

University of Wollongong - Research Online

Thesis Collection

Title: Efficiency and productivity in Botswana's financial institutions

Author: Boitumelo Dudu Moffat

Year: 2008

Repository DOI:

Copyright Warning

You may print or download ONE copy of this document for the purpose of your own research or study. The University does not authorise you to copy, communicate or otherwise make available electronically to any other person any copyright material contained on this site.

You are reminded of the following: This work is copyright. Apart from any use permitted under the Copyright Act 1968, no part of this work may be reproduced by any process, nor may any other exclusive right be exercised, without the permission of the author. Copyright owners are entitled to take legal action against persons who infringe their copyright. A reproduction of material that is protected by copyright may be a copyright infringement. A court may impose penalties and award damages in relation to offences and infringements relating to copyright material.

Higher penalties may apply, and higher damages may be awarded, for offences and infringements involving the conversion of material into digital or electronic form.

Unless otherwise indicated, the views expressed in this thesis are those of the author and do not necessarily represent the views of the University of Wollongong.

Research Online is the open access repository for the University of Wollongong. For further information contact the UOW Library: research-pubs@uow.edu.au

2008

Efficiency and productivity in Botswana's financial institutions

Boitumelo D. Moffat

University of Wollongong, bdm855@uow.edu.au

Follow this and additional works at: <https://ro.uow.edu.au/theses>

University of Wollongong

Copyright Warning

You may print or download ONE copy of this document for the purpose of your own research or study. The University does not authorise you to copy, communicate or otherwise make available electronically to any other person any copyright material contained on this site.

You are reminded of the following: This work is copyright. Apart from any use permitted under the Copyright Act 1968, no part of this work may be reproduced by any process, nor may any other exclusive right be exercised, without the permission of the author. Copyright owners are entitled to take legal action against persons who infringe their copyright. A reproduction of material that is protected by copyright may be a copyright infringement. A court may impose penalties and award damages in relation to offences and infringements relating to copyright material.

Higher penalties may apply, and higher damages may be awarded, for offences and infringements involving the conversion of material into digital or electronic form.

Unless otherwise indicated, the views expressed in this thesis are those of the author and do not necessarily represent the views of the University of Wollongong.

Recommended Citation

Moffat, Boitumelo D, Efficiency and productivity in Botswana's financial institutions, PhD thesis, School of Economics, University of Wollongong, 2008. <http://ro.uow.edu.au/theses/728>

Research Online is the open access institutional repository for the University of Wollongong. For further information contact the UOW Library: research-pubs@uow.edu.au

NOTE

This online version of the thesis may have different page formatting and pagination from the paper copy held in the University of Wollongong Library.

UNIVERSITY OF WOLLONGONG

COPYRIGHT WARNING

You may print or download ONE copy of this document for the purpose of your own research or study. The University does not authorise you to copy, communicate or otherwise make available electronically to any other person any copyright material contained on this site. You are reminded of the following:

Copyright owners are entitled to take legal action against persons who infringe their copyright. A reproduction of material that is protected by copyright may be a copyright infringement. A court may impose penalties and award damages in relation to offences and infringements relating to copyright material. Higher penalties may apply, and higher damages may be awarded, for offences and infringements involving the conversion of material into digital or electronic form.

Efficiency and Productivity in Botswana's Financial Institutions

A thesis submitted in fulfilment of the requirements for the
award of the degree of

Doctor of Philosophy

from

University of Wollongong

by

Boitumelo Dudu Moffat

BA, University of Botswana
MA (Economics), University of Botswana

School of Economics

2008

Certification

I, Boitumelo Dudu Moffat, declare that this thesis, submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the School of Economics, University of Wollongong, is wholly my own work unless otherwise referenced or acknowledged. The document has not been submitted for qualifications at any other academic institution.

Boitumelo Dudu Moffat

04 March 2009

To my loving husband, parents, brothers and sisters

Table of Contents

	Page
Certification	i
List of Tables	vii
List of Figures	ix
Abbreviations	x
Abstract	xi
Acknowledgements	xiv
 Chapter One: Introduction	 1
1.1 Background of the Study	1
1.2 Statement of the Problem and its Significance	3
1.3 Objectives of the Study	7
1.4 Structure of the Study	9
 Chapter Two: Financial Institutions in Botswana	 12
2.1 Introduction	12
2.2 Overview of Botswana's Financial Institutions	13
2.3 Botswana's Financial Development	16
2.4 The Banking Sector	18
2.4.1 Market Structure	18
2.4.2 Regulation and Supervision	20
2.4.3 Market Access	22
2.4.4 Investment, Prices and Performance Indicators	23
2.4.5 Policy Reforms	25
2.5 Government-Owned Financial Institutions	28
2.6 Other Financial Institutions	31
2.6.1 Investment and Merchant Banks	31
2.6.2 Private Lending Companies	32
2.6.3 Insurance Companies	33
2.7 Summary	33

Chapter Three: Efficiency in Financial Institutions: Concepts and Measurement	37
3.1 Introduction	37
3.2 Efficiency Concepts	37
3.2.1 Cost Efficiency	38
3.2.2 Revenue Efficiency	40
3.2.3 Standard Profit Efficiency	41
3.2.4 Alternative Profit Efficiency	41
3.3 Methods of Measuring Efficiency	43
3.3.1 Traditional Methods and their Relevance to Financial Institutions	43
3.3.2 Efficiency Through the Use of a Production Function	46
3.3.3 Frontier Methods	47
3.3.4 Parametric Techniques	51
3.3.5 Non-Parametric Techniques	53
3.3.6 Parametric Versus Non-Parametric Techniques	54
3.4 Summary	58
Chapter Four: Empirical Literature Review on the Usage of DEA	61
4.1 Introduction	61
4.2 Overview of Financial Sector Efficiency Studies	62
4.3 Efficiency in Financial Institutions	63
4.4 Efficiency and Productivity	71
4.5 Efficiency Related to Financial Liberalisation	75
4.6 Determinants of Efficiency	80
4.7 Summary	86
Chapter Five: Methodology	89
5.1 Introduction	89
5.2 Efficiency Measurement Using DEA	91
5.3 Scale Efficiency	95
5.4 Identification of Targets and Peers in DEA	98
5.4.1 Targets	98
5.4.2 Efficiency Peers	99

5.5	Assessing Productivity Change	100
5.6	Specification of Inputs and Outputs	106
5.7	Sample and Data Sources	110
5.8	Determinants of Efficiency	111
5.9	Summary	113
Chapter Six: Empirical Results and Analysis		116
6.1	Introduction	116
6.2	Efficiency of Financial Institutions in Botswana	118
6.3	Productivity Analysis	128
6.4	Determinants of Efficiency: Univariate Approach	135
	6.4.1 Technical Efficiency and Institution Size	135
	6.4.2 Technical Efficiency and Ownership	138
	6.4.3 Technical Efficiency and Age of the Institution	140
	6.4.4 Technical Efficiency and Non-Performing Loans	142
6.5	Summary	144
Chapter Seven: Policy Implications of the Study		148
7.1	Introduction	148
7.2	Implications of the Results	150
	7.2.1 Facilitating Institutional Growth and Higher Efficiency	150
	7.2.2 Portfolio Management and Monitoring	152
	7.2.3 Risk Spreading and Technical Efficiency	153
7.3	The Way Forward	153
	7.3.1 Regulatory Reform	154
	7.3.2 Technological Innovation	157
	7.3.3 Extending Banking Services to the Unbanked	160
Chapter Eight: Summary and Conclusions		164
8.1	Introduction	164
8.2	Summary of Major Empirical Findings	165
8.3	Policy Implications	167
8.4	Contributions of the Study	168
8.5	Limitations of the Study	169

8.6 Areas for Future Research	170
Bibliography	172
List of Candidate's Publications	183

List of Tables

	Page
Table 2.1: Financial Institutions' Balance Sheet (December 2006)	14
Table 2.2: Banking Profitability	15
Table 2.3: Indicators of Financial Development by Income Group	18
Table 2.4: Characteristics of the Six Largest Banks in the Market for Deposits	19
Table 2.5: Characteristics of the Six Largest Banks in the Market for Loans	20
Table 4.1: Survey of Financial Institutions' Efficiency Studies	62
Table 4.2: Studies on Efficiency of Financial Institutions: Application of DEA	70
Table 4.3: Applications of Productivity and Efficiency in Financial Institutions	74
Table 4.4: Applications of Financial Liberalisation and its Impact on Efficiency	79
Table 4.5: Application of Determinants of Efficiency- Summary of Contributions	84
Table 5.1: Input/Output Variables under the Three Approaches	110
Table 6.1: Average Technical Efficiency of Botswana's Financial Institutions, 2001-2006	119
Table 6.2: Performance Trend in Botswana's Financial Institutions, 2001-2006	122
Table 6.3: Average Pure Technical Efficiency of Botswana's Financial Institutions, 2001-2006	126
Table 6.4: Average Scale Efficiency of Botswana's Financial Institutions, 2001-2006	127
Table 6.5: Malmquist Index Summary of Firm Means 2001/2002-2005/2006	129
Table 6.6: Malmquist Index Summary of Annual Means 2001/2002-2005/2006	134
Table 6.7: Technical Efficiency and Size, 2001-2006	136
Table 6.8: Average Technical Efficiency, 2001-2006	137
Table 6.9: Technical Efficiency and Ownership, 2001-2006	139
Table 6.10: Technical Efficiency and Age, 2001-2006	141

Table 6.11: Technical Efficiency and Non-Performing Loans, 2001-2006	143
Table 7.1: Summary of Recommendations	162

List of Figures

	Page
Figure 2.1: Financial Depth and Per Capita GDP	17
Figure 3.1: Illustration of Efficiency Measurement	48
Figure 5.1: Measuring Technical and Scale Efficiency	97
Figure 5.2: Measuring Productivity Change Over Time	101
Figure 6.1: Technical Efficiency of Financial Institutions in Botswana, 2001-2006	121

Abbreviations

ABC	African Bank Corporation
ATM	Automated Teller Machine
BB	Bank of Baroda
BBS	Botswana Building Society
BCB	Botswana Cooperative Bank
BCCB	Bank for Credit and Commerce Botswana
BCCI	Bank for Credit and Commerce International
BDC	Botswana Development Corporation
BoB	Bank of Botswana
BPS	Botswana Postal Services
BSB	Botswana Savings Bank
BSE	Botswana Stock Exchange
CRS	Constant Returns to Scale
DEA	Data Envelopment Analysis
DHA	Disposable Hull Approach
DFA	Distribution Free Approach
DMU	Decision Making Unit
GDP	Gross Domestic Product
FDI	Foreign Domestic Investment
FNBB	First National Bank Botswana
NDB	National Development Bank
ROA	Return on Assets
ROE	Return on Equity
ROI	Return on Investment
SFA	Stochastic Frontier Analysis
SSA	Sub-Saharan Africa
TFA	Thick Frontier Analysis
TFP	Total Factor Productivity
VRS	Variable Returns to Scale

Abstract

The productivity and efficiency of the financial sector is pivotal to the attainment of economic growth and development in developed and developing economies alike, and is of particular interest in the wake of financial sector reform and restructuring. The financial system in Botswana has undergone major structural and institutional changes in recent years. Throughout the 1980s a series of financial reforms were introduced to boost the efficiency and productivity of financial institutions by enhancing the crucial role of market forces (BoB, 1999). New entrants to the system and new products such as Automated Teller Machines (ATM), credit and debit card services were permitted as a result. To date, no study has been carried out to assess the impact of these reforms on the efficiency of financial institutions in Botswana.

The main aim of this study is to conduct an empirical investigation of financial institutions in Botswana with a view to assessing their technical efficiency and productivity. By investigating technical efficiency and productivity among financial institutions in Botswana, this study addresses the following three questions: a) What is the mean efficiency score of financial institutions in Botswana? b) What is the total factor productivity change for Botswana's financial institutions? c) What are the major determinants of efficiency in the context of Botswana's financial institutions? Data envelopment analysis, which is a non-parametric approach, is employed in this study to analyse empirically the technical efficiency and productivity of financial institutions in Botswana. In order to assess the robustness and sensitivity of the results, three approaches namely, value-added approach, intermediation approach and operating approach are employed in defining the inputs and outputs of the institutions. The results suggest an asymmetry between institutions regarding their technical efficiency under

different approaches over the years. Similar to Dos and Ghosh (2006), the yearly technical efficiency estimates under the value-added approach are mostly higher than those of the other two approaches. This is because DEA is a flexible technique and produces efficiency scores that are different when alternative sets of inputs and outputs are employed.

Most of the inefficiency identified stem from the under utilisation of resources, as well as from the current scale of operation. This is consistent with other studies, for example, Rangan *et al.* (1988); Favero and Papi (1995); Taylor *et al.* (1997); Sathye (2001); Drake (2001) and Neal (2004). The overall average efficiency score under the three approaches during the sample period for Botswana's financial institutions is 0.62. This figure lies below other efficiency indices reported in other studies (for example see, Sathye (2003)), and this suggests that the banks in Botswana are performing relatively poorly.

In terms of productivity analysis, the results indicate that there has been a loss or little productivity growth at the frontier during the period in question, although there has been some improvement in the relative efficiency of most of the financial institutions in Botswana. The loss in total factor productivity has, therefore, been mostly due to technological regress. The empirical results demonstrate that foreign institutions are, overall, relatively more efficient than their public counterparts under the three approaches. It is unlikely that public institutions, by virtue of undertaking most of the government borrowing programs, can generate a significant fee-based income from this source.

The poor overall productivity performance of Botswana's financial sector is cause for concern, as it is likely to constrain the growth and development of the overall economy. As a consequence, the authorities will need to rethink their reform measures to date with the objective of stimulating more competition in the marketplace.

This thesis has made three significant contributions to the analysis efficiency in financial institutions. First, this is the first study to address the issue of efficiency and productivity in Botswana's financial institutions using DEA and Malmquist indices. Second, this study has employed a larger category of financial institutions than that of other studies. Finally, no previous study has assessed efficiency, productivity and their determinants in one study. This study, therefore, extends the existing literature by assessing the efficiency, productivity and the determinants as one study.

Acknowledgements

First and foremost, I am grateful to the Almighty God for giving me the strength, knowledge and wisdom to complete this thesis.

My deepest gratitude goes to my supervisors. I am deeply indebted to my primary supervisor, A/Prof Abbas Valadkhani, for his thoughtful guidance, intellectual support and encouragement throughout the period of my study. I also thank my co-supervisors A/Prof Charles Harvie and Dr Arusha Cooray for the invaluable dedication, time and patience they devoted to ensure that high standards were upheld throughout the study. I also wish to acknowledge the invaluable efforts of the staff in the School of Economics at the University of Wollongong, who contributed to the success of this work and the whole PhD program.

Special thanks go to all other students in the Commerce Research Centre at the University of Wollongong for their advice, fun and moral support throughout the period of study. I am particularly grateful to the University of Botswana for providing me with the scholarship that enabled me to pursue this course.

In a very special way, my heartfelt gratitude goes to members of my family, for their encouragement, understanding, moral support and daily prayers for me. A special thanks goes to my husband for having borne the pain of my absence from home for so long.