

## REVISITING THE TECHNICAL EFFICIENCY GAINS OF INDIAN COMMERCIAL BANKS FROM BANCASSURANCE

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**ABSTRACT.** The study is an attempt to evaluate the effect of initiating bancassurance on technical efficiency performance of Indian commercial banks. The technique of Data Envelopment Analysis (DEA) has been used to calculate technical efficiency scores for 20 major commercial banks offering bancassurance services over the period of 2009-10 to 2011-12. The major outcomes of the analysis are: i) introduction of bancassurance increases average overall technical efficiency (OTE) levels; ii) some banks are the gainers, while, some are the looser on OTE front after introducing the bancassurance; iii) the initiation of bancassurance has improved managerial efficiency of Indian commercial banks, while, a dismal performance observed on scale efficiency (SE) front; iv) the SE gains are constrained due to the existence of increasing returns-to-scale; and v) private sector banks following agency model have noticed higher efficiency gains because of bancassurance. In sum, the banks need to improve upon SE to universalize the efficiency gains from bancassurance. Given the existence of increasing returns-to-scale, there exists ample scope for Indian commercial banks to improve upon SE levels via exploiting the economies of scale through enlarging the magnitude of output(s).

### 1. INTRODUCTION

From the consumers' behavior perspective, the rising income levels in India have made the customers more demanding. The bank customers nowadays, not only demand savings to secure their future but they also demand a risk cover to meet out the uncertainties. Alongside from producer point of view, the entry of the private and foreign banks in Indian banking industry during the liberalization regime has made sturdy environment for public sector banks. Thus, expansion and diversification from traditional banking activities is the need of hour for Indian commercial banks. In this context, Indian Banks following the bancassurance models started providing both insurance and banking products under the same roof. The bancassurance was thought out to a panacea for the existing problem of the shrinking margins and tough competitions in the last two decades (see, Jayaraman and Srinivasan (2014) for a brief review of Indian banking industry). It was expected that the initiation of bancassurance will prove to be a bonanza for banks because of accompanying benefits such as increased return on assets, risk free fee income, reduced operating cost, customer retention, efficiency improvement etc. Given that the efficiency gains are among the major benefits expected from bancassurance, the present study attempts to evaluate the effect of introducing bancassurance on technical efficiency performance of Indian commercial banks.

However, ample research is available on evaluation of technical efficiency of Indian banking sector (see Gulati and Kumar, 2009; Kumar and Gulati, 2010; and Jayaraman and Srinivasan,

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2014 for review of the existing studies). The survey of available literature confirms two facts: i) a scant literature is available on exploring the impact of bancassurance on technical efficiency of Indian commercial banks; and ii) the use of non-parametric frontier approach namely, Data Envelopment Analysis (DEA) is common to assess the technical efficiency level of banks. The first finding represents the gap in literature and defends the rationale of analyzing the impact of bancassurance on technical efficiency of Indian commercial banks. However, the later finding advocates the use of DEA for analyzing the technical efficiency scores; in literature survey it has been observed that for small sample studies, like ours, the use of DEA is suitable as its use is free from the distributional assumption unlike Stochastic Frontier Analysis (SFA) base approach.

However, to ascertain the set objectives, the paper has been divided into four sections. The present has an introductory role. Section 2 provides research design and explains the efficiency scores that have been computed. The section is enriched with a brief discussion on technique applied, sources of data and construction of variables. Section 3 is empirical in nature and provides evidence about the differences in performance of Indian banking sector without and with bancassurance income. The last section concludes the paper and suggests some policy implications.

## 2. RESEARCH DESIGN

In the present study, we utilized the Data Envelopment Analysis (DEA) based output oriented CCR model, named after Charnes, Cooper and Rhodes (1978) and BCC model, named after Banker, Charnes and Cooper (1984) to obtain efficiency measures under constant returns-to-scale (CRS) and variable returns-to-scale (VRS) assumptions, respectively (see Charnes et al., 1978; Banker et al., 1984; Charnes et al., 1994; Zhu, 2003; and Kumar and Arora, 2007 for detailed models). The analysis is based upon the longitudinal dataset of 20 sampled commercial banks spanning over the period of three years 2009-10 to 2011-12. The selection of the banks for analysis has been made on the basis of the contribution in bancassurance income. The significant players offering bancassurance have been selected for the analysis purpose. It is worth mentioning here that the bancassurance in India had been introduced in year 2000 by State Bank of India (SBI), whereas, the banks started providing data on bancassurance income from the year 2009 onwards. Given a small time dimension of three years in the bancassurance regime, an intertemporal comparison of efficiency change is not feasible. Thus, a case and control methodology has been followed to test the impact of bancassurance on the technical efficiency performance of banks. The efficiency scores of banks under evaluation have been computed using two alternative models: i) an unrestricted model (i.e., the case model); and ii) a restricted model (i.e., control model). In restricted model banks are assumed to be performing traditional activities and operating without bancassurance income. Thus, in restricted model, only two outputs net-interest margin (i.e., spread) and other income have been included and the third output bancassurance income has been excluded from output vector of two inputs production function. However, an unrestricted full model has been estimated with three outputs (i.e., an additional output bancassurance income along with earlier two same outputs) and two same inputs (physical capital and labour). The physical capital has been measured as the value of fixed assets, while number of workers have been taken as labour. Further, all the input and output variables except labour are measured in Rupee lacs and have been deflated at the base of year prices of 2004-05 to neutralize the impact of inflation on efficiency scores. In addition, to remove the bank specific heterogeneity all the variables have been divided by number of branches to obtain per branch figures. The efficiency scores obtained therefore represent per branch efficiency of the bank under evaluation. After estimating the technical efficiency scores using these two models, a comparison has been made to test the inference that bancassurance has improved efficiency score significantly i.e., the efficiency scores obtained using unrestricted model are higher than the scores obtained using restricted model.

3. EMPIRICAL ANALYSIS

Table 1 provides the overall technical efficiency summary of sampled commercial banks. The overall technical efficiency scores of sampled banks have been computed using restricted (i.e., without bancassurance income) and unrestricted (i.e., with bancassurance income) models. The analysis depicts average overall technical efficiency scores to the tunes of 70.37 percent without bancassurance income and 75.31 percent with bancassurance income. Thus, introduction of bancassurance has been observed to be satisfying the expectations of technical efficiency improvement in Indian banking industry. An average deviation to the tune of 7.01 percent has been observed between the OTE scores without bancassurance income and with bancassurance income. The observed difference is significant by all standards and thus, supports the inference of positive effect of bancassurance on technical efficiency of Indian commercial banks.

Table 1: Effect of Bancassurance on Overall Technical Efficiency			
Name of the Bank (4)	Overall Technical Efficiency		Efficiency Gain/Loss
	(2)	(3)	(4) = $\frac{(3)-(2)}{(2)} \times 100$
	Restricted Model	Unrestricted Model	
State Bank of India# \$	0.8157	0.7453	-8.6228
Canara Bank# \$	0.5113	0.5467	6.9100
Oriental Bank of Commerce# \$	0.8403	0.7710	-8.2507
Bank of India# \$	0.5657	0.5990	5.8928
Union Bank of India# \$	0.7043	0.6263	-11.0743
State Bank of Hyderabad# *	0.8583	0.8350	-2.7184
United Bank# *	0.4457	0.4303	-3.4405
Punjab and Sind Bank# *	0.4423	0.5947	34.4386
State Bank of Bikaner and Jaipur# *	0.9290	0.8947	-3.6957
Indian Bank# *	0.5760	0.6463	12.2106
Federal Bank@ \$	0.7370	0.6787	-7.9150
Jammu and kashmir bank@ \$	0.6920	0.7320	5.7803
Karnataka Bank@ \$	0.5113	0.7310	42.9596
ICICI@ \$	0.8897	0.7800	-12.3267
HDFC@ \$	0.6503	1.0000	53.7673
Kotak Mahindra Bank@ *	0.8363	0.7347	-12.1562
Yes Bank@ *	1.0000	1.0000	0.0000
Axis Bank@ *	0.9740	0.9913	1.7796
ING Vyasya@ *	0.5007	0.7240	44.6072
Indusind Bank@ *	0.5943	1.0000	68.2557
Average	0.7037	0.7531	7.0104

Note: i) Restricted model represents DEA estimation without bancassurance income and Unrestricted model represents DEA estimation with bancassurance income; ii) Efficiency improvements are in percentage terms; iii) # represents Public Sector Bank; iv) \$ represents joint venture model of bancassurance; v) @ represents private bank; and vi) \* represents agency model of bancassurance. Source: Author's Calculations

Further, a disaggregated bank level analysis reveals the highest difference of efficiency scores (obtained using unrestricted and restricted models) for Indusind bank to the tune of 68.26 percent. When the bancassurance income is included (i.e., unrestricted model estimation), the Indusind bank becomes the fellow of the club of benchmark banks with an efficiency score of unity. However, without considering the bancassurance income (i.e., restricted model estimation), Indusind bank does not appear in the set of best-practice banks and observed to be operating with only 59.43 percent of efficiency. The HDFC bank is the second highest gainer with average 53.77 percent deviation of OTE scores computed with and without bancassurance income. The HDFC also becomes the part of efficient banks with bancassurance income. However, without bancassurance income HDFC was found to be operating with OTE score of 65.03

percent. The ING Vyasya is the third largest gainer from bancassurance with 44.61 percent deviation in overall technical efficiency scores. The OTE scores have been noticed to the tune of 50.07 percent and 72.40 percent without and with bancassurance income, respectively.

Furthermore, in addition to an improvement in technical efficiency, the bancassurance has brought competitive advantages to Indian commercial banks. A bank gains advantage in barometric type of leadership when its situation or rank among other banks improves. Though the ranking of inefficient banks is easy but the DEA literature on ranking of efficient banks is full of criticism. The techniques of super efficiency, cross efficiency and frequency count of efficient banks in reference sets are such techniques that are commonly used for ranking of efficient banks. However, all of these techniques have their own advantages and disadvantages. Thus, in order to compare the situation of each bank, the use of a matrix given in Figure 1 has been preferred that plots the average OTE scores with bancassurance income (unrestricted model) against the that obtained without bancassurance income (restricted model).

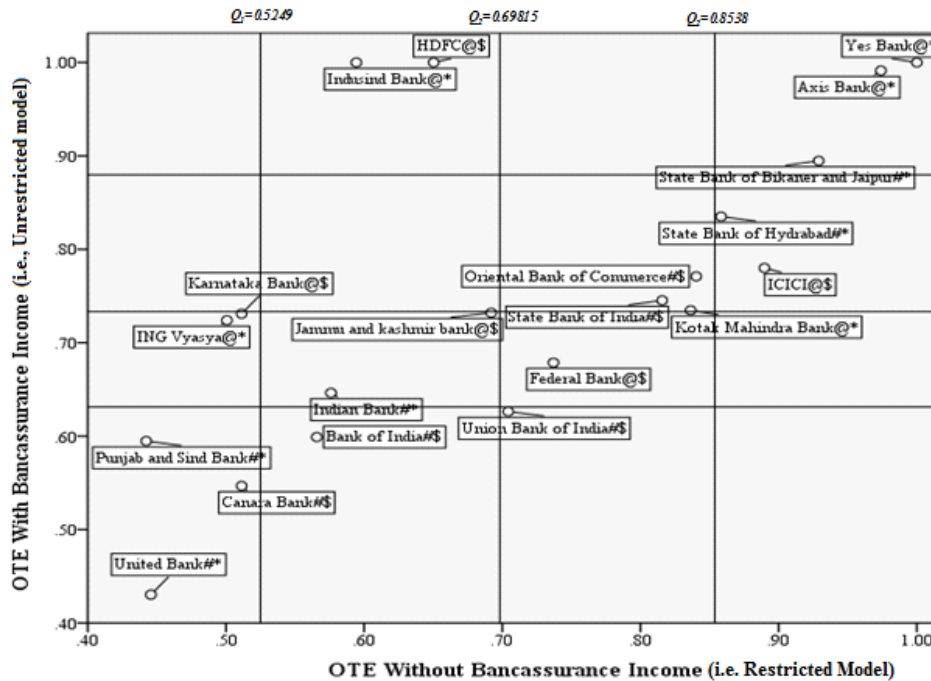


Figure 1. Situation of Banks in Terms of OTE Scores with Unrestricted and Restricted Models. *Source: Authors' Elaborations*

It is evident from Figure 1 that Indusind bank and HDFC bank have gained the highest competitive advantages. Both of them are observed to be benchmark with bancassurance income. Without the bancassurance income, both of these banks were found to be operating in the quadrant of technical efficiency below Q2. Three banks namely, The Yes Bank, Axis Bank and The Bank of Bikaner and Jaipur are the affiliates of extreme North-eastern quadrant i.e., they remain highly efficient banks without and with bancassurance income. Talking about the laggards of sample namely, Punjab and Sind Bank, Canara Bank and United Bank; they remain the part of extreme south-western quadrant. In simple words, these banks are having OTE below Q1 in both models. Though, a significant deviation to the tune 34.44 percent has been observed in OTE score of Punjab and Sind bank yet the bank remains at same situation with OTE below Q1. The same deviation was observed to be 6.91 and -3.44 percent for Canara

Bank and United Bank, respectively. The banks namely Karnataka Bank and ING Vyasya have also gained significantly from bancassurance as these banks are the affiliates of below Q1 quadrant in restricted model estimation, whereas, in unrestricted model estimation these banks are having OTE near Q2 (i.e., median).

Alongside, there are certain banks that have observed deterioration in both OTE and competitiveness when bancassurance income is included. The Union Bank of India (UBI) is one such bank that has been situated at a better place without bancassurance income i.e., OTE above Q2. However, when bancassurance income is added into model, the OTE situation deteriorates and UBI becomes the companion of below Q1 quadrant. In the case of UBI, the observed deviation of OTE with bancassurance and without bancassurance income is negative to the tune of -11.07 percent. Therefore, the introduction of bancassurance has worsened the efficiency score and situation of Union Bank of India. The Union Bank of India is at third last place and observed to be the companion of the ICICI bank and Kotak Mahindra Bank with highest and second highest negative deviations to the tunes of -12.33 and -12.16, respectively. The ICICI bank was observed to be operating with OTE above Q3 without bancassurance income but with bancassurance income its situation shifted to OTE below Q3. The Kotak Mahindra Bank though lies in the range of  $Q2 \leq OTE \leq Q3$  with both of models, the situation observed to be near lower limit with bancassurance income in comparison to its situation near upper limit without bancassurance income. Thus, these banks have lost competitiveness due to bancassurance. Talking about the largest commercial bank i.e., State Bank of India, the fourth last rank has been assigned with fourth most negative deviation to the tune of -8.62 percent. The story of SBI is also same as of Kotak Mahindra Bank in terms of its situation in Figure 1.

**3.1. Sources of Technical Efficiency Gains: Managerial and Scale Efficiency Decompositions.** As discussed above, the commercial banks have significantly gained from bancassurance in terms of OTE and competitiveness. Now the question arises which source of OTE has played the key role in making banking industry better off in terms of overall technical efficiency. The literature on technical efficiency measurement recommends the use of BCC model to compute the Pure Technical Efficiency (PTE) also known as the measure of managerial efficiency and the ratio of OTE to PTE is defined as the scale efficiency (SE). The ratio SE thus, explains the residual component of overall technical inefficiency (OTIE) not by explained pure technical inefficiency (PTIE). The PTIE represents technical inefficiency due to management slacks whereas scale inefficiency (SIE) is the consequence of choosing either super or sub-optimal scale of production.

Table 2 provides the PTE summary of banks computed using BCC model under the aforesaid restricted and unrestricted models' framework. The analysis reveals a significant difference of PTE scores to the tune of 7.90 percent. Thus, the average difference in OTE score has been contributed solely by the managerial improvements. As the average difference in case of PTE exceeds the average difference in the OTE scores, the same difference computed for SE scores must be negative on a-priori grounds. Table 3, including the scale efficiency summary confirms the fact that the average difference in SE scores is -0.61 percent. Thus, the commercial banks must owe the credit of higher OTE due to bancassurance to PTE i.e., to managerial improvements.

The bank level analysis reveals the fact that five banks namely, ING Vyasya, Indusind Bank, Punjab and Sind Bank, Karnatak Bank, and State Bank of Hyderabad have become managerially efficient with PTE score equals unity in unrestricted model (i.e., model with bancassurance income). The difference in managerial efficiency has been observed highest to the tune of 60.34 percent for ING Vyasya. It is worth mentioning here that ING Vyasya is the bank with third largest difference in OTE scores computed without and with bancassurance income. Given the fact that ING Vyasya is largest gainer bank in terms of managerial efficiency differences, a question arises: what constraints the bank to maintain the same place in case of OTE difference? The answer lies in comparison of PTE difference of ING Vyasya with its

SE difference. The comparison discloses the fact that a negative difference in SE scores has restricted the ING Vyasya to attain a status of bank with highest OTE difference.

The visualization of Table 3 ascertains the fact that scale efficiency falls from 82.40 percent to 72.60 percent for ING Vysya when bancassurance income is included. The SIE in a decision making unit increases due to its operations at either suboptimal or super-optimal production scale i.e., while bank is observed operating with either decreasing or increasing returns-to-scale, respectively. Thus, the information pertaining to returns-to scale in case of ING Vysya may help to identify the possible reason for loss of scale efficiency due to initiation of bancassurance. Table 4 provides the evidence of returns-to-scale for sampled banks and reveals that ING Vysya is operating at increasing returns-to-scale in both restricted and unrestricted models. Thus, it may be inferred that ING Vysya is operating at suboptimal production scale and needs to enlarge its scale of production via enhancing the size of its three outputs.

Name of the Bank (4)	Pure Technical Efficiency		Efficiency Gain/Loss	
	(2)	(3)	(4) =	$\frac{(3)-(2)}{(2)} \times 100$
	Restricted Model	Unrestricted Model		
State Bank of India# \$	0.8837	0.8480		-4.0362
Canara Bank# \$	0.5767	0.6080		5.4335
Oriental Bank of Commerce# \$	1.0000	1.0000		0.0000
Bank of India# \$	0.6910	0.7117		2.9908
Union Bank of India# \$	0.9393	0.9393		0.0000
State Bank of Hyderabad# *	0.9987	1.0000		0.1335
United Bank# *	1.0000	1.0000		0.0000
Punjab and Sind Bank# *	0.7573	1.0000		32.0423
State Bank of Bikaner and Jaipur# *	1.0000	1.0000		0.0000
Indian Bank# *	0.6917	0.8190		18.4096
Federal Bank@ \$	0.9867	0.9733		-1.3514
Jammu and ashmir bank@ \$	0.7143	0.7547		5.6463
Karnataka Bank@ \$	0.8440	1.0000		18.4834
ICICI@ \$	0.9280	0.8560		-7.7586
HDFC@ \$	0.8050	1.0000		24.2236
Kotak Mahindra Bank@ *	1.0000	1.0000		0.0000
Yes Bank@ *	1.0000	1.0000		0.0000
Axis Bank@ *	1.0000	1.0000		0.0000
ING Vyasya@ *	0.6220	0.9973		60.3430
Indusind Bank@ *	0.7147	1.0000		39.9254
Average	0.8577	0.9254		7.8956

Note: i) Restricted model represents DEA estimation without bancassurance income and Unrestricted model represents DEA estimation with bancassurance income; ii) Efficiency improvements are in percentage terms; iii) # represents Public Sector Bank; iv) \$ represents joint venture model of bancassurance; v) @ represents private bank; and vi) \* represents agency model of bancassurance. Source: Author's Calculations

Further, the Indusind Bank has noticed higher managerial and scale efficiency scores with bancassurance income and thus, designated at the top rank with highest OTE difference. Although, a largest part of the difference in OTE scores has been contributed by managerial efficiency difference (i.e., PTE difference) yet a substantial amount of it has been contributed by scale efficiency difference (See Table 2 and 3). The pure technical efficiency scores have been noticed to the tunes of 0.7147 and 1 without and with bancassurance income, respectively. However, the scale efficiency was observed by the amounts of 0.8327 and 1 with two models, respectively. Table-4 reveals that the operation of Indusind bank at Constant returns-to-scale (CRS) with bancassurance income has made possible the higher level of scale efficiency.

The analysis of sources of efficiency gains for HDFC Bank (i.e., second largest gainer in terms of OTE score) reveals the fact that the bank has become benchmark in both managerial and scale practices with bancassurance income. The HDFC bank has experienced a managerial efficiency difference to the tune of 24.22 percent with PTE scores 0.8050 and 1 without and with bancassurance income, respectively. However, scale efficiency difference to the tune of 23.76 percent with SE scores 0.8080 and 1 without and with bancassurance income, respectively, has been observed. Thus, both managerial and scale efficiency components are equally important sources of difference in OTE scores computed without and with bancassurance incomes. Table 4 confirms that the HDFC bank is found operating at decreasing returns-to-scale without bancassurance income, whereas, with bancassurance income it is found to be operating at constant returns-to-scale.

Name of the Bank (1)	Scale Efficiency		Efficiency Gain/Loss (4) = $\frac{(3)-(2)}{(2)} \times 100$
	(2) Restricted Model	(3) Unrestricted Model	
State Bank of India# \$	0.9207	0.8793	-4.4895
Canara Bank# \$	0.8863	0.8987	1.3915
Oriental Bank of Commerce# \$	0.8403	0.7710	-8.2507
Bank of India# \$	0.8170	0.8407	2.8968
Union Bank of India# \$	0.7450	0.6670	-10.4698
State Bank of Hydrabad# *	0.8597	0.8350	-2.8693
United Bank# *	0.4457	0.4303	-3.4405
Punjab and Sind Bank# *	0.5937	0.5947	0.1684
State Bank of Bikaner and Jaipur# *	0.9290	0.8947	-3.6957
Indian Bank# *	0.8553	0.7887	-7.7942
Federal Bank@ \$	0.7463	0.6973	-6.5654
Jammu and kashmir bank@ \$	0.9690	0.9673	-0.1720
Karnataka Bank@ \$	0.6170	0.7310	18.4765
ICICI@ \$	0.9513	0.9027	-5.1156
HDFC@ \$	0.8080	1.0000	23.7624
Kotak Mahindra Bank@ *	0.8363	0.7347	-12.1562
Yes Bank@ *	1.0000	1.0000	0.0000
Axis Bank@ *	0.9740	0.9913	1.7796
ING Vyasya@ *	0.8240	0.7260	-11.8932
Indusind Bank@ *	0.8327	1.0000	20.0961
Average	0.8226	0.8175	-0.6139

Note: i) Restricted model represents DEA estimation without bancassurance income and Unrestricted model represents DEA estimation with bancassurance income; ii) Efficiency improvements are in percentage terms; iii) # represents Public Sector Bank; iv) \$ represents joint venture model of bancassurance; v) @ represents private bank; and vi) \* represents agency model of bancassurance. Source: Author's Calculations

The analysis of laggards of the sample i.e., ICICI Bank, Kotak Mahindra Bank, and Union Bank of India discloses the fact that among three banks, ICICI Bank has lost both managerial and SE score after including bancassurance income. The fall in managerial efficiency is to the tune of -7.76 percent (i.e., from 0.9280 to 0.8560 without and with bancassurance income, respectively) alongside a fall in scale efficiency to the tune of -5.12 percent (i.e., from 0.9513 to 0.9027 with two models, respectively). The apathy of Kotak Mahindra bank is that it appears to be the benchmark bank with managerial efficiency score of unity with and without bancassurance income. However, the loss of scale efficiency to the tune of -12.16 percent is responsible for classification of Kotak Mahindra bank into the laggard category of sample. The scale efficiency without bancassurance income is 0.8363, whereas, with bancassurance income

the score falls to 0.7347. Hence, the Kotak Mahindra bank will have to take urgent measures to improve its scale efficiency. The bank is observed to be operating at DRS in Table 4. Thus, the bank is required to downsize its production operation so as to improve scale efficiency levels. Further, the Union Bank of India also discloses same characteristics as the managerial efficiency remains same with and without bancassurance to the tune of 0.9393. The only source of higher technical inefficiency with bancassurance income is scale inefficiency. The scale inefficiency difference to the tune of -10.47 percent has been observed (i.e. 0.7450 without and 0.6670 with bancassurance income, respectively). However, the story is slightly different in the case of Union Bank of India in comparison to Kotak Mahindra Bank.

Name of the bank	Restricted Model				Unrestricted Model			
	IRS	CRS	DRS	Dominant RTS	IRS	CRS	DRS	Dominant RTS
State Bank of India	2	0	1	IRS	3	0	0	IRS
Canara Bank	3	0	0	IRS	3	0	0	IRS
Oriental Bank of Commerce	2	1	0	IRS	3	0	0	IRS
Bank of India	3	0	0	IRS	3	0	0	IRS
Union Bank of India	3	0	0	IRS	3	0	0	IRS
State Bank of Hyderabad	3	0	0	IRS	3	0	0	IRS
United Bank	3	0	0	IRS	3	0	0	IRS
Punjab and Sind Bank	2	0	1	IRS	3	0	0	IRS
State Bank of Bikaner and Jaipur	2	1	0	IRS	3	0	0	IRS
Indian Bank	3	0	0	IRS	3	0	0	IRS
Federal Bank	3	0	0	IRS	3	0	0	IRS
Jammu and Kashmir bank	2	0	1	IRS	3	0	0	IRS
Karnataka Bank	3	0	0	IRS	3	0	0	IRS
ICICI	0	2	1	CRS	0	1	2	DRS
HDFC	0	0	3	DRS	0	3	0	CRS
Kotak Mahindra Bank	0	1	2	DRS	0	0	3	DRS
Yes Bank	0	3	0	CRS	0	3	0	CRS
Axis Bank	0	2	1	CRS	0	2	1	CRS
ING Vyasya	3	0	0	IRS	3	0	0	IRS
Indusind Bank	0	0	3	DRS	0	3	0	CRS
Average	2	0	1	IRS	2	1	0	IRS

Notes: i) Restricted model represents DEA estimation without bancassurance income and Unrestricted model represents DEA estimation with bancassurance income; ii) IRS represents increasing returns-to-scale; iii) CRS represents constant returns-to-scale; and iv) DRS represents decreasing returns-to-scale.

Source: Author's Calculations

The survey of Table 4 discloses the existence of increasing returns-to-scale in case of Union Bank of India. Therefore, increasing the size of production, i.e. enlarging the output levels, will help Union Bank of India to reap the scale economies and become scale efficient. The last but not the least State Bank of India that recorded overall technical efficiency loss to the tune of 8.62 percent with bancassurance income owes the observed loss equally to managerial and scale efficiencies. The managerial efficiency difference between restricted and unrestricted models in case of SBI has been observed to the tune of -4.04 percent (i.e., from 0.8837 to 0.8480), whereas, the scale efficiency difference has been noticed to be -4.49 percent (i.e., from 0.9207 and 0.87930). Hence, the SBI will have to work upon both managerial and scale efficiency improvements to become technically efficient with bancassurance business.

**3.2. Sector Specific and Model Specific Comparisons of Efficiency Gains.** Alternatively, a sector specific and model specific comparison of efficiency gains is necessary to draft



some policy implications for Indian commercial banks. Table 5 provides average technical efficiency score in matrix format with rows representing different measures of efficiency in sector specific arrangement (i.e., Public and Private sector arrangement) and column representing model specific arrangement in without (Restricted model) and with bancassurance income (unrestricted model) categories.

3.2.1. *Sector Specific Comparison.* The analysis of Table 5 confirms that in terms of OTE, the public sector banks have gained nothing given that the average OTE observed to be 0.6689 with and without bancassurance income. However, the difference in OTE score without and with bancassurance income for Private sector banks is 13.34 percent. The observed OTE for Private sector banks without bancassurance income is 0.7386, whereas, with bancassurance income the OTE amounts to be 0.8372.

Table 5: Sector Specific and Model Specific Comparison of Technical Efficiency and Its Components								
Nature of Bank		Efficiency Score	Restricted		Unrestricted		Average	
			Model		Model		(Sector Specific)	
			Bancassurance Model Specific					
			Joint	Agency	Joint	Agency	Restricted	Unrestricted
			Venture		Venture		Model	Model
Sector	Public Sector	OTE	0.6875	0.6503	0.6577	0.6802	0.6689	0.6689
Specification		PTE	0.8181	0.8895	0.8214	0.9638	0.8538	0.8926
		SE	0.8419	0.7367	0.8113	0.7087	0.7893	0.7600
	Private Sector	OTE	0.6961	0.7811	0.7843	0.8900	0.7386	0.8372
		PTE	0.8556	0.8673	0.9168	0.9995	0.8615	0.9581
		SE	0.8183	0.8934	0.8597	0.8904	0.8559	0.8750
Average		OTE	0.6918	0.7157	0.7210	0.7851	0.7037	0.7531
(Bancassurance		PTE	0.8369	0.8784	0.8691	0.9816	0.8577	0.9254
Model Specific)		SE	0.8301	0.8150	0.8355	0.7995	0.8226	0.8175

Notes: i) Restricted model represents DEA estimation without bancassurance income and Unrestricted model represents DEA estimation with bancassurance income; ii) Model Specific average represents the average of all banks following joint venture and agency models; iii) Sector Specific average represents the average of all Public and Private banks; and iv) the underlined figures are average OTE, PTE and SE scores reported earlier. Source: Author's Calculations

The analysis of components of efficiency reveals that the public sector banks although have gained 4.54 percent in terms of managerial efficiency (i.e., PTE) yet the loss of SE to the tune of -3.71 percent cancels out the OTE gains from bancassurance. The inference may be supported with an evidence that pure technical efficiency without and with bancassurance income for public sector is observed to be 0.8538 and 0.8926, respectively. However, the average SE scores observed are 0.7893 and 0.76 using restricted and unrestricted models, respectively. Thus, the Public Sector banks need to improvise their SE to harvest the potential benefits of bancassurance. Parallely, the observed difference of OTE for Private sector banks following two models is to the tune of 13.35 percent; 11.21 percent of which has been explained by managerial efficiency difference. The PTE scores of Private sector banks have been observed to the tunes of 0.8615 and 0.9581 without and with bancassurance income, respectively. However the scale efficiency scores are 0.8559 and 0.8750 with two models. Thus, the highest difference is attributable to managerial efficiency and less has been contributed by scale efficiency differences among Private sector banks. Given that most of the banks are operating at increasing returns-to-scale (IRS), Private sector banks have also been observed short of potential efficiency improvements. Enlargement of scale of production will help Private Banks to reap potential efficiency improvements from bancassurance too.

3.2.2. *Model Specific Comparison.* The model specific comparison reveals that the banks following Agency model of bancassurance have witnessed higher OTE gains in comparison to the

banks following Joint Venture (JV) model. The observed gain to the tune of 9.70 percent has been observed in the banks following Agency model in comparison to a gain of 4.22 percent to the banks following JV model. The OTE scores to the tune of 0.7157 and 0.7851 have been computed for Agency banks using restricted and unrestricted models without and with bancassurance income, respectively. However, for JV banks, the OTE scores to the tune of 0.6918 and 0.7210 have been noticed with same restricted and unrestricted models. Therefore, the difference of average OTE for Agency banks is higher than that for JV banks.

To explain the sources of higher OTE difference for Agency banks, the average PTE and SE scores have been analyzed. In Agency banks, 11.75 percent difference has been caused by managerial improvements. The PTE score is noticed to be 0.8784 and 0.9816 with restricted and unrestricted models for the Agency banks. However, the scale efficiency difference of -1.94 percent has been observed as a constraint on potential efficiency gains. If a positive scale efficiency difference had been noticed, the Agency banks might have attained an average OTE score of unity. Thus, the Agency banks will have to work upon scale efficiency improvements. Alongside, the observed OTE improvements in JV model category are subject to the PTE improvements. The PTE difference of 3.85 percent is the significant component of OTE improvement, whereas, scale efficiency difference to the tune of 0.65 percent is insignificant source of OTE improvement.

#### 4. CONCLUSIONS AND POLICY IMPLICATIONS

The analysis has been carried out to test the importance of bancassurance in Indian banking industry. The data of 20 major banks having significant share in bancassurance has been taken for three years spanning over the period 2009-10 to 2011-12. The technical efficiency scores have been computed using two linear programming based Data Envelopment Analysis models (restricted and unrestricted). The restricted model has been estimated with two outputs and two inputs excluding the third output bancassurance income. However, unrestricted model has been estimated with three outputs (two same outputs along with third output bancassurance income) and two same inputs. The technical efficiency scores obtained using two models are compared to quantify the gains from bancassurance activities to those Indian commercial banks who offer bancassurance services.

The analysis depicts average OTE scores to the tunes of 70.37 percent in restricted model without bancassurance income and 75.31 percent in unrestricted model with bancassurance income. Thus, introduction of bancassurance has been observed supporting the inference of technical efficiency improvement in Indian banking industry. An average deviation to the tune of 7.01 percent has been observed between the OTE scores obtained using two models. The observed difference is significant by all standards and thus, imitates the fact that bancassurance has positively affected technical efficiency in Indian commercial banks. In bank level analysis, some banks have been observed to be operating with higher efficiency after including bancassurance income while, some others have exhibited deterioration in terms of technical efficiency and competitiveness.

After observing significant gains in technical efficiency from bancassurance, the sources of efficiency improvement have been explored. The bifurcation of Overall Technical Efficiency into Pure and scale efficiency reveals i) a significant difference of pure technical efficiency scores to the tune of 7.90 percent using without and with bancassurance income models; ii) an average difference in scale efficiency scores to the tune of -0.61 percent with said models; iii) the source of higher OTE difference is pure technical efficiency i.e., to managerial improvements; and iv) the presence of increasing returns-to-scale reflects the existence of ample economies of scale and thus, reflects the chances of enlarging production scale to become scale efficient.

In addition, a sector specific and model specific comparison of efficiency gains discloses that i) the efficiency difference (i.e., efficiency gain) is higher in Private sector banks in comparison to the public sector banks; ii) the public sector banks although have gained 4.54 percent in terms of managerial efficiency yet the loss of scale efficiency to the tune of -3.71 percent cancel

out the overall technical efficiency gains from bancassurance; iii) most of the private sector banks are operating at increasing returns-to-scale (IRS) and thus, observed short of potential efficiency improvements; iv) Agency model of bancassurance have witnessed higher OTE gains in comparison to the banks following Joint Venture (JV) model; v) in Agency banks, 11.75 percent difference has been caused by managerial improvements and the scale efficiency difference is to the tune of -1.94 percent; and vi) the Agency banks will have to work upon scale efficiency improvements to attain potential efficiency improvements.

In sum, the analysis reveals significant efficiency gains from bancassurance to the Indian banking sector. However, the gains stem from managerial improvements only and banks are lacking scale efficiency improvements. Moreover, the gains are visible in private sector banks that follow agency model of bancassurance. Therefore, the banks need to improve upon scale efficiency to universalize the efficiency gains from bancassurance. Given the opportunity to enlarge the production scale in the light of the existence of increasing returns-to-scale, banks must need to exploit economies of scale by enlarging the total output through expanding the bancassurance income.

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