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Efficiency of Banks With a Double Bottom Line

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Abstract

If banks' performance is to be be evaluated against the objectives they actually pursue, assessments of stakeholder-oriented banks should go beyond financial efficiency. Furthermore, also the environment these institutions operate in has to be kept in mind when interpreting levels of managerial inefficiency. For 401 Austrian regional banks, this study compares financial efficiency to a measure of social efficiency that considers several kinds of stakeholder benefits. Both efficiency scores are calculated by use of data envelopment analysis. In a second estimation stage, we use truncated regression to account for differences in efficiency due to the market environment. Our results show that efficiency rankings across Austrian savings banks and credit cooperatives change considerably when their double bottom line and local market factors are considered. Both issues thus are important for adequate and fair performance benchmarking.

Keywords: Savings Banks, Credit Cooperatives, Non-Profit Objectives, Social Efficiency, Data Envelopment Analysis

JEL Classification: D22, G21, L20, M11, R51

I. Introduction

Recent financial and societal crises as well as the general trend towards sustainability have induced increased interest also in associated aspects of bank business models. Stakeholders demand more socially responsible behavior (*Martínez-Campillo* et al. 2018; *Cuesta-González* et al. 2021), and also academic research connected to ESG and CSR topics in banking is mounting, as can be seen from recent bibliometric analyses (*Galletta* et al. 2022; *Hassan* et al. 2023). Besides enlarged obligations of non-financial reporting that, so far, mainly refer to larger banks, there have been calls for re-orientation towards more prudential

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(even 'boring') banking (*Schackmann-Fallis* et al. 2018). Also current trends within the industry (low margins, consolidation, digitalization) pose the question of how sustainable business models might look like.

Stakeholder banks have proven to be crisis-resilient and to contribute to stabilizing the economy by less procyclical lending (e. g., *Ferri* et al. 2014; *Meriläinen* 2016; *Epstein*/*Dutt* 2018; *Groeneveld* 2020). By that, and other forms of support for local economies, they are found to strengthen economic development and growth (*Hakenes* et al. 2015; *Coccorese*/*Shaffer* 2021). Meanwhile, savings banks and credit cooperatives have been able to largely maintain their financial efficiency.

Just as commercial banks, stakeholder banks are primarily evaluated with respect to the dogma of financial performance. Thus, this paper seeks to make a step towards an improved or more adequate efficiency measurement of banks with a double bottom line. Despite being discussed for quite a long time, concensus approaches or standards haven't yet evolved on a combined measurement of financial and social efficiency. This is somewhat surprising given the importance of banks with a double bottom line in many countries.

This paper deals with savings banks and credit cooperatives, which are part of what the literature calls either stakeholder banks (*Ferri* et al. 2014; *Meriläinen* 2016), alternative banks (*Butzbach*/*von Mettenheim* 2015), or publicly oriented banks (*Epstein*/*Dutt* 2018). The general feature of those is that the pursuit of profit and shareholder wealth maximization is not the primary or only objective.[1] We add to the literature that tries to integrate the degree to which banks pursue non-financial objectives into efficiency measurement. Social performance, in this respect, is not seen as a sideshow that affects financial success, but as an integral part of performance. Especially the set of outputs employed in calculating relative efficiency levels is extended to consider potential benefits for banks' stakeholders. Thereby, we seek to avoid that the pursuit of non-profit goals is interpreted as managerial slack in case evaluations are based on standard efficiency metrics (see *Hackethal* et al. 2012), that may yield rather low ratings for savings banks and also credit cooperatives. Furthermore, we also compute efficiency rankings that are corrected for environmental factors that might distort efficiency comparisons across banks.

[1] Savings banks, credit cooperatives and a few joint-stock banks are evaluated jointly in this paper based on the premise of a comparable business model that *Conrad* et al. (2014), for German savings banks, describe as focussed on relationship banking based on regional proximity and personal contact with local retail customers. Savings banks and credit cooperatives have a similar historic origin, are regionally anchored, have similar atypical objective functions (*Raab*/*Welzel* 2011), and tend to care for the social value of their activities (*Schulz-Nieswandt*/*Köstler* 2012).

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Our results show that the evaluation is strongly affected by these reasonable adaptations. Rankings based on relative efficiency levels change considerably once the double bottom line and the market environment of savings banks and credit cooperatives is taken into account. Thus, particular emphasis shall be put on these aspects in performance evaluation especially of small regional banks.

The remainder of the paper is structured as follows. Section 2 describes the necessary background with respect to stakeholder-oriented banks, their objectives and the measurement of non-financial outputs. Furthermore, the bank efficiency literature is reviewed with respect to the double bottom line of savings banks and credit cooperatives. Data and variables used are introduced in Section 3, which also describes the empirical approach of the paper. Section 4 presents several sets of results, while the final section summarizes our findings and concludes.

II. Background and Literature Review

Savings banks and credit cooperatives are banks that have a double bottom line (*Ayadi* 2009; 2010). Besides financial objectives, their goal system contains aspects of social commitment and promotion of the region they operate in.[2] Other than their German counterparts, Austrian savings banks have no legally binding public mandate, but their statutes generally contain a social orientation. For credit cooperatives as well, it is understood that their value creation goes beyond member support towards societal benefits (*Kosinowski* 2020; *Groeneveld* 2020). Both types of banks argue non-financial goals and corporate citizenship in codes of conduct and public communication.

An active pursuit of a double bottom line implies an orientation towards multiple stakeholders. As the primary ones, for example, *Avkiran*/*Morita* (2010) list shareholders, customers, management, employees, and regulators. One may add the environment in form of the civil society (*Rebai* et al. 2016) or, more suitable for banks with regional engagement, the local municipality (*Ahn*/*Le* 2015). Regulators stand for the contribution to the societal value of financial stability.

In brief, regionally oriented stakeholder banks pursue the following goals: provide access to financial services and credit (also in unattractive markets, to opaque or disadvantaged customers, based on customer proximity and the collection of soft information, probably at more favorable rates for customers than commercial banks do), support financial system stability by pursuing a stable,

[2] For that, we may use the term Corporate Social Responsibility, but do not explicitly consider environmental goals and aspects which are generally also subsumed under that notion.

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long-term oriented business model, and contribute to local employment and community development (by tax payments, sponsorship expenses and donations).

However, the focus in performance management predominantly is on financial measures of success and associated narratives. These cannot fully capture the performance of entities with more than one bottom line, multiple objectives and a rather complex stakeholder management (*Tischer* et al. 2016). *Brown* (2006) and *Ahn*/*Le* (2014) thus argue that the performance of such banks should be evaluated against actually pursued objectives – a suitable approach also needs to consider social welfare goals (*Bachiller*/*Garcia-Lacalle* 2018). As there is no general framework for this,[3] we need to define the components of these societal objectives, as done above. Examples of such a catalogue may be found in e.g. *Schackmann-Fallis* et al. (2018) for (German) savings banks or *Groneneveld* (2020) with respect to (European) credit cooperatives. Sector-wide reports help to define such a set of objectives with associated output measures. The German Savings Banks Finance Group, for example, publishes a Report to Society since 2013 featuring a detailed set of indicators (see, e.g., Deutscher Sparkassen- und Giroverband 2022). For the cooperative banking sector, the Cooperative Financial Network publishes a Report on Corporate Citizenship since 2008 (Bundesverband der Deutschen Volksbanken und Raiffeisenbanken 2022, for example).[4]

Similar issues of output measurement and quantitative social accounting (or impact) are long known for non-profit and social enterprises (*Ebrahim* et al. 2014; *Rawhouser* et al. 2019). *Bagnoli*/*Megali* (2011) argue that effectiveness for social enterprises should measure activities realized to achieve the mission, benefits for the intended beneficiaries, and the impact on the wider community. Social accounting approaches have been developed for this context, but are rarely applied for other organizational types (such as banks, for example). *Cordes*/*Coventry* (2010) discuss the Social Return On Investment (SROI) and Cost-Benefit Analysis, whereas *Mook*/*Handy* (2010) illustrate Expanded Value Added

[3] This is rather different for another kind of double bottom line entities: microfinance institutions. For those, objectives seem rather undisputed (poverty alleviation, women's empowerment, rural financial inclusion) and these banks mostly have clear and trustworthy mission statements (*Mersland* et al. 2019). In microfinance, however, there also is a discussion about output measurement (*Meyer*/*Krauss* 2021), ratings are provided by specialized agencies (*Beisland* et al. 2021) and studies exist that evaluate financial and social efficiency in combination (e.g., *Gutiérrez-Nieto* et al. 2009). Typical outputs, besides financial results, are measures of financial inclusion or lending outreach (to the poor, to women, to rural areas).

[4] These reports are only available in German language. The Federcasse association of Italian credit cooperatives also publishes a similar report (Bilancio di Coerenza) since 2002, but only in Italian.

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Statements (EVAS). Also the Balanced Scorecard should be added in this respect (see, e.g., *Wu* et al. 2009, for an application to banking). Finally, it should be noted that also the empirical research on social enterprises contains examples of quantitative performance measurement for benchmarking using frontier methods (*Staessens* et al. 2019, for instance).

Some approaches seek to quantify CSR information through text or content analysis of banks' (sustainability) reports, websites and other sources in order to generate some kind of score or index. A prominent example of such a disclosure score is *Scholtens* (2009), a more recent analysis is *Costa* et al. (2022). This kind of literature also brings forth indices such as the Radical Affinity Index (*San-Jose* et al. 2011), the Banking Sustainability Performance Index (*Rebai* et al. 2016), or the Social and Ethical Banking Index (*Serrano Pérez* 2017, for social banks). Still another approach uses customer surveys to generate CSR image scales (e.g. *Pérez* et al. 2013).

However, the quite extensive literature that examines the relation between corporate social and financial performance[5] mostly uses ESG scores provided by rating agencies and other institutions (Refinitiv, MSCI, sustainalytics, etc.). As ratings from such providers are only made available for rather large or listed banks, they are no option in case small and regional banks are focussed.

Studies on bank performance are legion, even if only those that analyze efficiency are considered. Several reviews of the associated literature therefore are available, such as *Berger/Humphrey* (1997), *Berger/Mester* (1997), *Fethi/Pasiouras* (2010), or *Bhatia* et al. (2018). *Worthington* (2010) provides a review of frontier efficiency studies of deposit-taking financial mutuals, while *Aiello/Bonanno* (2018b) seek to assess result heterogeneity in bank efficiency studies with a meta-regression approach. However, from these surveys and other studies that evaluate the bank efficiency literature with respect to approaches and research objectives (such as *de Abreu* et al. 2019 or *Ahmad* et al. 2020), one could conclude that non-profit goals and stakeholder orientation are not of great interest and thus not broadly assessed in bank efficiency analyses, at least not in contributions to the top finance journals. Research on savings banks and credit cooperatives for the German case (which is comparable to the Austrian one) also evaluates these institutions only with respect to the attainment of financial (efficiency) goals (*Conrad* et al. 2014; *Reichling/Schulze* 2018; *Richter* et al. 2018; *Thiem/Schiereck* 2022). A similar example for Austria is *Hahn* (2007).

[5] A certain share of that literature probably suffers from identification problems. Approaches that account for endogeneity are, for example, *Shen* et al. (2016), who find a positive effect of social performance on financial results, or *López-Penabad* et al. (2023), who report a U-shaped relation between ESG performance and bank efficiency. Note that this paper refrains from a more detailed review of the respective evidence as we seek for a combined performance measure consistent with a dual bottom line.

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Some efficiency studies even find that stakeholder banks outperform other types in terms of financial efficiency. For example, *Pacelli* et al. (2019) observe that savings and cooperative banks (from Germany, France, Spain and Italy, over the 2011 – 2016 period) are more cost-efficient than commercial banks, except for Spain. Other studies, however, report similar levels of efficiency (*Ayadi* 2009, 2010; *Groeneveld* 2014; *Mäkinen*/*Jones* 2015). *Kontolaimou*/*Tsekouras* (2010), on the other hand, argue that savings banks and credit cooperatives are found less efficient than commercial banks when using data on 2800 banks from six EU countries including Austria and Germany.

Manetti/*Bagnoli* (2013) mark the transition to more sensible comparisons that are reflecting the differing objectives. They argue that cooperative banks, for example, may appear less efficient compared to traditional banks due to their statutory commitments. If financial indicators (financial value added and the cost-income ratio) are corrected for benefits created to the main stakeholders, the gap is significantly reduced. Another approach might consist of using scores from rating institutions as additional factors in efficiency calculation. An example, though from microfinance, is *Amersdorffer* et al. (2015), who apply the Social Performance Indicator of Cerise in combination with financial success.

Most applications of social outputs in bank efficiency measurement use Data Envelopment Analysis (DEA) to obtain efficiency scores. *Ahn*/*Le* (2014) discuss the bank behavioral models that might be used in this context. DEA-based performance measurement from a goal-oriented perspective shall enable an evaluation of performance against the goals that are actually pursued, and benefits and efforts[6] (outputs and inputs in the DEA terminology) should be chosen accordingly. *Ahn*/*Le* (2016), for example, base their proposal on stakeholder values such as the return on equity (shareholders), salaries and job security (employees), financial transactions (customers), and bank stability (regulators). From the viewpoint of the intermediation apprach of bank production (*Sealey*/*Lindley* 1977), profitability (from the intermediation business), the volumes of deposit and lending services and personnel expenses may represent benefits derived from the associated objectives. Effort (cost) factors might comprise financial and non-financial resources, as well as credit risks (*Ahn*/*Le* 2016, 378).

A part of the empirical literature similarly motivates the choice of output factors in relation to the double bottom line of stakeholder-oriented banks. Studies that thus report some sort of social efficiency in the DEA context are summarized in Table 1. For being (almost) omnipresent, the volumes of loans and deposits (if used as an output to represent the benefits from related services) are not featured in the table. Prominent output factors applied are the net interest

[6] The broader the set of stakeholders for which benefits and costs are specified, the more does social efficiency determined that way resemble a cost-benefit analysis.

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spread, the number of employees, the number of branches or the share of branches maintained in small (and possibly less developed) municipalities, and measures of tax payments, stability or community promotion. In light of a typical input factor choice in efficiency analyses, a usage of the number of employees as an output factor as in, for example, *Ahn*/*Le* (2015) and *San-Jose* et al. (2014; 2018) is especially noteworthy.

The research of *Ahn*/*Le* (2015) is a good and relevant example to be discussed in some detail. The authors compare intermediation, production and profit efficiency, and they find German savings banks being more (uniformly) efficient in fulfilling their public mandate than they are in maximizing profit. Social outputs considered for efficiency in the intermediation sense are loans plus deposits (success with respect to the objective of funds intermediation, also to generate a sustainable profit) and employees (used instead of the number of branches, to proxy the extent of access to banking services provided). Loan loss provisions, as a measure of credit risk, are inputs alongside interest and non-interest expenses. Resulting intermediation efficiency in that sense is above 80 % on average in most years examined, but profit efficiency typically is below 80 %.

As our study does, some empirical papers also deal with the goal of promoting (societal activities in) the community, reflected by featuring expenses for sponsorship and donations in the set of benefits (outputs). In addition to those listed in Table 1 (*García-Cestona*/*Surroca* 2008; *Piatti* 2014; *Piatti*/*Cincinelli* 2015), some other studies also gather data on expenses devoted to prosocial activities or social welfare but do not calculate efficiency measures (*Bachiller*/*Garcia-Lacalle* 2018; *Idasz-Balina* et al. 2020).

Apart from *Ahn*/*Le* (2015), also other studies feature a comparison of efficiency scores derived under the usual profit maximization assumption (financial efficiency) with performance from a social efficiency model. *Bergendahl*/*Lindblom* (2008) report social efficiency being somewhat more dispersed than financial efficiency, but the number of fully efficient banks is relatively higher in the social model. The results of *Martínez-Campillo* et al. (2018) and *San-Jose* et al. (2014; 2018), on the other hand, are more in line with *Ahn*/*Le* (2015) as average social efficiency is found to be higher than the average financial performance. Due to differing regions, sample periods, and inputs and outputs chosen, however, these findings may not be directly comparable.

The measurement of efficiency also plays a role in research on bank competition. *Hackethal* et al. (2012), for example, propose adjusting the Lerner index for differences in profit efficiency to compute a measure of potential market power. By this, they want to correct actual margins of price over marginal cost for being low in case banks enjoy the quiet life due to (local) market power. Then, they exhibit slack in generating revenues (forgo pricing opportunities) or have inefficiently high input expenses or both. However, *Hackethal* et al. (2012) argue that

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this form of operational slack is observationally equivalent to the German savings banks they examine actively pursuing their public mandate (societal objectives). In that case, observed inefficiency does not stem from poor cost management skills or inferior governance, but from, e.g., benevolent interest rate setting or local factor consumption, extensive activities and expenses related to lending, or the support of local communities in fulfilling their economical, social and cultural tasks. *Hackethal* et al. (2012, 4280) then propose to consider benevolent activities as output factors to better discriminate between the two explanations of low profit efficiency. However, associated data were not available to them, which is a limitation of their results. Considering the pursuit of societal goals in efficiency measurement thus would also help in adequately assessing the competitive behavior of stakeholder-oriented banks which might be a motivation for future research.

Table 1

Social Output Factors Applied in the Empirical Literature

Output variables	**Source**	**Description of (base) sample**
Average interest rate paid on deposits; reciprocal of average interest rate received from borrowers	*Fried* et al. (1993)	8947 U.S. credit unions, 1990
Average interest rate paid on deposits; reciprocal of average interest rate received from borrowers	*Brown* (2006)	254 Australian credit unions, 1993 – 1995
Reciprocal value of interest and fee income relative to the volume of loans to customers	*Piatti*/*Cincinelli* (2015)	82 Italian mutual banks, 2011
Negative value of the difference in the average rate on loans to the average rate in the sample	*Piatti* (2014)	60 Italian mutual banks, 2010/2011
Net interest margin (used on the input side as a bad output)	*Bergendahl*/*Lindblom* (2008)	88 independent Swedish savings banks, 1997 – 2001
Number of employees (proxy for the number of branches, which depicts the accessability of banking services)	*Ahn*/*Le* (2015)	396 German savings banks, 2006 – 2011
Number of employees	*San-Jose* et al. (2014)	Spanish savings banks, 2000 – 2011, 6000 observations
Number of employees	*San-Jose* et al. (2018)	2752 banks from EU-15 countries, 2014

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Output variables	Source	Description of (base) sample
Share of branches in municipalities with less than 25,000 inhabitants	*Martínez-Campillo/Fernández-Santos* (2017)	81 Spanish cooperative banks, 2008 – 2014
Share of branches in municipalities with less than 25,000 inhabitants	*Martínez-Campillo* et al. (2018)	81 Spanish cooperative banks, 2008 – 2013
Share of branches in municipalities with less than 25,000 inhabitants	*Sierra-Fernández* et al. (2019)	81 Spanish cooperative banks, 2008 – 2013
Number of branches	*Canhoto/Dermine* (2003)	20 Portuguese banks, 1990 – 1995
Number of branches	*Bergendahl/Lindblom* (2008)	88 independent Swedish savings banks, 1997 – 2001
Social contribution in form of tax payments	*San-Jose* et al. (2014)	Spanish savings banks, 2000 – 2011, 6000 observations
Social contribution in form of tax payments	*San-Jose* et al. (2018)	2752 banks from EU-15 countries, 2014
Part of profit distributed to the community (taxes in % of profit)	*Piatti* (2014)	60 Italian mutual banks, 2010/2011
Financial stability (reciprocal value of contingent risks and commitments)	*San-Jose* et al. (2014)	Spanish savings banks, 2000 – 2011, 6000 observations
Financial stability (reciprocal value of contingent risks and commitments)	*San-Jose* et al. (2018)	2752 banks from EU-15 countries, 2014
Financial stability (bad debt write-offs as a bad output)	*Glass* et al. (2010)	388 Irish credit unions, 2006
Training hours per employee	*Piatti/Cincinelli* (2015)	82 Italian mutual banks, 2011
Training hours per employee	*Piatti* (2014)	60 Italian mutual banks, 2010/2011
Spending to services with charitable or social character	*García-Cestona/Surroca* (2008)	50 Spanish savings banks, 1998 – 2002
Donations and sponsorship (per member)	*Piatti* (2014)	60 Italian mutual banks, 2010/2011
Donations and sponsorship (in % of profit)	*Piatti/Cincinelli* (2015)	82 Italian mutual banks, 2011
Social fund contribution (Education and Promotion Fund) in % of net profit	*Martínez-Campillo* et al. (2018)	81 Spanish cooperative banks, 2008 – 2013

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III. Data, Variables and Empirical Approach

As the final set of benefit variables shall contain data from a one-time survey, the entire empirical part is restricted to an examination of 2020. Due to the focus on regional retail banks, the study does not consider most large, joint-stock banks that operate nationwide, private banks, state mortgage banks, building and loan associations, special purpose banks, and branch offices of Member State credit institutions. Also the (regional) head institutions of the savings and cooperative banks' sectors were excluded from the sample (as well as the Zweite Sparkasse) as their business focus differs from that of the primary, regional banks.[7]

The basic sample thus consists of savings banks, two kinds of credit cooperatives (Raiffeisen and Volksbank), as well as selected joint-stock banks that exhibit a local orientation.[8] By that, we seek to establish a comprehensive sample of regional banks with a focus on stakeholder relationships and a stated goal to promote the region they operate in. For the end of 2020, 401 banks fulfill these criteria. Data on their financial statements, as well as information on the geographical distribution of banks' offices, was obtained from the Austrian National Bank (the Oesterreichische Nationalbank, OeNB).

Choosing the year 2020 for the survey as well as the entire analysis introduces some vagueness as the levels of bank inputs and outputs (costs and benefits) may be non-uniformly impacted by the Covid-19 pandemic. This might be true for bank lending and thus interest income, although effects were attenuated by government support measures (Oesterreichische Nationalbank 2021). As in Germany (*Wrede* 2021), however, savings banks and credit cooperatives extended the level of credit in the first year of the pandemic. As a further example, banks with a preference for event sponsoring might have more strongly adapted their regional support expenses in lockdown periods. Although the effects the pandemic had on our data are hard to assess, we hope that the answer to the general question of the paper (whether efficiency rankings of stakeholder-oriented banks are strongly affected by choosing a more adequate performance definition) is quite independent of the atypical setting in 2020.

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[7] Following these deletions, we are not able to compare stakeholder banks to (large) commercial banks in terms of social efficiency. However, the number of the latter is rather small in Austria and commercial banks cannot be considered comparable to the banks in our sample with respect to regional presence and interests. Thus, their absence is bearable based on the premise that efficiency comparisons should occur among homogenous entities.

[8] There are four of those joint-stock banks: the Volkskreditbank (VKB), the Bank für Kärnten und Steiermark (BKS), the Bank für Tirol und Vorarlberg (BTV), and the Oberbank.

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A two-step procedure was pursued to gather data on sponsorship expenses. On the one hand, all 401 banks were polled via an email survey in spring 2021 and asked to provide their expenses for sponsoring and donations in 2020. These may include disbursements that promote social welfare and activities related to cultural, educational, charitable, healthcare and leisure purposes, mostly made to municipalities, clubs or associations (by devoting financial benefits, but also including allowances in kind). Aside from the survey, publicly available content from the banks' websites (factsheets, annual reports, sustainability reports, press reports, customer magazines and sales bulletins) was screened on whether it contained the desired information. In that manner, it was possible to gather data on sponsorship and donations for 127 banks (about 32 % of the basic sample). For 112 banks, the information emanates from the survey (amounting to a response rate of about 28 %).

The empirical approach is as follows. For the basic sample of 401 banks (consisting of 4 joint-stock banks, 46 savings banks, 341 Raiffeisen and 10 Volksbank credit cooperatives), we calculate a rather standard efficiency measure (termed Financial Efficiency, or FE) as well as a first integrated measure (though without sponsoring data, termed Social Efficiency A, or SEA) by use of Data Envelopment Analyis (DEA). Both the distributions of these two scores, as well as the banks' efficiency ranking positions shall be evaluated and compared, loosely following *Amersdorffer* et al. (2015) and *Martínez-Campillo* et al. (2020). A second set of results then is obtained for the subset of 127 banks by also considering the additional sponsorship data in the computation of social efficiency (resulting in scores termed SEB). All efficiency scores (except for measures of scale efficiency calculated later on) are corrected for the bias that originates from the fact that the true frontier is unobserved. This is done per the procedure of *Simar/Wilson* (2007) that is, thereafter, also applied to examine the connection of efficiency to selected environmental factors. Finally, the predictions from the regression model are used to evaluate how strongly efficiency rankings are affected by bank and market characteristics.

FE, which is used as a benchmark that social efficiency is compared to, is computed using standard outputs and inputs. Thereby, the disputed role of deposits is avoided by using only interest expenses, as resources in the production process. Personnel costs and other administrative expenses (including depreciation) make up the additional input factors. Production outcomes consist of total loans, other earning assets, and non-interest income.[9]

[9] Non-interest income shall proxy for the increased importance of fee-generating services for bank profitability, and is considered by, for example, *Ahn/Le* (2014; 2015). *Fethi/Pasiouras* (2010) refer to other studies that use non-interest income as an additional output.

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Outputs (benefits) in the approach that integrates both financial and (some) non-profit objectives (for which the term social efficiency shall be used) are: the sum of total loans and customer deposits (compatible with an objective of extensively providing the associated intermediation services), the number of bank offices in municipalities with less than 10,000 inhabitants (quantifying the extent of regional presence, also including otherwise underserved markets), the *z*-score (as a proxy of the bank's contribution to financial sector stability), municipal tax payments (measuring the contribution to municipality budgets, and thus to the financing of public spending), and expenses for local sponsoring and donations.[10] Efforts (resources used) are represented by personnel expenses, other administrative expenses, and net write-downs (depicting risk in the credit portfolio, and the screening and monitoring efforts made to keep it low).

Although we appreciate that stakeholder banks may see the creation and retention of local jobs as a valuable part of their operations, we cannot not follow *Ahn*/*Le* (2015) or *San-Jose* et al. (2014; 2018) in considering the number of employees as an output factor as the respective data is not available. To the opposite, personnel expenses are applied as a cost factor, as we do not presume personnel a factor to be maximized (an output). Loan revaluations depict asset quality, but may also be seen as a (second) financial stability measure, though only referring to credit risk. A similar measure is applied, for example, in *Bergendahl*/*Lindblom* (2008), *Glass* et al. (2010) and *Ahn*/*Le* (2015).

Total loans consist of claims against other banks as well as against customers, other earning assets are fixed-income securities, shares, participations and shares in affiliated enterprises. Non-interest income contains net commissions income, income from securities and participations, and from financial operations. Following *Lepetit*/*Strobel* (2013), the *z*-score is calculated as *(mean(ROA)+er)/sd(ROA)*, where the mean and the volatility of the ROA use 12 years of data (2009 – 2020), and *er* is the equity share in total assets. Municipal tax is a levy to be paid to municipal bodies based on the wage bill originating in production sites that are actually located in their area. Net write-downs represent the net expenditure from loan re-valuations (direct write-offs as well as bad debt provisions). Table 2 reports descriptive statistics for all input and

[10] In a standard efficiency analysis, we can only refer to such crude or quite generally defined goals and associated outputs. On the one hand, data for more refined goal definitions are harder to obtain and some efforts on some objectives are not easily measured or quantified. To give some examples, there are many aspects of employee relationship management (diversity, training hours, social benefits, etc.) or lending (for start-ups, housing, minorities, non-prime customers, and so on). On the other hand, the potential set of indicators quickly would become extensive, and thus impractical for the calculation of frontier efficiency (where the number of outputs and inputs should be rather limited).

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output measures used, as well as their dimensions. Data from financial statements generally are in millions of euro, municipal tax and sponsoring data, however, in thousand euro.

All in all, we use many of the social outputs from the empirical literature at once (apart from the number of employees, as mentioned above), plus the *z*-score. Interest rates (see also Table 1), however, are not among the output set. *Bergendahl/Lindblom* (2008), among others, argue that stakeholder-oriented banks may generate customer value by rather high deposit rates and reasonably low lending rates. Practical observation leads us to believe that such behavior is not particularly pronounced among regional banks, which is confirmed by *Busch/Memmel* (2021), at least for deposit rates.

Efficiency scores are estimated by DEA, using an input-oriented model for FE, whereas scores for SEA and SEB are output-oriented. All models assume variable returns to scale. Bias-corrected scores are computed per the procedure of *Simar/Wilson* (2007), Algorithm #2, which also comprises a second estimation stage based on truncated regression. In the latter part of the procedure, (inhomogenous) market environments are controlled for that may affect (in)efficiency levels. By this, it is avoided that, for example, weak efficiency is attributed to managerial incompetence if it is actually caused by unfavorable external conditions. As many bank-specific variables are, in one form or another, used as benefit and cost measures in the calculation of efficiency scores, the only bank-level covariate we apply in that second extimation stage is bank size, measured by the natural logarithm of total assets. The remaining covariates are factors describing market environments that banks face. For that, data observed at the municipality level is transformed to one value per bank by calculating (population-weighted) averages of these variables of all municipalities the bank operates branches in. The variables used in this context are described in Table 3 with descriptive statistics being reported as well. Municipality data were obtained from Statistics Austria (except district-level start-up intensities coming from the Austrian Economic Chambers, Wirtschaftskammer Österreich, or WKO) and refer to 2018 with the exception of average income, which is for 2017.

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Table 2

Benefits and Costs (Outputs and Inputs) – Description and Statistics

Variable	Description/Note	Units
Loans	Claims against credit institutions and customers (non-banks)	Million euro
Deposits	Deposits from (liabilities to) customers (nonbanks)	Million euro
Other earning assets	Fixed-income securities, shares, participations and shares in affiliated enterprises	Million euro
Non-interest income	Net income from commissions, income from securities, participations and financial operations	Million euro
Municipal tax (bank level)	Municipal tax expenses of the bank	Thousand euro
Bank offices	Number of offices the bank operates in municipalities with less than 10,000 inhabitants	Count
Z-score	Return on assets plus equity ratio, divided by the standard deviation of the return on assets	Score/Ratio
Sponsoring and donations	Sponsoring of social, educational, cultural, charitable and leisure activities and donations to associated institutions	Thousand euro
Personnel expenses	Staff costs	Million euro
Administrative expenses	Administrative costs including depreciation	Million euro
Interest expenses		Million euro
Net write-downs	Net value adjustments of loans (including direct write-offs), net risk provisions for lending	Million euro

Variable	Mean	Standard deviation	Minimum	Maximum
Loans	538.65	1348.92	20.92	16773.10
Deposits	489.92	1184.82	20.71	12039.82
Other earning assets	48.82	169.56	0.24	2145.11
Non-interest income	4.99	14.62	0.19	189.90
Municipal tax (bank level)	128.01	315.68	7.00	3796.00
Bank offices	5.43	7.54	0	84
Z-score	47.28	24.62	4.27	209.42
Sponsoring and donations*	128.48	166.74	7.00	1125.00
Personnel expenses	5.44	13.86	0.29	172.36
Administrative expenses	4.05	10.63	0.20	101.25
Interest expenses	1.08	5.84	–0.04	79.85
Net write-downs	1.45	5.30	–2.38	59.70

* Available for 127 observations.

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Table 3

Second-Stage Explanatory Variables – Description and Statistics

Variable	Description/Note	Units
Bank size	Natural logarithm of total assets	Ln(million euro)
Population	Number of inhabitants	1000 capita
Elderly inhabitants	Share of inhabitants aged 60 or more in the total population of the municipality	%
Tertiary education	Share of inhabitants with a tertiary educational achievement (university or comparable)	%
Average income	Average yearly income of the employed resident population	1000 euro per capita
Primary sector employment	Employment share in the primary production sector (agriculture, forestry, and fishery)	%
Non-commuters	Share of employed inhabitants that do not commute to a workplace outside of the district	%
Municipal tax (municipality)	Revenues of the community from municipality tax	100 euro per capita
Business registration intensity	Newly founded firms relative to district population (start-up intensity)	Firms per 1000 capita
Unemployment rate	Percent of working population unemployed	%
Bank office density	Bank offices relative to population	Offices per 1000 capita

Variable	Mean	Standard deviation	Minimum	Maximum
Bank size	5.618	1.102	3.230	9.970
Population	13.974	35.491	0.804	286.292
Elderly inhabitants	25.491	3.332	17.458	36.427
Tertiary education	8.544	3.450	2.062	25.290
Average income	24.865	2.417	17.458	32.566
Primary sector employment	8.442	6.699	0.078	37.188
Non-commuters	61.462	14.917	27.961	93.167
Municipal tax (municipality)	3.143	2.012	0.532	17.875
Business registration intensity	4.249	0.800	3.000	8.009
Unemployment rate	4.832	2.628	1.044	19.481
Bank office density	0.656	0.309	0.169	2.877

Notes: Descriptive statistics are shown for the full sample (401 observations).

Market-related data is from 2018, except for average income, which is from 2017.

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IV. Results

1. *Results on Efficiency Scores, Full Sample*

First, we compute FE and SEA scores for 401 banks (in 2020) per *Simar/Wilson* (2007), Algorithm #2,[11] thus correcting efficiency scores for an inherent bias as the true production frontier is unobservable. Results from the second estimation stage are reported in Subsection 5. For density and box plots of bias-corrected scores (FEBC and SEABC, then), see Figure 1. Scatterplots of scores and efficiency rankings are to be found in Figure 2.

As can be inferred from Figure 1, bias-corrected SEA scores are much more uniform than FE scores – on average, they are 0.88 and 0.76, respectively. This means that the average regional bank in Austria is nearer to the best practice institution with respect to social efficiency than it is for financial efficiency. Contrary to some interpretations from other studies, this does not necessarily mean that banks are more successful in terms of social objectives (more socially efficient) than they are in financial terms.[12] As efficiency scores from DEA always are relative measures, there are no absolute levels of efficiency on which such comparisons could be based. More sensibly, one can compare rankings individual banks have in both score distributions, as, for example, also *Amersdorffer* et al. (2015) and *Martínez-Campillo* et al. (2020) do.

Several interesting and important conclusions can be drawn from banks' efficiency score distributions and from bank rankings derived from these scores. First, financial efficiency appears to be very diverse across Austrian savings banks and credit cooperatives, and many of those regional banks are very distant from best practice. Second, when moving from the financial to the social efficiency perspective, ranks change considerably. The maximum downward movement from the FEBC to the SEABC rank (the respective best practice bank has the rank 401) is 364, and on the other hand, one bank improves by 320 positions. Bias-corrected scores correlate by 0.50, rank correlations are 0.53 (Spearman's ρ) and 0.37 (Kendall's τ). Figure 2 contains a scatterplot of ranking positions (the graph on the right). Banks rank rather differently in financial and social terms,

[11] Results are obtained by using the STATA module simarwilson (*Badunenko/Tauchmann* 2019), using 100 replications in the bias-correction procedure and 2000 bootstrap replications with the truncated regression model. Additionally, the module flex (*Santos Silva* et al. 2013) is used to estimate the second stage by fractional logit (*Papke/Wooldridge* 1996) to obtain an R^2 measure.

[12] Banks with relative bias-corrected scores on Social Efficiency A that are higher than their scores on FE are to be found above the diagonal in the left graph of Figure 2. This means that they score relatively better based on SEABC than for FEBC, but does not necessarily imply that their success in achieving social goals exceeds the respective attainment of financial goals in absolute terms.

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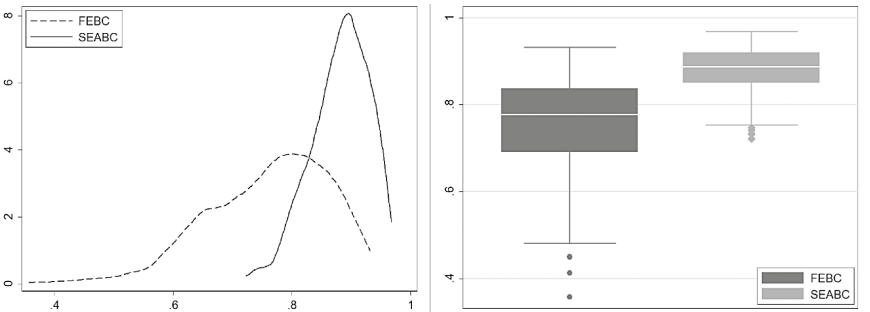

Figure 1: Distribution of Bias-Corrected Efficiency Scores (Financial Efficiency, Social Efficiency A), Full Sample

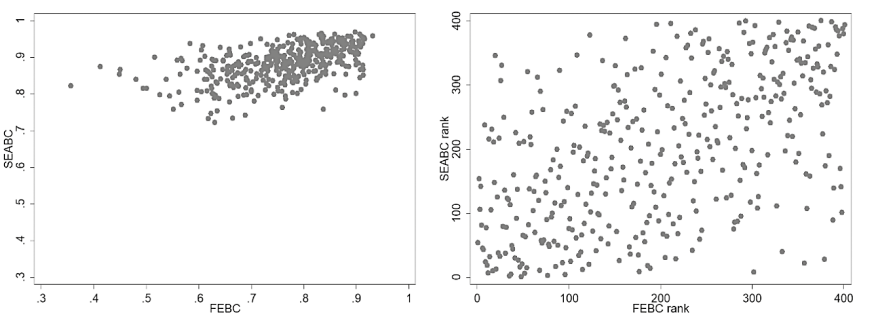

Figure 2: Social Efficiency A vs. Financial Efficiency (Scores and Rank), Full Sample

which confirms our proposition that the perspective of efficiency evaluation matters. The degree to which stakeholder banks in Austria pursue (are successful in pursuing) social objectives seems to be only moderately diverse.

2. Results on Efficiency Scores, Restricted Sample

For Social Efficiency B (SEB), scores were calculated by considering sponsorship expenses as additional social output. The ranks with respect to the FEBC scores described above are adjusted to consider the 127 banks with sponsorship information only. Figure 3 presents score distributions, while Figure 4 shows scatterplots of bias-corrected scores and associated rankings. SEB scores (corrected for bias, SEBBC), on average, are 0.91. SEBBC scores' correlation with FEBC scores is 0.35, rank correlation coefficients emerge as 0.38 (Spearman) and 0.26 (Kendall). Considering expenses for sponsoring and donations as an additional output thus reduces the correlation between financial and social efficiency scores. Differences in ranking positions again are exorbitant – the largest ranking change downwards is 106 positions, upwards it is 108 positions.

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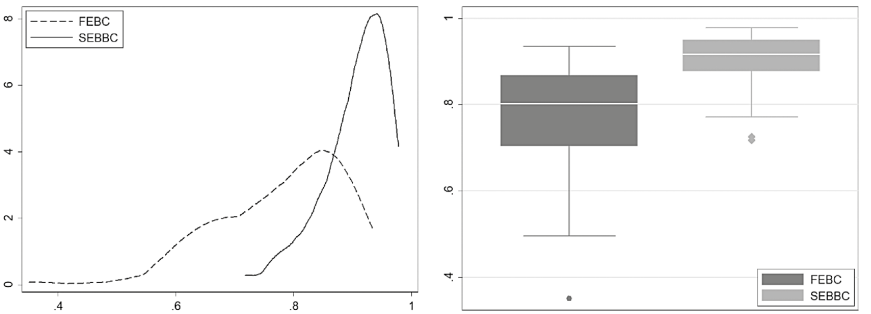

Figure 3: Distribution of Bias-Corrected Efficiency Scores (Financial Efficiency, Social Efficiency B), Restricted Sample

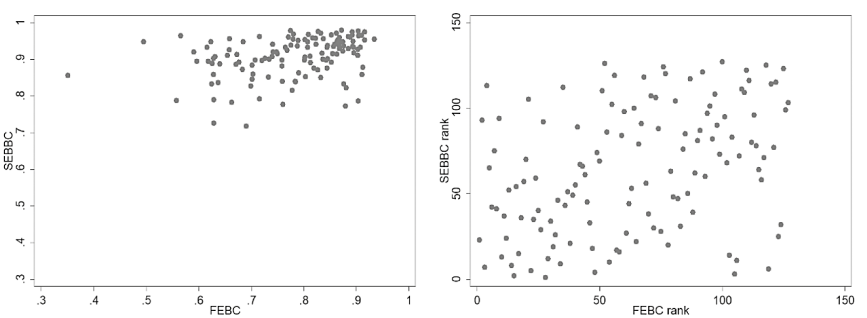

Figure 4: Social Efficiency B vs. Financial Efficiency (Scores & Rank), Restricted Sample

3. *Characteristics of Banks 'Improving' Most*

Can we say something about the banks whose relative efficiency positions improve the most when moving from financial to social efficiency? By simple correlations with bank-level characteristics and environmental circumstances it can be observed that banks with larger rank differences (SEABC versus FEBC) are significantly larger and more deposit-financed, have a higher share of interest income and are more likely to be situated in regions with an elder population, lower municipal tax revenues and less within-district commuters. While this points to more socially efficient banks being not-too-small rural banks, correlations in general are rather low. When considering Social Efficiency B, some correlations turn insignificant, possibly due to the lower number of observations (and effects of selection into taking part in the survey). Conclusions are similar if we only look for characteristics of banks that move their position from below median in FEBC to above the median score in social efficiency.

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4. *Scale Efficiency*

Some comments also on the scale efficiency of the examined banks shall be made, although its assessment is not practicable based on bias-corrected scores. After bias correction, there is no equality of maximum scores from variable (VRS) and constant returns to scale (CRS), thus no DMU is (strictly) at the most productive scale size (MPSS). Thus, the MPSS is not easily identifiable, and scale efficiency scores even may be larger than one. The following figures are thus obtained by using uncorrected efficiency scores.[13] A bank that is found efficient (with an uncorrected score of one) both when assuming VRS or CRS operates at the MPSS. For Social Efficiency A (SEA) the mean value is 0.979 for scale efficiency. 22 out of 401 banks are at the MPSS, 209 operate under decreasing returns to scale (DRS), 170 under increasing returns to scale (IRS). On average, the potential to reap (further) economies of scale is rather limited, and about the same number of banks might improve by growth or downsizing. Similar conclusions apply for SEB (results are not reported).

5. *Correcting for Environmental Confounders*

Another important aspect is how environmental conditions affect performance evaluations. With regional banks examined, also local circumstances are to be considered in order to avoid mistaking the influence of exogenous factors for managerial inefficiency (*Brown* 2006; *Tabak* et al. 2013). While many studies control for such confounding factors (e.g. population density, per capita income, unemployment rate) at the regional level, only some investigate their incremental goodness-of-fit.[14] Estimates of the additional explanatory power provided are about 10 to 15 percentage points (*Bos*/*Kool* 2006; *Conrad* et al. 2014) or a third (reported by *Aiello*/*Bonanno* 2018a). However, environmental factors applied by *Bos*/*Kool* (2006) and *Aiello*/*Bonanno* (2018a) also contain some bank characteristics. *Glass*/*McKillop* (2006) report that market features like per capita income and local unemployment explain almost the entire dispersion in the efficiency of US credit unions.

Recent papers that apply environmental factors in explaining the efficiency of German cooperative banks are *Richter* et al. (2018) and *Dombrowa* (2019), while *Reichling*/*Schulze* (2018) and *Thiem*/*Schiereck* (2022) examine such external determinants for German savings banks. *Thiem*/*Schiereck* (2022), for example,

[13] Results are obtained by using the STATA module teradial (*Badunenko*/*Mozharovskyi* 2016).

[14] Estimates of incremental goodness-of-fit are mostly from studies using Stochastic Frontier Analysis (SFA) or from OLS being used to explain efficiency scores obtained by DEA. *Conrad* et al. (2014) represent an example for the latter case.

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propose influences from population density and structure, regional economic development and bank competition.

Table 4 features the results from considering covariates in a second estimation stage per *Simar*/*Wilson*'s (2007) Algorithm #2. R^2 values are obtained from estimating the same model by fractional logit (*Papke*/*Wooldridge* 1996). Incremental explanatory power of regional factors (all except bank size) is about half the R^2 reported in Table 4, a bit more in case of financial efficiency. Thus, as found by other studies, environmental factors have their share in explaining differences in efficiency positions. Several (potential) indicators of market structure, demand and attractiveness are applied. Financial efficiency is higher for larger banks, and banks in markets with a lower share of elderly, a lower unemployment rate, but higher bank office density and per capita income. Regional banks thus seem to be more financially successful in more developed and more attractive markets. Surprisingly, FEBC is also significantly higher for banks in areas with a higher share of employment in agriculture, which might be due to isolation effects in such markets.

Social Efficiency A is also higher for larger banks. Effects of regional factors are mixed, some of the relations of efficiency with characteristics of developed markets mentioned above also apply here. However, the share of non-commuters and municipal tax revenues are negatively significant, which points to banks in areas with poorer employment dynamics exhibiting higher social efficiency scores. When moving to Social Efficiency B (with sponsoring expenses as an additional output, but a lower number of observed banks), average income per capita loses its significance. As the population age shows a positive relation to efficiency here, there is even more indication on that banks in economically disadvantaged regions may put more emphasis on social commitment and community promotion activities.

As argued above, an interpretation of scores in terms of managerial skills may be misleading if the non-uniform influences of banks' environments are not considered. Nevertheless, only a few papers present corrected, sometimes termed *pure*, efficiency scores (for example, *Reichling*/*Schulze* 2018; and *Thiem*/*Schiereck* 2022).[15] To obtain such measures, we use simple predictions from the explanatory estimation stage, which can be interpreted as an environment-adapted benchmark. These are then deducted from the original scores to obtain residual inefficiencies. If positive, for example, this residual indicates that efficiency is higher than predicted for banks of similar size operating in markets with similar characteristics. Again, bank ranking changes rather dramatically

[15] Such a correction of performance indicators has gained some popularity in the literature that uses simple cost-income ratios as efficiency measures (*DeYoung* 1997; *Burger*/*Moormann* 2008; *Richter*/*Gischer* 2019).

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Table 4

Determinants of Efficiency

Variable	Financial Efficiency	Social Efficiency A	Social Efficiency B
Bank size	3.030** (0.00)	2.189** (0.00)	3.953** (0.00)
Population	–0.004 (0.84)	0.008 (0.32)	–0.021 (0.16)
Elderly inhabitants	–0.923** (0.00)	–0.119 (0.11)	0.287** (0.01)
Tertiary education	0.121 (0.63)	–0.172 (0.12)	–0.096 (0.60)
Average income	0.815** (0.01)	0.590** (0.00)	0.093 (0.65)
Primary sector employment	0.226** (0.04)	0.054 (0.30)	–0.255** (0.00)
Non-commuters	0.012 (0.77)	–0.041** (0.03)	–0.131** (0.00)
Municipal tax (municipality)	0.414 (0.19)	–0.246* (0.08)	–0.574** (0.01)
Business registration intensity	–0.285 (0.67)	–0.432 (0.17)	–0.540 (0.23)
Unemployment rate	–0.794** (0.00)	–0.354** (0.00)	–0.779** (0.00)
Bank office density	6.620** (0.00)	4.720** (0.00)	10.271** (0.00)
Constant	58.367** (0.00)	68.977** (0.00)	70.104** (0.00)
Number of banks	401	401	127
R^2 (from fractional logit)	0.242	0.306	0.721

Notes: Dependent variables: financial efficiency scores (input-oriented) and social efficiency scores (output-oriented) for 2020.

Efficiency scores are bias-corrected, and calculated assuming variable returns to scale.

Estimation method: truncated regression, *Simar/Wilson* (2007) Algorithm #2.

The table reports mean bootstrap coefficients, multiplied by 100.

R^2 is from an estimation of fractional logit (*Papke/Wooldridge* 1996).

P-values for the *t*-test on non-significance are given in parentheses.

* Significant at the 10 % level. ** Significant at the 5 % level.

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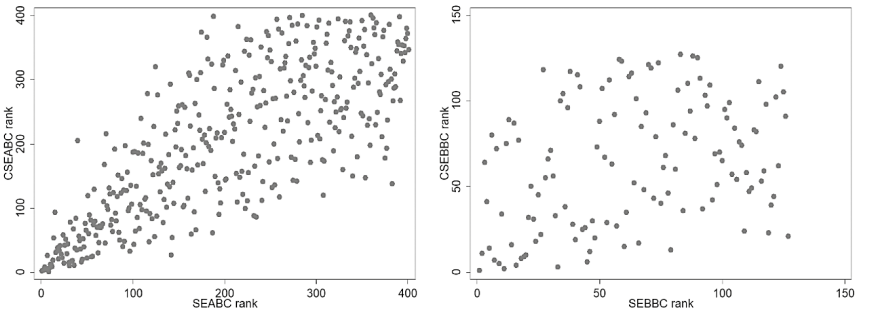

Figure 5: Ranks Before and After Correcting for Environmental Factors (Social Efficiency A and B)

(see Figure 5, which shows the ranks before and after correcting SEABC and SEBBC for environmental factors), which further hints on the importance of the market environment for potential and realized (revealed) efficiency outcomes.

6. Sectoral Differences in Efficiency

Finally, we examine how efficiency estimates vary across bank types. Table 5 shows results from the larger sample, controlled for environmental circumstances (residuals from the first two regressions in Table 4, obtained as described in Subsection 5 above). These efficiency measures are thus centered at zero for the whole sample, positive (negative) values indicate a relative outperformance (underperformance). Descriptive statistics for subgroups reveal that the lowest sector average of adjusted financial efficiency can be observed for savings banks. Savings banks also marginally underperform the rest of the sample in terms of social efficiency. However, their average ranking improves significantly when compared to ranks in residual financial efficiencies. Most joint-stock banks overperform in both efficiency categories, and Volksbank credit cooperatives improve (by 50 positions in the ranking, on average) when considering social instead of financial performance. However, these differences and improvements are not found to significantly differ from zero.[16] Variances of residual efficiency

[16] The null hypotheses in these tests is that efficiency measures of one sector are not significantly different from those in the remaining bank sectors. Explaining the observed differences is obscured by accounting for the impact of market characteristics, but from the raw data, it can be seen that, for example, the average savings bank has rather high personnel expenses and relatively low non-interest income (both relative to total assets). As Raiffeisen credit cooperatives make up the vast majority of the sample and show highly dispersed efficiency measures, their average ranking could not be expected to change

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measures, on the other hand, differ significantly across groups (according to a Bartlett test), which seems to be driven by the rather homogeneous efficiency levels of the four joint-stock banks. For Social Efficiency B (the respective results are not shown in tabular form), both its average level and variance appear rather homogeneous across bank sectors.

Table 5

Environment-Controlled Efficiency by Bank Type

Sector (Number of Banks)	**Financial Efficiency Mean (SD) [Min, Max]**	**Social Efficiency A Mean (SD) [Min, Max]**	**Rank Difference Mean (SD) [Min, Max]**
Joint-stock banks (4)	0.014 (0.030) [–0.014, 0.047]	0.014 (0.018) [–0.002, 0.029]	28 (20.61) [10, 54]
Savings banks (46)	–0.068** (0.092) [–0.297, 0.124]	–0.018** (0.039) [–0.163, 0.040]	32.30** (109.56) [–286, 295]
Raiffeisen credit cooperatives (341)	0.007 (0.083) [–0.412, 0.210]	0.001 (0.042) [–0.115, 0.087]	–6.15 (126.15) [–351, 337]
Volksbank credit cooperatives (10)	–0.034 (0.141) [–0.313, 0.069]	0.015 (0.020) [–0.020, 0.051]	50 (83.05) [–72, 193]
All banks (401)	–0.003 (0.088) [–0.412, 0.210]	–0.001 (0.041) [–0.163, 0.087]	0 (123.52) [–351, 337]

Notes: Residual financial efficiency scores (input-oriented) and social efficiency scores (output-oriented) for 2020, after controlling for bank size and environmental variables.

P-values for the *t*-test on non-significant differences from the rest of the sample are given in parentheses.

* Significant at the 10 % level. ** Significant at the 5 % level.

very much. All the other (smaller) groups of banks show average rank improvements when the focus changes towards social efficiency. The relative importance of certain inputs and outputs (that are considered in financial but not social efficiency and vice versa) also here gives an indication on why this happens. For example, the financial efficiency of Raiffeisen credit cooperatives is favored by rather low interest expense levels, whereas social efficiency suffers from relatively high loan revaluations. Furthermore, social efficiency does not consider the minor importance of other earning assets for Volksbank credit cooperatives anymore, but appreciates joint-stock banks' high *z*-score levels.

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V. Summary and Conclusions

Stakeholder-oriented banks such as savings banks and credit cooperatives not only have shown to be able to effectively compete with commercial banks, but also to be resilient to financial crises. By their very nature and business model, these bank types credibly fulfill the demand of political and societal forces with respect to a more social orientation of the banking sector.

The main takeaway of the paper is that the assessment of stakeholder banks' efficiency needs to increasingly take their actual objectives into account. Despite a certain diversity in the extent of their individual social commitment, savings banks and credit cooperatives should be evaluated against the double bottom line goals that constitute their business model. As efficiency positions seem to be dramatically diverse across performance evaluation concepts, stakeholder-oriented banks should not be solely assessed based on financial figures. Sensible and fair comparisons with other bank types need to take the social orientation of these banks into account.

Interfering market attributes represent a further factor affecting the performance of stakeholder banks. Even if their incremental explanatory power is not staggering, environmental factors obscure a fair evaluation of managerial (in) efficiency, a fact that future research should increasingly consider.

Of course, our paper has several limitations. First, social efficiency is only assessed for one year and, in its most comprehensive form, for a restricted set of banks, which may inhibit the generalizability of the obtained results. Second, there are several, more detailed facets of banks' social contribution for which there is no data or quantitative measure. Further progress in reporting (standards) may help in solving this problem in the future. At the same time, academic research is called upon to develop a suitable performance evaluation system for stakeholder-oriented banks (*Groeneveld* 2020).

Reporting and benchmarking systems improved in this way may open new paths for stakeholder banks to convey their business model and competitive advantages more easily, objectively, and credibly to all stakeholders. An enlarged knowledge about their overall performance would also generate a more profound basis in discussions of financial stability, regional development, and institutional diversity (on the latter see, e.g., *Kotz/Schäfer* 2018 or *Bertuch-Samuels* 2018). Additionally, policies that might support the retention of stakeholder banks and their business model, such as proportional regulation or more prudent consolidation (*Groeneveld* 2020) would have more backing as well.

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References

de Abreu, E. S./*Kimura*, H./*Sobreiro* V. A. (2019): What is going on with studies on banking efficiency? Research in International Business and Finance, Vol. 47, 195 – 219.

Ahmad, N./*Naveed*, A./*Ahmad*, S./*Butt*, I. (2020): Banking sector performance, profitability, and efficiency: A citation-based systematic literature review. Journal of Economic Surveys, Vol. 34(1), 185 – 218.

Ahn, H./*Le*, M. H. (2014): An insight into the specification of the input-output set for DEA-based bank efficiency measurement. Management Review Quarterly, Vol. 64(1), 3 – 37.

Ahn, H./*Le*, M. H. (2015): DEA efficiency of German savings banks: evidence from a goal-oriented perspective. Journal of Business Economics, Vol. 85(9), 953 – 975.

Ahn, H./*Le*, M. H. (2016): Decision-oriented Performance Measurement Framework – An Emphasis on Rationality. In Ahn, H./Clermont, M./Souren, H. (Eds.), Nachhaltiges Entscheiden (369 – 383). Springer.

Aiello, F./*Bonanno*, G. (2018a): Multilevel empirics for small banks in local markets. Papers in Regional Science, Vol. 97(4), 1017 – 1037.

Aiello, F./*Bonanno*, G. (2018b): On the sources of heterogeneity in banking efficiency literature. Journal of Economic Surveys, Vol. 32(1), 194 – 225.

Amersdorffer, F./*Buchenrieder*, G./*Bokusheva*, R./*Wolz*, A. (2015): Efficiency in microfinance: financial and social performance of agricultural credit cooperatives in Bulgaria. Journal of the Operational Research Society, Vol. 66(1), 57 – 65.

Avkiran, N. K./*Morita*, H. (2010): Benchmarking firm performance from a multiple-stakeholder perspective with an application to Chinese banking. Omega, Vol. 38(6), 501 – 508.

Ayadi, R./*Llewellyn*, D. T./*Schmidt*, R. H./*Arbak*, E./*De Groen*, W. P. (2010): Investigating Diversity in the Banking Sector in Europe – Key Developments, Performance and Role of Cooperative Banks. Centre for European Policy Studies, Brussels.

Ayadi, R./*Schmidt*, R. H./*Carbó Valverde*, S./*Arbak*, E./*Rodriguez Fernandez*, F. (2009): Investigating Diversity in the Banking Sector in Europe – The Performance and Role of Savings Banks. Centre for European Policy Studies, Brussels.

Bachiller, P./*Garcia-Lacalle*, J. (2018): Corporate governance in Spanish savings banks and its relationship with financial and social performance. Management Decision, Vol. 56(4), 828 – 848.

Badunenko, O./*Mozharovskyi*, P. (2016): Nonparametric frontier analysis using Stata. Stata Journal, Vol. 16(3), 550 – 589.

Badunenko, O./*Tauchmann*, H. (2019): Simar and Wilson two-stage efficiency analysis for Stata. Stata Journal, Vol. 19(4), 950 – 988.

Bagnoli, L./*Megali*, C. (2011): Measuring Performance in Social Enterprises. Nonprofit and Voluntary Sector Quarterly, Vol. 40(1), 149 – 165.

DOI https://doi.org/10.3790/ccm.2023.1428501 | Generated on 2025-10-29 08:17:53
OPEN ACCESS | Licensed under CC BY 4.0 | https://creativecommons.org/about/cclicenses/

Beisland, L. A./*Djan*, K. O./*Mersland*, R./*Randøy*, T. (2021): Measuring Social Performance in Social Enterprises: A Global Study of Microfinance Institutions. Journal of Business Ethics, Vol. 171(1), 51 – 71.

Bergendahl, G./*Lindblom*, T. (2008): Evaluating the performance of Swedish savings banks according to service efficiency. European Journal of Operational Research, Vol. 185(3), 1663 – 1673.

Berger, A. N./*Humphrey*, D. B. (1997): Efficiency of financial institutions: International survey and directions for future research. European Journal of Operational Research, Vol. 98(2), 175 – 212.

Berger, A. N./*Mester*, L. J. (1997): Inside the black box: What explains differences in the efficiencies of financial institutions? Journal of Banking & Finance, Vol. 21(7), 895 – 947.

Bertuch-Samuels, A. (2018): Why we should embrace institutional diversity in banking. Vierteljahreshefte zur Wirtschaftsforschung, Vol. 87(4), 127 – 139.

Bhatia, V./*Basu*, S./*Mitra*, S. K./*Dash*, P. (2018): A review of bank efficiency and productivity. OPSEARCH, Vol. 55(3 – 4), 557 – 600.

Bos, J. W. B./*Kool*, C. J. M. (2006): Bank efficiency: The role of bank strategy and local market conditions. Journal of Banking & Finance, Vol. 30(7), 1953 – 1974.

Brown, R. (2006): Mismanagement or mismeasurement? Pitfalls and protocols for DEA studies in the financial services sector. European Journal of Operational Research, Vol. 174(2), 1100 – 1116.

Bundesverband der Deutschen Volksbanken und Raiffeisenbanken (2022): Bericht über das gesellschaftliche Engagement 2021. Retrieved from https://www.bvr.de/p.nsf/0/518601A68E6B0BA1C12588C50021E7BC/%24FILE/BVR_CSR_2021_DS.pdf. Accessed February 20, 2023.

Burger, A./*Moormann*, J. (2008): Productivity in banks: myths & truths of the Cost Income Ratio. Banks and Bank Systems, Vol. 3(4), 85 – 94.

Busch, R./*Memmel*, C. (2021): Why Are Interest Rates on Bank Deposits so Low? Credit and Capital Markets, Vol. 54(4), 641 – 668.

Butzbach, O./*von Mettenheim*, K. E. (2015): Alternative Banking and Theory. Accounting, Economics, and Law: A Convivium, Vol. 5(2), 105 – 171.

Canhoto, A./*Dermine*, J. (2003): A note on banking efficiency in Portugal, New vs. Old Banks. Journal of Banking & Finance, Vol. 27(11), 2087 – 2098.

Coccorese, P./*Shaffer*, S. (2021): Cooperative banks and local economic growth. Regional Studies, Vol. 55(2), 307 – 321.

Conrad, A./*Neuberger*, D./*Trigo Gamarra*, L. (2014): The Impact of Regional Economic Conditions on the Efficiency of Savings Banks in the Light of Demographic Change. Credit and Capital Markets, Vol. 47(4), 533 – 570.

Cordes, J. J./*Coventry*, K. (2010): Assessing nonprofit performance. In B. A. Seaman/R. A. Young (Eds.), Handbook of Research on Nonprofit Economics and Management (263 – 279). Edward Elgar.

DOI https://doi.org/10.3790/ccm.2023.1428501 | Generated on 2025-10-29 08:17:53
OPEN ACCESS | Licensed under CC BY 4.0 | https://creativecommons.org/about/cclicenses/

Costa, E./*Pesci*, C./*Andreaus*, M./*Taufer*, E. (2022): When a sector-specific standard for non-financial reporting is not enough: evidence from microfinance institutions in Italy. Sustainability Accounting, Management and Policy Journal, Vol. 13(6), 1334 – 1360.

de la Cuesta-González, M./*Froud*, J./*Tischer*, D. (2021): Coalitions and Public Actions in the Reshaping of Corporate Responsibility: The Case of the Retail Banking Industry. Journal of Business Ethics, Vol. 173(3), 539 – 558.

Deutscher Sparkassen- und Giroverband (2022): Bericht an die Gesellschaft 2021 – Kennzahlen zum Bericht. Retrieved from https://im-auftrag-der-gesellschaft.de/wp-content/uploads/2021-DSGV-Kennzahlen-zum-Bericht.pdf. Accessed February 20, 2023.

DeYoung, R. (1997): Measuring Bank Cost Efficiency: Don't Count on Accounting Ratios. Financial Practice and Education, Vol. 7(1), 20 – 31.

Dombrowa, M. (2019): The Relationship between Size, Efficiency and Locational Factors: a two-stage DEA Analysis of German Cooperative Banks. Working Paper, Institute for Cooperative Research, University of Münster.

Ebrahim, A./*Battilana*, J./*Mair*, J. (2014): The governance of social enterprises: Mission drift and accountability challenges in hybrid organizations. Research in Organizational Behavior, Vol. 34, 81 – 100.

Epstein, G./*Dutt*, D. (2018): Public Banks, Public Orientation and the Great Financial Crisis of 2007 – 2008. In: Costabile, L./Neal, L. (Eds.), Financial Innovation and Resilience (327 – 343). Palgrave Macmillan.

Ferri, G./*Kalmi*, P./*Kerola*, E. (2014): Does bank ownership affect lending behavior? Evidence from the Euro area. Journal of Banking & Finance, Vol. 48, 194 – 209.

Fethi, M. D./*Pasiouras*, F. (2010): Assessing bank efficiency and performance with operational research and artificial intelligence techniques: A survey. European Journal of Operational Research, Vol. 204(2), 189 – 198.

Fried, H. O./*Lovell*, C. A. K./*Vanden Eeckout*, P. (1993): Evaluating the performance of US credit unions. Journal of Banking and Finance, Vol. 17(2 – 3), 251 – 265.

Galletta, S./*Mazzù*, S./*Natici*, V. (2022): A bibliometric analysis of ESG performance in the banking industry: From the current status to future directions. Research in International Business and Finance, Vol. 62, 101684.

García-Cestona, M./*Surroca*, J. (2008): Multiple goals and ownership structure: Effects on the performance of Spanish savings banks. European Journal of Operational Research, Vol. 187(2), 582 – 599.

Glass, J. C./*McKillop*, D. G. (2006): The impact of differing operation environments on US Credit Union Performance, 1993 – 2001. Applied Financial Economics, Vol. 16(17), 1285 – 1300.

Glass, J. C./*McKillop*, D. G./*Rasaratnam*, S. (2010): Irish credit unions: Investigating performance determinants and the opportunity cost of regulatory compliance. Journal of Banking & Finance, Vol. 34(1), 67 – 76.

Groeneveld, H. (2014): Features, Facts and Figures of European Cooperative Banking Groups over Recent Business Cycles. Journal of Entrepreneurial and Organizational Diversity, Vol. 3(1), 11 – 33.

DOI https://doi.org/10.3790/ccm.2023.1428501 | Generated on 2025-10-29 08:17:53
OPEN ACCESS | Licensed under CC BY 4.0 | https://creativecommons.org/about/cclicenses/

Groeneveld, H. (2020): Reconciling different truths about isomorphic pressure and distinctive behavior at European cooperative banks: Back to the future with Raiffeisen's principles. Annals of Public and Cooperative Economics, Vol. 91(3), 359 – 385.

Gutiérrez-Nieto, B./*Serrano-Cinca*, C./*Mar Molinero*, C. (2009): Social efficiency in microfinance institutions. Journal of the Operational Research Society, Vol. 60(1), 104 – 119.

Hackethal, A./*Koetter*, M./*Vins*, O. (2012): Do government owned banks trade market power for slack? Applied Economics, Vol. 44(33), 4275 – 4290.

Hahn, F. R. (2007): Environmental determinants of bank efficiency in Austria. Empirica, Vol. 34(3), 231 – 245.

Hakenes, H./*Hasan*, I./*Molyneux*, P./*Xie*, R. (2015): Small Banks and Local Economic Development. Review of Finance, Vol. 19(2), 653 – 683.

Hassan, M. K./*Rabbani*, M. R./*Brodmann*, J./*Bashar*, A./*Grewal*, H. (2023): Bibliometric and Scientometric analysis on CSR practices in the banking sector. Review of Financial Economics, Vol. 41(2), 177 – 196.

Idasz-Balina, M./*Balina*, R./*Achsani*, N. A./*Błaszczak*, I./*Chrostowska-Juszczyk*, G. (2020): The Determinants of Cooperative Banks' Community Service – Empirical Study from Poland. Sustainability, Vol. 12(5), 1885.

Kontolaimou, A./*Tsekouras*, K. (2010): Are cooperatives the weakest link in European banking? An non-parametric metafrontier approach. Journal of Banking & Finance, Vol. 34(8), 1946 – 1957.

Kosinowski, G. (2020): Members, Clients and the Society: A Grounded Theory of Cooperative Banks' Value Creation. In: Farache, F./Grigore, G./Stancu, A./McQueen, D. (Eds.), Values and Corporate Responsibility – CSR and Sustainable Development (87 – 125). Palgrave Macmillan.

Kotz, H.-H./*Schäfer*, D. (2018): Diversity across EU banking sectors: Poorly researched and underappreciated. Vierteljahreshefte zur Wirtschaftsforschung, Vol. 87(4), 153 – 179.

Lepetit, L./*Strobel*, F. (2013): Bank insolvency risk and time-varying *Z*-score measures. Journal of International Financial Markets, Institutions & Money, Vol. 25, 73 – 87.

López-Penabad, M. C./*Iglesias-Casal*, A./*Silva Neto*, J. F./*Maside-Sanfiz*, J. M. (2023): Does corporate social performance improve bank efficiency? Evidence from European banks. Review of Managerial Science, Vol. 17(4), 1399 – 1437.

Mäkinen, M./*Jones*, D. C. (2015): Comparative efficiency between cooperative, savings and commercial banks in Europe using the frontier approach. Annals of Public and Cooperative Economics, Vol. 86(3), 401 – 420.

Manetti, G./*Bagnoli*, L. (2013): Mutual and social efficiency of Italian co-operative banks: an empirical analysis. Annals of Public and Cooperative Economics, Vol. 84(3), 289 – 308.

Martínez-Campillo, A./*Fernández-Santos*, Y. (2017): What About the Social Efficiency in Credit Cooperatives? Evidence from Spain (2008 – 2014). Social Indicators Research, Vol. 131(2), 607 – 629.

DOI https://doi.org/10.3790/ccm.2023.1428501 | Generated on 2025-10-29 08:17:53
OPEN ACCESS | Licensed under CC BY 4.0 | https://creativecommons.org/about/cclicenses/

Martínez-Campillo, A./*Fernández-Santos*, Y./*del Pilar Sierra-Fernández*, M. (2018): How Well Have Social Economy Financial Institutions Performed During the Crisis Period? Exploring Financial and Social Efficiency in Spanish Credit Unions. Journal of Business Ethics, Vol. 151(2), 319 – 336.

Martínez-Campillo, A./*Wijesiri*, M./*Wanke*, P. (2020): Evaluating the Double Bottom-Line of Social Banking in an Emerging Country: How Efficient are Public Banks in Supporting Priority and Non-priority Sectors in India? Journal of Business Ethics, Vol. 162(2), 399 – 420.

Meriläinen, J.-M. (2016): Lending growth during the financial crisis and the sovereign debt crisis: The role of bank ownership structure. Journal of International Financial Markets, Institutions and Money, Vol. 41, 168 – 182.

Mersland, R./*Nyarko*, S. A./*Szafarz*, A. (2019): Do social enterprises walk the talk? Assessing microfinance performances with mission statements. Journal of Business Venturing Insights, Vol. 11, e00117.

Meyer, J./*Krauss*, A. (2021): The social performance of microfinance investment vehicles. Journal of Sustainable Finance & Investment, Vol. 11(2), 163 – 186.

Mook, L./*Handy*, F. (2010): Social accounting for value creation in nonprofits. In: Seaman, B. A./Young, R. A. (Eds.), Handbook of Research on Nonprofit Economics and Management (263 – 279), Edward Elgar.

Oesterreichische Nationalbank (2021): Financial Stability Report 41, Vienna.

Pacelli, V./*Pampurini*, F./*Sylos Labini*, S. (2019): The peculiarity of the cooperative and mutual model: Evidence from the European banking sector. Journal of Financial Management, Markets and Institutions, Vol. 7(1), 1940001.

Papke, L. E./*Wooldridge*, J. M. (1996): Econometric methods for fractional response variables with an application to 401(k) plan participation rates. Journal of Applied Econometrics, Vol. 11(6), 619 – 632.

Pérez, A./*Martínez*, P./*Rodríguez del Bosque*, I. (2013): The development of a stakeholder-based scale for measuring corporate social responsibility in the banking industry. Service Business, Vol. 7(3), 459 – 481.

Piatti, D. (2014): Italian mutual banks: Corporate social and financial performance. European Scientific Journal, Vol. 10(4).

Piatti, D./*Cincinelli*, P. (2015): Measuring social efficiency: The case of Italian mutual banks. Academy of Accounting and Financial Studies Journal, Vol. 19(2), 205 – 224.

Raab, S./*Welzel*, P. (2011): The Economics of Regional Demarcation in Banking. Schmalenbach Business Review, Vol. 63(2), 120 – 144.

Rawhouser, H./*Cummings*, M./*Newbert*, S. L. (2019): Social Impact Measurement: Current Approaches and Future Directions for Social Entrepreneurship Research. Entrepreneurship Theory and Practice, Vol. 43(1), 82 – 115.

Rebai, S./*Azaiez*, M. N./*Saidane*, D. (2016): A multi-attribute utility model for generating a sustainability index in the banking sector. Journal of Cleaner Production, Vol. 113, 835 – 849.

Reichling, P./*Schulze*, G. (2018): Regional Differences in the Efficiency of German Savings Banks. Credit and Capital Markets, Vol. 51(3), 445 – 464.

DOI https://doi.org/10.3790/ccm.2023.1428501 | Generated on 2025-10-29 08:17:53
OPEN ACCESS | Licensed under CC BY 4.0 | https://creativecommons.org/about/cclicenses/

Richter, F./*Christians*, U./*Hartl*, F. (2018): Effizienz der Banken. Zeitschrift für das gesamte Genossenschaftswesen, Vol. 68(1), 29 – 47.

Richter, T./*Gischer*, H. (2019): Zur Leistungsfähigkeit europäischer Banken: Ist die Aufwand-Ertrag-Relation ein belastbarer Indikator? Betriebswirtschaftliche Forschung und Praxis, Vol. 71(3), 354 – 382.

San-Jose, L./*Retolaza*, J. L./*Gutierrez-Goiria*, J. (2011): Are Ethical Banks Different? A Comparative Analysis Using the Radical Affinity Index. Journal of Business Ethics, Vol. 100(2), 151 – 173.

San-Jose, L./*Retolaza*, J. L./*Lamarque*, E. (2018): The Social Efficiency for Sustainability: European Cooperative Banking Analysis. Sustainability, Vol. 10(9), 3271.

San-Jose, L./*Retolaza*, J. L./*Torres Pruñonosa*, J. (2014): Efficiency in Spanish banking: A multistakeholder approach analysis. International Financial Markets, Institutions and Money, Vol. 32, 240 – 255.

Santos Silva, J. M. C./*Tenreyro*, S./*Wei*, K. (2013): FLEX: Stata module for flexible pseudo maximum likelihood estimation of models for doubly-bounded data. Statistical Software Components S457735, Boston College Department of Economics.

Schackmann-Fallis, K.-P./*Gischer*, H./*Weiß*, M. (2018): A Case for Boring Banking and Re-Intermediation. Applied Economics Quarterly, Vol. 64(3), 199 – 238.

Scholtens, B. (2009): Corporate Social Responsibility in the International Banking Industry. Journal of Business Ethics, Vol. 86(2), 159 – 175.

Schulz-Nieswandt, F./*Köstler*, U. (2012): Sparkassen und Kreditgenossenschaften – zwei ungleiche Zwillinge?! Zeitschrift für öffentliche und gemeinwirtschaftliche Unternehmen, Vol. 35(3), 345 – 356.

Sealey, C. W./*Lindley*, J. T. (1977): Inputs, Outputs, and a Theory of Production and Cost at Depository Financial Institutions. Journal of Finance, Vol. 32(4), 1251 – 1266.

Serrano Pérez, M. E. (2017): SEBI index: Measuring the commitment to the principles of social banking. Contaduría y Administración, Vol. 62(4), 1393 – 1407.

Shen, C.-H./*Wu*, M.-W./*Chen*, T.-H./*Fang*, H. (2016): To engage or not to engage in corporate social responsibility: Empirical evidence from global banking sector. Economic Modelling, Vol. 55, 207 – 225.

Sierra-Fernández, M.-P./*Martínez-Campillo*, A./*Fernández-Santos*, Y. (2019): An evaluation of social management in Spanish credit unions during the banking crisis. Business and Management Review, Vol. 10(3), 266 – 275.

Simar, L./*Wilson*, P. W. (2007): Estimation and inference in two-stage, semi-parametric models of production processes. Journal of Econometrics, Vol. 136(1), 31 – 64.

Staessens, M./*Kerstens*, P. J./*Bruneel*, J./*Cherchye*, L. (2019): Data Envelopment Analysis and Social Enterprises: Analysing Performance, Strategic Orientation and Mission Drift. Journal of Business Ethics, Vol. 159(2), 325 – 341.

Tabak, B. M./*Miranda*, R. B./*Fazio*, D. M. (2013): A geographically weighted approach to measuring efficiency in panel data: The case of US savings banks. Journal of Banking & Finance, Vol. 37(10), 3747 – 3756.

DOI https://doi.org/10.3790/ccm.2023.1428501 | Generated on 2025-10-29 08:17:53
OPEN ACCESS | Licensed under CC BY 4.0 | https://creativecommons.org/about/cclicenses/

Thiem, O. G./*Schiereck*, D. (2022): Effizienz der deutschen Sparkassen in Zeiten von Niedrigzins und digitaler Transformation. Zeitschrift für Bankrecht und Bankwirtschaft (Journal of Banking Law and Banking), Vol. 34(5), 273 – 297.

Tischer, D./*Yeoman*, R./*White*, S./*Nicholls*, A./*Michie*, J. (2016): An Evaluative Framework for Mutual and Employee-Owned Businesses. Journal of Social Entrepreneurship, Vol. 7(3), 342 – 368.

Worthington, A. C. (2010): Frontier efficiency measurement in deposit-taking financial mutuals: A review of techniques, applications, and future research directions. Annals of Public and Cooperative Economics, Vol. 81(1), 39 – 75.

Wrede, M. (2021): Lending by credit cooperatives, savings banks and other banks during the Covid-19 pandemic in Germany. Zeitschrift für das gesamte Genossenschaftswesen, Vol. 71(3), 192 – 209.

Wu, H.-Y./*Tzeng*, G.-H./*Chen*, Y.-H. (2009): A fuzzy MCDM approach for evaluating banking performance based on Balanced Scorecard. Expert Systems with Applications, Vol. 36(6), 10135 – 10147.

DOI https://doi.org/10.3790/ccm.2023.1428501 | Generated on 2025-10-29 08:17:53
OPEN ACCESS | Licensed under CC BY 4.0 | https://creativecommons.org/about/cclicenses/