

## The Productivity Paradox of Information Technology : A Study of Indian Commercial Banks

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### Abstract

The present study attempts to link technology induction in Indian commercial banks with their financial performance by classifying the banks on the basis of usage of technology. Till date, it is a matter of debate whether Technology provides better financial results. There is no conclusive evidence that spending on IT improves financial performance. The scholars call it "IT Productivity Paradox". It is generally believed that technology provides efficiency, hence, improves working and performance of an organization. This implies that with the technology induction, the financial performance of an organization should also improve. Findings of the paper show that the fully IT-oriented banks are financially better off than the partially IT-oriented banks. The various banking parameters of productivity and profitability have significantly improved in the recent years. However, for Indian banking industry, the correlation between Technology induction and financial productivity is negative though statistically insignificant and low.

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### INTRODUCTION

For decades, it has been a matter of debate whether Technology<sup>1</sup> provides better financial results. Till date there is no conclusive evidence that spending on IT improves financial performance. The scholars call it "IT Productivity Paradox". The term 'paradox' indicates a negative correlation between IT investments and

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<sup>1</sup> The term 'technology' has been defined in many ways. Technology or Information Technology refers to the knowledge of using tools and machines to do tasks efficiently. For the purpose of present study, Technology/ Information Technology refers to the use of computers and other electronic equipments to store and send information (Cambridge Learner's Dictionary, 2004).

productivity. Morrison and Berndt (1990) found that additional IT investments contributed negatively to financial productivity. They concluded that the estimated marginal benefits of investment in IT are less than the estimated marginal costs. On the similar lines, studies by Strassman (1990) and Dos Santos et al. (1993) have also concluded that there is insignificant correlation between IT spending and profitability measures, which means IT spending is unproductive.

There are, on the other hand, studies which show that there is no correlation between IT investment and financial productivity (Loveman, 1994; Barua et al., 1991). Jordan and Jane (1999) found that even the most successful banks offering Internet banking were able to serve only a relatively small share of their customer base with IT channels. Thus, it was difficult to determine whether Internet banking has a significant impact on bank performance. And there are studies which have found significant contributions from IT toward financial growth (Lichtenberg, 1995; Brynjolfsson and Hitt, 1996). Most of these firm-level studies have been restricted to the manufacturing sector (that too, outside India), in large part owing to lack of firm-level data from the service sector.

There are studies which have drawn on statistical correlation between IT spending and profitability or stock value for their analyses they have concluded impact of IT on productivity is positive (Brynjolfsson, 1993; Wilson, 1993). Apart from this financial angle, Porter (1980) states that in a free entry competitive market, firms cannot gain sustainable competitive advantages from technologies that are available to all the firms. It is only when a technology creates significant barriers to entry that it becomes profitable to invest in it. Thus, the firm's investment in IT should not be associated with extra profits.

It is apparent that most of the studies relating to the contribution of IT toward firm level productivity have been restricted to the manufacturing industry. The problem is particularly persistent in the banking industry, which is the focus of the present study. In India too, there are not many studies that have focused on IT contribution in the banking sector. Muniappan (2006) found that IT revolution has brought stunning changes in the business environment. No other sector has been influenced by advances in technology as much as banking and finance, as a result, the Indian banking has a totally new face today. Technology has been used as a strategy to win market and customers. Similarly, Kamakodi (2007) examined how computerization has influenced the banking habits and preference of Indian bank customers and what factors influence these preferences. He found that change of residence, salary account and non-availability of the technology based services were the three main reasons for shifting to another bank.

Patnaik (2004) found that shared ATMs are taking place and they are



mutually beneficial. This mushrooming new dimension of shared ATMs has increased non-interest income of the banks. This is the most popular e-channel and widely used in all the bank groups. Paul and Mukherjee (2007) examined that cash management in ATMs is a new concept which facilitates the banks to source cheaper funds and serve its clients more efficiently. Padwal (2004) stresses on the need of integration of business development planning with clear IT/IS road map. Malhotra and Singh (2005) describe the key risks associated with the adoption of banking technology. IT allows the banking industry to establish a direct link to the customers. Similarly, Habbar (2004) emphasizes that managing technology is a key challenge for the Indian banking industry. Banks have enhanced their networks and communication infrastructure to reap the full benefits of computerization. E-banking is fast catching up. There is a great need for trust, privacy and confidentiality. These are the major areas of concern for today's banking. Only sound corporate governance would lead to effective and meaningful banking (Lakshmi, 2004). Narayanasami (2005) states that Indian banking is in a better position with respect to technology, capital adequacy, credit management, risk bearing capacity, international competitiveness and contribution to the national economy. Uppal (2008) found that e-banking services by the banks provide customer satisfaction.

Many studies have also highlighted the importance of customer satisfaction and the management of customer relations in the success of banking business (Singh, 2004; Krishnaveni and Prabha, 2006; Mishra and Jain, 2007; Raveendra, 2007; Sharma et al., 2007; Sharma and Dhanda, 2007; Singh and Kabirai, 2007; Thakur, 2007; Uppal and Kaur, 2007; Vanniarajan and Nathan, 2008). The process of economic liberalization and financial sector reforms has underlined the importance of customer-focus by the banks (Shanker, 2004). The main bottlenecks to the superior services are the untrained human resource and the lagging technology (Thakur, 2007).

In the banking sector in India, there have been a number of studies which have focused on the financial performance and efficiency of the banks in the recent past. The studies reveal that the profitability of Indian banks has increased since the second generation banking reforms and among the several bank groups, the foreign and private sector banks are performing well as compared to the public and nationalized banks in India (Sarkar et al., 1998; Muniappan, 2002; Sooden and Bali, 2004; Aggarwal, 2005; Arora and Verma, 2005; Bhaskar, 2005; Madhavankutty, 2007; Uppal and Kaur, 2007; Kumar and Sreeramulu, 2008).

#### **PRESENT STUDY**

The specific objective of the present paper is to study the inter-group

comparison of financial performance of Indian commercial banks by classifying the banks on the basis of usage of Technology. The study of financial performance of banks has been carried out from the year 1997 to 2008. The total time period for the study has been divided into two periods: Pre-technology Induction Era and Post-technology Induction Era. The period from the years 1997-98 to 2000-01 has been taken as India's Pre-technology Induction Era, while Post-technology Induction Era has been considered to be effectively started from 2001 afterwards. During the period 1997-98 to 2000-01, the technological applications in the Indian banking sector were not quite developed and mature. Moreover, new private sector banks started entering the Indian banking industry in a big way from the year 1997. The technological boost only came after the implementation of IT Act. The Government of India gave its assent to the Act in October 2000 but the Information Technology Act which is a comprehensive legislation for IT applications in the business, became effective only after 2001. The Act has brought the structure, legal validity and authenticity for transacting and making payments online. Hence, the period after 2001 has been termed as Post-technology Induction Era. Another reason for assuming such period as Post-technology Induction Era is that in India E-banking and Internet banking services started in full-swing only 2001 onwards.

#### **RESEARCH METHODOLOGY**

The financial performance of a bank can be measured in a number of ways. Profitability is the most widely used indicator to judge the financial position of a business. For measuring the profitability of commercial banks, various banking and financial ratios have been computed. To measure the extent of technology induction quantitatively, technology index was formulated for each bank group. An average figure based on ATMs, Fully Computerised Branches and Credit Cards for each bank for each year starting from the 1997-98 till 2007-08 has been computed and averaged for each bank group. The numbers so arrived represent in percentage, the extent of technology induction for each bank group.

#### **DATA SOURCE AND COLLECTION**

For the purpose of financial performance analysis, the data has been collected from the bank's annual reports and publications, Indian Bank Association's publications primarily Performance Highlights of Indian Banks, RBI's reports, bulletins, Internet uploads, etc. A number of websites of both Indian and foreign universities and academic institutes were also browsed to gather more information for the present study.



## SAMPLE DESIGN AND SAMPLE UNIT

The universe of the study is Indian Scheduled Commercial Banking. As per RBI<sup>2</sup>, the Indian banking has been divided into different bank groups. Further, on the basis of usage of technology RBI recognizes different bank groups as 'Partially IT-oriented Banks' or 'Fully IT-oriented Banks'. Thus, the four major bank groups relevant for the study are outlined as below.

### Partially IT-oriented Banks

Group-I : Public Sector Banks (excluding State Bank of India and its Associates) (20 Banks); Group-II : State Bank of India and its 7 Associates (08 Banks).

### Fully IT-oriented Banks

Group-III : Private Sector Banks (25 Banks); Group-IV : Foreign Banks (29 Banks).

It has been considered appropriate to study a sample of five banks from each group as mentioned above. From each group of banks, top five banks (in terms of highest business per employee in the year 2007) have been taken. Thus, the

**Table 1**  
Selected Bank Groups on the basis of Usage of Technology

S. No.	Partially IT-oriented Banks		Fully IT-oriented Banks	
	Group-I Public Sector Banks	Group-II State Bank of India and Associates	Group-III Private Sector Banks	Group-IV Foreign Banks
1.	Punjab National Bank (PNB)	State Bank of India (SBI)	HDFC Bank	Standard Chartered Bank
2.	Canara Bank (CB)	State Bank of Hyderabad (SBOH)	ICICI Bank	Citi Bank
3.	Bank of India (BOI)	State Bank of Patiala (SBOP)	UTI Bank (Now Axis Bank)	HSBC Bank
4.	Union Bank of India (UBI)	State Bank of Travancore (SBOT)	Jammu & Kashmir Bank	ABN Amro Bank
5.	Bank of Baroda (BOB)	State Bank of Bikaner & Jaipur (SBOBJ)	Federal Bank	Deutsche Bank

<sup>2</sup> Report on Trend and Progress of Banking in India published by Reserve Bank of India, 2007-08.

Indian banking industry would constitute, for this study, the sum total of all the banks groups, i.e., 20 banks in total. Table 1 shows the selected bank groups for the present study on the basis of usage of technology.

## RESULTS AND ANALYSIS

### Spread Ratios Analysis

Spread which is the difference between interest earned (on loans and advances) and interest paid (on deposits and borrowings) by the banks plays a major role in determining the profitability of banks.

Table 2 reveals the Spread Ratios of Indian Commercial Banks. Interest rates in Indian banking sector have declined from the low to high technology period. Thus, the spread of banks has declined because of lower interest rates in the recent years. In low-technology era, the maximum average interest earned as a percentage of average assets was 9.74% in the case of Group-IV banks and in high-technology era, the maximum average interest earned as a percentage of average assets<sup>3</sup> was 7.62% in Group-II banks. In low-technology era, the maximum average spread as a percentage of average assets was 3.43% in the case of Group-IV (foreign) banks and in high-technology era, the maximum average spread as a percentage of average assets was 3.34% again in Group-IV banks.

There is significant difference in the fully and partially IT-oriented banks in the case of Interest Earned and Interest Paid in the two periods. However, the difference in spread is not statistically significant as the interest rates have overall declined in the high technology period. Overall, the t-test exhibits insignificant difference in the means of two periods for the Indian banking industry.

### Burden Ratios Analysis

Burden is defined as the difference between non-interest expenditure and non-interest income of the banks. Burden is usually taken in the negative sense since non-interest expenses tend to exceed non-interest income in the banking industry.

Table 3 reveals the Burden Ratios of Indian Commercial Banks. Like the Spread, the average burden has also decreased from 2.14% to 1.81% for Indian banking industry. In low-technology era, the maximum Burden as %age of Average Total Assets was 2.80% in the case of Group-IV banks and the minimum average Burden as %age of Average Assets was 0.99% in Group-III banks. In high-technology

<sup>3</sup> Average Assets (AAs) include: Cash and Bank Balances with RBI, Investments, Loans and Advances like commercial loans, small industries loans, personal loans and agricultural loans, Other Assets like Fixed Assets.

**Table 2**  
**Spread Ratios of Indian Commercial Banks**

Group	Average	Spread Ratios		
		IE%AA's	IP%AA's	S%AA's
G-I	X <sub>1</sub>	9.24	6.36	2.87
	X <sub>2</sub>	7.30	4.44	2.85
	Mean Gap	1.94	1.92	0.02
	S.E.	0.80	0.75	0.19
	t-Value	3.89	4.09	0.13
	LOS	**	**	-----
G-II	X <sub>1</sub>	8.90	6.01	2.91
	X <sub>2</sub>	7.62	4.59	3.04
	Mean Gap	1.28	1.41	0.13
	S.E.	0.58	0.68	0.28
	t-Value	3.50	3.30	0.72
	LOS	**	**	-----
G-III	X <sub>1</sub>	8.69	6.59	2.08
	X <sub>2</sub>	6.25	4.12	2.11
	Mean Gap	2.44	2.47	0.03
	S.E.	1.09	1.04	0.49
	t-Value	3.58	3.77	0.09
	LOS	**	**	-----
G-IV	X <sub>1</sub>	9.74	6.31	3.43
	X <sub>2</sub>	6.69	3.34	3.34
	Mean Gap	3.05	2.97	0.09
	S.E.	1.00	1.11	0.54
	t-Value	4.88	4.27	0.27
	LOS	**	**	-----
Banking Industry Average	X <sub>1</sub>	9.14	6.31	2.83
	X <sub>2</sub>	6.96	4.12	2.81
	Mean Gap	2.17	2.19	0.02
	S.E.	0.71	0.75	0.11
	t-Value	4.40	4.03	0.77
	LOS	**	**	----

**Source :** Computed from the data published by Performance Highlights of Indian Banks, Indian Bank Association, 1997-2008.

**Note :** IE%AA's : Interest Earned as per cent of Average Assets; IP%AA's : Interest Paid as per cent of Average Assets; S%AA's : Spread as per cent of Average Assets.

X<sub>1</sub> – Average in Low-technology induction period; X<sub>2</sub> – Average in High-technology induction period; \*Mean is significant at the 0.05 level; \*\*Mean is significant at the 0.01 level.

LOS : Level of Significance.



**Table 3**  
**Burden Ratios of Indian Commercial Banks**

Group	Average	Burden Ratios		
		NIE%AAAs	NII%AAAs	B%AAAs
G-I	X <sub>1</sub>	3.55	1.07	2.48
	X <sub>2</sub>	3.24	1.25	1.99
	Mean Gap	0.31	0.18	0.49
	S.E.	0.41	0.39	0.15
	t-Value	1.22	0.73	5.28
	LOS	-----	-----	**
G-II	X <sub>1</sub>	3.68	1.37	2.31
	X <sub>2</sub>	3.58	1.40	2.18
	Mean Gap	0.10	0.03	0.13
	S.E.	0.20	0.32	0.35
	t-Value	0.80	0.14	0.60
	LOS	-----	-----	-----
G-III	X <sub>1</sub>	2.71	1.73	0.99
	X <sub>2</sub>	2.92	1.86	1.06
	Mean Gap	0.21	0.13	0.07
	S.E.	0.42	0.43	0.26
	t-Value	0.78	0.50	0.45
	LOS	-----	-----	-----
G-IV	X <sub>1</sub>	5.39	2.59	2.80
	X <sub>2</sub>	4.79	2.77	2.02
	Mean Gap	0.60	0.18	0.79
	S.E.	0.35	0.21	0.22
	t-Value	2.72	1.34	5.69
	LOS	*	-----	**
Banking Industry Average	X <sub>1</sub>	3.83	1.69	2.14
	X <sub>2</sub>	3.63	1.82	1.81
	Mean Gap	0.20	0.13	0.33
	S.E.	0.16	0.23	0.11
	t-Value	1.73	1.27	4.95
	LOS	----	----	**

**Source :** Computed from the data published by Performance Highlights of Indian Banks, Indian Bank Association, 1997-2008.

**Note :** NIE%AAAs : Non-Interest Expenditure as per cent of Average Assets; NII%AAAs : Non-Interest Income as per cent of Average Assets; B%AAAs : Burden as per cent of Average Assets. X<sub>1</sub> – Average in Low-technology induction period; X<sub>2</sub> – Average in High-technology induction period; \*Mean is significant at the 0.05 level; \*\*Mean is significant at the 0.01 level. LOS : Level of Significance.



era, the maximum Burden as a Percentage of Average Assets was 2.18% in the case of Group-II banks and the minimum Burden as a Percentage of Average Assets was 1.06% in Group-III banks.

There is a decline in the Burden as a Percentage of Average Assets of Indian banks which is a positive sign. Overall, the t-test exhibits significant difference in the means of two periods at 1% LOS for the Indian banking industry.

#### Profitability Ratios Analysis

The t-test exhibits significant difference in the means of two periods at 1% LOS for the Indian banking industry. There is significant difference in the means in the case of partially IT banks and insignificant difference in the means of fully

**Table 4**  
Profitability Ratios of Indian Commercial Banks

Group	Average	Profitability Ratios			
		NP%TI	NP%TD	NP%AAs	
G-I	X <sub>1</sub>	3.75	0.44	0.39	
	X <sub>2</sub>	10.21	1.01	0.86	
	Mean Gap	6.46	0.57	0.48	
	S.E.	1.49	0.16	0.14	
	t-Value	6.93	5.67	5.29	
	LOS	**	**	**	
	G-II	X' <sub>1</sub>	5.86	0.77	0.60
G-II	X <sub>2</sub>	9.50	1.00	0.86	
	Mean Gap	3.64	0.24	0.26	
	S.E.	1.29	0.16	0.12	
	t-Value	4.50	2.39	3.41	
	LOS	**	*	**	
	G-III	X <sub>1</sub>	10.48	1.46	0.64
		X <sub>2</sub>	13.00	1.52	0.78
Mean Gap		2.52	0.06	0.14	
S.E.		3.41	0.44	0.31	
t-Value		1.18	0.22	0.71	
LOS		----	----	----	
G-IV		X <sub>1</sub>	4.60	1.00	0.62
	X <sub>2</sub>	14.46	2.37	1.32	
	Mean Gap	9.86	1.36	0.70	
	S.E.	6.56	1.17	0.68	
	t-Value	2.40	1.87	1.63	
	LOS	*	----	----	

Table 4 (Contd.)

Banking	X <sub>1</sub>	6.17	0.91	0.56
Industry	X <sub>2</sub>	11.79	1.47	0.95
Average	Mean Gap	5.62	0.56	0.39
	S.E.	1.72	0.25	0.17
	t-Value	4.31	2.84	2.79
	LOS	**	*	*

Source : Computed from the data published by Performance Highlights of Indian Banks, Indian Bank Association, 1997-2008.

Note : X<sub>1</sub> – Average in Low-technology induction period; X<sub>2</sub> – Average in High-technology induction period; \*Mean is significant at the 0.05 level; \*\*Mean is significant at the 0.01 level. LOS : Level of Significance.

IT banks. This is because that the fully IT banks (Private and Foreign Banks) from the very inception are Hi-tech banks, thus, in terms of technology induction there cannot be any significant difference in the low and high periods. When we compare profits to average assets the winners again are Foreign banks and Private banks. The analysis of Average Profitability Gap among various bank groups indicates that there is a little change in Group-I to Group-III banks but there is a huge change in Group-IV banks (Foreign Banks).

#### TECHNOLOGY AND FINANCIAL PERFORMANCE OF DIFFERENT BANK GROUPS

This section highlights the impact of technology and its various channels on banks' performance and productivity.

##### Fully Computerized Branches as a Percentage of Total Branches

The ratio of computerized branches as a percentage of total branches in new private sector and foreign banks is 100% in both Low-technology induction period and High-technology induction period (Table 5).

But this ratio was lowest in the case of G-I banks in low technology era, i.e., 18.16%, however, this ratio increased to 81.42% on an average at the end high-technology period. In the case of SBI group banks, this ratio increased to 97.14% from 76.75% average in Low-technology induction period. In high-technology induction period, this ratio is more consistent in G-II banks (where C.V. is only 2.67%).



**Table 5**  
**Fully Computerized Branches as a Percentage of Total Branches**

	Year	G-I	G-II	G-III	G-IV	Banking Industry
Low-technology Induction Period	1997-98	9.91	36.12	100.00	100.00	61.50
	1998-99	13.12	87.91	100.00	100.00	75.25
	1999-00	16.82	90.67	100.00	100.00	76.87
	2000-01	32.82	92.30	100.00	100.00	81.28
	A.M.	18.16	76.75	100.00	100.00	73.72
	G.R.	231.18	155.54	0.00	0.00	32.16
	S.D.	10.16	27.14	0.00	0.00	8.53
	C.V.	55.94	35.36	0.00	0.00	11.57
High-technology Induction Period	2001-02	63.23	93.25	100.00	100.00	89.12
	2002-03	74.72	94.27	100.00	100.00	92.24
	2003-04	88.13	96.92	100.00	100.00	96.26
	2004-05	92.24	98.11	100.00	100.00	97.58
	2005-06	92.12	100.00	100.00	100.00	98.03
	2006-07	97.74	100.00	100.00	100.00	99.43
	2007-08	81.42	97.43	100.00	100.00	94.71
	A.M.	84.22	97.14	100.00	100.00	95.34
	G.R.	28.77	4.48	0.00	0.00	6.27
	S.D.	11.99	2.60	0.00	0.00	3.61
C.V.	14.23	2.67	0.00	0.00	3.78	

Source : Computed from the data published by Performance Highlights of Indian Banks, Indian Bank Association, 1997-2008.

#### ATMs as a Percentage of Total Branches

ATM is the most popular e-channel and the maximum bank customers use it. The ratio of ATMs as a Percentage of Total Branches increased very sharply in all the bank groups in High-technology induction period (Table 6). In high-technology induction period, this ratio is more consistent in G-I banks (where C.V. is only 11.90%). However, the maximum rise is observed in G-IV banks and similar is the case of G-III banks. Overall, in Indian Banking Industry this ratio has increased from average 44.82% in Low-technology induction period to 82.63% in High-technology induction period.

**Table 6**  
**ATMs as a Percentage of Total Branches**

	Year	G-I	G-II	G-III	G-IV	Banking Industry
Low- technology Induction Period	1997-98	4.65	4.98	40.33	79.12	32.27
	1998-99	14.19	6.91	84.29	83.52	47.22
	1999-00	21.22	9.15	64.13	99.41	48.47
	2000-01	22.90	10.75	42.35	129.49	51.37
	A.M.	15.74	7.94	57.75	97.88	44.82
	G.R.	392.47	115.86	5.01	63.66	59.19
	S.D.	8.30	2.52	20.70	22.80	8.55
	C.V.	52.73	31.73	35.84	23.29	19.07
High- technology Induction Period	2001-02	35.11	12.41	52.19	117.24	54.23
	2002-03	36.52	14.28	51.65	175.64	69.52
	2003-04	37.45	15.25	82.15	274.13	102.24
	2004-05	40.01	20.45	88.35	170.31	79.78
	2005-06	46.88	26.65	85.66	199.10	89.57
	2006-07	47.21	28.90	80.33	231.27	96.92
	2007-08	40.92	20.77	72.65	210.21	86.13
	A.M.	40.58	19.81	73.28	196.84	82.63
	G.R.	16.55	67.37	39.20	79.30	58.82
	S.D.	4.83	6.28	15.39	49.72	16.51
C.V.	11.90	31.70	21.00	25.25	19.98	

Source : Computed from the data published by Performance Highlights of Indian Banks, Indian Bank Association, 1997-2008.

### Technology Index

The values as given in Table 7, represent in percentage, the extent of technology induction for each bank group. In the Technology index maximum share belongs to Group-III banks in Low-technology induction period and in High-technology induction period the highest Technology Index was of foreign banks. The increase in average for this group is from 52.87% to 77.53%. The lowest technology index, in both the periods, is of G-I banks and the average ranges from 36.83% to 44.37%. SBI group is at third position and its average ranges from 44.36% to 57.93%. These mean ratios are more consistent for G-I and G-III banks (CV is 5.29 and 9.71% respectively).



**Table 7**  
**Technology Index**

	Year	G-I	G-II	G-III	G-IV	Banking Industry
Low- technology Induction Period	1997-98	33.02	41.60	48.39	49.73	43.18
	1998-99	36.32	44.53	53.52	51.79	46.54
	1999-00	38.57	45.40	55.42	52.93	48.08
	2000-01	39.42	45.94	57.42	57.04	49.95
	A.M.	36.83	44.36	53.68	52.87	46.94
	G.R.	11.50	10.43	18.66	14.70	15.68
	S.D.	2.85	1.93	3.87	3.07	2.86
	C.V.	7.73	4.35	7.20	5.80	6.09
High- technology Induction Period	2001-02	41.35	47.49	60.99	62.12	52.98
	2002-03	42.14	49.46	65.89	69.62	56.77
	2003-04	43.18	51.37	68.09	74.31	59.23
	2004-05	44.23	57.93	70.31	78.06	62.63
	2005-06	45.13	62.88	73.89	83.31	66.30
	2006-07	47.36	65.03	77.91	86.17	69.11
	2007-08	47.25	71.40	80.78	89.14	72.14
	A.M.	44.37	57.93	71.12	77.53	62.74
	G.R.	14.27	50.35	32.45	43.50	36.16
	C.V.	5.29	15.43	9.71	12.38	10.96

Source : Computed from the data published by Performance Highlights of Indian Banks, Indian Bank Association, 1997-2008.

### IT PRODUCTIVITY PARADOX

Here, an attempt has been made to judge that how far the Technology is correlated to financial performance of various bank groups.

G-I has positive but very low correlation (0.11) between dependent variable and independent variable. Co-efficient of correlation is also statistically not significant.  $r^2$  shows positive but negligible variations in the financial productivity. In G-II banks, there is negative but low correlation (-0.05) between financial productivity and Technology index. Co-efficient of determination is also negligible (0.02) in this group and  $r$  is insignificant. In the same manner, in G-III banks co-

Table 8

## Technology Index and Financial Performance of Bank Groups

Bank Group	Financial Performance	
	r	r <sup>2</sup>
G-I (Other Public sector banks)	0.11	0.01
G-II (SBI and its associates)	-0.05	0.02
G-III (Private sector banks)	-0.24	0.05
G-IV (Foreign banks)	-0.27	0.07
Indian Banking Industry	-0.45	0.20

Note : r → Co-efficient of correlation.

r<sup>2</sup> → Co-efficient of determination.

efficient of correlation between two variables is also negative but low (-0.24). The co-efficient of determination shows only 5% variations in the financial productivity of banks due to technology. Foreign banks like private sector banks have almost the same co-efficient of correlation – negative but low (-0.27). The co-efficient of determination shows only 7% variations in the financial productivity of banks due to technology.

### CONCLUSION

In the present study, it is found that the partially IT-oriented banks are less profitable than the fully IT-oriented banks. However, in terms of overall productivity and profitability their performance is gradually improving over the recent years. Foreign banks and private banks are on the top in terms of the overall profitability parameters. This can be attributed to higher level of technology induction in comparison to public banks. Analyzing further, it is found that SBI and associate banks are ranked second after the foreign Banks in terms of the spread ratios but their higher Burden places them next to Private Banks in terms of profitability. The Private Banks are more profitable as they have the lowest financial burden in the two periods. Moreover, they have a high proportion of non-interest income and comparatively low level of non-interest expenditure as compared to SBI group of banks. The foreign banks have also higher Burden ratios but they have been able to maintain high Non-interest income which is offsetting high Burden. The difference in the Burden and Non-interest income is the main reason for the differences in the profitability among different groups of banks.

The Interest earned ratios are declining over the years for all groups of banks because over the last few years RBI has lowered the interest rates. Still



foreign banks were able to have highest Interest earned ratios in low technology era as compared to the Indian banks. In the high technology period, SBI group has the highest Interest earned ratio. The Interest earned ratio for the Indian banks has almost been the same across all the categories. The Interest paid ratio is the lowest for the foreign banks (followed by private sector banks) in the high technology era. In terms of financial performance analysis, the findings of the present study supports, to a large extent, the findings of the studies by Sarkar et al. (1998), Shanmugam and Das (2004), Uppal and Kaur (2007), and Kumar and Sreeramulu (2008).

Overall, for banking industry, the correlation between financial productivity and Technology index is low and negative and statistically insignificant. The coefficient of determination also indicates less effect of Technology on financial productivity. We can conclude that the effect of IT on financial productivity of banks is negative though not much. Only in the case of G-I banks it is positive and very low. This is because of the reason that technology induction requires financial investment and spending that makes their correlation negative. However, from the view point of temporal comparison and on the basis of usage of technology by various bank groups, the fully IT-oriented banks have financially performed better than partially IT-oriented banks in both low and high technology periods. This implies that technology does provide an edge which leads to better financial performance. That means, technology does align with financial performance. From the analysis, the winners emerging are Fully IT-oriented banks. Foreign banks are at the top followed by Private banks. From Partially IT-oriented banks, SBI and its associates are performing better than other public sector banks. Again, the reason is that SBI is also concentrating on enhancing its technology base over the last many years. Overall, the Indian banking sector has performed well on various fronts in the high technology induction period but especially those banks have performed well which had a better technology base.

#### **SCOPE FOR FURTHER RESEARCH**

The technology induction in Indian banks has still not reached at its maturity, which leaves a lot of room for further research in this area. A study, similar to the present study, can be conducted atleast once in every three to five years time so that the pitfalls and problems in the growth and implementation of banking technology can be analysed and corrected. A similar study can be conducted with special reference to Indian semi-urban and rural sectors. A study can also be undertaken to judge the various dimensions of technology induction in other service organizations, such as Insurance, Mutual Funds, NBFCs, etc.

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