Financial and Environmental Efficiency Evaluation of the Greek Banking Sector

Paraskevas Perlegas, Stella Sofianopoulou*, Dimitris Psychoyios

Department of Industrial Management & Technology,
University of Piraeus, Piraeus, Greece
**Corresponding author: sofianop@unipi.gr*

Abstract

This paper aims to evaluate banks that operate within the Greek banking sector on the basis of both financial and environmental criteria. More specifically, the main target is to identify the most socially responsible banks, without of course excluding financial indices criteria that are of catalytic importance. To accomplish our goal, Data Envelopment Analysis (DEA) is employed which will provide us with results and conclusions on the banks' performance, but more important, will depict which commercial banks implement policies and procedures of Corporate Social Responsibility (CSR) more effectively. The findings of this study not only point in the right direction for the strengthening of the backbone of the Greek banking sector, but also enlighten the importance of implementing sustainability practices and at the same time constitute a major challenge for other banks to implement such policies.

Keywords: Benchmarking, Corporate Social Responsibility (CSR), Sustainable Development (SD), Data Envelopment Analysis (DEA), environmental performance, financial performance, Greek banking sector

Introduction

Harmful human activities and catastrophic business practices towards the environment in the last decades, along with the urgent need of enterprises to differentiate themselves from their competitors, have led firms to adopt environmental friendly policies. These, coupled with actions that aim to embrace responsibility towards customers, employees, communities, providers and shareholders constitute Corporate Social Responsibility (CSR), thus covering social, economic, environmental and institutional aspects.

It is obvious that there is a strong linkage between Sustainable Development (SD) and CSR. The former is defined by the World Commission on Environment and Development as the development that meets the needs of the present generation without jeopardizing the ability of future generations to meet their own needs. The definitions of those two fundamental concepts imply that one of the main goals of CSR is the implementation of SD's aims. We believe that both CSR and SD are of great importance at this point since not only they will be referred several times in the rest of this work, but also their influence and implementation into business practices, triggered off the very existence of this study.

Significance of applying CSR practices

First of all it is essential to point out that when we refer to sustainable development (SD) practices -as many people might think, we don't only mean costly practices, such as buying more expensive products, but on the contrary, we also refer to actions that finally reduce cost, entailing profits. Such activities would be the saving on materials and energy consumption as required input, in addition to waste reduction and material recycling, thus creating reusable resources for the companies. All these can be achieved by the principles and guidance of environmental management standards or other managerial tools (as for example the ISO 14000 series and EMAS). Furthermore, cost reduction can be achieved, by employing CSR tools (codes of conduct, eco-labels and certification) in managing possible risks and liabilities, creating that way a more solid image of the firm and of the service/product provided. This results in benefits concerning the environment, benefits which contribute to enhanced financial performance and increased profitability.

The majority of banks/financial institutions that take under consideration CSR practices and follow specific societal-environmental policies tend to integrate ethical, social, health & safety, environmental (sustainability) and economic issues within corporate reports, thus making corporate and society interests to converge. All these actions take shape and essence through Environmental Management Accounting (EMA). According to International Federation of Accountants (IFAC), EMA is the management of environmental and economic performance through the development and implementation of appropriate environment related accounting systems and practices. The benefits of EMA implementation into decision making among others include improved reputation (i.e. impact on share price), increased loyalty to the company, competitive advantage in the market share, improved internal data collection, better reporting systems and last but not least, improved social and environmental performance (Adams and Frost, 2008).

At this point it is essential to note that many organizations exist (one major example being USSIF), trying to boost and promote along with their members (professionals, firms, institutions and other organizations) investment practices that consider environmental, social and corporate governance criteria to generate long- term competitive financial returns and positive societal impact. As it is further analyzed CSR and corporate financial performance -as many researchers have already stated (Keffas and Olulu-Briggs, 2011) are very closely related. The implementation of these practices, improve reputation, branding and increase credibility, bolstering the relations with investors, providing them easier access to funding. It is obvious that, investment companies and interested individuals invest funds, taking into consideration CSR criteria, which are mostly expressed in terms of indices, combining "compressed" environmental and financial information. Those indices provide investors with information on a company's financial and environmental performance, acting that way as a bridge between investors and fund-seeking institutions. It is important at this point to make a reference to some of those indices used for benchmarking, such as Dow Jones Group Sustainability Index (DJGSI), the FTSE4 Good Indices and the Jantzi Social Index. It should be also noted that there are many more in literature, as well as some other used

in practice, providing relevant information, depending every time on what each investor is mostly interested in.

Considering also the opportunities that the implementation of CSR practices can provide, someone would focus on the competitive advantage gained. In periods of recession particularly, these practices can provide a relatively cheap (from the prospective of the business which implements them) complementary incentive for attracting potential investors. Capital markets can thus invest in those economies, enhancing the circulation of "money", boosting domestic economy and consequently, as we live in a world of globalization, resulting to the dispersion to the whole world by way of commercial transactions. Therefore, it is obvious that with the appropriate implementation of CSR practices by businesses in collaboration with governments, CSR can become a crucial instrument for strengthening a country's economy and welfare.

Apart from what has already been described as far as CSR benefits are concerned, it is also important to point out some more advantages generated for the banks by the utilization of the results of studies, exploiting the use of quantitative data analysis. As Harrison and van Hoek (2011) have already stated, quantitative analysis provides a vehicle for recording the efficiency of the firm, constituting a decision-making tool based on past data, giving the ability of using those data simultaneously for benchmarking and for observation of the profitability of the bank during a specific period of time. That way, managers can be aware of efficiency fluctuations in the performance of their institutions. Last but not least performance measurement and benchmarking can provide an incentive for the employees and employers to be more efficient.

DEA

Data Envelopment Analysis (DEA) is a mathematical programming method used for measuring the relative efficiencies of a homogenous set of Decision Making Units (DMUs). The nature of those DMUs may vary from hospitals and banks, to schools, universities and military camps. As it is a non-parametric method the only data required, are the inputs and outputs of DMUs, without being needed to make any assumption about the distribution of our data (distribution-free). The efficiency score is defined by the weighted sum of outputs divided by the weighted sum of inputs always subject to specific constraints. In this work we will not refer to the mathematical model of DEA, as our aim is the investigation of the results, rather than the model itself.

Inputs

Inputs considered in this study are costs related to the production of bank services, in accordance with the intermediation approach for measuring banking activities. These costs include the cost of deposits, denoted by the ratio of interest expenses to deposits and short term funding; the price of capital, which corresponds to the ratio of non-personnel expenses divided by the fixed assets and the price of labor calculated by the ratio of personnel expenses to total assets (Liadaki, Gaganis, 2010).

- Interest expenses/deposits
- Other overhead expenses/fixed assets
- Personnel expenses/total assets

Since financial performance measurement of the banking sector has already been presented by researchers in the past, the novelty of this work lies in the combined use of both environmental and financial measures as input data. DEA has the advantage of utilizing data, without being concerned about the units of measures for the inputs or outputs of DMUs. The only restriction that applies is obviously the use of the same number and nature of inputs and outputs for all the DMUs. That specific and unique characteristic of DEA permits us to use different measures, rather than only financial ones. The implementation of environmental data as inputs is portrayed into our results, illustrating and promoting the multidimensional character of a contemporary financial institution, providing the stakeholders with useful information for the institution/DMU under investigation, combining that way CSR and financial performance.

The environmental inputs included to our study are:

- Total waste recycled: including batteries, paper, toners-cartridges, electronic devices etc. all expressed in kg
- CO_2 emissions, resulting from the banks' operation, expressed in tones
- Water consumption, expressed in m^3

Of course, inputs used, depend on the researcher's aims. For example, one could argue that also "Workers' Injuries" is an important index which should be considered in the measurement of efficiency (concerning Health and Safety issue). That is undoubtedly correct, but in this work the focus is on merely environmental issues. Considering the importance of several equivalent inputs, we finally suggest the aforementioned three ones.

Outputs

According to Sealey and Lindley (1977), outputs are defined as the services depository financial institutions provide to their customers-debtors. The main services a bank can provide are loans and the ability of depositing. Those two aspects, supplemented by other earning assets the bank holds (interest bearing accounts, CD's, dividend stocks, preferred stocks, bonds and similar instruments), constitute its major source of income. Consequently, according to the aforementioned researchers' approach, the outputs used in this study are the following:

- Loans
- Other earning Assets
- Deposits

All data –related to inputs and outputs, including any other information concerning the operation of each bank/group, were collected from the Sustainability-Citizenship Reports, Annual reports and financial statements (balance sheets and P&Ls), presented by the institutions, for year 2011.

There are two possible orientations of DEA models: the input oriented model, and the output oriented model. The two basic DEA models are the CCR model and the BCC model. The CCR model is the initial DEA model developed by Charnes et al., (1978). CCR is based on the assumption of

constant return to scale (CRS). The BCC model is introduced by Banker et al. (1984). The BCC model considers variable return to scale (VRS). The results of the analysis were extracted using the MS Excel Add-in, xlDEA 2.1, produced by the Greek software company, ProductivityTools. The model utilized is Input oriented CCR under the assumption of CRS.

DEA and data collection

The banks considered in this study are: 1)Alpha Bank, 2)National Bank of Greece, 3)Emporiki Bank, 4)Eurobank, 5)Piraeus Bank, 6)Citibank, 7)HSBC, 8)ABN Amro, 9)Credit Suisse, 10) Deutche Bank, 11)UniCredit, 12)Royal Bank of Scotland (RBS). All these banks operate in Greece with at least one of their Group's subsidiaries. Table 1 presents the financial inputs used in DEA analysis. The financial data for Alpha Bank, National Bank of Greece, Emporiki Bank, Eurobank, Piraeus Bank, Credit Suisse, Deutche Bank and UniCredit were gathered exclusively from the banks' income statements and balance sheets, whereas, for Citibank and Royal Bank of Scotland were collected from the Group's counterparts. Regarding HSBC and ABN Amro, the financial input data were evaluated from the Groups' income statements while output was collected from the banks' balance sheets.

Table 2 presents the environmental inputs for the DEA implementation. Concerning the environmental data, as mentioned before, they were collected from CSR Reports for each Group. As the analysis is focused on the Greek banking sector, care was taken to format data that did not refer solely to Greece; so that they could best correspond to the data from the original reports. Data for Alpha Bank, National Bank of Greece, Emporiki Bank, Eurobank, Piraeus Bank and Citibank were used as provided by those institutions as they refer to their operation in Greece. For the remaining, each entry in Table 2, refers to an approximation of the corresponding input data, since the data provided by those institutions were not specifically provided for their operation in Greece. That way we have an average estimation of each environmental input for Greece, with the only exception of ABN Amro, whose data refers to the Netherland's market only, so were used as they are, making the assumption that similar data are valid for the case of Greece. Additionally, as for "total waste recycled input", care has been taken, using the reciprocal of each DMU's data (1/total waste recycled), in order to be in accordance with DEA assumptions –the greater the amount of wastes recycled, the better environmental performance is

Tables and Figures

Table 1. Financial Inputs.

	interest exp/deposits	oth over exp/fix as	personnel exp/total assets
Alpha Bank	0,038748	0,669980	0,007084
National Bank of Greece	0,018431	1,234802	0,011873
Emporiki Bank	0,022897	0,673888	0,017050
Eurobank	0,107752	1,211207	0,005186
Piraeus Bank	0,036252	0,851964	0,005176
Citibank	0,027986	0,169524	0,013708
HSBC	0,015290	2,135662	0,005533
ABN Amro	0,021765	2,102548	0,006272
Credit Suisse	0,048469	1,076716	0,012493
Deutsche Bank	0,028971	2,297513	0,006069
UniCredit	0,028200	12,266521	0,008788
Royal Bank of Scotland	0,014272	0,573475	0,005759

Table 2. Environmental Inputs.

	total waste recycled(kg)	CO_2 emissions(tn)	water consumption(m^3)
Alpha Bank	$4,8561*10^{-6}$	34.064	30.123
National Bank of Greece	$1,8812*10^{-6}$	51.905	43.825
Emporiki Bank	$1,9547*10^{-6}$	27.900	43.574
Eurobank	$3,2865*10^{-6}$	43.607	69.150
Piraeus Bank	$3,7135*10^{-6}$	27.420	41.873
Citibank	$15,680*10^{-6}$	3.580	14.310
HSBC	$2,0769*10^{-6}$	10.284	58.926
ABN Amro	$0,1458*10^{-6}$	47.080	163.492
Credit Suisse	$2,7859*10^{-6}$	6.709	23.368
Deutsche Bank	$8,4055*10^{-6}$	4.470	23.365
UniCredit	$0,1592*10^{-6}$	34.065	801.154
Royal Bank of Scotland	$1,6984*10^{-6}$	14.728	50.000

Table 3. Outputs.

	loans	other earning assets	deposits
Alpha Bank	36.152.015	8.226.785	46.523.996
National Bank of Greece	52.891.237.000	21.011.075.000	77.896.030.000
Emporiki Bank	18.034.932	1.169.399	17.452.141
Eurobank	60.052.000.000	11.038.000.000	30.236.000.000
Piraeus Bank	32.920.855.000	6.429.380.000	43.358.043.000
Citibank	469.833.596.148	655.496.918.704	659.257.859.264
HSBC	177.208.819.536	238.834.952.040	205.540.730.872
ABN Amro	442.449.000.000	44.625.000.000	377.893.000.000
Credit Suisse	172.398.383.650	454.060.134.157	275.471.453.763
Deutsche Bank	412.514.000.000	1.337.909.000.000	601.730.000.000
UniCredit	285.884.367.614	108.587.679.444	215.188.293.253
Royal Bank of Scotland	695.383.885.242	875.309.223.314	710.295.517.655

In Figures 1 and 2, the results of the analysis are presented, first, when assessing only financial data and second, when environmental data were also taken into consideration.

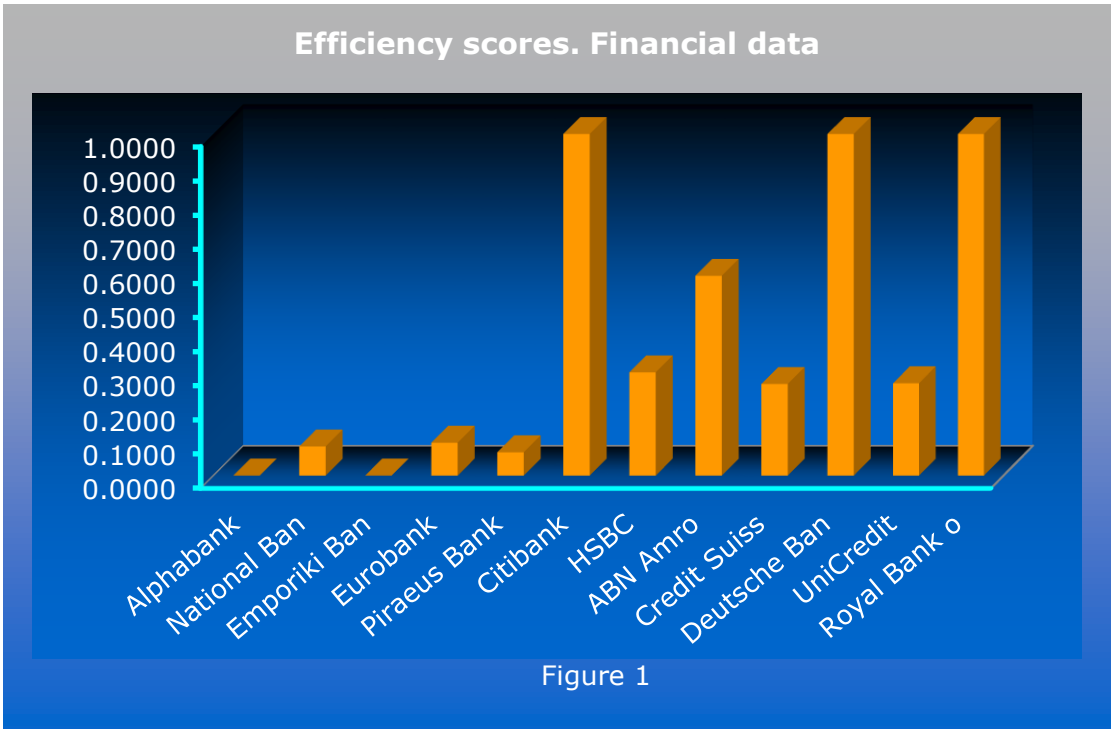

Figure 1

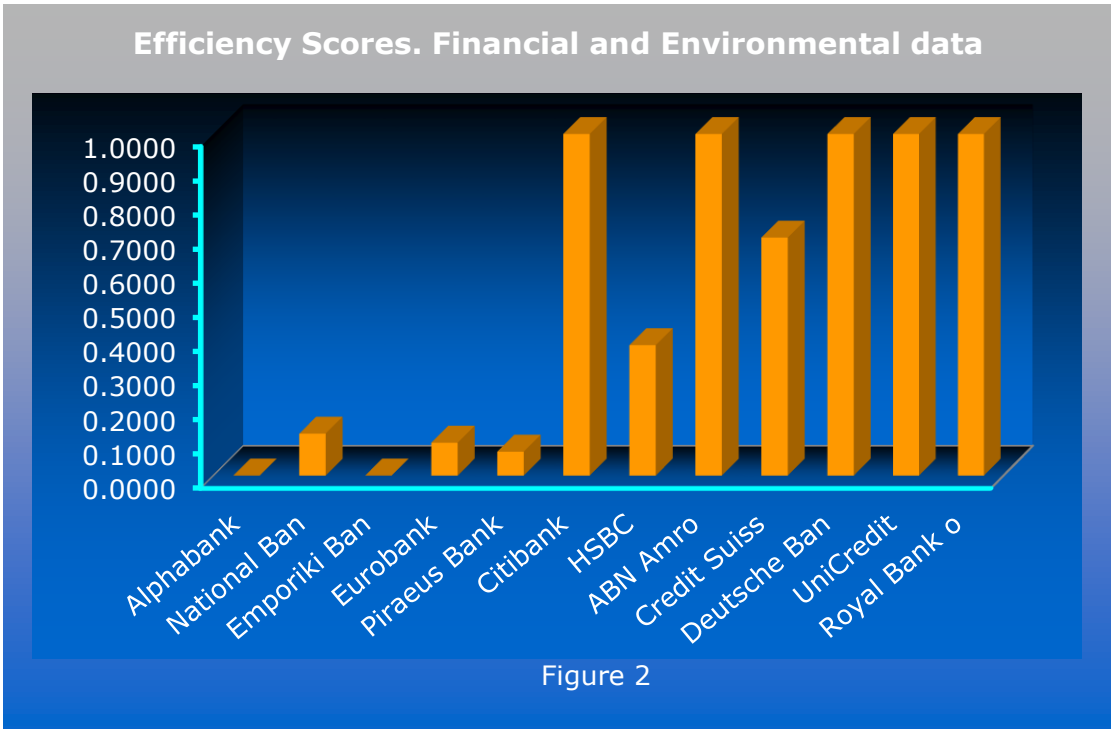

Figure 2

In Tables 4, 5, 6 and 7 the focus is on the financial and environmental inputs case, as previous research efforts concentrated on financial data (e.g. Varias and Sofianopoulou, 2012).

Table 4.

Efficient peers and weights	Citibank	ABN Amro	Deutsche Bank	UniCredit	Royal Bank of Scotland
Alpha Bank	0,0000		0,0000		0,0000
National Bank of Greece			0,0063		0,1043
Emporiki Bank					0,0000
Eurobank					0,0864
Piraeus Bank			0,0073		0,0549
Citibank	1,0000				
HSBC			0,0430		0,2529
ABN Amro		1,0000			
Credit Suisse			0,1822		0,2402
Deutsche Bank			1,0000		
UniCredit				1,0000	
Royal Bank of Scotland					1,0000

Each entry in Table 4 indicates the change each inefficient bank has to undergo, in order to become efficient. More specifically, it presents the required percentage improvement for each inefficient DMU's input and output when compared to its efficient peers, so that it can reach maximum efficiency. That means that the management of Credit Suisse for example, has to adopt methods and practices from Deutche Bank and RBS. Consequently, one can see that the inefficient bank Credit Suisse, has the reference set {Deutche Bank,RBS} with weights {0.1822,0.2402}.

Table 5.

Virtual Financial Inputs	interest exp/deposits		oth over exp/fix assets		pers exp/total assets	
Alpha Bank	0,00000138	*100,00%*	0,00005672	*99,99%*	0,00000052	*99,99%*
National Bank of Greece	0,00167170	*90,93%*	0,07432543	*93,98%*	0,00063908	*94,62%*
Emporiki Bank	0,00000036	*100,00%*	0,00001452	*100,00%*	0,00000015	*100,00%*
Eurobank	0,00123250	*98,86%*	0,04952418	*95,91%*	0,00049733	*90,41%*
Piraeus Bank	0,00099406	*97,26%*	0,04819267	*94,34%*	0,00036021	*93,04%*
Citibank	0,02798590	*0,00%*	0,16952407	*0,00%*	0,01370847	*0,00%*
HSBC	0,00485611	*68,24%*	0,24388401	*88,58%*	0,00171772	*68,95%*
ABN Amro	0,02176542	*0,00%*	2,10254812	*0,00%*	0,00627159	*0,00%*
Credit Suisse	0,00870749	*82,04%*	0,55639490	*48,32%*	0,00248943	*80,07%*
Deutsche Bank	0,02897147	*0,00%*	2,29751325	*0,00%*	0,00606949	*0,00%*
UniCredit	0,02820014	*0,00%*	12,26652145	*0,00%*	0,00878819	*0,00%*
Royal Bank of Scotland	0,01427196	*0,00%*	0,57347488	*0,00%*	0,00575897	*0,00%*

Table 6.

Virtual Environmental Inputs						
	total waste recycled(kg)		CO_2 emissions(tn)		water consumption(m^3)	
Alpha Bank	$0,00041*10^{-6}$	*99,99%*	0,71	*100,00%*	2,55	*99,99%*
National Bank of Greece	$0,23022*10^{-6}$	*87,76%*	1.564,64	*96,99%*	5.363,48	*87,76%*
Emporiki Bank	$0,00004*10^{-6}$	*100,00%*	0,37	*100,00%*	1,27	*100,00%*
Eurobank	$0,14667*10^{-6}$	*95,54%*	1.271,88	*97,08%*	4.317,90	*93,76%*
Piraeus Bank	$0,15438*10^{-6}$	*95,84%*	840,75	*96,93%*	2.913,87	*93,04%*
Citibank	$15,6796*10^{-6}$	*0,00%*	3.580,00	*0,00%*	14.310,00	*0,00%*
HSBC	$0,79116*10^{-6}$	*61,91%*	3.917,45	*61,91%*	13.651,63	*76,83%*
ABN Amro	$0,14585*10^{-6}$	*0,00%*	47.080,00	*0,00%*	163.492,00	*0,00%*
Credit Suisse	$1,93956*10^{-6}$	*30,38%*	4.352,70	*35,13%*	16.269,14	*30,38%*
Deutsche Bank	$8,40553*10^{-6}$	*0,00%*	4.470,00	*0,00%*	23.364,62	*0,00%*
UniCredit	$0,15919*10^{-6}$	*0,00%*	34.065,08	*0,00%*	801.153,87	*0,00%*
Royal Bank of Scotland	$1,69837*10^{-6}$	*0,00%*	14.728,00	*0,00%*	50.000,00	*0,00%*

Table 7.

Virtual Outputs						
	loans		other earning assets		deposits	
Alpha Bank	40.601.334,64	*12,31%*	63.091.184,85	*666,90%*	46.523.997,08	*0,00%*
National Bank of Greece	75.146.254.006,51	*42,08%*	99.756.585.586,11	*374,78%*	77.896.036.463,19	*0,00%*
Emporiki Bank	17.604.208,96	*- 2,39%*	22.159.165,69	*1794,92%*	17.981.708,32	*3,03%*
Eurobank	60.052.003.256,94	*0,00%*	75.590.007.664,72	*584,82%*	61.339.740.338,69	*102,87%*
Piraeus Bank	41.162.536.838,78	*25,03%*	57.771.684.325,88	*798,56%*	43.358.045.348,79	*0,00%*
Citibank	469.833.580.544,85	*0,00%*	655.496.904.705,19	*0,00%*	659.257.884.673,19	*0,00%*
HSBC	193.629.421.646,74	*9,27%*	278.946.789.764,44	*16,79%*	205.540.736.112,58	*0,00%*
ABN Amro	442.449.002.495,95	*0,00%*	44.624.998.399,99	*0,00%*	377.892.995.071,95	*0,00%*
Credit Suisse	242.221.223.992,32	*40,50%*	454.060.136.349,99	*0,00%*	280.280.134.453,22	*1,75%*
Deutsche Bank	412.513.992.704,18	*0,00%*	1.337.909.051.392,58	*0,00%*	601.729.990.656,26	*0,00%*
UniCredit	285.884.383.231,84	*0,00%*	108.587.679.743,94	*0,00%*	215.188.291.583,88	*0,00%*
Royal Bank of Scotland	695.383.883.776,05	*0,00%*	875.309.236.224,06	*0,00%*	710.295.486.464,05	*0,00%*

Tables 5, 6 and 7 indicate the target/virtual inputs and outputs required for an inefficient bank to become efficient. The first column in each input/output indicates the target value and the second column shows the corresponding percentage decrease/increase required in original data. This data is calculated from the inputs and outputs of each bank's efficient peers using the corresponding weights. In Tables 2 and 4 for example, the virtual input "water consumption" for Credit Suisse is calculated by adding the product of Deutche Bank's weight and its "water consumption" input, with the product of RBS's weight and its "water consumption" input respectively. Thus, Credit Suisse can reach maximum efficiency by improving its performance, having as a model, RBS and Deutche Bank's practices, changing in this direction its inputs and outputs.

Table 8. Aggregate Scores

No.	Bank	Financial Scores	Financial & Environmental Scores	Change(%)
1	Alpha Bank	0,0001	0,0001	0
2	National Bank of Greece	0,0849	0,1224	44,16
3	Emporiki Bank	0,0000	0,0000	0
4	Eurobank	0,0959	0,0959	0
5	Piraeus Bank	0,0679	0,0696	2,5
6	Citibank	1,0000	1,0000	0
7	HSBC	0,3012	0,3809	26,46
8	ABN Amro	0,5843	1,0000	71,14
9	Credit Suisse	0,2673	0,6962	160,45
10	Deutsche Bank	1,0000	1,0000	0
11	UniCredit	0,2694	1,0000	271,19
12	Royal Bank of Scotland	1,0000	1,0000	0

Computational results and discussion

In Table 8, the efficiency of each DMU is indicated, with Citibank, Deutsche Bank and Royal Bank of Scotland, leading among all candidates of our sample -while referring to financial data only, whereas, when environmental data are included in the previous analysis, apart from the aforementioned ones, ABN Amro and UniCredit also reach maximum efficiency. Consequently, for a potential investor who takes under consideration just the financial performance of a bank, it is clear that units 6, 10 and 12 are the most suitable choices for him. However, for an investor who is as much interested in the environmental performance as he is in the financial one, it is obvious that apart from those three banks, one could also choose units 8 and 11. The fact that those two banks are not the most efficient ones from the financial point of view, but are in the combined case, indicates that they probably follow an environmental friendly policy, which concurs with the principals of SD and CSR -always in accordance with the financial performance. Additionally, the same conclusion is drawn, according to the last (fifth) column in Table 8, for unit 9 and rather faintly, for unit 2 respectively. This column indicates the percentage change of the efficiency of each bank, when environmental data are implemented into our analysis, together with financial ones. Concerning unit 9, it may be 30,38% far from reaching maximum efficiency, but one can see that it has the second best position when environmental factors are taken into consideration among all candidates.

The findings suggest that considering CSR in efficiency assessment of banks is in some cases not only important on ethical and social grounds, but also indicates that banks that are socially responsible may have economic advantages. These results should be of interest to managers who are interested in engaging in socially responsible activities, investors and financial analysts who assess banks performance, and policy makers who design and suggest guidelines on CSR.

Looking into our results, it is worth mentioning that Greek banks, i.e. units 1 to 5, are ranked in the “0-10%” range score frequency -except for unit 2 at the combined analysis, which is just exceeding it. This is a result of the fact that Greek financial institutions are not as internationally dispersed as the other banks under investigation, engaged in less expanded worldwide activity, resulting apparently in lower financial performance. National Bank of Greece, which belongs to

NBG Group, is the one that operates in more countries than any other Greek bank -13 countries, while next is UniCredit which operates in 22 countries.

At this point, we have to refer to the significance of using a larger sample of DMUs in DEA. Someone would argue that there is a lack of diversification concerning the efficiency scores, since five banks -in the combined data analysis, are indicated as efficient, whereas at the mere financial inputs case, there are just three units indicated as efficient. This is stemmed from the fact that there is a rule of thumb relating the number of DMUs and inputs and outputs affecting the outcome of DEA model. "If the number of DMUs (*n*) is less than the combined number of inputs and outputs (*m+s*), a large proportion of the DMUs will be identified as efficient and efficiency discrimination among DMUs is questionable due to an inadequate number of degrees of freedom" (Cooper et al., 2007). According to this, with the addition of three environmental inputs in the combined model, the presence of more fully efficient banks is rather expected. Of course reducing the number of inputs by excluding one ore more financial inputs from our analysis would produce lower average efficiency scores but this would change the aim of this study that is to evaluate the financial and environmental efficiency of the Greek banking sector. Keeping that in mind, the main purpose of this paper is not just to rank the financial institutions of the Greek banking industry, probably accomplished under some compromise, but also to prove the feasibility of such an analysis, where the combination of financial and environmental measures are taken into consideration. The implementation, therefore, of such a study, would be of greater significance and utility, if applied in countries with larger economies and a more developed environmentally and socially responsible awareness providing more accurate and reliable results. This is not unfortunately the case in Greece where only 22% of the Greek banks follow a SD policy, applying CSR practices, tracking and publishing the corresponding data.

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