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Productivity Change of Ethiopian Banks: A Malmquist Productivity Index Approach

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Abstract
This study evaluates the productivity change of the Ethiopian banking industry. For this purpose secondary data on input variables (interest expense, non-interest expense and deposit) and output variables (interest income, non-interest income and loan) are collected from the audited balance sheets and income statements of the banks under study. A Malmquist productivity index approach is employed to evaluate the productivity change of the Banks. The results of the study confirmed that; Abay bank, Construction and Business Bank and Commercial Bank of Ethiopia exhibited a productivity regress. For Abay Bank productivity regress is due to the technical change component while for Construction and Business bank and Commercial Bank of Ethiopia productivity regress is due to the efficiency change component. Thus, Abay bank should invest more on technological development and innovation while Construction and Business bank and Commercial Bank of Ethiopia should improve their resource use efficiency. The efficiency change component is split into pure technical efficiency component and scale efficiency component and the results revealed that Construction and Business bank and United bank exhibited productivity regress in the pure technical efficiency component while Construction and Business bank, Commercial bank of Ethiopia, Nib international bank and Wegagen bank exhibited productivity regress in the scale efficiency change component. Thus, Construction and Business bank and United bank should improve their managerial capacity and Construction and Business bank, Commercial Bank of Ethiopia, Nib international bank and Wegagen bank should adjust their scale of operation.
Keywords: Productivity Change, Commercial Banks in Ethiopia, Malmquist Productivity Index, Technical Efficiency Change, Technological Change

1. Introduction

The financial system in Ethiopia consists of 16 private banks (Abay Bank [AB], Addis International Bank [AIB], Awash International Bank [AWIB], Bank of Abyssinia [BA], Berhan International Bank [BRIB], Bunna International Bank [BUIB], Cooperative Bank of Oromia [CBO], Dashen Bank [DB], Debub Global Bank [DGB], Enat Bank [EB], Lion International Bank [LIB], Nib International Bank [NIB], Oromia International Bank [OIB], United Bank [UB], Wegagaen Bank [WB] and Zemen Bank [ZB]) and three state owned banks (Commercial Bank of Ethiopia [CBE], Development Bank of Ethiopia [DBE] and Construction and Business Bank [CBB] (Keatinge 2014). During the under study (the first growth and transformation plan period or from 2011 to 2015) these banks have recorded performance improvement loan provision and deposit mobilization. For instance, the total outstanding borrowing of the Banking industry in the fiscal year 2013/2014 was 17.3 Billion Birr[1] which increased to 31.5 Billion Birr in the 2014/2015 fiscal year. The banking industry also recorded a 19% increment in total capital in 2014/2015 fiscal year compared to the performance in the 2013/2014 fiscal year. It also recorded performance improvement in terms of deposit mobilization. That is, the total deposit of the banks increased from 55.64 billion Birr in the 2013/2014 fiscal year to 74.55 billion Birr in the 2014/2015 fiscal year (NBE, 2014/2015). Given this performance improvement Ethiopian banks are expected to play a formidable role in the country's economics growth and transformation. According to GoE 2010, Ethiopian Banks are expected to play a significant role in the growth and transformation plan implementation through rendering efficient and effective loan service to investors and mobilize the financial resources needed to implement the plan. For the banks to further improve their role in the overall economy and effectively perform the aforementioned functions they are supposed to further improve their performance in the aforementioned parameters. However, given scarce economic resource it is not an easy task to further improve the performance of the banks (Fasika, 2016). Instead the Ethiopian banks should be productive enough to provide better financial services using the existing resource. For this purpose it is crucial to evaluate the current productivity performance of the banks and formulate strategies to improve productivity performance for the second growth and transformation plan period.

Studies have been conducted to evaluate the total productivity changes of financial institutions. For instance, Suzuki and Sastrosuwito (2011) studied the Efficiency and Productivity Change of the Indonesian Commercial Banks employing a data envelopment analysis and Malmquist productivity index on input variables (total deposits, interest expenses, and other operating expenses) and output variables (total loans, interest income, and other operating revenues). The study results revealed that change in the Productivity of Indonesian commercial

[1] Birr is the unit of currency in Ethiopia.

banks during the study period is due to technological change rather than technical efficiency change and thus, it is argued that developing technologies and innovation are crucial to improve the productivity of the banking sector. Vinh (2012) also evaluated the efficiency and productivity of Vietnamese commercial banks using data envelopment analysis and Malmquist productivity index. The study has indicated that the average annual growth of the Malmquist productivity index was positive (8.8%) over the study period. Dang-Thanh (2012) evaluated the total factor productivity of Thai banks over the period from 2007 to 2010 applying DEA and Malmquist productivity Index. The study indicated that the productivity change of local banks is more stable compared to foreign banks.

Munteanu (2013) examined the productivity change patterns in the Romanian banking system. For this purpose the study applied Malmquist productivity index approach on input variables (interest expenses, staff expenses and deposits) and output variables (interest income, net value of loans and profit). Doing so, the study revealed that the Romanian banking system recorded productivity regress over the study period except the year 2010. Neupane (2013) also examined the efficiency and productivity of Commercial Banks in Nepal using a Malmquist productivity index approach. The study has shown that the productivity of Nepal banks has improved and it is due to technical progress not due to the technical efficiency component. Jreisat and Hassan (2016) examined the productivity change of the Egyptian banking sector using Malmquist productivity index approach. Accordingly, it is shown that in the whole study period the Egyptian banking sector exhibited a decline in total factor productivity growth. Serpil and Depren (2016) measured the efficiency and total factor productivity of banks in Turkey using a data envelopment analysis. The study revealed that majority of the banks under study exhibited productivity progress in the intermediation approach while in the production approach the converse is true.

Studies have been also conducted to evaluate the productivity performance of the Ethiopian financial system. For instance, Gebremichael and Rani (2012) evaluated the total factor productivity change of Ethiopian Microfinance Institutions (MFIs) employing a Malmquist productivity index approach. Using operating expense and number of employees as input variables and gross loan portfolio, number of loans and interest and fee income as output variables the study revealed that the micro finance industry recorded an average total factor productivity of 3.8%. Moreover it has shown that the total factor productivity change of the micro finance institutions over the study period is mainly attributed to technical efficiency change while the microfinance industry exhibited a regress in technological change. Gamachis (2016) assessed the technical efficiency and productivity of Ethiopian Commercial Banks using a Malmquist productivity index approach on input variables (labour and fixed assets) and output variables (total deposit and net loan and advances). The study has shown that the total factor productivity change during the study period is 0.956% which shows regress in total factor productivity. Moreover, it is shown that the average annual technical efficiency change, the average annual technological change, the average annual pure technical efficiency change and the average annual scale efficiency change are found to be 0.629%, 1.003%, 0.948% and 1.015% respectively. Lera and Rao (2016) also examined the total factor productivity change of the Ethiopian banking sector. Applying Malmquist productivity index approach on input variables (operating expenses, total deposit, interest expense and fixed asset) and output variables (loans and advances, interest income and non-interest income) the study revealed that Gain in total factor productivity change is in terms of technical progress instead of in terms of overall technical efficiency change.

Overall, studies have been conducted to evaluate the productivity change of financial institutions across the world. Nonetheless, those studies produced a conflicting result on the productivity performance and sources of productivity change. Studies have been also conducted to evaluate the productivity change of banks and microfinance institutions in Ethiopia. Nonetheless, no study is conducted with particular emphasis on the first growth and transformation plan period. Given the fact that banks in Ethiopia are expected to play the role of rendering loan service and mobilize financial resources needed to achieve the targeted plan, evaluating their productivity change is crucial to identify productivity differences among the Ethiopian banks and formulate strategies for better productivity performance for the second growth and transformation plan period. Thus, this study tried to evaluate the productivity change of Ethiopian banks over the first growth and transformation plan period using a Malmquist productivity change index approach.

2. Methodology

This paper aims at evaluating the productivity change of Ethiopian banks. For this purpose a Malmquist productivity index approach is employed. The following section presents the data type, data sources and the method of analysis used to achieve the objective of interest.

2.1 Data type and Sources

The Ethiopian financial system consists of 16 private owned banks and 3 government owned banks. Due to data limitation only 15 (13 privately banks and 2 government owned banks) banks are included in the current study. That is, Enat Bank, Debub Global Bank, Development Bank of Ethiopia and Addis International Bank are not included in the study.

Table 2.1: Definition of Variables in the Study

S.No.	Code	Variable Name	Definition
			Input Variables
1	IE	Interest Expense	The sum of payment on fixed deposits, saving and demand deposits
2	OE	Operating Expense	Expenses like salary and benefits, administrative and general expense, provision for doubtful debt and other and audit fee.
3	DD	Deposit	The sum of demand, time and saving deposit
			Output Variables
1	II	Interest Income	The sum of interest on loans and advance, interest on deposits and interest on treasury and NBE bills
2	NII	Non-Interest Income	Commission, fees and charges on letter of credit, on letter of guarantee and local transfer and other income.
3	LO	Loan	include real estate loan, commercial loan, industrial loan and consumer loan

On the other hand, though the interest of this study is in the period from 2011 to 2015, the year 2015 is not part of the current study due to data limitation. To evaluate the productivity changes of the banks under study secondary data on input variables (interest expense, non-interest expense and deposit) and output variables (interest income, non-interest income and loan)[1] are collected from the audited balance sheets and income statements of the banks under study. The study employed Malmquist productivity index approach to measure the productivity changes of the banks. The following table presents the lists of input and output variables used for the issue of interest.

2.2 Malmquist Productivity Index

This study employed the Malmquist productivity index approach to evaluate the productivity performance Ethiopian banks under study at period t and t+1 relative to technology at period t. Assuming (y^t, x^t) and (y^{t+1}, x^{t+1}) are combination of inputs and outputs produced in period t and t+1 respectively, the output oriented Malmquist total factor productivity change index between period's t (the base technology period) and period t+1 (the reference technology period) is given by equation (2.1) (Coelli & et.al, 2005, Gebremichael & Rani, 2012 & Neupane, 2013)

$$M_k^{t+1}(y^{t+1}, x^{t+1}, y^t, x^t) = \left[\frac{D_k^t(y^{t+1}, x^{t+1})}{D_k^t(y^t, x^t)} * \frac{D_k^{t+1}(y^{t+1}, x^{t+1})}{D_k^{t+1}(y^t, x^t)} \right]^{\frac{1}{2}} \text{-------(2.1)}$$

Where, M is the productivity of the most recent production point (y^{t+1}, x^{t+1}) relative to the earlier production point (y^t, x^t), D`s are the output distance function and t is time period which indicates the time period at which the input and output bundles are observed. Equation (2.1) gives a summary measure of the change in total factor productivity or M over a period of time. A value M greater than one indicates increase in total factor productivity while that of less than one indicates a regress in total factor productivity. The overall measure of total productivity change can be split to technical efficiency change (which measure whether the unit has moved closer to the frontier) and technical progress (which measures the shift of the frontier itself or improvement in production technologies). An equivalent way of writing this index is given in equation (2.2) (Coelli & et.al, 2005 & Neupane, 2013)

$$M_k^{t+1}(y^{t+1}, x^{t+1}, y^t, x^t) = \frac{D_k^{t+1}(y^{t+1}, x^{t+1})}{D_k^t(y^t, x^t)} \left[\frac{D_k^t(y^{t+1}, x^{t+1})}{D_k^{t+1}(y^{t+1}, x^{t+1})} * \frac{D_k^t(y^t, x^t)}{D_k^{t+1}(y^t, x^t)} \right]^{\frac{1}{2}} \text{----(2.2)}$$

Equation (2.2) can be simplified to equation (2.3)

$$M = TE * TC \text{------(2.3)}$$

Where, TE stands for the term outside the bracket in equation (2.2) and it is the efficiency change component of the total factor productivity of banks while TE stands for the term inside the bracket in equation

[1] The choice of appropriate input and output variables is very crucial in efficiency and productivity analysis. There are two commonly used approaches to do so. The intermediation approach and the production approach. According to (Tahir & Bakar, 2009) the intermediation approach is appropriate for bank level study while the production approach is more appropriate for branch level study. Thus, in the current study the intermediation approach is used to select input and output variables.

(2.2) and it is the technical change component of the total factor productivity of banks. The efficiency change component measures how well the production process converts inputs into outputs or catching up to the frontier while the technical change component measures improvement in technology (Coelli & et.al, 2005). For the efficiency change component a value less than one indicates productivity regress in that component while a value greater than one indicates productivity progress. Likewise, for the technical change component a value less than indicates productivity regress in that component and a value greater than one indicates productivity progress. The discussion above is based on constant returns to scale assumption. Assuming a variable returns to scale, the technical efficiency change in equation (2.2) can be decomposed to pure technical efficiency change and scale efficiency change (Gebremichael & Rani, 2012). That is;

The pure technical efficiency change is given by equation (2.4)

$$PTECH = \left[\frac{D_c^{t+1}(y^{t+1},x^{t+1})}{D_c^{t}(y^{t},x^{t})}\right]^{\frac{1}{2}} \text{------(2.4)}$$

The scale efficiency change is given by equation (2.5)

$$SECH = \left[\frac{D_c^{t}(y^{t+1},x^{t+1})/D_v^{t+1}(y^{t+1},x^{t+1})}{D_c^{t}(y^{t},x^{t})/D_v^{t+1}(y^{t},x^{t})}\right]^{\frac{1}{2}} \text{------(2.5)}$$

Where, the subscripts c and v stands for the constant returns to scale and the variables returns to scale respectively. A pure technical efficiency change of greater than one indicates an increase in pure technical efficiency while the converse is true if pure technical efficiency is less than one. Likewise, a scale efficiency of greater than one indicates that the most efficient scale is increasing overtime, while a value less than one indicates a decrease.

3. Result and Discussion

This study is conducted to evaluate the productivity change of Ethiopian banks. The following section presents discussions on the descriptive statistics and findings from the Malmquist productivity index.

3.1 Descriptive Statistics for Input and Output Variables

In this study the intermediation approach is used to select the input (interest expense, operating expense and deposit) and the output (interest income, non-interest income and loan) variables. Table 3.1 presents descriptive statistics of those input and output variables. As it is shown in the table 3.1 the Ethiopian banks under study was incurred on average 277 million Birr and 363 Million Birr as interest expense and non-interest expense respectively over the period under study. On the other hand, the banks were able to mobilize an average deposit 13.869 Billion Birr. Regarding the output measures the Ethiopian banks generated an average interest income and non-interest income of 863 million Birr and 546 Million Birr respectively. On the other hand, the average loan provision of the banks is determined at 7 billion Birr.

Table 3.1: Descriptive Statistics of Input and Out Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Interest income (in millions of Birr)	60	863.8477	2112.131	4.9	11996.59
Non-interest income (in millions of Birr)	60	546.8815	1072.973	7.44	5198.82
Loan (in millions of Birr)	60	7037.227	16340.04	158	87261.79
Interest expense (in millions of Birr)	60	277.7323	567.2889	1.1	3436.2
Operating expense (in millions of Birr)	60	365.57	669.281	15.04	4073.16
Deposit (in millions of Birr)	60	13869	34906.94	263.38	192275.2

Source: Author's computation based on data collected from the banks` annual report (2011-2014)

3.2 The Total Factor Productivity of the Ethiopian Banks

Table 3.1 presents a total factor productivity index calculated for the Ethiopia Banks using the Malmquist productivity index approach. As it is shown in the table 3.2 the Ethiopian banks under study recorded varied total factor productivity. That is Abay Bank, Construction and Business Bank and Commercial banks of Ethiopia exhibited a productivity regress with a productivity index of 0.885%, 0.979% and 0.988 respectively. The remaining 12 (80%) banks under study have exhibited productivity progress. Among the banks that exhibited productivity progress; United bank, Zemen bank, and Dashen bank have achieved a higher productivity growth, with a total factor productivity growth of 1.11%, 1.115% and 1.125% respectively.

Table 3.2: Total Factor Productivity over Three Years

		Total Factor Productivity			
S.No.	Banks	2012	2013	2014	Mean
1	AB	0.539	1.221	1.052	0.885
2	AWIB	1.047	1.213	0.968	1.071
3	BA	1.105	1.046	1.106	1.085
4	BRIB	1.180	1.078	0.988	1.079
5	BUIB	0.957	0.970	1.098	1.006
6	CBB	1.017	0.977	0.945	0.979
7	CBE	0.977	0.932	1.059	0.988
8	CBO	0.954	1.028	1.204	1.057
9	DB	0.939	1.427	1.010	1.106
10	LIB	1.146	0.892	1.100	1.040
11	NIB	1.368	0.811	0.936	1.013
12	OIB	1.211	0.824	1.276	1.084
13	UB	1.370	0.913	1.051	1.095
14	WB	0.892	1.351	0.845	1.006
15	ZB	1.028	1.289	1.028	1.108
	Mean	1.049	1.065	1.044	1.038

Source: Author's computation based on data collected from the banks` annual report (2011-2014)

3.3 Decomposition of the Malmquist Productivity Indexes

To investigate the sources of productivity progress or regress of the banks under study, the total factor productivity change is decomposed into efficiency change component and technical change component. Accordingly, it is found that for Abay Bank productivity regress is due to the technical change component instead of the efficiency change component. On the other hand, for Construction and Business bank and Commercial Bank of Ethiopia productivity regress is due to the efficiency change component instead of the technical change component. Nib international bank and Wegagen Bank exhibited a decline in efficiency change component. But they recorded an increase in total factor productivity due to the fact that the progress in the technical change component outweighs the regress in the efficiency change component.

Overall, the banking industry exhibited a total factor productivity progress over the study period. The decomposition of total factor productivity change into the efficiency change component and the technical change component is also done for the banking industry as a whole. Accordingly, the result proved that in the year 2012, the banking industry exhibited a regress in the efficiency change component while it exhibited progress in the technical change component. For the rest of the period under study (the years 2013 and 2014) the banking industry exhibited productivity progress both in the efficiency change component and the technical change component.

Table 3.3 Malmquist Index Summaries of Annual Means

Year	effch	techch	Pech	sech	tfpch
2012	0.977	1.051	0.983	0.995	1.027
2013	1.011	1.038	1.018	0.993	1.049
2014	1.001	1.038	1.000	1.001	1.039
Mean	0.996	1.042	1.000	0.996	1.038

Source: Author's computation based on data collected from the banks` annual report (2011-2014)

It is also possible to decompose the efficiency change component into a pure technical efficiency change component and a scale efficiency change component. This is done by relaxing the constant returns to scale assumption and calculate the Malmquist productivity index relative to the variables returns to scale assumption. Accordingly, the result revealed that Construction and Business bank and United bank exhibited productivity regress in the pure technical efficiency component while the reaming banks exhibited productivity progress. On the other hand, Construction and Business bank, Commercial bank of Ethiopia, Nib international bank and Wegagen bank exhibited productivity regress in the scale efficiency change component while for the remaining banks the converse is true.

Table 3.4 Malmquist Index Summaries of Firm Means

S.No.	Banks	effch	techch	pech	sech	tfpch
1	AB	1.000	0.885	1.000	1.000	0.885
2	AWIB	1.000	1.071	1.000	1.000	1.071
3	BA	1.000	1.085	1.000	1.000	1.085
4	BRIB	1.006	1.073	1.006	1.000	1.079
5	BUIB	1.000	1.006	1.000	1.000	1.006
6	CBB	0.963	1.017	0.992	0.971	0.979
7	CBE	0.984	1.004	1.000	0.984	0.988
8	CBO	1.000	1.057	1.000	1.000	1.057
9	DB	1.015	1.090	1.015	1.000	1.106
10	LIB	1.000	1.040	1.000	1.000	1.040
11	NIB	0.969	1.046	1.000	0.969	1.013
12	OIB	1.000	1.084	1.000	1.000	1.084
13	UB	1.034	1.060	0.989	1.046	1.095
14	WB	0.976	1.031	1.000	0.976	1.006
15	ZB	1.000	1.108	1.000	1.000	1.108
	Mean	0.996	1.042	1.000	0.996	1.038

Source: Author's computation based on data collected from the banks` annual report (2011-2014)

4. Conclusion and Recommendations

This study evaluated the productivity status of Ethiopian Banks employing a Malmquist productivity index approach on input variables (interest expense, non-interest expense and deposit) and output variables (interest income, non-interest income and loan). Data for these lists of input and output variables are collected from the audited balance sheets and income statements of the Banks under study. Accordingly, it is found that Abay bank, Construction and Business bank and Commercial bank of Ethiopia exhibited productivity regress with a productivity growth of 0.885%, 0.979% and 0.988% respectively while the rest (12 Ethiopian banks) exhibited productivity progress. The source of productivity regress for Abay bank is due to the technical change component while that of Construction and Business bank and Commercial bank of Ethiopia productivity regress is due to technical efficiency change component. The efficiency change component is split to pure technical efficiency change component and scale efficiency change component. This is done by relaxing the restrictive constant returns to scale assumption to a variable returns to scale assumption. The result confirmed that Construction and Business bank and United bank exhibited productivity regress in the pure technical efficiency component while Construction and Business, Commercial Bank of Ethiopia, Nnib international bank and Wegagen bank exhibited productivity regress in the scale efficiency component. Based on the findings from the current study the following recommendations are forwarded.

- Abay bank should invest more in the technological development and innovation while Construction and Business bank and Commercial bank of Ethiopia should improve their resource use efficiency.
- Construction and Business bank and United bank should improve their managerial capacity through providing trainings.
- Construction and Business bank, Commercial Bank of Ethiopia, Nib international bank and Wegagen bank should adjust their scale of operation.

4.1 Direction for Future Research

This study tried to evaluate the productivity performance of Ethiopian banks over the first growth and transformation plan period; from the year 2011 to 2014. Future studies could be conducted to find out the factors affecting the total factor productivity performance of Ethiopian banks.

References

Coelli, T. J., Rao, D. S. P., O'Donnell, C. J., & Battese, G. E. (2005). *An introduction to efficiency and productivity analysis*. Springer Science & Business Media.

Dang-Thanh, N., & Nguyen, L. T. P. (2012). Total factor productivity of Thai banks in 2007-2010: An application of DEA and Malmquist index. *Journal of Applied Finance and Banking*, *2*(5), 27-42.

Keatinge, T. (2014). The Role of Public and Private Sector Banking in Ethiopia's Future Economic Growth. *Policy brief. Global Center on Cooperative Security: Building Strong Partnerships for a more secure world*.

Gamachis Garamu. (2016). Technical Efficiency and Productivity of Ethiopian Commercial Banks: Data Envelopment Analysis (DEA) Approach. *International Journal of Scientific and Research Publications*, 6 (9), 860-864

Gebremichael, B. Z., & Rani, D. L. (2012). Total factor productivity change of ethiopian microfinance institutions (mfis): A malmquist productivity index approach (mpi). *European Journal of Business and Management*, *4*(3), 105-114.

Jreisat, A., & Hassan, H. (2016). Productivity Change of the Egyptian Banking Sector: A Two Stage Non-Parametric Approach.

Lera, D. D., & Rao, P. H. (2016). Total Factor Productivity Change of the Ethiopian Banking Sector: a Malmquist Productivity Index Approach (Mpi).*PARIPEX-Indian Journal of Research*, *5*(1).

Munteanu, A. (2013). Productivity change patterns in Romanian banking system: the impact of size and ownership on total factor productivity.*Актуальні проблеми економіки*, (10), 371-380.

National Bank of Ethiopia (NBE), 1982. Annual Report, 2014/14. NBE, Addis Ababa.

Neupane, B. (2013). Efficiency and Productivity of Commercial Banks in Nepal: A Malmquist Index Approach. *Asian Journal of Finance & Accounting*, *5*(2), 220-243.

Serpil, K., & Depren, Ö. (2016). Measuring Efficiency and Total Factor Productivity using Data Envelopment Analysis: An Empirical Study from Banks of Turkey. *International Journal of Economics and Financial Issues*,*6*(2).

Suzuki, Y., & Sastrosuwito, S. (2011). Efficiency and productivity change of the Indonesian commercial banks. *International Proceedings of Economics Development and Research*, *7*, 10-14.

Tahir, I. M., and Bakar, N. M. A. (2009). Evaluating efficiency of Malaysian banks using data envelopment analysis. International Journal of Business and Management, 4(8), 96.

Vinh, N. T. H. (2012). Evaluating the efficiency and productivity of Vietnamese commercial banks: A data envelopment analysis and Malmquist index.

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