EFFICIENCY OF ISLAMIC AND CONVENTIONAL BANKS DURING FINANCIAL CRISIS: EMPIRICAL EVIDENCE FROM MALAYSIA

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ABSTRACT

The global financial crisis that engulfed the world in the mid of 2007 till the end of 2009 slightly affected the Asian countries such as Malaysia has focused attention on the flaws of the conventional banking system. Islamic banks seem much stronger to recover in financial crisis compared to conventional banks because of the inherent nature of Islamic banks, which prohibits the interest payments in all transactions. Thus, this study examines the efficiency level of Islamic and conventional banks during financial crisis particularly in 2007 to 2012. The efficiency of Islamic and conventional banks is measured utilizing Data Envelopment Analysis by adopting the intermediation approach. The data are extracted by Bankscope and Annual Report from 2007 to 2012. The samples consisted of Islamic and conventional banks in Malaysia. The results indicate that pure technical efficiency contributed more to the overall technical efficiency of Islamic banks. In conventional banks, the scale efficiency dominates the overall technical efficiency. In overall, the finding shows that Islamic banks are exhibited higher technical efficiency compared to the conventional banks attributed to the higher pure technical efficiency. Hence, the findings of this study have policy implications, and make a contribution to policy-making by providing empirical evidence on the performance of the Islamic and conventional banks and their efficiency level.

Keywords: Efficiency, Financial Crisis, Data Envelopment Analysis

ABSTRAK

Krisis kewangan global yang melanda dunia pada pertengahan tahun 2007 hingga akhir tahun 2009 sedikit menjejaskan negara-negara Asia seperti Malaysia telah menunjukkan kelemahan sistem perbankan konvensional. Bank-bank Islam kelihatan lebih kukuh untuk pulih dalam krisis kewangan berbanding dengan bank-bank konvensional kerana sifat semulajadinya yang melarang bayaran faedah dalam semua transaksi. Oleh itu, kajian ini meneliti tahap kecekapan bank-bank Islam dan konvensional semasa krisis kewangan terutamanya pada tahun 2007 hingga 2012. Kecekapan bank-bank Islam dan konvensional diukur dengan menggunakan DEA dengan menggunakan pendekatan pengantaraan. Data diperolehi dari Bankscope dan Laporan Tahunan Bank dari tahun 2007 sehingga 2012 . Sampel terdiri daripada bank-bank Islam dan konvensional di Malaysia. Keputusan menunjukkan bahawa PTE menyumbang lebih kepada kecekapan teknikal secara keseluruhan bank Islam. Dalam bank konvensional pula, kecekapan skala menguasai kecekapan teknikal secara keseluruhan. Secara keseluruhannya, dapatan kajian menunjukkan bahawa bank-bank Islam menunjukkan kecekapan teknikal yang lebih tinggi berbanding dengan bank-bank konvensional. Oleh itu, hasil kajian ini mempunyai implikasi dasar, dan membuat sumbangan kepada penggubalan dasar dengan menyediakan bukti empirikal mengenai prestasi bank-bank Islam dan konvensional serta tahap kecekapan mereka.

Kata Kunci: Kecekapan, Krisis Kewangan, DEA

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LIST OF ABBREVIATIONS

DMU	Decision making unit
BIMB	Bank Islam Malaysia Berhad
SPI	Skim Perbankan Islam
SPTF	Skim Perbankan Tanpa Faedah
BAFIA	Banking and Finance Institutions Act 1989
BNM	Bank Negara Malaysia
GDP	Gross Domestic Product
DEA	Data Envelopment Analysis
SFA	Stochastic Frontier Analysis
TFA	Thick Frontier Analysis
SFH	Special Finance House
MENA	Middle Eastern and North African
OIC	Organizations of Islamic Conference
VRS	Variable Returns to Scale
VAR	Vector auto-regression
CRS	Constant Returns to Scale
OTE	Overall technical efficiency
PTE	Pure technical efficiency
SE	Scale efficiency
TE	Technical efficiency
NIRS	Non-increasing returns to scale
OLS	Ordinary Least Squares

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CHAPTER ONE

INTRODUCTION

1.0 Introduction

Efficiency can be defined as the good usage of resources to maximize the production of the goods and services of the firms where it concerns with the relationship between the input resources such as labour costs, capital and equipment and the output produced using the inputs (Farrell, 1957). It means the organizations can use or manage their resources to produce goods and services very well.

The efficiency issues remain a predominant focal point on the subject of economics, whether it pertains to firm, organization or countries. In conditions of banking sector, the efficiency evaluation is an essential instrument to evaluate the success of the banking industry. This is supported by Bashir (2001) when he stated that the rating of efficiency is important due the structure of economic todays is tremendous increase. As stated by Berger & Humphrey (1997), studies that concentrated on the efficiency of financial institutions have become a crucial component of banking literature over 24 years ago. They come out with two reasons. The first one is efficiency is the best measurement to evaluate a bank's success. The second reason is, efficiency can be employed to

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REFERENCES

A Guide to DEAP Version 2.1. (1996). Retrieved May 27, 2014, from http://www.owlnet.rice.edu/~econ380/DEAP.PDF

Abdelkarim, M. (2013). The Relative Efficiency of Saudi Banks: Data Envelopment Analysis Models. *International Journal of Academic Research in Accounting, Finance and Management Sciences*, 3 (3), 152-161.

Ab-Rahim, R., Kadri, N., & Ismail, F. (2013). Efficiency Performance of Malaysian Islamic Banks. *MPRA Paper No. 46238*.

Ab.Rahim, R., Ismail, F., & Abd.Majid, M. S. (2013). Efficiency of Islamic and Conventional Banks in Malaysia. *Journal of Financial Reporting and Accounting*, 11 (1), 92-107.

Affin Bank Berhad. (2007-2012). *Annual Report* retrieved at www.affinbank.com.my.

Affin Islamic Bank Berhad. (2007-2012). *Annual Report* retrieved at www.affinislamicbank.com.my.

Ahmad, N. H., Mohamad Noor, M.A.N., & Sufian, F. (2011). Measuring Islamic Banks Efficiency: The Case of World Islamic Banking Sectors. *MPRA Paper No. 29497*.

Ahmad Mokhtar, H., Abdullah, N., & Alttabshi, S. (2006). A Conceptual Framework for and Survey of Banking Efficiency Study. *Unitar e Journal*, 2 (2), 1-19.

Ahmad Mokhtar, H.S., Abdullah, N., & Alhabshi, S.M. (2008). Efficiency and Competition of Islamic Banking in Malaysia. *Humanomics*, 24 (1), 24-48.

Ahmad, S., & Abdul Rahman, A.R. (2012). The Efficiency of Islamic and Conventional Commercial Banks in Malaysia. *International Journal of Islamic and Middle Eastern Finance and Management*, 5 (3), 241-263.

Ahmadanuar, M., Norhan, N.I., & Panah, H.G.Y. (2014). Inputs and Outputs in Islamic Banking System. *Iranian Journal of Management Studies*, 7 (1), 175- 188.

Ajlouni, M. M., & O.Omari, H. (2010). Performance Efficiency of the Jordanian Islamic Banks Using Data Envelopment Analysis and Financial Ratios Analysis, 271–281.

Alliance Islamic Bank Berhad. (2007-2012). *Annual Report* retrieved at www.allianceislamicbank.com.my.

Al-Habshi, H. S. A. M. N. A. S. M. (2006). Efficiency of Islamic Banking in Malaysia: A Stochastic Frontier Approach. Retrieved May 27, 2014, from http://library.sesrtcic.org/files/article/22.pdf

Al-Rajhi Banking and Investment Corporation (Malaysia). (2007-2012). *Annual Report* retrieved at www.alrajhibank.com.my.

Amba, M. S., & Almukharreq, F. (2013). Impact of the Financial Crisis on Profitability of the Islamic Banks vs Conventional Banks- Evidence from GCC. *International Journal of Financial Research, 4*, 83. doi:10.5430/ijfr.v4n3p83

Am Bank Berhad. (2007-2012). *Annual Report* retrieved at www.ambankgroup.com.

Am Islamic Bank Berhad. (2007-2012). *Annual Report* retrieved at www.amislamicbank.com.my.

Ariss, R. T. (2010). Competitive Conditions in Islamic and Conventional Banking: A Global Perspective. *Review of Financial Economics*, 19, 101-108.

Asian Finance Bank Berhad. (2007-2012). *Annual Report* retrieved at www.asianfinancebank.com.my.

Banker, R.D., Charnes, A. & Cooper, W.W. (1984). Some Models for Estimating Technical and Scale Inefficiencies in Data Envelopment Analysis. *Management Science*, 30 (9), 1078-1092.

Bank Islam Malaysia Berhad. (2007-2012). *Annual Report* retrieved at www.bankislam.com.my.

Bank Muamalat Malaysia Berhad. (2007-2012). *Annual Report* retrieved at www.muamalat.com.my.

Bank of Tokyo-Mitsubishi UFJ (Malaysia) Bhd. (2007-2012). *Annual Report* retrieved at www.bk.mufg.jp/global/malaysia.

Beck Thorstern, Demirgüç-kunt Asli, Merrouche Ouarda. (2010). Islamic vs. Conventional Banking Business Model, Efficiency and Stability. *Policy Research Working Paper*, (October), 1–44.

Berger, A.N., & Humphrey, D.B. (1997). Efficiency of Financial Institutions: International Survey and Direction for Future Research. *European Journal of Operational Research*, 98, 175-212.

British Prime Minister Urges Bold Effort to Lay Groundwork for Future Growth - NYTimes.com. (n.d.). Retrieved May 21, 2014, from http://www.nytimes.com/2009/03/05/world/europe/05brown.html?_r=0

Charnes, A., Cooper, W.W., & Rhodes, E. (1978). Measuring the Efficiency of Decision Making Units. *European Journal of Operational Research*, (6), 429-444.

Chazi, A., & Syed, L. a. M. (2010). Risk exposure during the global financial crisis: the case of Islamic banks. *International Journal of Islamic and Middle Eastern Finance and Management*, *3*(4), 321–333. doi:10.1108/17538391011093261

CIMB Islamic Bank Berhad. (2009). *Annual Report* retrieved at www.cimbislamic.com.

Citibank Berhad. (2009). *Annual Report* retrieved at www.citibank.com.

Coelli, T., Prasada-Rao, D.S. & Battese, G.E. (1998). *An Introduction to Efficiency and Productivity Analysis*. Boston: Kluwer Academic Publishers.

Differences Between Islamic Banks & Conventional. (n.d.). Retrieved May 21, 2014, from http://zaharuddin.net/senarai-lengkap-artikel/38/297-differences-between-islamic-banks-a-conventional.html

Dual Banking Systems and Interest Rate Risk for Islamic Banks. (n.d.). Retrieved May 21, 2014, from http://mpra.ub.uni-muenchen.de/12763/1/MPRA_paper_12763.pdf

Farrell, M.J. (1957). The Measurement of Profit Efficiency. *Journal of the Royal Statistical Society*, 3, 253-290.

Ghafoorian, H., Panah, Y., Ahmadanuar, M., & Norhan, N. I. (2014). Inputs and Outputs in Islamic Banking System. *Iranian Journal of Management Studies*, *7*(1), 175–188.

Goh Soo Khoon; Michael Lim Mah-Hui. (2010). The Impact of the Global Financial Crisis: The Case of Malaysia. Retrieved May 27, 2014, from http://www.twnside.org.sg/title2/ge/ge26.pdf

Hassan, M. K. I. B. S. M. M. A. T. (2008). Cost , Revenue , and Profit Efficiency of Islamic versus Conventional Banks: International Evidence Using Data Envelopment Analysis. *Islamic*, *15*(2), 23–74.

Hong Leong Bank Berhad. (2007-2012). *Annual Report* retrieved at www.hlb.com.my.

Hong Leong Islamic Bank Berhad. (2007-2012). *Annual Report* retrieved at www.hlisb.com.my.

HSBC Amanah Malaysia Berhad. (2007-2012). *Annual Report* retrieved at www.hsbcamanah.com.my.

HSBC Amanah Malaysia Berhad. (2007-2012). *Annual Report* retrieved at www.hsbc.com.my.

Isik, I., & Hassan, M. K. (2002). Cost and Profit Efficiency of the Turkish Banking Industry: An Empirical Investigation. *The Financial Review*, *37*(2), 257–279. doi:10.1111/1540-6288.00014

Islamic Banking | BIMB Holdings Berhad (BHB). (n.d.). Retrieved May 21, 2014, from http://www.bimbholdings.com/portfolio/islamic-banking

Islamic Banking System in Malaysia. (n.d.). Retrieved May 21, 2014, from http://ifp.law.harvard.edu/login/view_pdf/?file=The+Islamic+Banking+System+in+Malaysia.pdf&type=Project_Publication

Islamic Financial Services Act 2013. (n.d.). Retrieved May 21, 2014, from http://www.bnm.gov.my/documents/act/en_ifsa.pdf

Kamaruddin, B.H., Safa, M.S., & Mohd, R. (2008). Assessing Production Efficiency of Islamic Banks and Conventional Bank Islamic Windows in Malaysia. *MPRA Paper No. 10670*.

Kassim, S. H., & Majid, M. S. A. (2010). Impact of financial shocks on Islamic banks: Malaysian evidence during 1997 and 2007 financial crises. *International Journal of Islamic and Middle Eastern Finance and Management*, *3*(4), 291–305. doi:10.1108/17538391011093243

Kumbhakar, S.C. & Lovell, C.A.K. (2003). Stochastic Frontier Analysis. New York, USA: Cambridge University Press.

Kuwait Finance House (Malaysia) Berhad. (2007-2012). *Annual Report* retrieved at www.kfh.com.my.

Malayan Banking Berhad. (2007-2012). *Annual Report* retrieved at www.maybank.com.my.

Maybank Islamic Bank Berhad. (2007-2012). *Annual Report* retrieved at www.maybankislamic.com.my.

Mohamad Noor, M.A.N., Ahmad, N.H., & Sufian, F. (2011). The Efficiency of Islamic Banks: Empirical Evidence from the Asian Countries' Islamic Banking Sectors. *MPRA Paper No. 31869*.

Mohamed, M.M. (2009). Modeling the Efficiency of Top Arab Banks: A DEA – Neutral Network Approach. *Expert Systems with Applications*, 36, 309-320.

Mohd Tahir, I., Abu Bakar, N. M., & Haron, S. (2009). Evaluating Efficiency of Malaysian Banks Using Data Envelopment Analysis. *International Journal of Business and Management*, *4*, 96–106.

Mokhtar, H. S. A., Abdullah, N., & Alhabshi, S. M. (2008). Efficiency and competition of Islamic banking in Malaysia. *Humanomics*, *24*(1), 28–48. doi:10.1108/08288660810851450

Noor, N. H. A. M. A. N. M. (2011). The Determinants Efficiency and Profitability of World Islamic Banks. Retrieved May 27, 2014, from http://www.ipedr.com/vol3/47-M10013.pdf

OCBC Al Amin Bank Berhad. (2007-2012). *Annual Report* retrieved at www.ocbc.com.my/ocbcal_amin.

Public Islamic Bank Berhad. (2007-2012). *Annual Report* retrieved at www.publicislamic.com.my.

RHB Bank Berhad. (2007-2012). *Annual Report* retrieved at www.rhb.com.my.

RHB Islamic Bank Berhad. (2007-2012). *Annual Report* retrieved at www.rhbislamic.com.my.

Samad, A. (1999). Comparative Efficiency of Islamic Bank vis-a-vis Conventional Banks in Malaysia. *IIUM Journal of Economics and Management*, 7 (1), 1-25.

Said, A. (2013). Evaluating the Overall Technical Efficiency of Islamic Banks Operating in the MENA Region During the Financial Crisis. *International Journal of Economics and Financial Issues*, 3 (2), 426-434.

Sassi, H. (2013). The Impact of Bank Regulations and Institutions on Efficiency in Selected MENA Banks. *International Journal of Economics and Finance*, *5*, 84–100. Retrieved from http://search.proquest.com/docview/1431164027?accountid=10297\nhttp://sfx.cranfield.ac.uk/cranfield?url_ver=Z39.88-2004&rft_val_fmt=info:ofi/fmt:kev:mtx:journal&genre=article&sid=ProQ:ProQ:abiglobal&atitle=The+Impact+of+Bank+Regulations+and+Institutions+on+Efficiency+in+Selected+MENA+Banks&title=International+Journal+of+Economics+and+Finance&issn=1916971X&date=2013-08-01&volume=5&issue=8&spage=84&au=Sassi,+Houda&isbn=&jtitle=International+Journal+of+Economics+and+Finance&btitle=&rft_id=info:eric

Sufian, F. (2006). Size and Returns to Scale of the Islamic Banking Industry in Malaysia: Foreign versus Domestic Banks. *IIUM Journal of Economics and Management*. 12 (2), 147-175.

Sufian, F. (2007). The Efficiency of Islamic Banking Industry in Malaysia: Foreign vs Domestic Banks. *Humanomics*, 23 (3), 174.

Sufian, F. (2007). Trends in the efficiency of Singapore's commercial banking groups: A non-stochastic frontier DEA window analysis approach. *International Journal of*

Productivity and Performance Management, *56*(2), 99–136. doi:10.1108/17410400710722626.

Sufian, F. (2006:2007). The Efficiency of Islamic Banking Industry: A Non-Parametric Analysis with Non-Discretionary Input Variable. *Islamic Economic Studies*, 14 (1) (2), 53-87.

Sufian, F., Noor, M.A.M., & Majid, M. Z.A. (2008). The Efficiency of Islamic Banks: Empirical Evidence from the MENA and Asian Countries Islamic Banking Sectors, *The Middle East Business and Economic Review*, 20, 1-19.

Sufian, F., & Habibullah, M. S. (2010). Developments in the efficiency of the Thailand banking sector: a DEA approach. *International Journal of Development Issues*, *9*(3), 226–245. doi:10.1108/14468951011073316

Standard Chartered Saadiq Berhad. (2007-2012). *Annual Report* retrieved at www.standardchartered.com.my.

Wasiuzzaman, S., & Gunasegavan, U. N. (2013). Comparative study of the performance of Islamic and conventional banks: The case of Malaysia. *Humanomics*, *29*(1), 43–60. doi:10.1108/08288661311299312

Website Bank Negara Malaysia retrieved at www.bnm.gov.my.

William W. Cooper; Lawrence M. Seiford, J. Z. (2004). Data Envelopment Analysis. Retrieved May 27, 2014, from file:///C:/Users/Admin/Downloads/d912f50874777a184b.pdf

Yudistira, D. (2004). Efficiency in Islamic Banking: An Empirical Analysis of 18 Banks, *Islamic Economic Studies*, 12 (1), 1-19.

APPENDIX A

DATA ENVELOPMENT ANALYSIS TEST

APPENDIX A: DATA ENVELOPMENT ANALYSIS TEST

a) Efficiency of Islamic banks in 2007

```
Instruction file = 2007-ins.txt
Data file        = 2007-dta.txt

 Input orientated DEA

 Scale assumption: VRS

 Slacks calculated using multi-stage method


 EFFICIENCY SUMMARY:

  firm  crste  vrste  scale

    1  1.000  1.000  1.000  -
    2  1.000  1.000  1.000  -
    3  0.112  0.691  0.162 irs
    4  0.371  1.000  0.371 drs
    5  0.371  0.890  0.417 drs
    6  1.000  1.000  1.000  -
    7  0.475  1.000  0.475 irs
    8  1.000  1.000  1.000  -

 mean  0.666  0.948  0.678

Note: crste = technical efficiency from CRS DEA
      vrste = technical efficiency from VRS DEA
      scale = scale efficiency = crste/vrste
```

b) Efficiency of Islamic banks in 2008

```
Instruction file = 08-ins.txt
Data file        = 08-dta.txt

 Input orientated DEA

 Scale assumption: VRS

 Slacks calculated using multi-stage method


 EFFICIENCY SUMMARY:

  firm  crste  vrste  scale

    1  0.560  1.000  0.560 drs
    2  1.000  1.000  1.000  -
    3  1.000  1.000  1.000  -
    4  0.124  0.305  0.405 irs
    5  0.275  1.000  0.275 drs
    6  0.354  1.000  0.354 drs
    7  0.450  0.500  0.901 irs
    8  1.000  1.000  1.000  -
    9  1.000  1.000  1.000  -
   10  1.000  1.000  1.000  -
   11  0.444  0.450  0.988 drs
   12  0.165  0.400  0.413 irs

 mean  0.614  0.805  0.741

Note: crste = technical efficiency from CRS DEA
      vrste = technical efficiency from VRS DEA
      scale = scale efficiency = crste/vrste
```

c) Efficiency of Islamic banks in 2009

```
Instruction file = 09-ins.txt
Data file        = 09-dta.txt

 Input orientated DEA

 Scale assumption: VRS

 Slacks calculated using multi-stage method


 EFFICIENCY SUMMARY:

  firm  crste  vrste  scale

    1  1.000  1.000  1.000  -
    2  1.000  1.000  1.000  -
    3  1.000  1.000  1.000  -
    4  0.430  1.000  0.430 drs
    5  0.446  0.611  0.729 irs
    6  1.000  1.000  1.000  -
    7  1.000  1.000  1.000  -
    8  0.125  1.000  0.125 irs
    9  0.461  1.000  0.461 irs
   10  0.540  0.939  0.575 irs
   11  0.451  0.955  0.472 irs

 mean  0.678  0.955  0.708

Note: crste = technical efficiency from CRS DEA
      vrste = technical efficiency from VRS DEA
      scale = scale efficiency = crste/vrste
```

d) Efficiency of Islamic banks in 2010

```
Instruction file = 10-ins.txt
Data file        = 10-dta.txt

 Input orientated DEA

 Scale assumption: VRS

 Slacks calculated using multi-stage method


 EFFICIENCY SUMMARY:

  firm  crste  vrste  scale

    1  1.000  1.000  1.000  -
    2  1.000  1.000  1.000  -
    3  0.755  0.969  0.779 drs
    4  1.000  1.000  1.000  -
    5  0.600  0.738  0.814 irs
    6  1.000  1.000  1.000  -
    7  0.549  0.736  0.746 drs
    8  1.000  1.000  1.000  -
    9  1.000  1.000  1.000  -
   10  0.619  0.938  0.660 irs
   11  1.000  1.000  1.000  -
   12  0.720  1.000  0.720 irs

 mean  0.854  0.948  0.893

Note: crste = technical efficiency from CRS DEA
      vrste = technical efficiency from VRS DEA
      scale = scale efficiency = crste/vrste
```

e) Efficiency of Islamic banks in 2011

```
Instruction file = 11-ins.txt
Data file        = 11-dta.txt

 Input orientated DEA

 Scale assumption: VRS

 Slacks calculated using multi-stage method


 EFFICIENCY SUMMARY:

  firm  crste  vrste  scale

    1  0.781  1.000  0.781 irs
    2  1.000  1.000  1.000  -
    3  0.785  0.885  0.887 drs
    4  1.000  1.000  1.000  -
    5  0.628  0.885  0.710 irs
    6  0.907  1.000  0.907 drs
    7  0.647  0.736  0.880 drs
    8  0.707  0.768  0.921 irs
    9  1.000  1.000  1.000  -
   10  1.000  1.000  1.000  -
   11  1.000  1.000  1.000  -
   12  0.614  0.872  0.703 drs
   13  0.748  0.941  0.794 drs

 mean  0.832  0.930  0.891

Note: crste = technical efficiency from CRS DEA
      vrste = technical efficiency from VRS DEA
      scale = scale efficiency = crste/vrste
```

f) Efficiency of Islamic banks in 2012

```
Instruction file = 12-ins.txt
Data file        = 12-dta.txt

 Input orientated DEA

 Scale assumption: VRS

 Slacks calculated using multi-stage method


 EFFICIENCY SUMMARY:

  firm  crste  vrste  scale

    1  1.000  1.000  1.000  -
    2  1.000  1.000  1.000  -
    3  1.000  1.000  1.000  -
    4  0.599  1.000  0.599 irs
    5  0.815  0.871  0.936 irs
    6  0.400  0.800  0.500 irs
    7  1.000  1.000  1.000  -
    8  0.111  0.275  0.405 irs
    9  0.655  1.000  0.655 drs

 mean  0.731  0.883  0.788

Note: crste = technical efficiency from CRS DEA
      vrste = technical efficiency from VRS DEA
      scale = scale efficiency = crste/vrste
```

g) Efficiency of conventional banks in 2007

```
Instruction file = 07-ins.txt
Data file        = 07-dta.txt

 Input orientated DEA

 Scale assumption: VRS

 Slacks calculated using multi-stage method


 EFFICIENCY SUMMARY:

  firm  crste  vrste  scale

    1  1.000  1.000  1.000  -
    2  0.311  1.000  0.311 irs
    3  0.651  0.747  0.871 irs
    4  0.390  0.594  0.656 irs
    5  1.000  1.000  1.000  -
    6  0.229  0.229  1.000  -
    7  0.356  0.423  0.840 irs

 mean  0.562  0.713  0.811

Note: crste = technical efficiency from CRS DEA
      vrste = technical efficiency from VRS DEA
      scale = scale efficiency = crste/vrste
```

h) Efficiency of conventional banks in 2008

```
Instruction file = 08-ins.txt
Data file        = 08-dta.txt

 Input orientated DEA

 Scale assumption: VRS

 Slacks calculated using multi-stage method


 EFFICIENCY SUMMARY:

  firm  crste  vrste  scale

    1  0.745  1.000  0.745 irs
    2  1.000  1.000  1.000  -
    3  1.000  1.000  1.000  -
    4  0.987  1.000  0.987 irs
    5  1.000  1.000  1.000  -
    6  1.000  1.000  1.000  -
    7  0.829  0.834  0.993 irs

 mean  0.937  0.976  0.961

Note: crste = technical efficiency from CRS DEA
      vrste = technical efficiency from VRS DEA
      scale = scale efficiency = crste/vrste
```

i) Efficiency of conventional banks in 2009

```
Instruction file = 09-ins.txt
Data file        = 09-dta.txt

 Input orientated DEA

 Scale assumption: VRS

 Slacks calculated using multi-stage method


 EFFICIENCY SUMMARY:

  firm  crste  vrste  scale

    1  1.000  1.000  1.000  -
    2  1.000  1.000  1.000  -
    3  0.289  1.000  0.289 drs
    4  1.000  1.000  1.000  -
    5  1.000  1.000  1.000  -
    6  0.590  0.616  0.957 irs
    7  0.410  1.000  0.410 drs
    8  0.369  0.470  0.784 drs

 mean  0.707  0.886  0.805

Note: crste = technical efficiency from CRS DEA
      vrste = technical efficiency from VRS DEA
      scale = scale efficiency = crste/vrste
```

j) Efficiency of conventional banks in 2010

```
Instruction file = 10-ins.txt
Data file        = 10-dta.txt

 Input orientated DEA

 Scale assumption: VRS

 Slacks calculated using multi-stage method


 EFFICIENCY SUMMARY:

  firm  crste  vrste  scale

    1  1.000  1.000  1.000  -
    2  1.000  1.000  1.000  -
    3  1.000  1.000  1.000  -
    4  0.632  0.895  0.706 irs
    5  0.633  0.813  0.778 irs
    6  0.880  0.904  0.973 irs
    7  1.000  1.000  1.000  -
    8  0.473  1.000  0.473 drs

 mean  0.827  0.952  0.866

Note: crste = technical efficiency from CRS DEA
      vrste = technical efficiency from VRS DEA
      scale = scale efficiency = crste/vrste
```

k) Efficiency of conventional banks in 2011

```
Instruction file = 11-ins.txt
Data file        = 11-dta.txt

 Input orientated DEA

 Scale assumption: VRS

 Slacks calculated using multi-stage method


 EFFICIENCY SUMMARY:

  firm  crste  vrste  scale

    1  1.000  1.000  1.000  -
    2  1.000  1.000  1.000  -
    3  1.000  1.000  1.000  -
    4  0.797  1.000  0.797 drs
    5  0.539  0.850  0.634 irs
    6  0.568  0.652  0.870 drs
    7  0.558  0.639  0.872 irs
    8  0.768  0.949  0.809 drs
    9  0.717  0.942  0.762 irs

 mean  0.772  0.893  0.860

Note: crste = technical efficiency from CRS DEA
      vrste = technical efficiency from VRS DEA
      scale = scale efficiency = crste/vrste
```

l) Efficiency of conventional banks in 2012

```
Instruction file = 12-ins.txt
Data file        = 12-dta.txt

 Input orientated DEA

 Scale assumption: VRS

 Slacks calculated using multi-stage method


 EFFICIENCY SUMMARY:

  firm  crste  vrste  scale

    1  1.000  1.000  1.000  -
    2  1.000  1.000  1.000  -
    3  1.000  1.000  1.000  -
    4  1.000  1.000  1.000  -
    5  0.338  1.000  0.338 irs
    6  0.787  0.976  0.807 irs
    7  0.866  1.000  0.866 drs
    8  0.520  0.569  0.914 irs
    9  0.499  0.898  0.555 irs

 mean  0.779  0.938  0.831

Note: crste = technical efficiency from CRS DEA
      vrste = technical efficiency from VRS DEA
      scale = scale efficiency = crste/vrste
```

APPENDIX B

T-TEST

APPENDIX B : T-TEST

a) Overall technical efficiency

i. Parametric Test

Group Statistics

	TYPES	N	Mean	Std. Deviation	Std. Error Mean
OTE	1	65	.4391	.33802	.04193
	0	48	.1262	.12381	.01787

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
OTE	Equal variances assumed	55.326	.000	6.112	111	.000	.31291	.05120	.21146	.41436
	Equal variances not assumed			6.866	85.523	.000	.31291	.04558	.22230	.40352

ii. Non-Parametric Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
OTE	113	.3062	.30962	.01	1.00
TYPES	113	.5752	.49651	.00	1.00

iii. Mann-Whitney Test

Ranks

	TYPES	N	Mean Rank	Sum of Ranks
OTE	0	48	36.64	1758.50
	1	65	72.04	4682.50
	Total	113		

Test Statistics[a]

	OTE
Mann-Whitney U	582.500
Wilcoxon W	1758.500
Z	-5.680
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: TYPES

b) Pure technical efficiency

i. Parametric Test

Group Statistics

	TYPES	N	Mean	Std. Deviation	Std. Error Mean
PTE	1	65	.6157	.29646	.03677
	0	48	.1762	.18507	.02671

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
PTE	Equal variances assumed	24.541	.000	9.046	111	.000	.43951	.04859	.34323	.53578
	Equal variances not assumed			9.670	108.302	.000	.43951	.04545	.34942	.52959

ii. Non-Parametric Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
PTE	113	.4290	.33498	.05	1.00
TYPES	113	.5752	.49651	.00	1.00

iii. Mann-Whitney Test

Ranks

	TYPES	N	Mean Rank	Sum of Ranks
PTE	0	48	30.47	1462.50
	1	65	76.59	4978.50
	Total	113		

Test Statistics[a]

	PTE
Mann-Whitney U	286.500
Wilcoxon W	1462.500
Z	-7.410
Asymp. Sig. (2-tailed)	.000

a. Grouping Variable: TYPES

c) Scale efficiency

i. Parametric Test

Group Statistics

	TYPES	N	Mean	Std. Deviation	Std. Error Mean
SE	1	65	.6426	.29660	.03679
	0	48	.7716	.20115	.02903

Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
									95% Confidence Interval of the Difference	
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	Lower	Upper
SE	Equal variances assumed	18.725	.000	-2.603	111	.010	-.12906	.04957	-.22729	-.03083
	Equal variances not assumed			-2.754	110.290	.007	-.12906	.04687	-.22193	-.03619

ii. Non-parametric Test

Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
SE	113	.6974	.26712	.09	1.00
TYPES	113	.5752	.49651	.00	1.00

iii. Mann-Whitney Test

iv. **Ranks**

	TYPES	N	Mean Rank	Sum of Ranks
SE	0	48	63.22	3034.50
	1	65	52.41	3406.50
	Total	113		

Test Statistics[a]

	SE
Mann-Whitney U	1261.500
Wilcoxon W	3406.500
Z	-1.734
Asymp. Sig. (2-tailed)	.083

a. Grouping Variable: TYPES