.
Deposits and Borrowings	A deposit is a liability owed by the bank to the depositors. Borrowings mean borrowings from RBI, Government, other banks, and institutions.
Total Assets	It includes fixed assets, Investments, loans & advances, and current assets of the bank

Source: Created by the author

[11]Interest expenses of the banks under study constitute almost 70% of their total expenses.
[12]Variables have been divided by the total assets to calculate the ratios.

It is important to note here that there is no consensus on the ideal set of input-output variables that reflects the performance of the banks best (Casu et al., 2002; Sathye, 2003). The ultimate objective of the bank is to increase its Interest Income and Non-Interest Income which guarantees its existence in today's competitive market. To achieve the desired output, the bank incurs two types of expenditure, namely Interest Expenses and Non-Interest Expenses, and uses its fixed assets. Deposits and borrowings have been included in the list of inputs because the Interest Expenses do not always give a clear picture of the volume of a fund available with the bank for lending and investments, especially when the deposits are more in low interest yielding accounts. Based on the above argument, the study uses two input and four output variables in Table 7.2.

Table 7.2
Inputs and Outputs used

Inputs	**Outputs**
1. Fixed Assets to Total Assets	1. Interest Income to Total Assets
2. Interest Expense to Total Assets	2. Non-Interest Income to Total Assets
3. Non-Interest Expense to Total Assets	
4. Deposits & Borrowings to Total Assets	

Source: Created by the author

Outputs: We consider two output variables, i.e., Interest income and Non-Interest Income (Kumar et al., 2008). Interest income consists of interest/discount earned on advances/ bills; Income on investments, interest earned on balance with RBI and other inter-bank funds, and other interest incomes. Non-Interest income includes commission, exchange & brokerage, profit on the sale of investments, revaluation of assets, profit on exchange transactions, and other non-interest revenues.

Inputs: Following Siems et al. (1998), we also consider four inputs, namely fixed assets, interest expenses, non-interest expenses, and deposits & borrowings. Fixed assets include premises, fixed assets under construction, and other fixed assets. Interests Expenses include interest paid on deposits and borrowed funds. Non-Interest expenses cover all the bank's costs other than interest expenses like rent & rates, printing & stationery, advertisement & publicity, Director's fees, auditors' fees, postage and telegrams, repair & maintenance, insurance, and other miscellaneous expenditures. Deposits include demand deposits from banks and other, savings bank deposits, term deposits both from banks and others, deposits of branches in India and outside. In contrast, borrowings include borrowings in India from banks, RBI, other institutions & agencies, and secured borrowings.

It is important to note that the input and output variables of five associate banks of SBI and Bharatiya Mahila Bank Ltd operating independently before the merger, i.e., till 2017, have been added with the SBI to estimate the change in the productivity. A similar exercise was done in the case of DENA bank and Vijaya bank, which got merged with Bank of Baroda in 2019.

Table 7.3
Descriptive Statistics in Absolute Value

(Rupees in crores)

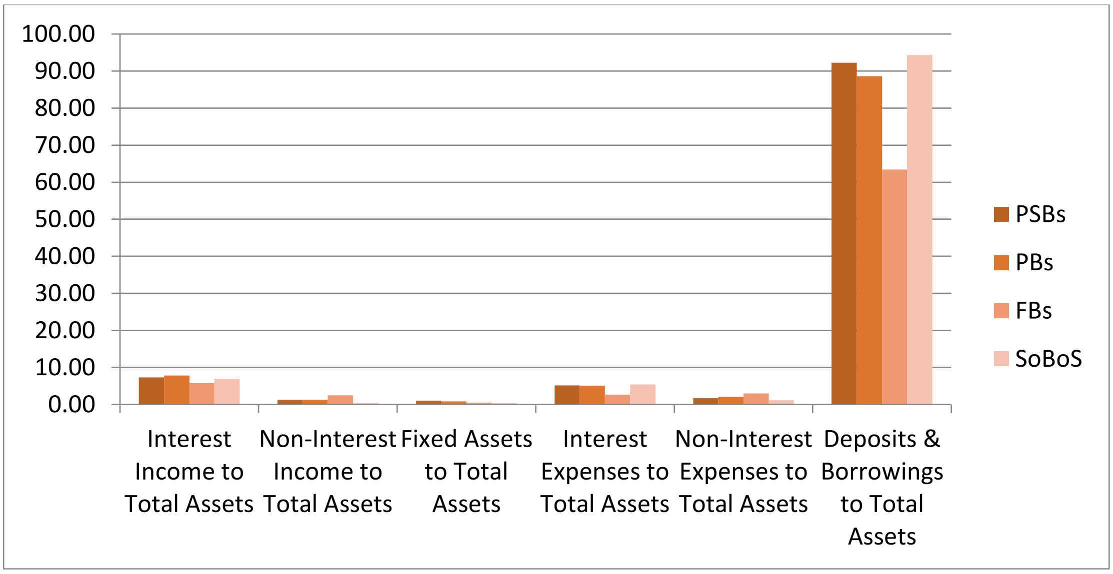
		Public Sector Banks (PSBs)			
Variables	**N**	**Mean (Rs.)**	**SD (Rs.)**	**Min. (Rs.)**	**Max. (Rs.)**
Output					
Interest Income	108	37019.20	49003.45	7929.53	257323.59
Non-Interest Income	108	11005.48	33554.06	428.75	214987.48
Input					
Fixed Assets	108	5197.03	7788.92	526.37	49906.42
Interest Expenses	108	25397.97	31608.37	5713.56	159238.77
Non-Interest Expenses	108	8761.74	13299.00	1332.50	75173.69
Deposits & Borrowings	108	479033.50	649385.22	88498.60	3556276.39
		Private Banks (PBs)			
Variables	**N**	**Mean (Rs.)**	**SD (Rs.)**	**Min. (Rs.)**	**Max. (Rs.)**
Output					
Interest Income	108	15797.61	21346.50	507.56	114812.65

Variables	N	Mean (Rs.)	SD (Rs.)	Min. (Rs.)	Max. (Rs.)
Non-Interest Income	108	3259.35	4968.53	28.94	23260.82
Input					
Fixed Assets	108	1506.55	2143.70	17.96	8410.29
Interest Expenses	108	9451.02	11773.44	337.71	58626.40
Non-Interest Expenses	108	4223.41	5885.34	113.64	30697.53
Deposits & Borrowings	108	177953.84	247761.32	5310.70	1292130.83
		Foreign Banks (FBs)			
Variables	**N**	**Mean (Rs.)**	**SD (Rs.)**	**Min. (Rs.)**	**Max. (Rs.)**
Output					
Interest Income	186	1647.66	2987.82	3.24	12949.14
Non-Interest Income	186	446.68	846.53	0.00	4752.81
Input					
Fixed Assets	186	143.18	368.68	0.09	1642.47
Interest Expenses	186	738.40	1240.86	0.47	5040.98
Non-Interest Expenses	186	535.53	986.47	3.42	4249.88
Deposits & Borrowings	186	19335.16	34533.91	30.55	168019.14
		State-owned banks of Sikkim (SoBoS)			
Variables	**N**	**Mean (Rs.)**	**SD (Rs.)**	**Min. (Rs.)**	**Max. (Rs.)**
Output					
Interest Income	12	136.89	49.03	36.39	197.64
Non-Interest Income	12	9.87	9.28	0.15	24.56
Input					
Fixed Assets	12	8.85	10.28	1.63	27.71
Interest Expenses	12	104.89	36.08	26.49	140.88
Non-Interest Expenses	12	25.23	16.20	5.99	54.23
Deposits & Borrowings	12	1924.61	800.66	539.47	3071.49

Source: Computed using data from RBI website and annual accounts of SBS & SISCO

Figure 7.1

Average Output and Input variables of Public, Private and Foreign banks



Source: Created using data from RBI website and annual accounts of SBS & SISCO

Table 7.4
Descriptive Statistics in Ratio

(% of Total Assets)

Variables	N	Mean %	SD %	Min. %	Max. %
		Public Sector Banks			
Output					
Interest Income	108	7.28	0.78	5.65	8.84
Non-Interest Income	108	1.24	1.24	0.05	7.75
Input					
Fixed Assets	108	0.99	0.31	0.13	1.72
Interest Expenses	108	5.14	0.90	4.03	7.07
Non-Interest Expenses	108	1.71	0.59	0.88	3.53
Deposits & Borrowings	108	92.27	3.91	87.55	95.19
		Private Banks			
Variables	**N**	**Mean %**	**SD %**	**Min. %**	**Max. %**
Output					
Interest Income	108	7.87	1.06	4.36	13.78
Non-Interest Income	108	1.26	0.60	0.36	4.60
Input					
Fixed Assets	108	0.83	0.52	0.21	2.71
Interest Expenses	108	5.05	0.97	2.86	8.96
Non-Interest Expenses	108	2.06	0.45	0.67	4.08
Deposits & Borrowings	108	88.66	10.01	42.10	92.68
		Foreign Banks			
Variables	**N**	**Mean %**	**SD %**	**Min. %**	**Max. %**
Output					
Interest Income	186	5.78	1.52	0.49	11.42
Non-Interest Income	186	2.45	3.71	0.00	18.87
Input					
Fixed Assets	186	0.48	0.62	0.01	4.71
Interest Expenses	186	2.67	1.12	0.13	6.40
Non-Interest Expenses	186	2.98	3.43	0.26	21.72
Deposits & Borrowings	186	63.41	15.50	12.23	86.65
		State-owned banks of Sikkim			
Variables	**N**	**Mean %**	**SD %**	**Min. %**	**Max. %**
Output					
Interest Income	12	7.00	1.84	4.46	11.71
Non-Interest Income	12	0.41	0.33	0.03	0.76
Input					
Fixed Assets	12	0.38	0.31	0.10	0.88
Interest Expenses	12	5.39	1.46	3.63	8.73
Non-Interest Expenses	12	1.17	0.39	0.61	1.67
Deposits & Borrowings	12	94.30	1.68	90.81	97.00

Source: Computed using data from RBI website and annual accounts of SBS & SISCO

We present the summary statistics for the output and input variables used in the analysis in Table 7.3 in ratios and Table 7.4 in absolute values. On average, private banks' interest income to total assets ratio is higher than the public sector, foreign and state-owned banks of Sikkim. The non-interest income to total assets ratio is higher in foreign banks than in other banks. The average fixed assets to total assets ratio are also higher in Public sector banks than the rest. The average interest expenses to total assets ratio of state-owned banks of Sikkim is higher than the rest of the banks. Foreign banks record the highest non-interest expenses to total assets ratio, whereas state-owned banks of Sikkim record the highest deposits and borrowings to total assets ratio. Analysis of variables in absolute value suggests that the public sector banks dominate the Indian banking sector.

7.4 Productivity Changes

This section of the chapter examines the productivity performance of the banks in India for the period 2014-15 to 2019-20. We will compare the productivity performance of the state-owned banks of Sikkim with the public sector, private and foreign banks operating in India and draw an overall ranking of the banks under study based on their average productivity growth. We compute the productivity changes using the Malmquist index, which gives us the overall productivity improvement and decomposes the productivity change into two components, Efficiency Change (effch) and Technological Change (techch). Efficiency change that captures the change in technical efficiency over time is called 'catch-up.' The technological change that captures the shift in technology due to the movement of efficiency frontiers over time is called 'frontier shift.' We shall decompose the Efficiency Change (effch) further into Pure Technical Efficiency Change (pech) which represents managerial efficiency, and Scale Efficiency Change (sech) which signifies economies of scale.

7.4.1 Average Productivity Growth of Banks in India

The study of the average Malmquist index provides insights into the collective productivity performance of the banks under investigation during the study period. As shown in Table 7.5 Indian banking industry reports a decline in productivity throughout the study period. Post demonetization, collectively, the banks record the highest drop in their productivity during 2017-18. The sharp decline in productivity during 2017-18 may be because of the liquidity surplus condition led by the demonetization. Productivity remained negative during 2018-19 & 2019-20, but the severity of decline reduced considerably during these years. The mean of the average Malmquist index of the last six years suggests that the Indian banking industry reported a productivity decline of 3.70 percent per annum during the study period.

Table 7.5
Average Productivity Growth of Indian Banking Industry

Year	effch	techch	pech	sech	tfpch	tfpch in %
2015-16	1.063	0.888	1.083	0.982	0.944	-5.60%
2016-17	0.931	1.024	0.922	1.01	0.954	-4.60%
2017-18	1.053	0.899	1.025	1.027	0.947	-5.30%
2018-19	0.928	1.073	0.948	0.98	0.996	-0.40%
2019-20	1.101	0.884	1.087	1.013	0.973	-2.70%
Mean	**1.013**	**0.95**	**1.011**	**1.002**	**0.963**	**-3.70%**

Source: Computed using data from RBI website and annual accounts of SBS & SISCO

7.4.2 Group-wise Average Productivity Growth of Banks in India

We now compute the average productivity growth of the public sector, private, foreign, and banks of Sikkim to see how productive they were during the study period. In table 7.6 and Figure 7.2, we present the average productivity of the public sector, private, foreign, and state-owned Sikkim banks. The results suggest that the Public sector banks recorded the highest average productivity decline of 7.15 percent per annum during the study period, followed by foreign banks with a decline of 2.21 percent, private banks with a 2.07 percent decline, and the state-owned banks of Sikkim with a decline of 1.45 percent per annum. It is interesting to note that the decline in the average productivity except for state-owned banks is attributable to the technological regress; however, the decline in productivity of the state-owned banks of Sikkim is mainly attributable to managerial inefficiency. Public sector banks record the highest drop of 11.63 percent in their productivity during 2017-18, perhaps because of the liquidity surplus situation led by the demonetization. Productivity of the public sector banks has improved substantially after that but continues to remain negative.

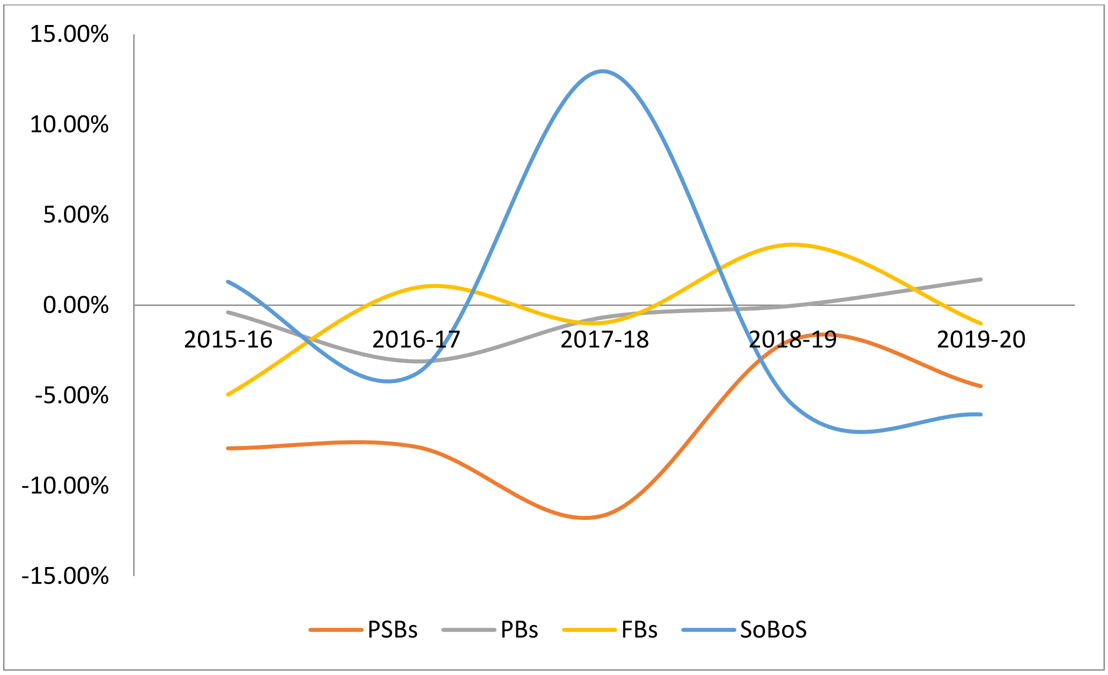
On the other hand, Private Banks record the highest decline in productivity during demonetization, i.e., 2016-17, and the decline is attributable mainly to managerial inefficiency. Post-2016-17, the productivity performance of the Private Banks continued to improve, and it recorded a productivity gain of 1.43 percent for the first time during 2019-20. Foreign banks recorded a productivity gain of 0.97 percent during the demonetization year but recorded a productivity decline attributable to managerial inefficiency in the succeeding year. The foreign banks have recorded the highest productivity gain of 3.35 percent during 2018-19. Sikkim's state-owned banks recorded a productivity gain of 1.30 percent a year before the demonetization. However, it records a productivity decline of 3.80 percent during the year of demonetization. During 2017-18, unlike others, state-owned banks of Sikkim recorded a very high productivity growth of 12.95 percent, mainly driven by technological progress. A substantial increase in the interest income recorded by the SISCO led to such unparallel growth in the productivity of the state-owned banks of Sikkim during 2017-18. The SISCO earned a higher interest during 2017-18, maybe because they could take advantage of the liquidity surplus led by the demonetization. Though the state-owned banks of Sikkim recorded the lowest decline during the period of study but their productivity drift after 2017-18 is not encouraging.

Table 7.6
Group-wise Average Productivity Growth of Banks in India

Public Sector Banks (PSBs)						
Year	**effch**	**techch**	**pech**	**sech**	**tfpch**	**tfpch in %**
2015-16	1.210	0.770	1.136	1.070	0.921	-7.92
2016-17	0.805	1.159	0.826	0.979	0.922	-7.84
2017-18	1.149	0.775	1.099	1.052	0.884	-11.63
2018-19	0.921	1.066	0.909	1.016	0.981	-1.91
2019-20	1.012	0.943	1.036	0.979	0.955	-4.48
Mean	**1.002**	**0.927**	**0.986**	**1.016**	**0.929**	**-7.15**
Private Banks (PBs)						
Year	**effch**	**techch**	**pech**	**sech**	**tfpch**	**tfpch in %**
2015-16	1.155	0.865	1.162	0.998	0.996	-0.39
2016-17	0.898	1.079	0.937	0.962	0.969	-3.11
2017-18	1.169	0.862	1.127	1.052	0.993	-0.67
2018-19	0.934	1.071	0.897	1.053	1.000	-0.03
2019-20	1.115	0.910	1.208	0.930	1.014	1.43
Mean	**1.026**	**0.950**	**1.033**	**0.994**	**0.975**	**-2.49**
Foreign Banks (FBs)						
Year	**effch**	**techch**	**pech**	**sech**	**tfpch**	**tfpch in %**
2015-16	0.969	0.980	1.042	0.935	0.951	-4.95
2016-17	1.070	0.942	0.998	1.074	1.010	0.97
2017-18	1.002	1.000	0.993	1.007	0.990	-0.97
2018-19	0.946	1.105	1.023	0.939	1.034	3.35
2019-20	1.188	0.844	1.082	1.123	0.990	-1.01
Mean	**1.016**	**0.962**	**1.017**	**0.999**	**0.978**	**-2.24**
State-owned Banks of Sikkim (SoBoS)						
Year	**effch**	**techch**	**pech**	**sech**	**tfpch**	**tfpch in %**
2015-16	0.973	1.035	0.931	1.038	1.013	1.30
2016-17	1.033	0.933	1.106	0.940	0.962	-3.80
2017-18	0.910	1.226	0.880	1.041	1.130	12.95
2018-19	1.043	0.904	1.026	1.016	0.945	-5.50
2019-20	0.984	0.956	0.971	1.015	0.940	-6.05
Mean	**0.983**	**1.002**	**0.975**	**1.009**	**0.986**	**-1.45**

Source: Computed using data from RBI website and annual accounts of SBS & SISCO

Figure 7.2
Group-wise Average Productivity Growth of Banks in India



Source: Created using data from RBI website and annual accounts of SBS & SISCO

7.4.3 Average Productivity growth of Public Sector Banks

Table 7.7 & figure 7.3 presents the average productivity growth of individual public sector banks. As shown in table 7.7, all the public sector banks in India record productivity decline during the study period. With the lowest productivity decline of 0.60 percent per annum, Punjab National Bank is the top-performing bank, and State Bank of India, with the highest productivity decline of 16.70 percent, is the worst-performing public sector bank in India. Five public sector banks to record the lowest productivity decline are Punjab National Bank, Indian Bank, Union Bank of India, and Central Bank of India. Five worst performing public sector banks whose productivity decline runs in double digits include Oriental Bank of Commerce, Bank of Baroda, United Bank of India, Corporation Bank, and State Bank of India. In the case of all the public sector banks except for Bank of Baroda, Corporation Bank, and State Bank of India, the decline in productivity is attributable to technological regress. However, the decline in the productivity of Bank of Baroda, Corporation Bank, and State Bank of

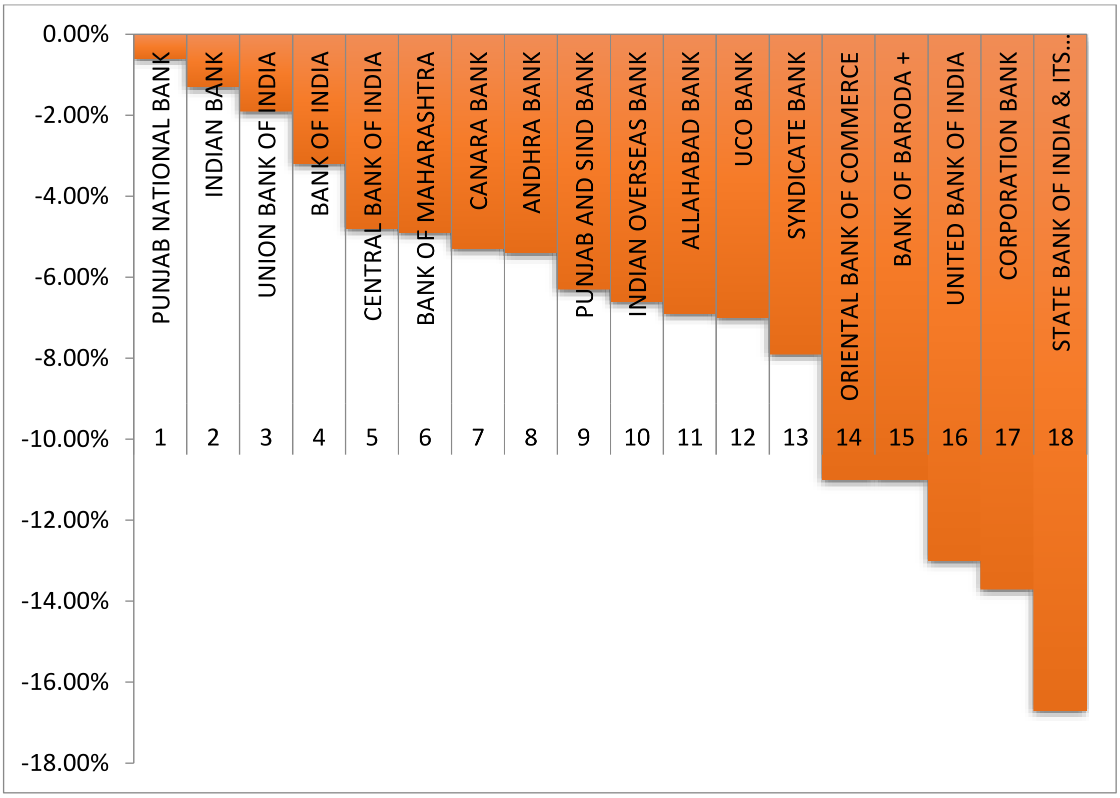
India is attributable to pure technical efficiency change (pech), which signifies managerial inefficiency.

Table 7.7
Public Sector Banks in order of their productivity performance

Rank	Public Sector Banks	effch	techch	pech	sech	tfpch	tfpch in %
1	PUNJAB NATIONAL BANK	1.053	0.944	1.047	1.006	0.994	-0.60
2	INDIAN BANK	1.060	0.932	1.041	1.018	0.987	-1.30
3	UNION BANK OF INDIA	1.055	0.930	1.056	0.999	0.981	-1.90
4	BANK OF INDIA	1.037	0.934	0.997	1.040	0.968	-3.20
5	CENTRAL BANK OF INDIA	1.008	0.944	0.996	1.012	0.952	-4.80
6	BANK OF MAHARASHTRA	1.020	0.932	1.007	1.013	0.951	-4.90
7	CANARA BANK	1.045	0.906	1.002	1.042	0.947	-5.30
8	ANDHRA BANK	1.021	0.926	1.026	0.995	0.946	-5.40
9	PUNJAB AND SIND BANK	1.031	0.909	1.012	1.018	0.937	-6.30
10	INDIAN OVERSEAS BANK	1.017	0.918	0.981	1.037	0.934	-6.60
11	ALLAHABAD BANK	0.989	0.941	0.977	1.013	0.931	-6.90
12	UCO BANK	1.018	0.914	1.003	1.015	0.930	-7.00
13	SYNDICATE BANK	0.986	0.934	0.946	1.042	0.921	-7.90
14	ORIENTAL BANK OF COMMERCE	0.973	0.914	0.962	1.012	0.890	-11.00
15	BANK OF BARODA +	0.931	0.945	0.931	1.000	0.880	-12.00
16	UNITED BANK OF INDIA	0.954	0.912	0.941	1.014	0.870	-13.00
17	CORPORATION BANK	0.926	0.932	0.907	1.021	0.863	-13.70
18	STATE BANK OF INDIA & ITS ASSOCIATES+	0.904	0.921	0.906	0.999	0.833	-16.70
	Mean	**1.002**	**0.927**	**0.985**	**1.016**	**0.929**	**-7.14**

Source: Computed using data from RBI website and annual accounts of SBS & SISCO

Figure 7.3
Public Sector Banks in order of their Productivity Performance



Source: Created using data from RBI website and annual accounts of SBS & SISCO

7.4.4 Average Productivity growth of Private Banks

Table 7.8 & figure 7.4 presents the average productivity growth of 18 private banks in India. ICICI Bank, with a whopping productivity gain of 7.40 percent per annum, is at the top of the table, and IDBI Bank, with the highest average productivity decline of 20.50 percent per annum, is at the bottom of the table. The banks to record productivity gain other than ICICI bank are YES Bank Ltd., RBL, DCB Bank Ltd., and HDFC Bank. Interestingly, all private banks record technological regress, including those experiencing a productivity gain; however, the banks with the productivity gain records a relatively higher efficiency change.

Table 7.8
Private Banks in order of their productivity performance

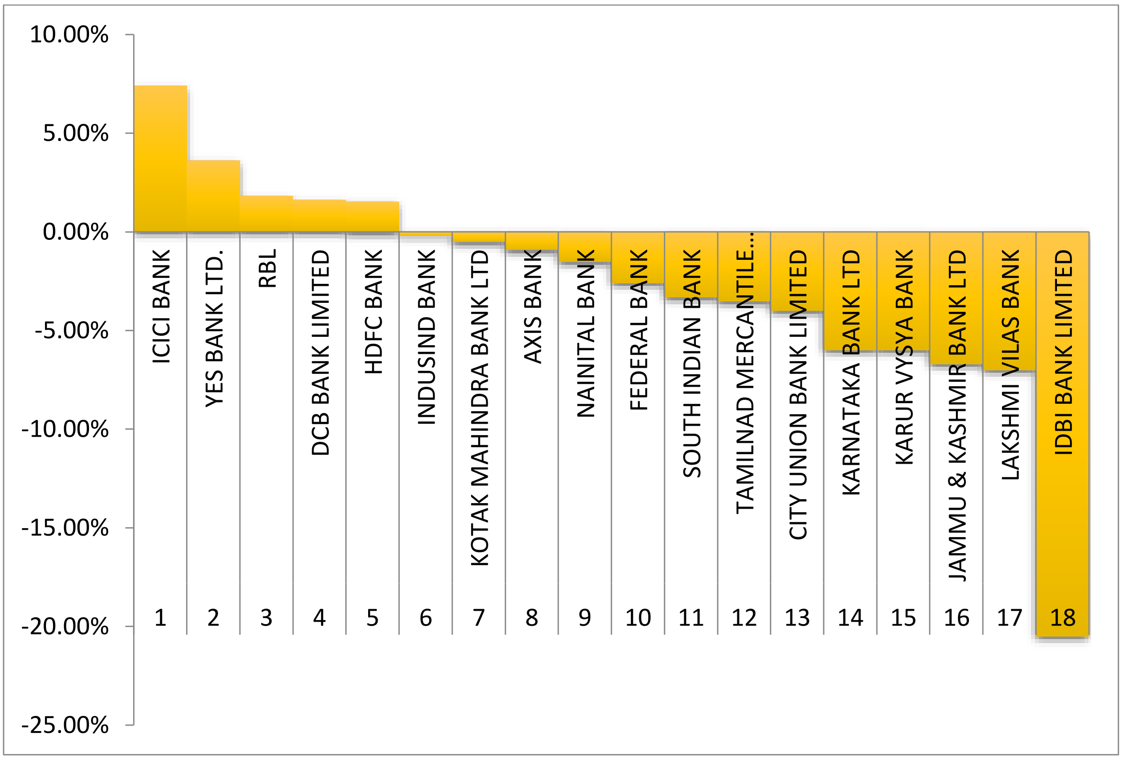
Rank	Private Banks	effch	techch	pech	sech	tfpch	tfpch in %
1	ICICI BANK	1.148	0.936	1.051	1.092	1.074	7.40

Rank	Private Banks	effch	techch	pech	sech	tfpch	tfpch in %
2	YES BANK LTD.	1.054	0.983	1.044	1.01	1.036	3.60
3	RBL	1.082	0.941	1.113	0.972	1.018	1.80
4	DCB BANK LIMITED	1.046	0.972	1.091	0.959	1.016	1.60
5	HDFC BANK	1.053	0.964	1.059	0.994	1.015	1.50
6	INDUSIND BANK	1.044	0.956	1.088	0.959	0.998	-0.20
7	KOTAK MAHINDRA BANK LTD	1.017	0.978	1.019	0.998	0.995	-0.50
8	AXIS BANK	1.046	0.947	1.037	1.009	0.991	-0.90
9	NAINITAL BANK	1.009	0.976	1.028	0.982	0.985	-1.50
10	FEDERAL BANK	1.013	0.962	1.023	0.99	0.974	-2.60
11	SOUTH INDIAN BANK	1.044	0.927	1.052	0.992	0.967	-3.30
12	TAMILNAD MERCANTILE BANK	1	0.966	1.028	0.972	0.965	-3.50
13	CITY UNION BANK LIMITED	1.02	0.941	1.029	0.991	0.96	-4.00
14	KARNATAKA BANK LTD	1.01	0.931	1.007	1.003	0.94	-6.00
15	KARUR VYSYA BANK	1	0.941	1.015	0.985	0.94	-6.00
16	JAMMU & KASHMIR BANK	0.982	0.95	0.976	1.006	0.933	-6.70
17	LAKSHMI VILAS BANK	0.993	0.937	1.021	0.973	0.93	-7.00
18	IDBI BANK LIMITED	0.911	0.873	0.911	1	0.795	-20.50
	Mean	**1.026**	**0.949**	**1.033**	**0.994**	**0.974**	**-2.60**

Source: Computed using data from RBI website and annual accounts of SBS & SISCO

Figure 7.4

Private Banks in order of their productivity performance



Source: Created using data from RBI website and annual accounts of SBS & SISCO

7.4.5 Average Productivity growth of Foreign Banks in India.

Table 7.9 & figure 7.5 presents the average productivity growth of 31 foreign banks in India. A total of 13 foreign banks recorded productivity gain during the period of study, namely FirstRand Bank ltd., American Express Banking Corp., Hongkong and Shanghai Banking Corp., CITI Bank NA, Deutsche Bank AG, Cooperative Rabobank UA, Sumitomo Mitsui Banking Corp., Sonali Bank, Barclays Bank PLC, Bank of Ceylon, Australia and Newzealand Banking Group, Societe Generale, and Bank of America NA. Foreign banks to record productivity decline of more than 10 percent includes Krung Thai Bank Public Company Limited, Bank of Nova Scotia, JP Morgan Chase Bank NA, Mashreq Bank PSC, and SBM Bank (India) Ltd

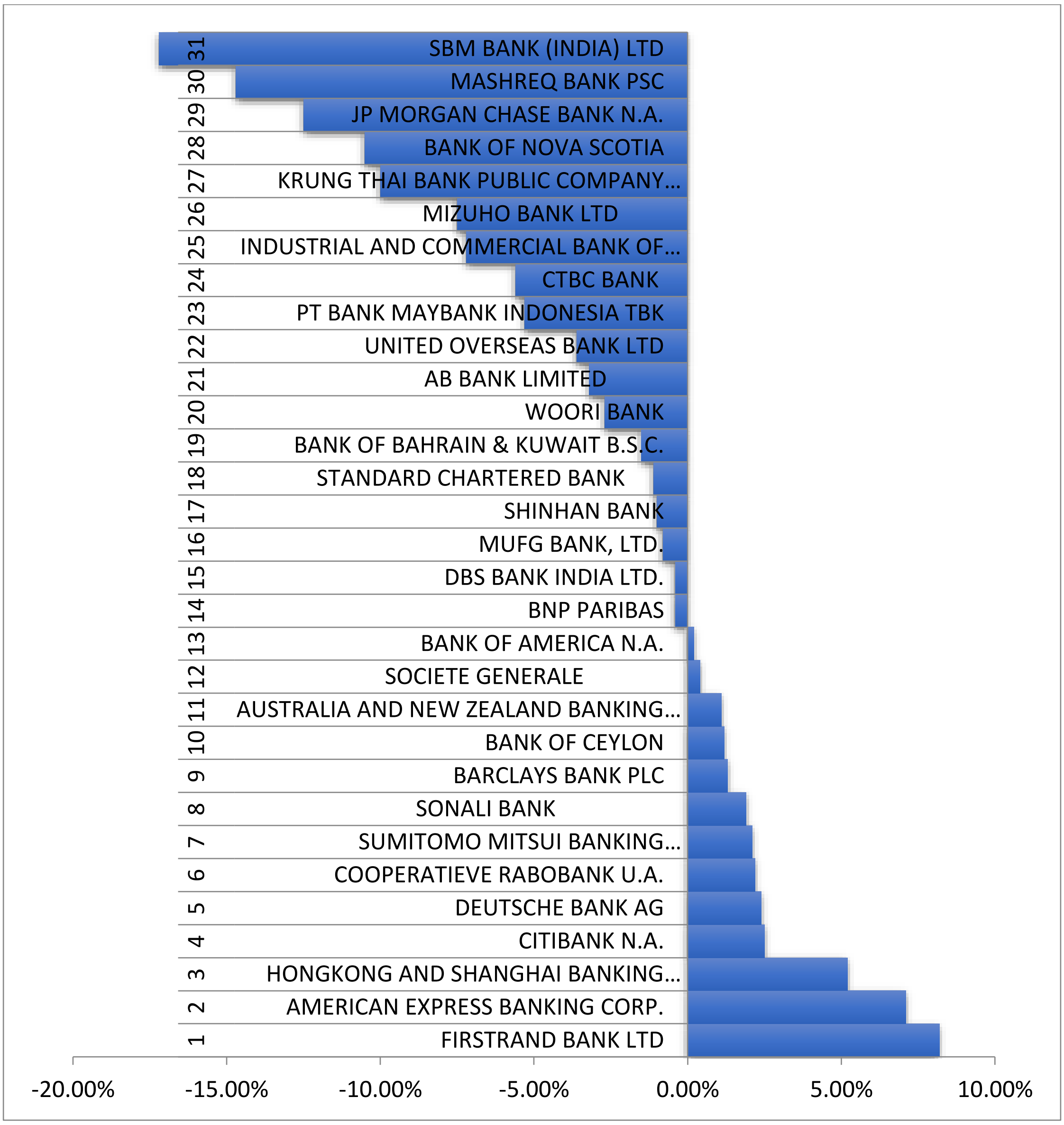
Table 7.9
Foreign Banks in order of their productivity performance

Rank	Name of the Bank	effch	techch	pech	sech	tfpch	tfpch in %
1	FIRSTRAND BANK LTD	1.076	1.005	1.071	1.005	1.082	8.20
2	AMERICAN EXPRESS BANKING CORP.	1.000	1.071	1.000	1.000	1.071	7.10
3	HONGKONG AND SHANGHAI BANKING CORPN.LTD.	1.064	0.988	1.047	1.016	1.052	5.20
4	CITIBANK NA.	1.055	0.971	1.079	0.978	1.025	2.50
5	DEUTSCHE BANK AG	1.054	0.971	1.066	0.989	1.024	2.40
6	COOPERATIEVE RABOBANK U.A.	1.006	1.016	1.051	0.957	1.022	2.20
7	SUMITOMO MITSUI BANKING CORPORATION	1.037	0.985	1.017	1.020	1.021	2.10
8	SONALI BANK	1.100	0.927	1.093	1.006	1.019	1.90
9	BARCLAYS BANK PLC	1.078	0.940	1.024	1.053	1.013	1.30
10	BANK OF CEYLON	1.000	1.012	1.000	1.000	1.012	1.20
11	AUSTRALIA AND NEW ZEALAND BANKING GROUP LTD.	1.046	0.966	1.069	0.979	1.011	1.10
12	SOCIETE GENERALE	1.050	0.956	1.109	0.946	1.004	0.40

Rank	Name of the Bank	effch	techch	pech	sech	tfpch	tfpch in %
13	BANK OF AMERICA NA.	1.042	0.962	1.035	1.006	1.002	0.20
14	BNP PARIBAS	1.052	0.946	1.047	1.005	0.996	-0.40
15	DBS BANK INDIA LTD.	0.995	1.001	0.985	1.010	0.996	-0.40
16	MUFG BANK, LTD.	1.041	0.953	1.026	1.014	0.992	-0.80
17	SHINHAN BANK	1.003	0.987	1.034	0.970	0.990	-1.00
18	STANDARD CHARTERED BANK	1.021	0.968	1.020	1.002	0.989	-1.10
19	BANK OF BAHRAIN & KUWAIT BSC.	1.025	0.961	1.007	1.017	0.985	-1.50
20	WOORI BANK	0.991	0.982	0.960	1.032	0.973	-2.70
21	AB BANK LIMITED	1.000	0.968	1.000	1.000	0.968	-3.20
22	UNITED OVERSEAS BANK LTD	1.000	0.964	1.000	1.000	0.964	-3.60
23	PT BANK MAYBANK INDONESIA TBK	1.000	0.947	1.000	1.000	0.947	-5.30
24	CTBC BANK	0.965	0.978	0.977	0.987	0.944	-5.60
25	INDUSTRIAL AND COMMERCIAL BANK OF CHINA	0.984	0.943	1.000	0.984	0.928	-7.20
26	MIZUHO BANK LTD	0.970	0.953	0.977	0.993	0.925	-7.50
27	KRUNG THAI BANK PUBLIC COMPANY LIMITED	0.951	0.946	0.953	0.999	0.900	-10.00
28	BANK OF NOVA SCOTIA	0.966	0.926	0.955	1.012	0.895	-10.50
29	JP MORGAN CHASE BANK NA.	1.000	0.875	1.000	1.000	0.875	-12.50
30	MASHREQ BANK PSC	0.991	0.861	0.993	0.998	0.853	-14.70
31	SBM BANK (INDIA) LTD	0.920	0.900	0.928	0.991	0.828	-17.20
	Mean	**1.016**	**0.962**	**1.017**	**0.999**	**0.978**	**-2.24**

Source: Computed using data from RBI website and annual accounts of SBS & SISCO

Figure 7.5
Foreign Banks in order of their productivity performance



Source: Created using data from RBI website and annual accounts of SBS & SISCO

7.4.6 Average Productivity growth of Banks of Sikkim.

In table 7.10 & figure 7.6, we present the average productivity growth of both the state-owned banks of Sikkim. SISCO records a productivity gain of 5.20 percent per annum, whereas the State Bank of Sikkim records a productivity decline of 8.10 per annum during the study period. The collective productivity decline of 1.45 percent per annum of state-owned banks of Sikkim, which is better than banks from other groups, is mainly due to better performance reported by the SISCO during the period of study. SISCO experience overall technical efficiency and technological efficiency during the study period. State Bank of Sikkim, on the other hand, was found to have experienced managerial inefficiency (pech) and scale inefficiency (sech) during the study period.

Table 7.10

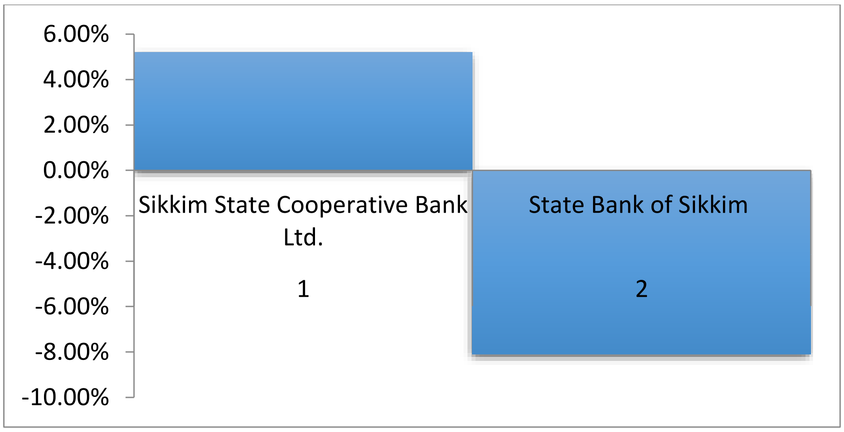
State-Owned Banks of Sikkim in order of their productivity performance

Rank	Name of the Bank	effch	techch	pech	sech	tfpch	tfpch in %
1	SIKKIM STATE COOPERATIVE BANK LTD.	1.032	1.020	1.014	1.018	1.052	5.20
2	STATE BANK OF SIKKIM	0.934	0.984	0.935	0.999	0.919	-8.10
	Mean	**0.983**	**1.002**	**0.975**	**1.009**	**0.986**	**-1.45**

Source: Computed using data from RBI website and annual accounts of SBS & SISCO

Figure 7.6

State-Owned Banks of Sikkim in order of their productivity performance



Source: Created using data from RBI website and annual accounts of SBS & SISCO

7.4.7 Overall ranking of the banks based on Average Productivity growth.

Table 7.11 ranks all the banks based on their productivity performance during 2014-15 to 2019-20. A total of 19 banks recorded productivity gain out of 69 banks considered for the study. The top five banks include three foreign banks, namely FirstTrand Bank Ltd., American Express Banking Corp, Hongkong and Shanghai Banking Corp Ltd., one private bank, namely ICICI Bank, and one state-owned bank,i.e., Sikkim State Cooperative Bank Ltd (SISCO). Sikkim State Cooperative Bank Ltd. (SISCO) can find a place in the top five banks based on productivity performance. On the other hand, the bottom five banks include two public sector banks, namely State Bank of India and Corporation Bank, two foreign banks Mashreq Bank PSC and SBM Bank (India) Ltd, and one private bank, IDBI Bank. State Bank of Sikkim (SBS), with an average productivity decline of 8.10 percent, secured 58th position in the overall ranking. Interestingly, none of the public sector banks can feature in the top 20 performing banks.

Table 7.11
The overall ranking of the banks based on the average productivity growth[13]

Rank	Name of the Bank	effch	techch	pech	sech	tfpch	tfpch in %
1	FIRSTRAND BANK LTD	1.076	1.005	1.071	1.005	1.082	8.20
2	ICICI BANK	1.148	0.941	1.051	1.092	1.074	7.40
3	AMERICAN EXPRESS BANKING CORP.	1	1.071	1	1	1.071	7.10
4	HONGKONG AND SHANGHAI BANKING CORPN.LTD.	1.064	0.988	1.047	1.016	1.052	5.20
5	SIKKIM STATE COOPERATIVE BANK LTD.	1.032	1.02	1.014	1.018	1.052	5.20
6	YES BANK LTD.	1.054	0.983	1.044	1.01	1.036	3.60
7	CITIBANK NA.	1.055	0.971	1.079	0.978	1.025	2.50
8	DEUTSCHE BANK AG	1.054	0.971	1.066	0.989	1.024	2.40
9	COOPERATIEVE RABO BANK	1.006	1.016	1.051	0.957	1.022	2.20
10	SUMITOMO MITSUI BANKING CORPORATION	1.037	0.985	1.017	1.02	1.021	2.10
11	SONALI BANK	1.1	0.927	1.093	1.006	1.019	1.90
12	RBL	1.082	0.941	1.113	0.972	1.018	1.80
13	DCB BANK LIMITED	1.046	0.972	1.091	0.959	1.016	1.60
14	HDFC BANK	1.053	0.964	1.059	0.994	1.015	1.50
15	BARCLAYS BANK PLC	1.078	0.94	1.024	1.053	1.013	1.30
16	BANK OF CEYLON	1	1.012	1	1	1.012	1.20
17	AUSTRALIA AND NEW ZEALAND BANKING GROUP LTD.	1.046	0.966	1.069	0.979	1.011	1.10
18	SOCIETE GENERALE	1.05	0.956	1.109	0.946	1.004	0.40

[13] The ranking is drawn among 18 PSBs, 18 PBs, 31 FBs and 2 Sikkim's banks only, hence, it does not reflect complete ranking of Indian banking industry. Further, the study does not include regional rural banks and cooperative banks.

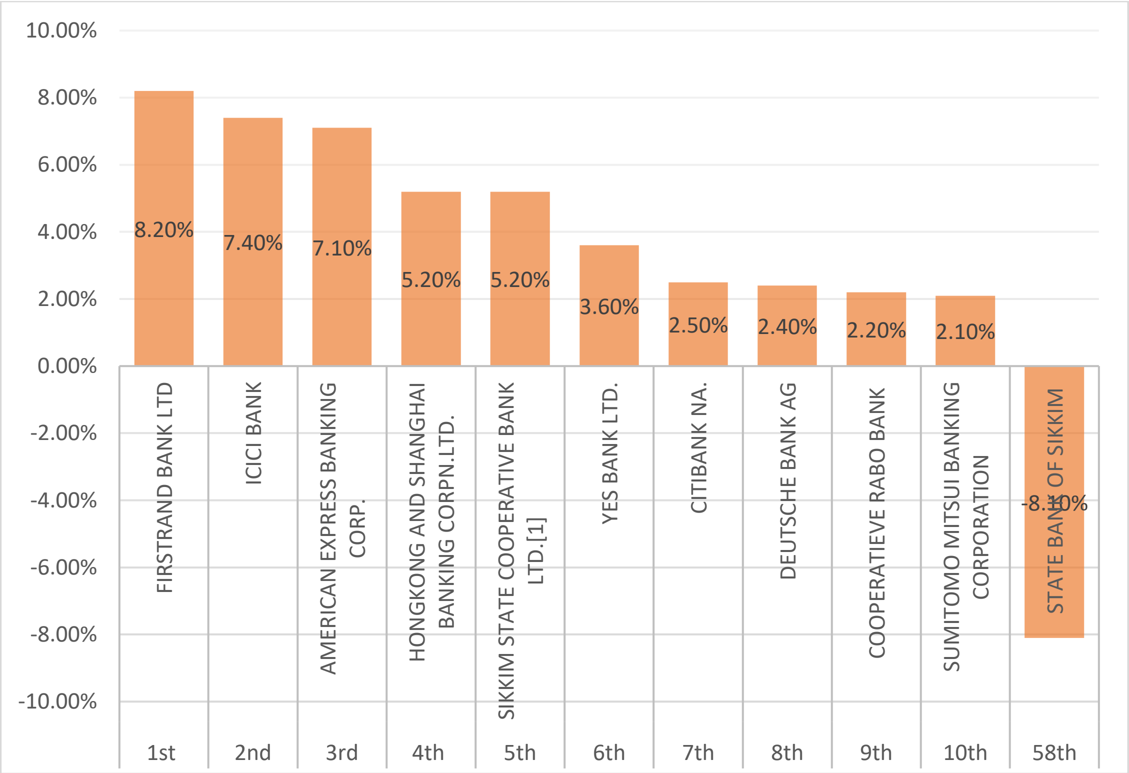
Rank	Name of the Bank	effch	techch	pech	sech	tfpch	tfpch in %
19	BANK OF AMERICA NA.	1.042	0.962	1.035	1.006	1.002	0.20
20	INDUSIND BANK	1.044	0.956	1.088	0.959	0.998	-0.20
21	BNP PARIBAS	1.052	0.946	1.047	1.005	0.996	-0.40
22	DBS BANK INDIA LTD.	0.995	1.001	0.985	1.01	0.996	-0.40
23	KOTAK MAHINDRA BANK LTD	1.017	0.978	1.019	0.998	0.995	-0.50
24	PUNJAB NATIONAL BANK	1.053	0.944	1.047	1.006	0.994	-0.60
25	MUFG BANK, LTD.	1.041	0.953	1.026	1.014	0.992	-0.80
26	AXIS BANK	1.046	0.947	1.037	1.009	0.991	-0.90
27	SHINHAN BANK	1.003	0.987	1.034	0.97	0.99	-1.00
28	STANDARD CHARTERED BANK	1.021	0.968	1.02	1.002	0.989	-1.10
29	INDIAN BANK	1.06	0.932	1.041	1.018	0.987	-1.30
30	NAINITAL BANK	1.009	0.976	1.028	0.982	0.985	-1.50
31	BANK OF BAHRAIN & KUWAIT	1.025	0.961	1.007	1.017	0.985	-1.50
32	UNION BANK OF INDIA	1.055	0.93	1.056	0.999	0.981	-1.90
33	FEDERAL BANK	1.013	0.962	1.023	0.99	0.974	-2.60
34	WOORI BANK	0.991	0.982	0.96	1.032	0.973	-2.70
35	BANK OF INDIA	1.037	0.934	0.997	1.04	0.968	-3.20
36	AB BANK LIMITED	1	0.968	1	1	0.968	-3.20
37	SOUTH INDIAN BANK	1.044	0.927	1.052	0.992	0.967	-3.30
38	TAMILNAD MERCANTILE BANK	1	0.966	1.028	0.972	0.965	-3.50
39	UNITED OVERSEAS BANK LTD	1	0.964	1	1	0.964	-3.60
40	CITY UNION BANK LIMITED	1.02	0.941	1.029	0.991	0.96	-4.00
41	CENTRAL BANK OF INDIA	1.008	0.944	0.996	1.012	0.952	-4.80
42	BANK OF MAHARASHTRA	1.02	0.932	1.007	1.013	0.951	-4.90
43	CANARA BANK	1.045	0.906	1.002	1.042	0.947	-5.30
44	PT BANK MAYBANK INDONESIA TBK	1	0.947	1	1	0.947	-5.30
45	ANDHRA BANK	1.021	0.926	1.026	0.995	0.946	-5.40
46	CTBC BANK	0.965	0.978	0.977	0.987	0.944	-5.60
47	KARNATAKA BANK LTD	1.01	0.931	1.007	1.003	0.94	-6.00
48	KARUR VYSYA BANK	1	0.941	1.015	0.985	0.94	-6.00
49	PUNJAB AND SIND BANK	1.031	0.909	1.012	1.018	0.937	-6.30
50	INDIAN OVERSEAS BANK	1.017	0.918	0.981	1.037	0.934	-6.60
51	JAMMU & KASHMIR BANK	0.982	0.95	0.976	1.006	0.933	-6.70
52	ALLAHABAD BANK	0.989	0.941	0.977	1.013	0.931	-6.90
53	UCO BANK	1.018	0.914	1.003	1.015	0.93	-7.00
54	LAKSHMI VILAS BANK	0.993	0.937	1.021	0.973	0.93	-7.00
55	INDUSTRIAL AND COM. BANK OF CHINA	0.984	0.943	1	0.984	0.928	-7.20
56	MIZUHO BANK LTD	0.97	0.953	0.977	0.993	0.925	-7.50

Rank	Name of the Bank	effch	techch	pech	sech	tfpch	tfpch in %
57	SYNDICATE BANK	0.986	0.934	0.946	1.042	0.921	-7.90
58	STATE BANK OF SIKKIM	0.934	0.984	0.935	0.999	0.919	-8.10
59	KRUNG THAI BANK PUBLIC COMPANY LIMITED	0.951	0.946	0.953	0.999	0.9	-10.00
60	BANK OF NOVA SCOTIA	0.966	0.926	0.955	1.012	0.895	-10.50
61	ORIENTAL BANK OF COMMERCE	0.973	0.914	0.962	1.012	0.89	-11.00
62	BANK OF BARODA +	0.93	0.949	0.933	0.997	0.883	-11.70
63	JP MORGAN CHASE BANK NA.	1	0.875	1	1	0.875	-12.50
64	UNITED BANK OF INDIA	0.954	0.912	0.941	1.014	0.87	-13.00
65	CORPORATION BANK	0.926	0.932	0.907	1.021	0.863	-13.70
66	MASHREQ BANK PSC	0.991	0.861	0.993	0.998	0.853	-14.70
67	STATE BANK OF INDIA & ITS ASSOCIATES+	0.904	0.915	0.906	0.998	0.828	-17.20
68	SBM BANK (INDIA) LTD	0.92	0.9	0.928	0.991	0.828	-17.20
69	IDBI BANK LIMITED	0.911	0.887	0.911	1	0.808	-19.20
	Mean	**1.013**	**0.95**	**1.011**	**1.002**	**0.963**	**-3.70**

Source: Computed using data from RBI website and annual accounts of SBS & SISCO

Figure 7.7

Productivity performance of state-owned banks against ten best performing commercial banks in India



Source: Created using data from RBI website and annual accounts of SBS & SISCO

7.5 Conclusions

In this paper, applying the Malmquist model, we analyzed the productivity performance of 69 banks in India for the period 2014-15 to 2019-20. The results suggest that the banks in India collectively experienced a productivity decline during the study period. Decomposition of the productivity index further explains that the collective decline in India's banks' productivity is attributable mainly to technological regress. The banks observed the highest decline in collective productivity during 2017-18, possibly because of the liquidity surplus condition due to demonetization. Results on the productivity performance of public, private, foreign, and state-owned banks of Sikkim suggest that the Public sector banks recorded the highest average productivity decline, followed by foreign banks, private banks, and the state-owned banks of Sikkim. The results also suggest that none of the public sector banks attained productivity gain during the study period. Though the state-owned banks of Sikkim recorded the lowest decline during the period of study but their productivity performance post-2017-18 is not encouraging. Among private banks, ICICI bank with the highest productivity growth in the group stays at the top of the table.

Similarly, FirstRand Bank ltd is the best performing foreign bank, and SISCO is the best-performing state-owned bank of Sikkim. Analysis of overall ranking suggests that the SISCO can find a place in India's top five performing banks[14] in terms of productivity. In contrast, SBS could only secure the 58th position in the overall ranking assigned to 69 banks based on productivity performance.

[14] Ranking is drawn among the selected 69 banks and excludes regional rural banks and cooperative banks. Thus, the ranking does not reflect the comprehensive national level ranking of the banks in India.

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CHAPTER 8

Analysis and Interpretation

8.1 Introduction

Chapter 5 analyses the overall financial health of the state-owned banks of Sikkim through the CAMEL model, and in Chapter 6, we compared the efficiency and productivity of the state banks through DEA. We formulated six hypotheses based on those chapters, and the same shall be tested in this chapter at a level of significance of 5 percent with an Independent t-test. By the end of this chapter, we shall know whether or not the selected banks are statistically different in terms of capital adequacy, assets quality, management efficiency, earning capacity, liquidity, and DEA efficiency.

8.2 A t-Test

While working with the Guinness Brewery, William Sealy Gosset, a chemist from Ireland, developed the t-statistics in 1908 to monitor the quality of a beer. A t-test is a statistical test used to compare the means of two variables or groups. It is used in hypothesis testing to see whether a treatment or process affects the population of interest or whether the means of the two groups are different from each other. The present study uses an Independent t-test to test the hypotheses formulated for the study.

8.3 Selection of appropriate t-test

A t-test can be one sample location test and a two-sample location test. Two sample t-test can be further divided as paired t-test and unpaired or independent t-test. In a paired t-test, the data is collected from the same subjects before and after the treatment. On the other hand, an unpaired t-test test is applied when the data is collected from separate or independent subjects. Unpaired data, which is a concern for this study, can have equal or unequal mean-variance based on which relevant t-test is selected. When the variance of two groups is equivalent, then Student's t-test is applied, whereas Welch's t-test is used when the variance of the groups is different or unequal. This study applies both equal and unequal variance t-test depending upon the result on variance obtained from the f-test. Formulas for Independent t-test with and without variance are as follows.

The formula for Student t-Test

$$t = \frac{m_A \; - \; m_A}{\sqrt{\frac{S^2}{n_A} \; + \; \frac{S^2}{n_B}}} \qquad \text{Equation 8.1}$$

Where,

m_A and m_B are the means of groups A and B,

n_A and n_B are the size of groups A and B

S^2 is an estimator of the pooled variance of groups A and B

$$S^2 = \frac{\sum(x - m_A) + \sum(x - m_B)^2}{n_A + n_B - 2} \qquad \text{Equation 8.2}$$

Degrees of freedom (df) = $n_A + n_B - 2$

Formula for Welch's t-test

$$t = \frac{m_A \; - \; m_A}{\sqrt{\frac{S_A^2}{n_A} \; + \; \frac{S_B^2}{n_B}}} \qquad \text{Equation 8.3}$$

Where,

m_A and m_B are the mean of groups A and B,

n_A and n_B are the size of groups A and B,

S_A and S_B are the standard deviations of groups A and B.

$$\frac{df = \left(\frac{S_A^2}{n_A} + \frac{S_B^2}{n_B}\right)^2}{\left(\frac{S_A^4}{n_A^2(n_A-1)} + \frac{S_B^4}{n_B^2(n_B-1)}\right)} \qquad \text{Equation 8.4}$$

8.4 F-test for checking of variance

F-test checks the variance of two sets of samples to see if they are similar or not by comparing the ratio of the variances of the samples. While applying the t-test for hypothesis testing, variance on each occasion was assessed using the F-test.

$$F\ calc = \frac{\sigma_1^2}{\sigma_2^2}$$ Equation 8.5

Where,

F_{calc}= Critical F-valueformula

$\sigma_1^2 \& \sigma_2^2 =$ the variance of the two samples and is calculated Equation -8.6

with the following

$$\sigma^2 = \frac{\sum(x - \bar{x})^2}{n - 1}$$

Where,

σ^2 is the variance

x is the values given in a set of data

$\bar{x}$ is the mean of the given data set

n is the total number of values in the data set

8.5 Empirical Results

8.5.1 Capital Adequacy

The study applied three ratios, i.e., CRAR, Debt to Equity Ratio, and Equity to Total Assets ratio, to assess the capital adequacy of the selected banks. The null hypothesis to be tested regarding capital adequacy is as follows.

Ho1: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Capital Adequacy.

Table 8.1
Capital Adequacy Ratios of SBS and SISCO for the period of 2011-12 to 2019-20

Ratio	Banks	Mean	S.D	Mean Diff.	Variance	P-Value	H0
CRAR	SBS	3.18	2.46	-19.36	Unequal	0.00032	Rejected
	SISCO	22.54	11.13				
Debt. to Equity Ratio	SBS	156.18	156.1	132.0	Unequal	0.02098	Rejected
	SISCO	24.12	24.12				
Equity to Total Assets Ratio	SBS	1.39	2.87	-4.06	Unequal	0.00348	Rejected
	SISCO	5.45	5.45				

Source: Computed using t-Test

Table 8.1 shows the Capital Adequacy Ratio of State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank Ltd. (SISCO). The average CAR of SBS and SISCO are 3.18 and 22.54, respectively. The mean difference is -19.36, and the p-value of 0.0003 is less than 0.05, indicating a significant difference in the mean of the selected banks. The average debt to equity ratio of SBS and SISCO are 156.18 and 24.12, respectively. The mean difference is 132.06, and the p-value of 0.02 is less than 0.05, indicating a significant difference in the mean of the selected banks. The average Equity to Total Assets ratio of SBS and SISCO are 1.39 and 5.45, respectively. The mean difference is -4.06, and the p-value of 0.003 is less than 0.05, indicating a significant difference in the mean of the selected banks. As in all the three ratios to measure capital adequacy, p values are less than 0.05; hence null hypothesis is considered as rejected. We may, therefore, say that there is a significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Capital Adequacy.

8.5.2 Asset Quality

The study applied four ratios, i.e., NPA to Gross Loan ratio, NPA to Equity Ratio, Govt. Securities to Total Investments Ratio, and Investments to Total Assets ratio, to assess the asset quality of the state-owned banks of Sikkim. The null hypothesis to be tested regarding asset quality is as follows.

Ho2: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Assets quality.

Table 8.2
Asset Quality Ratios of SBS and SISCO for the period of 2011-12 to 2019-20

Ratios	Banks	Mean	S.D	Mean Diff.	Variance	P-Value	H0
NPA to Total Loans Ratio	SBS	27.72	10.61	22.10	Unequal	0.000	Rejected
	SISCO	5.62	2.18				
NPA to Equity Ratio	SBS	1119.91	806.58	1075.39	Unequal	0.001	Rejected
	SISCO	44.52	13.40				
Govt. Sec. to Total Investments	SBS	0.00	0.00	-45.07	Unequal	0.000	Rejected
	SISCO	45.07	16.40				
Investments to Total Assets	SBS	6.02	6.16	-45.09	Unequal	0.000	Rejected
	SISCO	51.10	14.73				

Source: Computed using t-Test

Table 8.2 shows the Asset Quality Ratios of State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank Ltd. (SISCO). The average NPA to Gross Loans Ratio of SBS and SISCO are 27.72 and 5.62, respectively. The mean difference is 22.10, and the p-value of 0.0001 is less than 0.05, indicating a significant difference in the mean of the selected banks. The average NPA to equity ratio of SBS and SISCO are 1119.91 and 44.52, respectively. The mean difference is 1075.39, and the p-value of 0.0017 is less than 0.05, indicating a significant difference in the mean of the selected banks. The average Government Securities to Total Investments ratio of SBS and SISCO are 0.00 and 45.07, respectively. The mean difference is -45.07, and the p-value of 0.000 is less than 0.05, indicating a significant difference in the mean of the selected banks. The average Investments to Total Assets ratio of SBS and SISCO are 6.02 and 51.10, respectively. The mean difference is -45.09, and the p-value of 0.000 is less than 0.05, indicating a significant difference in the mean of the selected banks. As in all the four ratios to measure asset quality, p values are less than 0.05; hence null hypothesis is considered as rejected. We may, therefore, say that there is a significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Asset Quality.

8.5.3 Management Efficiency

The study applied three ratios, i.e., Credit to Deposit ratio, Business per Employee, and Profit per Employee, to assess the Management efficiency of the state-owned banks. The null hypothesis to be tested regarding management efficiency is as follows.

Ho3: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Management Efficiency.

Table 8.3
Management Efficiency Ratios of SBS and SISCO for the period of 2011-12 to 2019-20

Ratios Bank	Banks	Mean	S.D	Mean Diff.	Variance	P-Value	H0
Credit to Deposit Ratio	SBS	41.68	17.67	-4.31	Equal	0.598	Accepted
	SISCO	45.99	18.34				
Business per Employee	SBS	708.40	96.11	-848.9	Unequal	0.013	Rejected
	SISCO	1557.3	870.41				
Profit per Employee	SBS	2.39	0.81	-3.66	Unequal	0.0047	Rejected
	SISCO	6.04	3.12				

Source: Computed using t-Test

Table 8.3 shows the Management Efficiency Ratios of the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank Ltd. (SISCO). The average Credit to Deposit ratio of SBS and SISCO are 41.68 and 45.99, respectively. The mean difference is -4.31, and the p-value of 0.5988 is more than 0.05, indicating no significant difference in the mean of the selected banks in terms of credit to deposit ratio. The average Business per Employee of SBS and SISCO are 708.40 and 1557.36, respectively. The mean difference is -848.96, and the p-value of 0.0130 is less than 0.05, indicating a significant difference in the mean of the selected banks. The average Profit per Employee of SBS and SISCO is 2.39 and 6.04, respectively. The mean difference is -3.66, and the p-value of 0.004 is less than 0.05, indicating a significant difference in the mean of the selected banks. In two out of three ratios to measure management efficiency, p values are less than 0.05; hence the null hypothesis is rejected. We may, therefore, say that there is a significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Capital Adequacy.

8.5.4 Earning Ability

The study relied on four ratios, i.e., Credit to Deposit ratio, Business per Employee, and Profit per Employee, to assess the earning ability of the banks under study. The null hypothesis to be tested regarding management efficiency is as follows.

Ho4: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Earning Ability.

Table 8.4
Earning Ability Ratios of SBS and SISCO for the period of 2011-12 to 2019-20

Ratios Bank	Banks	Mean	S.D	Mean Diff.	Variance	P-Value	H0
Return on Assets	SBS	0.72	0.16	-0.39	Unequal	0.093	Accepted
	SISCO	1.11	0.66				
Op. Cost to Total Assets Ratio	SBS	0.43	0.14	-0.24	Unequal	0.134	Accepted
	SISCO	0.67	0.44				
Op. Cost to Total Income Ratio	SBS	89.72	2.40	5.24	Unequal	0.187	Accepted
	SISCO	84.48	11.45				
Net Interest Margin to Total Assets	SBS	1.67	0.35	-0.53	Unequal	0.134	Accepted
	SISCO	2.20	0.98				

Source: Computed using t-Test

Table 8.4 shows the Earning Ability Ratios of State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank Ltd. (SISCO). The average Return on Assets Ratio of SBS and SISCO are 0.72 and 1.11, respectively. The mean difference is -0.39, and the p-value of 0.093 is more than 0.05, indicating no significant difference in the mean of the selected banks. The average operating cost to total assets ratio of SBS and SISCO are 0.43 and 0.67, respectively. The mean difference is -0.24, and the p-value of 0.134 is more than 0.05, indicating no significant difference in the mean of the selected banks. The average operating cost to total income ratio of SBS and SISCO are 89.72 and 84.48, respectively. The mean difference is 5.24, and the p-value of 0.187 is more than 0.05, indicating no significant difference in the mean of the selected banks. The average NIM to Total Assets ratio of SBS and SISCO are 1.67 and 2.20, respectively. The mean difference is -0.53, and the p-value of 0.134 is more than 0.05, indicating no significant difference in the mean of the selected banks. As in all the four ratios to measure earning ability, p values are more than 0.05; hence the null hypothesis is accepted. We may, therefore, say that there is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Earning Ability.

8.5.5 liquidity

The study applied four ratios, i.e., Cash to Total Assets ratio, Liquid Assets to Total Assets ratio, Liquid Assets to Demand Deposit ratio, and Loan to Deposit Ratio, to assess the liquidity of the banks under study. The null hypothesis to be tested regarding management efficiency is as follows.

Ho5: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning liquidity.

Table 8.5
Liquidity Ratios of SBS and SISCO for the period of 2011-12 to 2019-20

Ratios Bank	Banks	Mean	S.D	Mean Diff.	Variance	P-Value	H0
Cash to Total Assets Ratio	SBS	1.71%	1.72	1.10	Unequal	0.096	Accepted
	SISCO	0.61%	0.92				
Liquid Assets to Total Assets Ratio	SBS	52.82%	16.67	37.48	Equal	0.0001	Rejected
	SISCO	15.33%	10.88				
Liquid Assets to Demand Deposit Ratio	SBS	6.47 times	3.71	-14.10	Unequal	0.101	Accepted
	SISCO	20.57 times	25.58				
Loan to Deposit Ratio	SBS	42.56%	17.82	-3.43	Unequal	0.676	Accepted
	SISCO	45.99%	18.34				

Source: Computed using t-Test

Table 8.5 shows the Liquidity Ratios of the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank Ltd. (SISCO). The average Cash to Total Assets ratio of SBS and SISCO are 1.71 and 0.61, respectively. The mean difference is 1.10, and the p-value of 0.096 is more than 0.05, indicating no significant difference in the mean of the selected banks. The average Liquid Assets to Total Assets ratio of SBS and SISCO are 52.82 and 15.33, respectively. The mean difference is 37.48, and the p-value of 0.00001 is less than 0.05, indicating a significant difference in the mean of the selected banks. The average Liquid Assets to Demand Deposits ratio of SBS and SISCO are 6.47 and 20.57, respectively. The mean difference is -14.10, and the p-value of 0.101 is more than 0.05, indicating no significant difference in the mean of the selected banks. The average Loan to Deposit ratio of SBS and SISCO are 42.56 and 45.99, respectively. The mean difference is -3.43, and the p-value of 0.676 is more than 0.05, indicating no significant difference in the mean of the selected banks. In three out of four ratios to measure liquidity, p values are more than 0.05; hence null hypothesis is considered as accepted. We may, therefore, say that there is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning liquidity.

8.5.6 Efficiency & Productivity

The study relied upon CCR & BCC models of Data Envelopment Analysis and Malmquist Total Factor Productivity Index. The null hypothesis to be tested regarding efficiency and productivity is as follows.

Ho6: There is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Efficiency and Productivity.

Table 8.6
Efficiency and Productivity

Efficiency Score/MI	Banks	Mean	S.D	Mean Diff.	Variance	P-Value	H0
	SBS	0.975	0.032				
OTE	SISCO	0.962	0.044	0.012	Equal	0.494	Accepted
	SBS	0.983	0.024				
PTE	SISCO	0.967	0.041	0.016	Equal	0.3192	Accepted
	SBS	0.991	0.013				
SE	SISCO	0.995	0.009	-0.004	Equal	0.5184	Accepted
Productivity	SBS	1.030	0.448				
Index	SISCO	1.062	0.229	-0.032	Equal	0.8522	Accepted

Source: Computed using t-Test

Table 8.6 shows the Efficiency score estimated using the CCR & BCC model and Productivity Index estimated using DEA-based Malmquist of State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank Ltd. (SISCO). The average Overall Technical Efficiency (OTE) of SBS and SISCO are 0.9755 and 09628, respectively. The mean difference is 0.0129, and the p-value of 0.494 is more than 0.05, indicating no significant difference in the mean of the selected banks. The average Pure Technical Efficiency (PTE) of SBS and SISCO are 0.9838 and 0.9673, respectively. The mean difference is 0.0164, and the p-value of 0.3192 is more than 0.05, indicating no significant difference in the mean of the selected banks. The average Scale Efficiency (SE) of SBS and SISCO are 0.9916 and 0.9951, respectively. The mean difference is -0.004, and the p-value of 0.5184 is more than 0.05, which indicates that there is no significant difference in the mean of the selected banks. The average Productivity Index of SBS and SISCO are 1.0308 and 1.0626, respectively. The mean difference is -0.032, and the p-value of 0.8522 is more than 0.05, indicating no significant difference in the mean of the selected banks. As in all the four indices, p values are more than 0.05; hence null hypothesis is considered as accepted. We may, therefore, say that there is no significant difference between the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank (SISCO) concerning Efficiency and Productivity.

8.6 Conclusion

The findings suggest a significant difference between the State Bank of Sikkim (SBS) and State Cooperative Bank Ltd. (SISCO) concerning Capital Adequacy, Assets Quality, and Management Efficiency. No significant difference was observed between the banks regarding Earning Capacity, Liquidity, and Efficiency & Productivity (estimated through Data Envelopment Analysis). Though there is a significant difference between banks concerning overall management efficiency, there is no significant difference regarding the Credit to Deposit ratio. Similarly, there is no significant difference between banks concerning overall liquidity; however, there is a significant difference between banks concerning Liquid Assets to Total Assets Ratio.

CHAPTER 9

Summary, Conclusions, Suggestions, and Policy Implications

9.1 Introduction

The State Bank of Sikkim, the only bank established before the merger with the Republic of India, played a crucial role in the development of the erstwhile kingdom of Sikkim. While the rest of the world already had an advanced banking system, Sikkim was without a formal bank until 1968. Sikkim State Cooperative Bank Limited, established in 1999 to promote financing to cooperative societies, is the second state-owned bank of Sikkim. Collectively these banks handle a significant portion of the governmental transactions and cater to the banking need of people from the different sections of the state. Studies looking into the performance, efficiency, and productivity of the state-owned banks of Sikkim are scanty. Absence of investigation of the state-owned banks and their importance to the state and its people, their in-depth study becomes pertinent.

9.2 Conclusions and Key Findings

This section briefly discusses the conclusions of all previous chapters of the study and key findings from the empirical chapters.

9.2.1 Apart from introducing the topic of the study, **Chapter 1** discuss the world history of banks, the history of banking in India, the history of the Reserve Bank of India, and the banking history of Sikkim. It presents the history of banking in India in three different eras, i.e., the Medival era, the colonial era, and the post-independence era. While discussing the post-independence history of banking in India, it emphasizes significant events in the country's banking history like the first nationalization in 1969, the second nationalization in 1980, liberalization in 1990, and mergers of banks between 2010 to 2020. Narsimham Committee & Banking Sector Reforms in India also finds special mention in this chapter. A brief account on the history of banking in Sikkim given in this chapter suggests the presence of only four banks, namely State Bank of India (1966), State Bank of Sikkim (1968), UCO Bank (1981), and Central Bank of India (1982) till the end of 1992. This chapter also briefly discusses the research methodology followed in the study. The chapter lays a foundation for chapters to follow in this study.

9.2.2 Chapter 2 briefly discusses various studies analyzing the banks' performance, efficiency, and productivity. It primarily includes studies on the financial performance of banks using the CAMEL model, efficiency estimation through Data Envelopment Analysis, and productivity analysis through DEA-based Malmquist Total Factor Productivity Index. This chapter also briefly discusses studies on banking history in Sikkim, India, and the world history of banks.

9.2.3 The research method followed in the study has been discussed in detail in **Chapter 3**. It observes the unavailability of the previous studies on the performance of the state-owned banks of Sikkim. It also talks about the importance of banks under investigation to Sikkim and its people. The chapter sets out the study's objectives, defines the study's scope, and formulates the hypotheses to be tested. We also discuss the data collection method and its source, study period, banks selected for analysis, and tools and techniques in this chapter. Finally, the chapter briefly introduces all the chapters of the study.

9.2.4 Chapter 4 discusses the banking history of Sikkim at length, with particular reference to the establishment of the State Bank of Sikkim and Sikkim State Cooperative Bank Ltd. It presents the chronological entry of various commercial banks to the state of Sikkim before and after its merger with the Republic of India. The chapter observes the State Bank of Sikkim be the bank with the maximum no. of branches in the state, followed by the State Bank of India. State Bank of India, in case of ATM installation, outnumbers all the other banks present in Sikkim and ranks second to the State Bank of Sikkim in the volume of business.

9.2.5 Applying the CAMEL model, **Chapter 5** analyses the financial soundness of the State Bank of Sikkim (SBS) and Sikkim State Cooperative Bank Ltd (SISCO) for 2011-12 to 2019-20. Key findings of this chapter are summarized hereunder.

1. In the capital adequacy parameter, SISCO bank is doing relatively better in all the ratios than the SBS. SISCO's average CRAR is above the minimum level of 9 percent prescribed by the Reserve Bank of India; whereas, SBS's average CRAR of 3.18 exhibits the vulnerable position of the bank concerning its capital adequacy. Both the banks' debt to equity ratio appears to be higher, but SBS's Debt to Equity ratio is six times the SISCO. The higher equity to total assets ratio of the SISCO compared to SBS indicates higher control of their investors on the bank's assets.
2. SBS is lagging far behind the SISCO in the asset's quality parameter. Gross Non-Performing Assets (GNPA) of the SBS has been facing an increasing trend from 2013-14 onward, and presently it amounts to Rs. 73054.50 lakhs which accounts for 36 percent of its total loans. SISCO records an average GNPA of 5.78 percent, below the national average of Scheduled Commercial banks as of 31.3.2020. Exuberantly high NPA to equity of the SBS reflects insufficient equity to absorb the losses arising from the non-performing assets. On the other hand, we find the SISCO's equity to be sufficient to absorb the bank's non-performing assets. Further, SBS records a meagre investment to total assets ratio as compared to that of SISCO. The lower investment to total assets ratio of the SBS reflects an inadequate cushion of investments to safeguard the bank from

its non-performing assets. SISCO's reasonable amount of investments in government securities make their investments substantially safer than SBS, which records zero investments in government securities, making its investments a lot riskier.

3. Further, SISCO is also a better-managed bank than the SBS. Higher average credit to deposit ratio substantiates better management of the SISCO. It is worth noting that there is an improvement in the credit-deposit ratio of the SBS post-2015-16. Though SISCO has a relatively better credit to deposit ratio than SBS, both banks fall substantially short of an ideal credit-deposit ratio of 70-80 percent. SISCO also records a higher average business per employee and profit per employee than SBS.
4. SISCO also leads the SBS in the earning quality parameter. Return on assets which is considered the single best measure to assess the earning efficiency of the banks, SISCO outperforms the SBS. SISCO has maintained a higher operating profit to total assets ratio and is more cost-effective than SBS. SISCO is also ahead in net interest margin, the difference between the interest earned and the interest expended by the bank.
5. Unlike other parameters, SBS is a more liquid bank than the SISCO, performing better in most liquidity ratios. SBS records higher average cash to total assets ratio than SISCO during the study period. SBS is better positioned to honour the customers' withdrawal requests with higher cash to total assets ratio. Likewise, SBS also leads in liquid assets to total assets and loan to deposit ratios. Substantially high liquid assets to total assets ratio and low loan to deposits ratio of SBS make it the most liquid bank. It also indicates idle assets, which will impact the bank's earnings capacity. Though less liquid otherwise,

SISCO records higher liquid assets to demand deposits than the SBS. SBS must see that it maintains adequate liquidity as higher than the adequate liquidity directly affects the bank's earnings. Though lagging in most of the parameters, SBS is consistently improving in many aspects from the last few years; however, NPA remains the source of major concern for the bank. Based on the performance in various parameters, we conclude SISCO to be a relatively more financially sound bank than the SBS.

9.2.6 Chapter 6 analyses the efficiency and productivity of the state-owned banks of Sikkim from 2011-12 to 2019-20 through Data Envelopment Analysis. Findings based on empirical results are as follows.

Based on the estimated efficiency scores of the state-owned banks of Sikkim, we know that under the constant return to Scale (CCR) model, SBS remained efficient in four out of nine years, whereas SISCO was efficient in five out of nine years. Under the variable return to scale (BCC) model, SBS remained efficient in five out of nine years, and SISCO also remained efficient in five out of nine years. Findings suggest that among many, the main reason for the inefficiency of SBS and SISCO is the excess deployment of Deposits & Borrowings. Excess deployment indicates that SBS and SISCO perhaps could not convert their loanable funds to interest-earning assets to the extent possible during those years when it became inefficient. The result also suggests scope for a substantial increase in the Non-Interest Income for both the banks. When we look at the trends in productivity, the SISCO recorded a growth of 4.5 percent during the study period, whereas SBS records a decline of 3.7 percent in productivity. The empirical results on efficiency and productivity also suggest that SISCO is more efficient and productive than SBS. The findings also indicate the effect of the demonetization on the

SISCO bank during 2016-17, wherein it recorded excess deployment of Deposits & borrowings by over 51 percent.

Further analysis of productivity suggests that the SBS recorded a productivity growth during pre-demonetization; however, it records a decline during post-demonetization. On the contrary, SISCO recorded growth in productivity in the post-demonetization period. Based on the empirical results, we conclude that the SISCO bank was more efficient and productive than SBS during the study period.

9.2.7 Chapter 7 attempts to answer how productive the state-owned banks of Sikkim are at the national level. To compare the productivity of state-owned banks with national level banks from 2014-15 to 2019-20, we apply the DEA-based Malmquist Total Factor Productivity Index. Findings based on empirical results are as follows.

We analyzed the productivity performance of 69 banks in India, including two state-owned banks of Sikkim, for 2014-15 to 2019-20. The results suggest that the banks in India collectively experienced a productivity decline during the study period. Decomposition of the productivity index further explains that the collective decline in India's banks' productivity is attributable mainly to technological regress. The banks observed the highest decline in collective productivity during 2017-18, possibly because of the liquidity surplus condition due to demonetization. Results on the productivity performance of public, private, foreign, and state-owned banks of Sikkim suggest that the Public sector banks recorded the highest average productivity decline, followed by foreign banks, private banks, and the state-owned banks of Sikkim. The results also suggest that none of the public sector banks attained productivity gain during the study period. Though the state-owned banks of Sikkim recorded the lowest decline during the period of study but their productivity performance post-2017-18 is not encouraging. Among private banks, ICICI bank with the highest productivity growth in the group stays at the top of the table. Similarly, FirstRand Bank ltd is the best performing foreign bank, and SISCO is the best-performing state-owned bank of Sikkim.

In the overall ranking, SISCO finds a place in India’s top five performing banks[15] in productivity, whereas SBS can only secure the 58th position from 69 banks under study. The results suggest that SISCO’s productivity growth is attributable to technological progress, whereas the productivity decline of SBS is mainly attributable to managerial inefficiency. Based on results on productivity, we conclude that the SISCO has done at par with the best performing commercial banks in India. In contrast, SBS falls in the worst-performing commercial banks in India.

9.2.8 We test a total of six hypotheses of the study in **Chapter 8** using an independent t-test. Before applying the t-test, this chapter uses the f-test to check the variance of the groups.

9.2.9 We conclude the study in **Chapter 9,** presenting a summary, key findings, suggestions, and policy implications.

9.3 Suggestions and Policy Implications

The Government of Sikkim holds 100 percent of the capital of the State Bank of Sikkim and more than 55 percent of Sikkim State Cooperative Bank Ltd. SISCO has its capital to risk-weighted assets above the minimum level prescribed by the Reserve Bank of India, whereas the SBS is a severely capital deficient bank. Therefore, the Government firstly must plan a capital infusion policy for the SBS to make it a capital adequate bank. SISCO is doing better in most financial parameters and has scope for expansion. Capital infusion by the Government will allow the bank to plan for expansions in the

[15] Ranking is drawn among 18 public sector, 18 private, 31 foreign and two Sikkim’s banks. It excludes regional rural banks and cooperative banks, thus does not reflect comprehensive national level ranking.

places with prospects. Capital infusion in these banks will not only help them to be able to absorb losses arising from operational risks but will also help to garner the confidence of their customers. Secondly, the alarming level of non-performing assets of the SBS demands more autonomy in its functioning. The majority of the members of the Board of the SBS are the representatives of the Government of Sikkim, leaving little scope for the bank to have the final say. The State Bank of Sikkim, Proclamation, 1968 falls under old laws protected through Article 371 (F) under the Constitution of India, thus prohibiting its alteration. As the change in the board's composition may amount to dilution of the old laws, the possibility of having a standing recommending committee comprising the experts from the field may be explored by the Government to guide the board to make decisions. To deal with the ever-increasing NPA, the SBS also seriously needs to review its lending policy, recovery policy, and provisioning policy for bad loans. Thirdly, both banks' higher operating cost demands increased reliance on technology for routine activities. Technology may have a higher initial cost, but it certainly helps reduce the bank's recurring cost. Non-interest income forms a substantial part of the total income of a bank. Fourthly, as the non-interest income of these state-owned banks is consistently low, both the banks must explore the possibilities of increasing the same. The entry of major commercial banks to the state has shrunken the share in the business of these banks. The other policy implication is that unless the Government remains committed to giving business to these local banks, they cannot withstand fierce competition from the new generation banks present in the state.

Further suggestions to the banks under study based on the empirical results have been enumerated as follows.

1. Higher debt to equity ratio indicates higher claims of the outsiders on the bank's assets. Both the banks need to lower the outsiders' claims by either increasing equity or decreasing debt.
2. SBS needs to improve its equity to total assets by increasing its equity capital.
3. NPA to equity ratio the SBS also needs to be improvised by increasing capital and reducing NPA.
4. SBS also needs to improve its investments against total assets.
5. Zero investments in government securities make investments of the SBS a lot riskier; hence, it needs to be re-looked.
6. Both banks must attempt to bring their credit-deposit ratio to an ideal 70-80 percent ratio.
7. SBS needs to improve its low business and profit per employee.
8. SBS must put serious efforts to improvise its Return on Assets ratio, which is considered the single best measure of earning efficiency.
9. SISCO must ensure to maintain adequate liquidity to honour withdrawal requests of the customers and meet up exigencies.
10. SBS should avoid retention of excess liquidity as it directly affects earning capacity.
11. Both the banks must avoid excess deployment of their deposits and borrowings.
12. SBS facing productivity decline post-demonetization, must work towards its improvement.
13. Both the banks must increase their earnings from non-core banking activities to improvise their ranking at the national level.
14. SBS must work towards improving its managerial efficiency

9.4 Conclusions

We conclude the study in this chapter by discussing key findings, suggestions, and policy implications. We find the SISCO to be a financially sound, efficient, and productive bank than the SBS. We also find SISCO doing reasonably well compared to besting performing banks in India, whereas SBS ranks among the worst-performing banks in India. This study is also not without a limitation. The main limitation of this study is the limited period of study, i.e., from 2011-12 to 2019-20 for comparison between the state-owned banks and 2014-15 to 2019-20 for comparison of state-owned banks with the national level commercial banks. Increased duration, though, would have given more insights but was not possible for mainly two reasons, i.e., unavailability of the data and constraint of time. Secondly, the study focuses only on two state-owned banks of Sikkim, hence does not capture the entire banking scenario in the state. This study paves the way for further research on factors explaining the performance of state-owned banks as against national-level banks. Further, the branch-level study of the state-owned banks might throw a better picture on their performance, efficiency, and productivity.

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