

Table 2.1

Comparison of the three parts of efficiency

	Scale efficiency	Scope efficiency	X efficiency
Definition	Addresses the question of whether the bank is operating at the minimum of its long-run average cost curve. Any deviation from this level of production could result in inefficiency in terms of scale of operation..	Concentrates on the relative cost of joint production with the cost of producing the same total output in different banks. In other words, scope efficiency occurs when the bank operates in different diversified locations	Defined as the ratio of the minimum costs that could have been expended to produce a given output bundles to the actual costs expended. X-efficiency varies between 0 and 100 percent
Measurements	The degree of scale economies is usually measured by the percentage change in costs due to proportionate increase in all outputs	It is measured by the difference between the cost of joint production and the sum of producing the different outputs individually.	It is measured by the ability of banks to minimize costs and maximize revenues through the optimal use and allocation of resources. This ability can be decomposed into two types of efficiencies (Technical and allocative)
Problems		<ul style="list-style-type: none"> - There is a problem in applying the translog specification to evaluate or test for scope economies. - There is often little or no data on specialized banks. - The using data are not on the efficient frontier. 	<p>There are a number of methods for assessing X-efficiency, -</p> <p>.and the results are quite sensitive to the choice of method</p> <p>On the theoretical level, X efficiency fails to relate inputs to -</p> <p>outputs by focusing solely on the cost function; researchers</p> <p>.implicitly assume that banking products are homogeneous</p> <p>If X-efficiency analyses were done in a static setting, they -</p> <p>will fail to capture changes in the regulatory environment and</p> <p>.in the marketplace</p>

Source: Designed by the researcher

Table 2.2

Comparison of the five approaches in the banking literature for measuring efficiency

	The Approach				
	Production Approach	Intermediation Approach	Asset Approach	Value Added Approach	User Cost Approach
Definition	Defines the bank activity as production of services, being more concerned with the technical efficiency of financial institutions.	views banks as institutions that collect (from depositors) and allocate funds (money) in loans and other assets (to borrowers)	It is a variant of the intermediation approach. It sees financial institutions as essential creators of loans	Views any balance sheet item as output if it absorbs a relevant share of capital and labor, otherwise it is considered as an input or non-relevant output	Views the net contribution to the bank revenue as important to distinguish inputs from outputs.
Main Inputs	Interest on deposits	Deposits and interests on the total costs (Divisible, liquid and riskless)	Liabilities	Any item except balance sheet items according to the definition	Loans
Main outputs	Deposits	The amount of loans and securities (Indivisible, illiquid and risky)	Assets	Any balance sheet item as output if it absorbs a relevant share of capital and labor ((deposits	Deposits

Source: Designed by the researcher

Table 2.3

Comparison of the main methods used for empirical estimation of efficiency

	The Main Method			
	Stochastic Frontier	Thick Frontier	Distribution Free	Data Envelopment Analysis (DEA)
Author	It was developed by Aigner et al. (1977) and Meeusen and van den Broeck (1977)	It was developed by Berger and Humphrey (1992)	It was developed by Berger (1993)	It was developed by Charnes, Cooper and Rhodes (1978)
Assumptions	This approach divides the deviation into two components: a random noise component and inefficiency component. It assumes that inefficiency follows an asymmetric half-normal distribution (truncated normal distribution), whereas random fluctuations follow a symmetric normal distribution.	This approach assumes that deviations from predicted costs within the lowest average cost quartile of banks represent random error, while deviations in predicted costs between the highest and lowest quartiles represent inefficiency.	This approach assumes that the difference in actual and predicted cost for a given cross-sectional period is a combination of a persistent inefficiency component and a random component.	This approach assumes that there are no random fluctuations, so that all deviations from the estimated frontier represent inefficiency.
Advantages	This approach takes into consideration the fact that deviation from the frontier could be due to a noise in the data or miss-specification errors and not necessarily to	This approach estimate separate cost functions for the lowest and highest average-cost quartiles.	It gives constant because there is no need to make any assumption about the distribution of the inefficiency term.	- No explicit functional form is imposed on the data and it operates well with assorted sizes of bank institutions. - This approach performs well with only a small number of

	The Main Method			
	Stochastic Frontier	Thick Frontier	Distribution Free	Data Envelopment Analysis (DEA)
	inefficiencies			<p>observations.</p> <ul style="list-style-type: none"> - This approach allows us to compute overall cost, technical, allocative, pure technical, and scale efficiency. - DEA can handle multiple input and multiple output models. - DMUs are directly compared against a peer or combination of peers - Inputs and outputs can have very different units. For example, X1 could be in units of lives saved and X2 could be in units of dollars without requiring an a priori tradeoff between the two.
Disadvantages	This approach gives inconsistent estimators when cross-sectional data are used for the estimation of the cost frontier	<ul style="list-style-type: none"> - Assumptions do not hold exactly. - This approach may not yield precise estimates of the overall level of inefficiencies in 	Not clear	<ul style="list-style-type: none"> - Its extreme sensitivity to outlying observations; therefore we will perform some sensitivity tests. - Since DEA is an extreme point

	The Main Method			
	Stochastic Frontier	Thick Frontier	Distribution Free	Data Envelopment Analysis (DEA)
		<p>banking.</p> <ul style="list-style-type: none"> - Dividing the data into quartiles may impose skewing and heteroskedasticity of the error terms (especially when the number of observations is not very high) 		<p>technique, noise (even symmetrical noise with zero mean) such as measurement error can cause significant problems.</p> <ul style="list-style-type: none"> - DEA is good at estimating relative efficiency of a DMU but it converges very slowly to absolute efficiency. In other words, it can tell you well you are doing compared to your peers but not compared to a theoretical maximum - Since DEA is a nonparametric technique, statistical hypothesis tests are difficult and are the focus of ongoing research. - Since a standard formulation of DEA creates a separate linear program for each DMU, large problems can be

	The Main Method			
	Stochastic Frontier	Thick Frontier	Distribution Free	Data Envelopment Analysis (DEA)
				computationally intensive.
The main problem of the frontier approaches mentioned so far is that the choice between random error or inefficiency remains somewhat arbitrary	SFA results depend on a priori distributional assumptions	TFA sorts the data in arbitrarily selected groups of firms, i.e. instead of quartiles other quantiles can be chosen	DFA makes strong assumptions on the evolution of X-efficiency over time and last	DEA ignores randomness from the very beginning
Method	Parametric	Parametric	Parametric	Non-parametric

Source: Designed by the researcher

Table 2.4

Comparison of the four approaches in the literature for measuring effectiveness

	The Approach			
	Goal Attainment	Systems	Strategic Constituencies	Competing Value
Definition	A bank is effective to the extent that it accomplishes its stated goals.	A bank is effective to the extent that it acquires needed resources	A bank is effective to the extent that all strategic constituencies are at least minimally satisfied.	A bank is effective to the extent that the emphasis of the bank in the four major areas matches constituent preferences.
Concentration Degree	It appraised in terms of	It focuses on means. End goals	Bank effectiveness becomes an	The main theme in this approach

	The Approach			
	Goal Attainment	Systems	Strategic Constituencies	Competing Value
	achievement of ends rather than means.	in this approach are not ignored, but they are one factor in more complex criteria.	estimation of how successful the bank has been at satisfying those critical constituencies, upon which the future survival of the bank depends.	is that the criteria you value and use in evaluating the bank's effectiveness – return on investment, market share, new product innovation, job security – depends on who you are and the interests you represent
Assumptions	This approach assumes that banks are deliberate, rational, and goal seeking entities.	This approach assumes that banks are made up of interrelated subparts.	This approach assumes that there are political arenas where vested interests compete for control over resources.	This approach assumes that there is no best criterion for the evaluation of bank effectiveness. There is neither a single goal that everyone can agree upon nor a consensus on which goals take precedence over others. This approach also assumes that diverse preferences can be consolidated and organized
Problems	<ul style="list-style-type: none"> - This approach talks about goals in general. - Goals of banks do not always refer to the bank's actual goals. - Short-term goals of bank are frequently different from its 	<ul style="list-style-type: none"> - It is easy to measure specific end goals compared with measuring process variables such as “flexibility of response to environmental changes”. - its focus is on the means 	<ul style="list-style-type: none"> - It is easy to say that we want to separate the strategic constituencies from larger environment but difficult to do so in practice - Identifying the expectations 	<ul style="list-style-type: none"> - It overcomes the problems of using merely the goal attainment or systems approaches since it encompasses both ends and means. It also included strategic constituencies but do nothing to

	The Approach			
	Goal Attainment	Systems	Strategic Constituencies	Competing Value
	long-term goals. - The multiple goals of banks create difficulties such as the competition with each other and sometimes they are incompatible.	necessary to achieve effectiveness rather than on bank effectiveness itself.	that the strategic constituencies hold for the bank presents a problem. How do you tap that information accurately?	alleviate the problems we pointed with this approach

Source: Designed by the researcher