



Efficiency of the Financial Services Institution

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Abstract: This paper analyze the Hungarian bank type Financial Services Institution by their 2014 Annual Report. The selected method should be the data envelopment analysis (DEA) by simple one input – one output process. Finally will be define the efficient units.

1 Introduction

Like the blood for the human body, the continuous money and capital transfer is a basic need for the economic system. To the modern era has been developed a complex financial services institutional organization. These papers try to analyze this sector.

2 Theoretical background

The efficiency theory was defined by Berger and Humphrey [Berger, Humphrey 1997]. The authors advised to use “nonparametric or parametric frontier analysis to firms within the financial industry”. In the basic article belongs to the financial institutions four types: banks, Saving & Loan Associations, credit unions, and insurance firms.

The Nonparametric frontiers are the data envelopment analysis (DEA) and Free Disposal Hull (FDH). There are three main parametric frontier approaches: the stochastic frontier

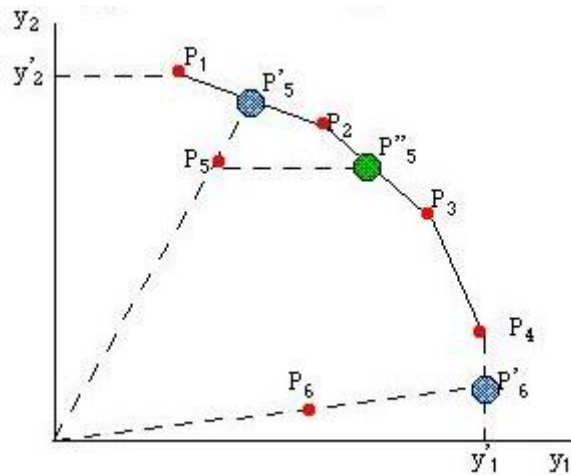
approach (SFA), the distribution-free approach (DFA) and the thick frontier approach (TFA).

Data envelopment analysis (DEA) is a linear programming based technique for measuring the relative performance of organizational units where the presence of multiple inputs and outputs makes comparisons difficult. The usual measure of efficiency is the output divided by the input.

The measurement of relative efficiency where there are multiple possibly incommensurate inputs and outputs was addressed by Farrel [Farrell 1957] and developed by Farrell and Fieldhouse [Farrell, Fieldhouse 1962], focusing on the construction of a hypothetical efficient unit, as a weighted average of efficient units, to act as a comparator for an inefficient unit.

A common measure for relative efficiency is, the weighted sum of outputs divided by the weighted sum of inputs.

Graph 1 shows a set of units P1, P2, ... P6 with each unit consuming the same amount of a single resource and producing different amounts of outputs, y_1 and y_2 as shown. For a given amount of resource input, units providing greater amounts of the outputs will be the efficient ones. Applying the DEA approach to this set of units will identify units P1, P2, P3 and P4 as efficient and they provide an envelope round the entire data set units P5 and P6 are within this envelope and are inefficient. The data envelope has been notionally extended to the axes by the lines P1y2' and P4y1' to enclose the data set.



Graph 1.
The Data Envelope

For unit P5 the peer group consists of the units P1 and P2 and a set of targets for P5 is provided at P5'. These targets are obtained by a pro rata increase in the outputs of unit P5. Clearly there are other possible targets for P5 and for example if the output level y_2 could not be increased for P5 then a target P5'' could be set which would rely entirely on increasing output y_1 . For unit P6 the pro rata increase leads to the set of targets P6'. However P6' is clearly dominated by P4 which produces the same amount of output y_1 but more output y_2 . In this case the pro rata increase needs to be supplemented by a further increase in the output of y_2 to provide an efficient target. Returning to unit P5 the set of targets P5 can be

obtained from a weighted average of the peer units P1 and P2. Thus P5 can be thought of as a composite unit made up of a weighted average of the peer units and this composite unit provides a target for the inefficient unit. [Dyson, Thanassoulis, Boussofiane 1990]

3 Methods

Vaz [Vaz 2010] described the basic methods of data envelopment analysis (DEA).



Figure 1
Modell of efficiency analysis Source [Vaz 2010]

During the process first should be defined the input and output variable(s), either one or more. Second all of the homogeneous Decision Making Units should be calculated every input and output variables. Third the output / input (productivity) ratio should be calculated, and comprised. Fourth from the input / output graph will be defined the efficient units, which are like the “upper border zone” of the points (1. graph red line). Final the productivity ration units should be descending ordered by the productivity rations.

In this cases the inputs will be defined as the Equity ration (Equity / Total Assets). The output should be any kind of profits divided by the revenue. The profit category should be chose from EBIT, profit after taxes or net income (balance sheet net profit figure).

4 Sources, Data and Process

After 2013 the National Bank of Hungary merged with the Financial Supervisor Authority. Since 2003 year after year will be published the so called “Golden Book”, which included all the supervised financial institutions Balance sheet and Profit and Loss Statement main figures.

These dates are the subject of this analysis.

Despite the few amount of variables it was used the simplest method: One input and one output. The input variable was the Equity per Total Assets ratio, and for the output was selected the Earning after taxes per Turnover ratio. The calculated input and output dates could be seen at the Table 2. and the items at the Graph 2.

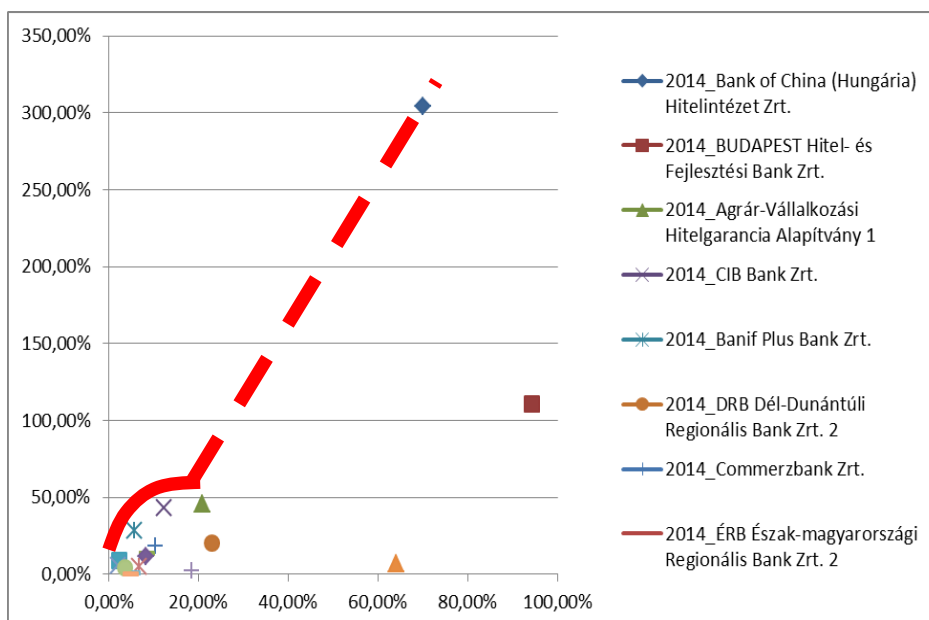
| | Name | Input | Output |
|-----|--|--------------|---------------|
| 1. | 2014_Bank of China (Hungária) Hitelintézet Zrt. | 69,98% | 304,04% |
| 2. | 2014_BUDAPEST Hitel- és Fejlesztési Bank Zrt. | 94,38% | 111,00% |
| 3. | 2014_Agrár-Vállalkozási Hitelgarancia Alapítvány ¹ | 20,89% | 45,55% |
| 4. | 2014_CIB Bank Zrt. | 12,38% | 42,96% |
| 5. | 2014_Banif Plus Bank Zrt. | 5,61% | 28,69% |
| 6. | 2014_DRB Dél-Dunántúli Regionális Bank Zrt. ² | 22,96% | 20,07% |
| 7. | 2014_Commerzbank Zrt. | 10,38% | 18,22% |
| 8. | 2014_ÉRB Észak-magyarországi Regionális Bank Zrt. ² | 6,89% | 13,73% |
| 9. | 2014_AEGON Magyarország Lakástakarékpénztár Zrt. | 8,44% | 13,41% |
| 10. | 2014_ERSTE BANK HUNGARY Zrt. | 8,25% | 11,77% |
| 11. | 2014_Dél-Dunántúli Takarékszövetkezet Zrt. ² | 2,26% | 8,67% |
| 12. | 2014_Fundamenta-Lakáskassza Lakás-takarékpénztár Zrt. | 64,15% | 7,02% |
| 13. | 2014_BRB BUDA Regionális Bank Zrt. ² | 2,17% | 5,67% |
| 14. | 2014_DUNA TAKARÉK BANK Zrt. | 6,76% | 4,65% |
| 15. | 2014_ERSTE Lakás-takarékpénztár Zrt. | 3,56% | 4,08% |
| 16. | 2014_Credigen Bank Zrt. | 18,37% | 2,53% |
| 17. | 2014_FHB Jelzálogbank Nyrt. | 5,27% | 1,26% |
| 18. | 2014_FHB Kereskedelmi Bank Zrt. | 4,76% | 0,18% |
| 19. | 2014_Garantiqa Hitelgarancia Zrt. ¹ | 5,25% | -0,04% |
| 20. | 2014_GRÁNIT Bank Zrt. | 6,59% | -2,76% |
| 21. | 2014_Merkantil Váltó és Vagyonbefektető Bank Zrt. | 8,76% | -4,70% |
| 22. | 2014_Porsche Bank Hungaria Zrt. | 13,24% | -9,55% |
| 23. | 2014_KDB Bank Európa Zrt. | 5,37% | -9,59% |
| 24. | 2014_OTP Jelzálogbank Zrt. | 7,20% | -12,83% |

| | | | |
|-----|--|--------|-----------|
| 25. | 2014_KELER Központi Értéktár Zrt. | 8,59% | -18,71% |
| 26. | 2014_MagNet Magyar Közösségi Bank Zrt. | 6,46% | -22,31% |
| | 2014_Banks_Total | 9,49% | -33,93% |
| 27. | 2014_Magyar Cetelem Bank Zrt. | 8,54% | -35,59% |
| 28. | 2014_Kereskedelmi és Hitelbank Zrt. | 8,92% | -40,56% |
| 29. | 2014_OTP Bank Nyrt. | 7,53% | -41,59% |
| 30. | 2014_MFB Magyar Fejlesztési Bank Zrt. | 18,20% | -41,99% |
| 31. | 2014_Pannon Takaréék Bank Zrt. | 13,02% | -42,04% |
| 32. | 2014_Magyar Takarékszövetkezeti Bank Zrt. | 27,34% | -42,67% |
| 33. | 2014_OTP Lakástakarékpénztár Zrt. | 5,29% | -44,74% |
| 34. | 2014_Sberbank Magyarország Zrt. | 3,85% | -46,76% |
| 35. | 2014_NHB Növekedési Hitel Bank Zrt. | 9,55% | -53,55% |
| 36. | 2014_Raiffeisen Bank Zrt. | 9,58% | -67,52% |
| 37. | 2014_MKB Bank Zrt. | 7,46% | -77,87% |
| 38. | 2014_UniCredit Bank Hungary Zrt. | 9,45% | -79,14% |
| 39. | 2014_Polgári Bank Zrt. | 6,35% | -101,62% |
| 40. | 2014_SOPRON BANK BURGENLAND Zrt. | 9,64% | -106,71% |
| 41. | 2014_MV-Magyar Vállalkozásfinanszírozási Zrt. ¹ | 12,10% | -109,03% |
| 42. | 2014_UniCredit Jelzálogbank Zrt. | 1,34% | -138,00% |
| 43. | 2014_Mohácsi Takaréék Bank Zrt. | 15,84% | -229,38% |
| 44. | 2014_Kinizsi Bank Zrt. | 65,97% | -832,69% |
| 45. | 2014_Magyar Export-Import Bank Zrt. | 81,21% | -1034,85% |

Table 1.

Inputs and Outputs of the 2014 Hungarian banks Data Source: "Golden Book 2014". National Bank of Hungary, Supervisor Department, Author's calculation

From the analyzed 45 items give only 18 organizations the accepted output value. Bank of China, Budapest Bank and Fundamenta Lakáskassza (Building Society) reach extraordinary outputs. All other received lower level value. Compare these Bank of China should be effective, Budapest Bank and Fundamenta Lakáskassza Building Society not.



Graph 2.

Elements of the Productivity ratios of the 2014 Hungarian banks Data Source: "Golden Book 2014". National Bank of Hungary, Supervisor Department, Author's calculation

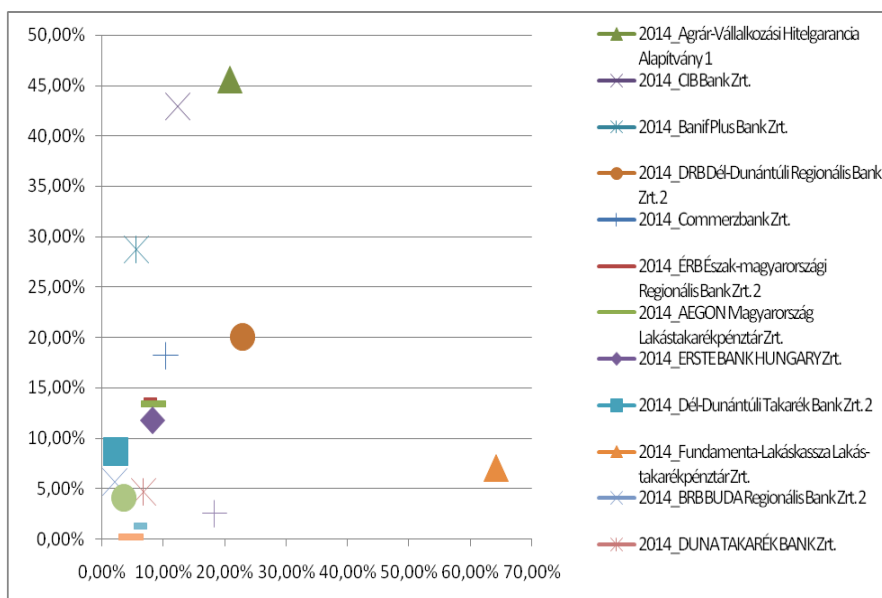
The Graph 3. shows the lower level group. Following the DEA method gave from the concentrated group four efficient units:

Agrár Vállalkozási Hitelgarancia Alapítvány (Hungarian Rural Credit Guarantee Foundation)

CIB Bank

BanifPlus Bank

Dél Dunántúli Takarékszövetkezet (S&L) Bank



Graph 3.

Reduced elements of the Productivity ratios of the 2014 Hungarian banks Data Source: “Golden Book 2014”. National Bank of Hungary, Supervisor Department, Author’s calculation

Next step lets calculate the productivity rate, the output per input ratio. These values could be show at the Table 3.

| | Name | Productivity ratio Out / In |
|----|--|--------------------------------|
| 1. | 2014_Banif Plus Bank Zrt. | 5,114852 |
| 2. | 2014_Bank of China (Hungária) Hitelintézet Zrt. | 4,344588 |
| 3. | 2014_Dél-Dunántúli Takarékszövetkezet Bank Zrt. ² | 3,83295 |
| 4. | 2014_CIB Bank Zrt. | 3,470295 |
| 5. | 2014_BRB BUDA Regionális Bank Zrt. ² | 2,605952 |
| 6. | 2014_Agrár-Vállalkozási Hitelgarancia Alapítvány ¹ | 2,180473 |
| 7. | 2014_ÉRB Észak-magyarországi Regionális Bank Zrt. ² | 1,993252 |
| 8. | 2014_Commerzbank Zrt. | 1,755339 |
| 9. | 2014_AEGON Magyarország Lakástakarékpénztár Zrt. | 1,588611 |

| | | |
|-----|--|-----------------|
| 10. | 2014_ERSTE BANK HUNGARY Zrt. | 1,426774 |
| 11. | 2014_BUDAPEST Hitel- és Fejlesztési Bank Zrt. | 1,17611 |
| 12. | 2014_ERSTE Lakás-takarékpénztár Zrt. | 1,144783 |
| 13. | 2014_DRB Dél-Dunántúli Regionális Bank Zrt. ² | 0,874232 |
| 14. | 2014_DUNA TAKARÉK BANK Zrt. | 0,687685 |
| 15. | 2014_FHB Jelzálogbank Nyrt. | 0,23999 |
| 16. | 2014_Credigen Bank Zrt. | 0,137662 |
| 17. | 2014_Fundamenta-Lakáskassza Lakás-takarékpénztár Zrt. | 0,109387 |
| 18. | 2014_FHB Kereskedelmi Bank Zrt. | 0,036881 |
| 19. | 2014_Garantiqa Hitelgarancia Zrt. ¹ | -0,00736 |
| 20. | 2014_GRÁNIT Bank Zrt. | -0,41876 |
| 21. | 2014_Merkantil Váltó és Vagyonbefektető Bank Zrt. | -0,53722 |
| 22. | 2014_Porsche Bank Hungaria Zrt. | -0,72185 |
| 23. | 2014_Magyar Takarékszövetkezeti Bank Zrt. | -1,56068 |
| 24. | 2014_OTP Jelzálogbank Zrt. | -1,78241 |
| 25. | 2014_KDB Bank Európa Zrt. | -1,78723 |
| 26. | 2014_KELER Központi Értéktár Zrt. | -2,17949 |
| 27. | 2014_MFB Magyar Fejlesztési Bank Zrt. | -2,30746 |
| 28. | 2014_Pannon TakaréK Bank Zrt. | -3,22904 |
| 29. | 2014_MagNet Magyar Közösségi Bank Zrt. | -3,4519 |
| | 2014_Banks_Total | -3,57458 |
| 30. | 2014_Magyar Cetelem Bank Zrt. | -4,16808 |
| 31. | 2014_Kereskedelmi és Hitelbank Zrt. | -4,54675 |
| 32. | 2014_OTP Bank Nyrt. | -5,52364 |
| 33. | 2014_NHB Növekedési Hitel Bank Zrt. | -5,60578 |
| 34. | 2014_Raiffeisen Bank Zrt. | -7,04607 |
| 35. | 2014_UniCredit Bank Hungary Zrt. | -8,37057 |
| 36. | 2014_OTP Lakástakarékpénztár Zrt. | -8,45107 |

| | | |
|-----|--|----------|
| 37. | 2014_MV-Magyar Vállalkozásfinanszírozási Zrt. ¹ | -9,01152 |
| 38. | 2014_MKB Bank Zrt. | -10,4317 |
| 39. | 2014_SOPRON BANK BURGENLAND Zrt. | -11,0662 |
| 40. | 2014_Sberbank Magyarország Zrt. | -12,1479 |
| 41. | 2014_Kinizsi Bank Zrt. | -12,6222 |
| 42. | 2014_Magyar Export-Import Bank Zrt. | -12,7433 |
| 43. | 2014_Mohácsi Takarékszövetkezet Zrt. | -14,4789 |
| 44. | 2014_Polgári Bank Zrt. | -15,9927 |
| 45. | 2014_UniCredit Jelzálogbank Zrt. | -103,048 |

Table 2

Productivity ratios of the 2014 Hungarian banks Data Source: "Golden Book 2014". National Bank of Hungary, Supervisor Department, Author's calculation

The Productivity ratio's value over 1 is good, between 0 and 1 should be accepted, less as 1 is unaccepted bad.

5 Conclusion

By simple efficiency method earned not enough different part of solutions. The DEA methods give more reason and using reduced variables gave also clear and understanding pictures from the analyzed research area.

From the existed 45 units 12 was good, 6 was acceptable and 27 was inefficient in the year 2014. By the DEA approach should be called efficient only 5 units, 4 banks (Bank of China, CIB Bank, BanifPlus Bank, Dél Dunántúli Takarékszövetkezet (S&L) Bank) and one Special Institution (Agrár Vállalkozási Hitelgarancia Alapítvány (Hungarian Rural Credit Guarantee Foundation)) (which belongs by supervisory to the banks). Both methods, the graphical and the productivity ratios give the same effective units!

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