

**MANAGERIAL  
ECONOMICS**

---

SEMIANNUAL

vol. 21 no. 2 ■ 2020



# EKONOMIA MENEDŻERSKA

PÓŁROCZNIK

tom 21 nr 2 ■ 2020



# MANAGERIAL ECONOMICS

SEMIANNUAL

vol. 21 no. 2 ■ 2020

Editor-in-Chief of AGH University of Science and Technology Press: *Jan Sas*

Managerial Economics Periodical Editorial Board

Editor-in-Chief:

*Henryk Gurgul* (AGH University of Science and Technology in Krakow, Poland)

Associate Editors:

*Joanna Duda* (AGH University of Science and Technology in Krakow, Poland)  
management

*Stefan Schleicher* (University of Graz, Austria)  
quantitative methods in economics and management

Scientific Editor:

*Lukasz Lach* (AGH University of Science and Technology in Krakow, Poland)

Technical Editor:

*Paweł Zajac* (AGH University of Science and Technology in Krakow, Poland)

Editorial Board:

*Stefan Bojnec* (University of Primorska, Koper, Slovenia)

*Gerrit Brösel* (University of Hagen, Germany)

*Karl Farmer* (University of Graz, Austria)

*Piotr Górski* (AGH University of Science and Technology in Krakow, Poland)

*Jessica Hastenteufel* (TUBH University of Applied Sciences, Saarland University, Germany)

*Thomas Hering* (University of Hagen, Germany)

*Ingo Klein* (University of Erlangen-Nuremberg, Germany)

*Mariusz Kudelko* (AGH University of Science and Technology in Krakow, Poland)

*Ulrike Leopold-Wildburger* (University of Graz, Austria)

*Manfred Jürgen Matschke* (University of Greifswald, Germany)

*Xenia Matschke* (University of Trier, Germany)

*Roland Mestel* (University of Graz, Austria)

*Stefan Palan* (University of Graz, Austria)

*Peter Steiner* (University of Graz, Austria)

Articles published in the semiannual Managerial Economics have been peer reviewed by reviewers appointed by the Editorial Board. The procedure for reviewing articles is described at the following web address: <http://www.managerial.zarz.agh.edu.pl>

Language Editor: *Aeddan Shaw*

Statistical Editor: *Anna Barańska*

Editorial support: *Magdalena Grzech*

Cover and title page design: *Zofia Lucka*

DOI: <https://doi.org/10.7494/manage>

© Wydawnictwa AGH, Kraków 2020, ISSN 1898-1143 (paper version),  
ISSN 2353-3617 (on-line version)

Number of copies 40. The printed version of the journal is the primary one.

---

Wydawnictwa AGH (AGH University of Science and Technology Press)

al. A. Mickiewicza 30, 30-059 Kraków

tel. 12 617 32 28, 12 636 40 38

e-mail: [redakcja@wydawnictwoagh.pl](mailto:redakcja@wydawnictwoagh.pl); <http://www.wydawnictwa.agh.edu.pl>

---

## CONTENTS

*Piotr Gretszel, Henryk Gurgul, Łukasz Lach, Stefan Schleicher*

Testing for the economic and environmental impacts of  
EU Emissions Trading System: A panel GMM approach ..... 99

*Jessica Hastenteufel, Lena Fuchs*

Low Interest Rates –  
A Real Threat to German Banks or First-Class Whining?! ..... 127

*Manfred Jürgen Matschke, Gerrit Brösel, Patrick Thielmann*

Functional business valuation –  
The theoretical foundation of argumentation value  
and its underlying function ..... 157

Summaries ..... 177

Instruction for authors ..... 179

Double blind peer review procedure ..... 183



Piotr Gretszel\*, Henryk Gurgul\*\*, Łukasz Lach\*\*\*,  
Stefan Schleicher\*\*\*\*

## Testing for the economic and environmental impacts of EU Emissions Trading System: A panel GMM approach

---

### 1. Introduction

The first in the world and largest installation-level ‘cap-and trade’ system for reducing greenhouse gas (GHG) emissions to date is the European Union’s Emissions Trading Scheme (EU ETS). The system is meant to help the EU attain its immediate and longer-term goals in terms of emissions reduction by promoting reductions of emissions in cost-efficient and economically efficient processes. The major element of EU ETS is its emission cap and also the EU emission allowances (EUAs) trading market. The cap ensures that total emissions do not exceed a fixed level in the period the cap is defined for. Since 2005 the system has controlled GHG emissions in approximately 11,000 installations. Compliance is ensured through the penalty and social control structure as high fines are imposed on those companies which emit too high amount of pollutant. In addition, firms face an obligation to surrender the allowances owed. Thus, the cap (i.e. the environmental target) is maintained effectively (EU, 2015). The EU ETS is organised in trading periods (or phases), of which four are currently decided and more may follow. Currently the system is in its third phase.

---

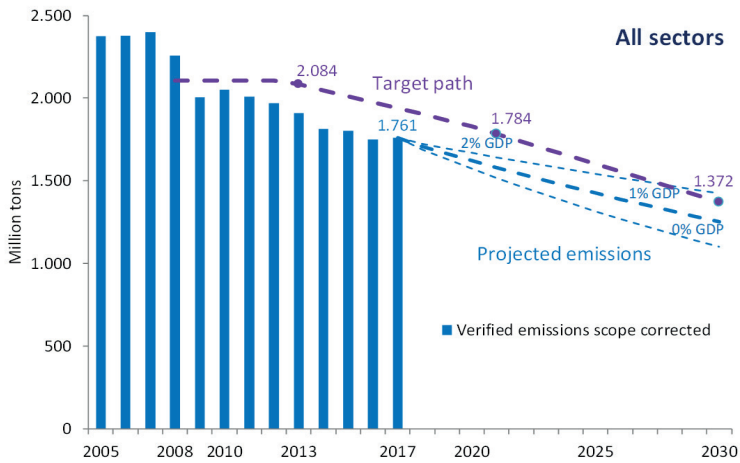
\* PCMI Corporation, U.S, e-mail: [piotr.gretszel@gmail.com](mailto:piotr.gretszel@gmail.com)

\*\* AGH University of Science and Technology, e-mail: [henryk.gurgul@gmail.com](mailto:henryk.gurgul@gmail.com) (corresponding author).

\*\*\* AGH University of Science and Technology, e-mail: [llach@zarz.agh.edu.pl](mailto:llach@zarz.agh.edu.pl).

\*\*\*\* Wegener Center for Climate and Global Change at the University of Graz, e-mail [stefan.schleicher@uni-graz.at](mailto:stefan.schleicher@uni-graz.at)

The revised EU ETS Directive, which will apply for the fourth period from 2021 to 2030, was designed to meet the reduction target for 2030 by reducing emissions by 43% compared to 2005 levels. Up to now the actual emissions were below the target path, i.e. the cap was not being binding. Depending on economic activity as measured by GDP, this unintended situation might continue over the next years. Figure 1 gives some basic insights on the performance of the EU ETS in recent years with projections on the next decade.



**Figure 1.** Verified emissions, target path and projected emissions

Source: Wegener Center elaborations on EEA, 2018 and EU TL, 2018

Verified emissions have been under the target path since the start of Phase 2 of the EU ETS. As underlined by Marcu et al. (2018, 2020) the relationships between changes in GDP and changes in emissions depicted in Figure 1 have created a corridor of potential future emission levels depending on GDP growth rates between 0 and 2 percent per year (current GDP growth trends fluctuates around 2 percent, in contrast to a stagnation in Phase 2). This suggests that in the Phase 4 of EU ETS actual emissions might exceed the target path only if GDP growth rates remain high. This conclusion, however, does not take into account various policy changes (including renewables deployment), that may have an impact on the GDP-emission links. In this context, an important research problem arises: How much of the result observed in Figure 1 and discussed in this paragraph is due to an actual decrease in CO<sub>2</sub> intensity, and how much is due to a decrease in the level of economic activity? This paper aims to shed some light on this crucial issue.



The COVID-19 pandemic has had a great impact on the European Union economies in many aspects, also with regard to the discussion on the future of EU climate policy. The plan to rebuild and support the European Union's economy, which is currently under discussion at European government summits, seems to place less emphasis on environmental issues since the main focus is being placed on a quick recovery of EU economy in the realms of global competition. One of the issues discussed in the EU's recovery plan following the COVID19 epidemic is the continued operation of the EU ETS. One of main challenges for Germany's 6-month EU Council presidency in the second half of 2020 is the discussion on making European Union climate neutral by 2050. In this context, a first big step is setting the final shape of European economic recovery programme. Germany supports the European Commission's proposal to increase the target to  $-50$  to  $-55$  percent. However, the general attitude to increasing ambitions of the EU climate policy in the upcoming years seems to be getting less enthusiastic. In other words, the very-needed debate on concrete climate policy tools might not get enough attention in the upcoming months.

The meeting of Special European Council held in Brussels between 17–21 July 2020 led to several initial conclusions, including EU climate policy. EU leaders agreed a recovery package and the 2021–2027 budget that is aimed at supporting the economic recovery after the COVID19 pandemic and increasing investment in the green and digital transitions. When it comes to climate action, it was announced that 30% of the total expenditure from the MFF and Next Generation EU will support climate-related projects. Expenses under the MFF and Next Generation EU will comply with the EU's objective of climate neutrality by 2050, the EU's 2030 climate targets and the Paris Agreement. By the end of 2022, the Commission plans to come back with a revised proposal on the EU ETS, possibly extending it to the aviation and maritime sectors.

The aim of this paper is to make a preliminary assessment of the effectiveness of the EU ETS in terms of reducing the actual emissions to the air while preserving economic growth of EU member states. The extensive empirical analysis is focuses on examining the issues in question for different phases of the EU ETS and various groups of EU economies that differ in terms of economic development and the overall air pollutant emission.

## **2. Main research hypotheses**

The data presented in Figure 1 suggests that verified emissions have been under the target path since the start of EU ETS Phase 2. One may claim that this

process was driven (at least to some extent) by the policy of EU ETS. This, in turn, suggests the formulation of the initial research hypothesis:

**Hypothesis 1.** Lowering the level free allowances in EU ETS had a statistically significant impact on reducing the level of actual emissions. This impact was especially strong in highly polluting EU economies.

From a global perspective coal combustion is not only the largest source of CO<sub>2</sub> emissions, but also a major threat to public health. At the same time about 80% of EU coal power plants (and all Polish coal power plants) do not comply with EU regulations on emissions standards. This feature of the combustion sector in EU leads to formulation of the second hypothesis:

**Hypothesis 2.** The impact of lowering allowances in EU ETS on reducing the level of actual emissions was much weaker for installations listed in combustion sector compared to other EU sectors.

In order to enable learning and refinement the EU ETS is designed to operate in phases. Burke (2006) underlines that the release of the very first verified emissions data in Phase 1 of EU ETS indicated that permits had been over-allocated by around ninety-five megatons while Alberola (2006) shows the EU ETS market was not as short as expected, particularly with regard to power producers needing fewer EUAs. However, based on lessons learnt from Phase 1 in later phases certain regulators refined the EU ETS in an attempt to provide a more robust and efficient market operation (Niblock and Harrison, 2011). Thus, it rapidly became evident that markets and economies managed to adjust to the scheme regulations. One may expect that this process of conforming to the new provisions should have a positive impact on general environmental effectiveness of EU ETS and the following hypothesis should hold true:

**Hypothesis 3.** The positive impact of lowering the level free allowances in EU ETS on reducing the level of actual emissions intensified during the later stages of EU ETS in all sectors and all EU countries.

As shown in Figure 1, levels of verified emissions and GDP growth seem to be correlated which directly stems from the fact that higher levels of air pollution are to some extent induced by increased economic activity. However, the ongoing process of shifting EU economy toward services and other activities characterized with low GHG emission levels, installation of new eco-efficient technologies and the impact of EU ETS system of penalties for extensive pollutants seem to support the final hypothesis of this paper:

**Hypothesis 4.** Lowering the level free allowances in EU ETS did not have a statistically significant impact on reducing GDP growth rates of EU economies.

The hypotheses listed above will be verified using detailed dataset described in Section 3 and the methodology described in Section 4.

### 3. The dataset

In this paper we use the detailed data on EU ETS provided by the Wegener Center for Climate and Global Change (WCCGC).<sup>1</sup> The database stems from EUTL and contains all monitored installations. The EEA-database also originates from EUTL but in contrary to WCCGC database is aggregated in (about 40) activities. In addition, the estimates of aggregates on WCCGC database are derived from a comparison of the intersection of installations in previous years, which gives a much better approximation compared to EEA database in which the missing values are not considered. Although the role of EU ETS in shaping the environmental policy of EU is obvious, current economic literature lacks any econometric analyzes devoted to the issues in question that would apply the reliable Wegener Center for Climate and Global Change database. Thus, the originality of this study follows from the fact that in contrary to existing studies (comp. e.g. Anderson and di Maria (2011), Jaraite and di Maria (2014), Martin et al. (2014), Borghesi and Flori (2018), Teixidó et al. (2019), Cañón-de-Francia and Garcés-Ayerbe (2019), Lin et al. (2019), Wildgrub et al. (2019), Verde et al. (2019), Bayer and Aklin (2020), Bruyn et al. (2020), among others) this paper provides results of a very first thorough empirical analysis of the detailed WCCGC database. Two main variables listed in Wegener Center for Climate and Global Change database will be used in empirical investigations. The first one is **free allocations** which are determined ex ante (widely) independent of production activity by installations, namely based on a so-called benchmark procedure. The basic idea is to give the installations with top technology the highest share of free allowances and others less, depending on their performance in a (outdated) reference period. The second one is **verified emissions** that reflect EU ETS policies as well as general economic conditions and international competitiveness. Table 1 presents the list of variables used in the empirical part of the study.

---

<sup>1</sup> Wegener Center for Climate and Global Change is an interdisciplinary, internationally oriented institute of the University of Graz (School of Environmental, Regional and Educational Sciences, with partner institutes also in the Faculties of Natural Sciences, Business, Social and Economic Sciences, and Arts and Humanities), which serves as core research center for pooling the competences of the University in the areas "Climate, Environmental, and Global Change".

**Table 1**  
Variables examined in the empirical analysis

| Symbol  | Definition  | Unit                                 | Data source                                  |
|---|---|--------------------------------------|--|
| <b>Variables defined for individual installations</b>                               |   |                                      |  |
| $A_{i,t}$   | Allowance in installation $i$ in period $t$   | Tons <sup>2</sup> of CO <sub>2</sub> | Wegener Center for Climate and Global Change |
| $A_{i,t}^{pbase2}$  | If period $t$ belongs to EU ETS Phase 2 this is equal to allowance in installation $i$ in period $t$ (i.e. $A_{i,t}$ ), otherwise this is equal to zero   | Tons of CO <sub>2</sub>              | Wegener Center for Climate and Global Change |
| $A_{i,t}^{pbase3}$  | If period $t$ belongs to EU ETS Phase 3 this is equal to allowance in installation $i$ in period $t$ (i.e. $A_{i,t}$ ), otherwise this is equal to zero   | Tons of CO <sub>2</sub>              | Wegener Center for Climate and Global Change |
| $E_{i,t}$   | Verified emissions in installation $i$ in period $t$  | Tons of CO <sub>2</sub>              | Wegener Center for Climate and Global Change |
| <b>Aggregated variables defined for groups of installations across EU countries</b> |   |                                      |  |
| $\bar{A}_{c,t}$   | Average allowance in installations in country $c$ in period $t$ , technically<br>$\bar{A}_{c,t} = \frac{1}{n} \sum_{i \in c} A_{i,t}$ , where $n$ is the number of installations in country $c$ in period $t$ | Tons of CO <sub>2</sub>              | Wegener Center for Climate and Global Change |
| $\bar{A}_{c,t}^{pbase2}$  | If period $t$ belongs to EU ETS Phase 2 this is equal to allowance in country $c$ in period $t$ (i.e. $\bar{A}_{c,t}$ ), otherwise this is equal to zero  | Tons of CO <sub>2</sub>              | Wegener Center for Climate and Global Change |
| $\bar{A}_{c,t}^{pbase3}$  | If period $t$ belongs to EU ETS Phase 3 this is equal to allowance in country $c$ in period $t$ (i.e. $\bar{A}_{c,t}$ ), otherwise this is equal to zero  | Tons of CO <sub>2</sub>              | Wegener Center for Climate and Global Change |
| $GDP_{c,t}$   | GDP growth in country $c$ in period $t$   | %                                    | Eurostat                                     |

A complete dataset was available for 22 European countries and covered the period 2005–2018. In the case of other countries, there were incomplete records

<sup>2</sup> Or the equivalent amount of a different greenhouse gas.

in the dataset because of delays in joining the European Union or the EU ETS program. We not only decided to estimate models for individual countries, but also to split the data into smaller groups, which allows to create aggregate data for GDP-focused calculations<sup>3</sup> as well as to compare the results between different groups of economies. Table 2 presents details of the country groups examined in this paper.

**Table 2**  
Groups of countries examined in the empirical analysis

| Group of countries                 | Composition of the group   |
|------------------------------------|--|
| Western Europe <sup>4</sup>        | Austria [AT], Belgium [BE], Spain [ES], France [FR], United Kingdom [GB], Ireland [IE], Netherlands [NL], Portugal [PT]  |
| High renewable energy <sup>5</sup> | Sweden [SE], Finland [FI], Lithuania [LT], Denmark [DK], Austria [AT], Portugal [PT], Estonia [EE]                       |
| Low renewable energy <sup>6</sup>  | United Kingdom [GB], Netherlands [NL], Belgium [BE], Ireland [IE], Poland [PL], Slovakia [SK], Hungary [HU]              |
| High air pollution <sup>7</sup>    | Czech Republic [CZ], Lithuania [LT], Hungary [HU], Latvia [LV], Poland [PL], Slovakia [SK], Hungary [HU]                 |
| Low air pollution <sup>8</sup>     | Sweden [SE], Finland [FI], Ireland [IE], Spain [ES], Portugal [PT], Denmark [DK], Estonia [EE]                           |
| High HDI index <sup>9</sup>        | Ireland [IE], Germany [DE], Sweden [SE], Netherlands [NL], Denmark [DK], Finland [FI], United Kingdom [GB], Belgium [BE] |
| Medium HDI index <sup>10</sup>     | Austria [AT], Slovenia [SI], Spain [ES], Czech Republic [CZ], France [FR], Italy [IT], Estonia [EE]                      |
| Low HDI index <sup>11</sup>        | Greece [GR], Poland [PL], Lithuania [LT], Slovakia [SK], Latvia [LV], Portugal [PT], Hungary [HU]                        |

<sup>3</sup> Note that GDP growth data is only available on the country level.

<sup>4</sup> These are the countries which are globally recognized as Western and highly developed in terms of economic development.

<sup>5</sup> Based on Eurostat data – [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Renewable\\_energy\\_statistics/pl](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Renewable_energy_statistics/pl).

<sup>6</sup> Based on Eurostat data – [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Renewable\\_energy\\_statistics/pl](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Renewable_energy_statistics/pl).

<sup>7</sup> Based on data on healthy life years lost as a result of air pollution per hundred inhabitants provided by WHO – [http://gamapserver.who.int/gho/interactive\\_charts/phe/aap\\_mbd/atlas.html](http://gamapserver.who.int/gho/interactive_charts/phe/aap_mbd/atlas.html).

<sup>8</sup> Based on data about healthy life years lost as a result of air pollution per hundred inhabitants provided by WHO – [http://gamapserver.who.int/gho/interactive\\_charts/phe/aap\\_mbd/atlas.html](http://gamapserver.who.int/gho/interactive_charts/phe/aap_mbd/atlas.html).

<sup>9</sup> Based on UN Development programme data – <http://hdr.undp.org/en/data>.

<sup>10</sup> Based on UN Development programme data – <http://hdr.undp.org/en/data>.

<sup>11</sup> Based on UN Development programme data – <http://hdr.undp.org/en/data>.

To give a brief overview of the statistical properties of the dataset on the examined variables, we abandon any attempt to supply descriptive statistics in tabular form, but instead focus on analysing a set of plots depicted in Figures 2–4 that give insights on the main trends observed in the database. In the further parts of this paper, we divide the installations listed in WCCGC database into three groups: the group covering all installations, the group covering combustion-related installations, and the group covering other (non-combustion) installations.

As can be seen in Figure 2, the level of free allowances was lower in the countries with high level of social development, in which the median of free allowances was about 25,000 tons of greenhouse gas, but in medium and low developed countries the median was higher than 50,000 tons of greenhouse gas almost in every EU ETS phase. In general, there was a slightly lower level of free allowances in EU ETS Phase 3 compared to previous phases. The levels of actual emissions did not seem to depend on the level of social development of examined countries. One can notice that the ratio of free allowances to actual emissions decreased significantly below unity during Phase 3 of EU ETS.

In this context an interesting research problem would be to test what the trends depicted in Figure 2 would look like if the combustion sector was examined separately among the installations. This interesting problem is tackled in Figure 3. The boxplots presented in Figure 3 confirm that allowance levels seem to be similar in the case of medium and high developed countries. These levels are significantly higher for low developed countries. On the other hand, actual emissions are much lower in countries with high level of social development than in the other groups. Compared to previous phases allowance allocation during Phase 3 was visibly lower, however actual emissions remained almost unchanged. Ratio of free allowances to actual emissions was higher than unity during the first two phases of EU ETS, and dropped below 1 during the Phase 3.

In the case of other sectors (comp. Figure 4), there seem to be more outliers than in the case of the data depicted in Figure 2 and 3, especially countries with a low level of social development. In these sectors there was almost no significant difference between the levels of free allowances and actual emissions during the EU ETS phases. In case of countries with a low and medium level of social development, the ratio of free allowances to actual emissions stayed high even in Phase 3. This suggests that no significant improvement in reducing emissions was reported during EU ETS Phase 3 for other sectors.

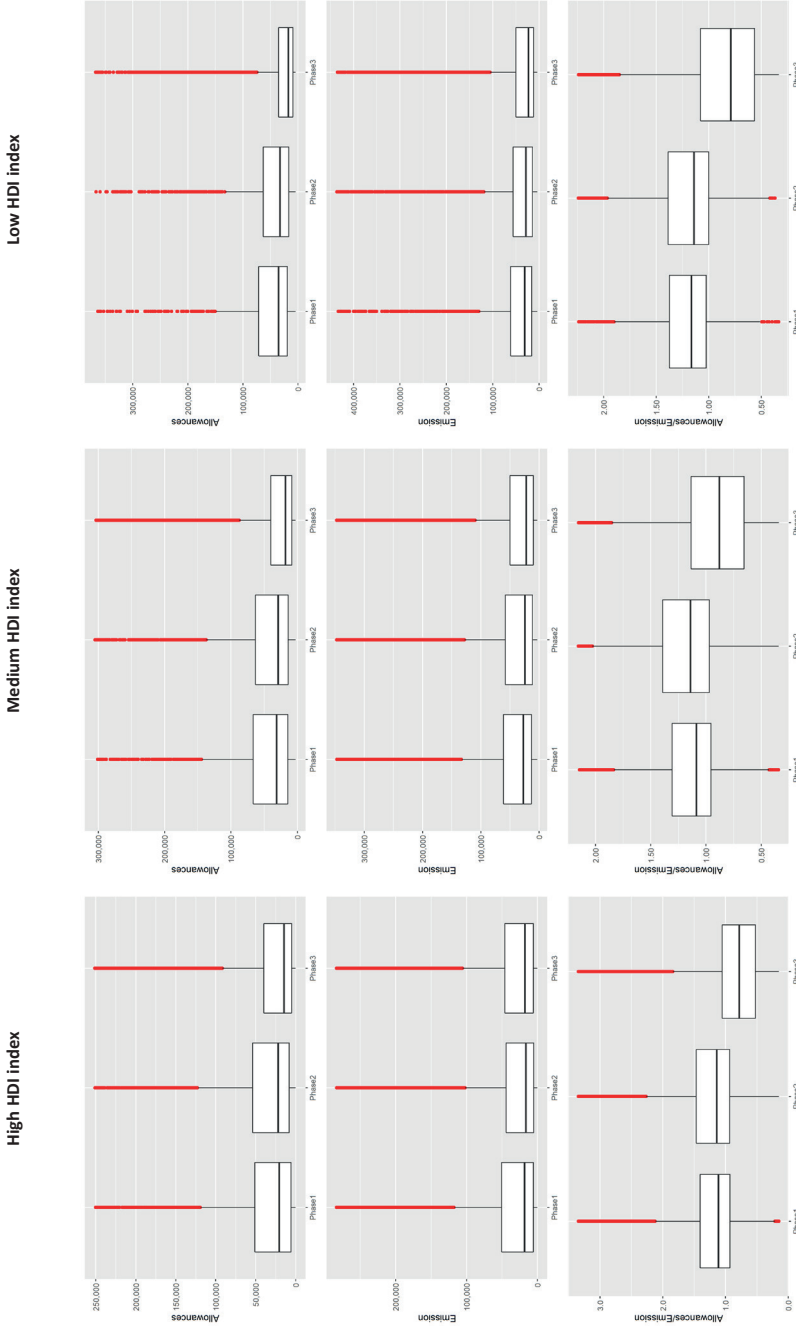
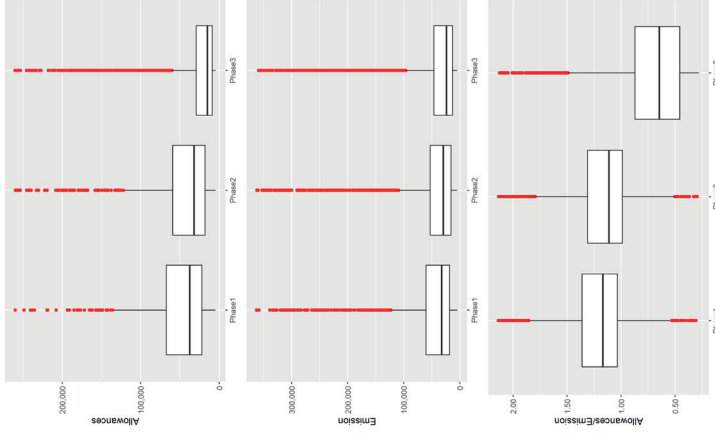
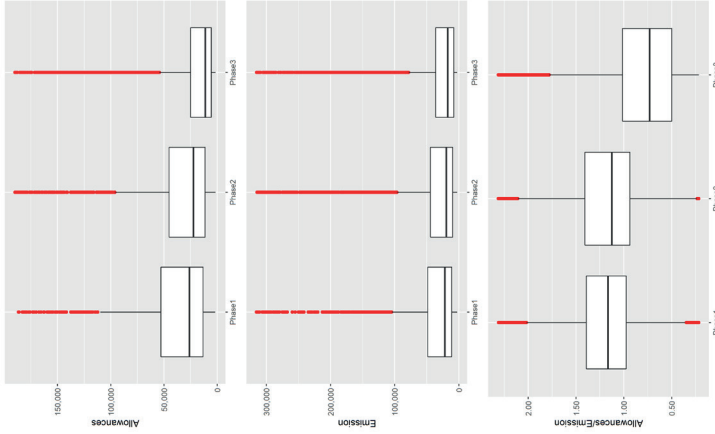


Figure 2. Comparison of boxplots on free allowances and verified emissions for all sectors during the three EU ETS phases

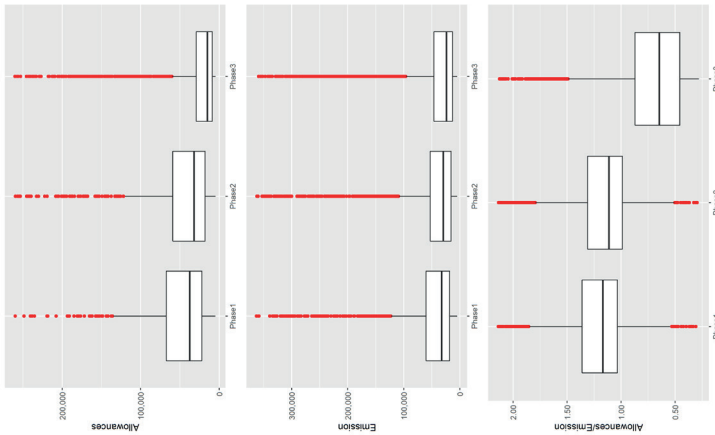
Low HDI index



Medium HDI index

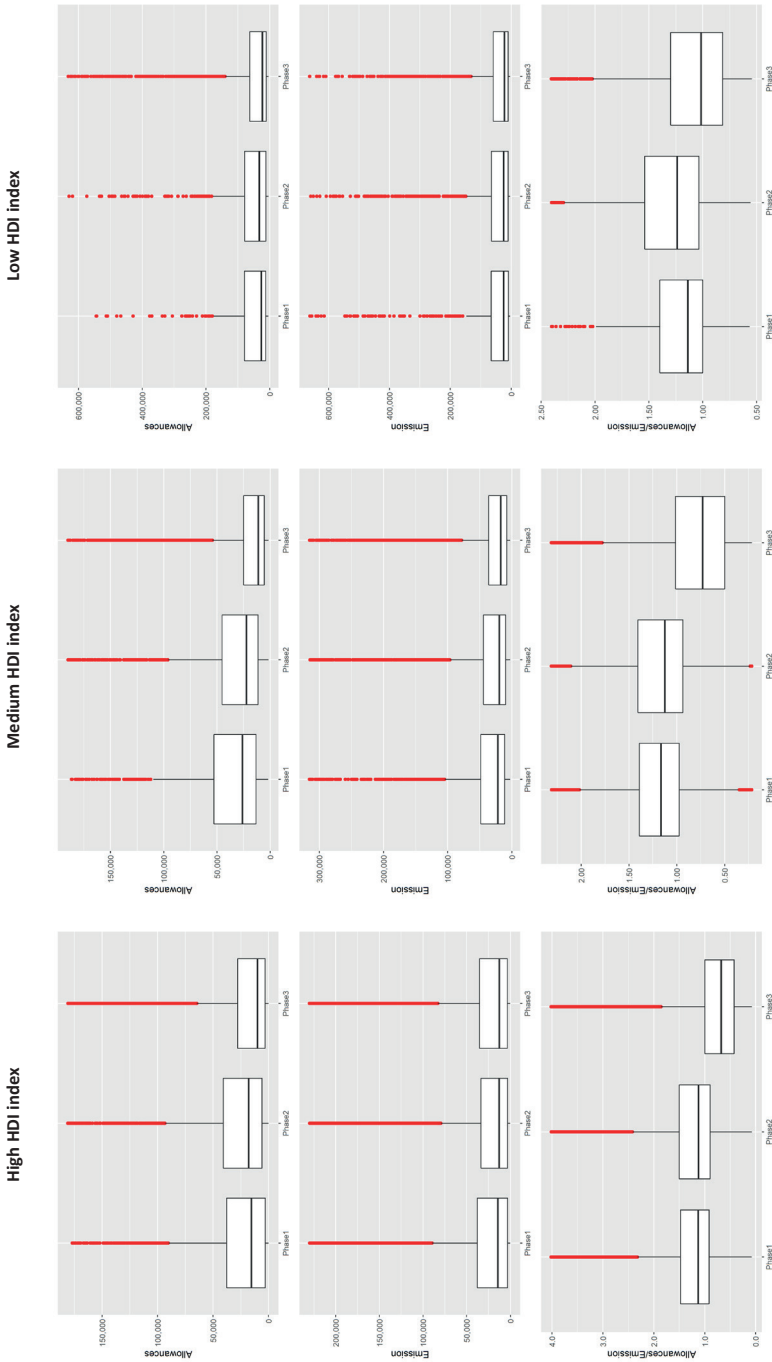


High HDI index



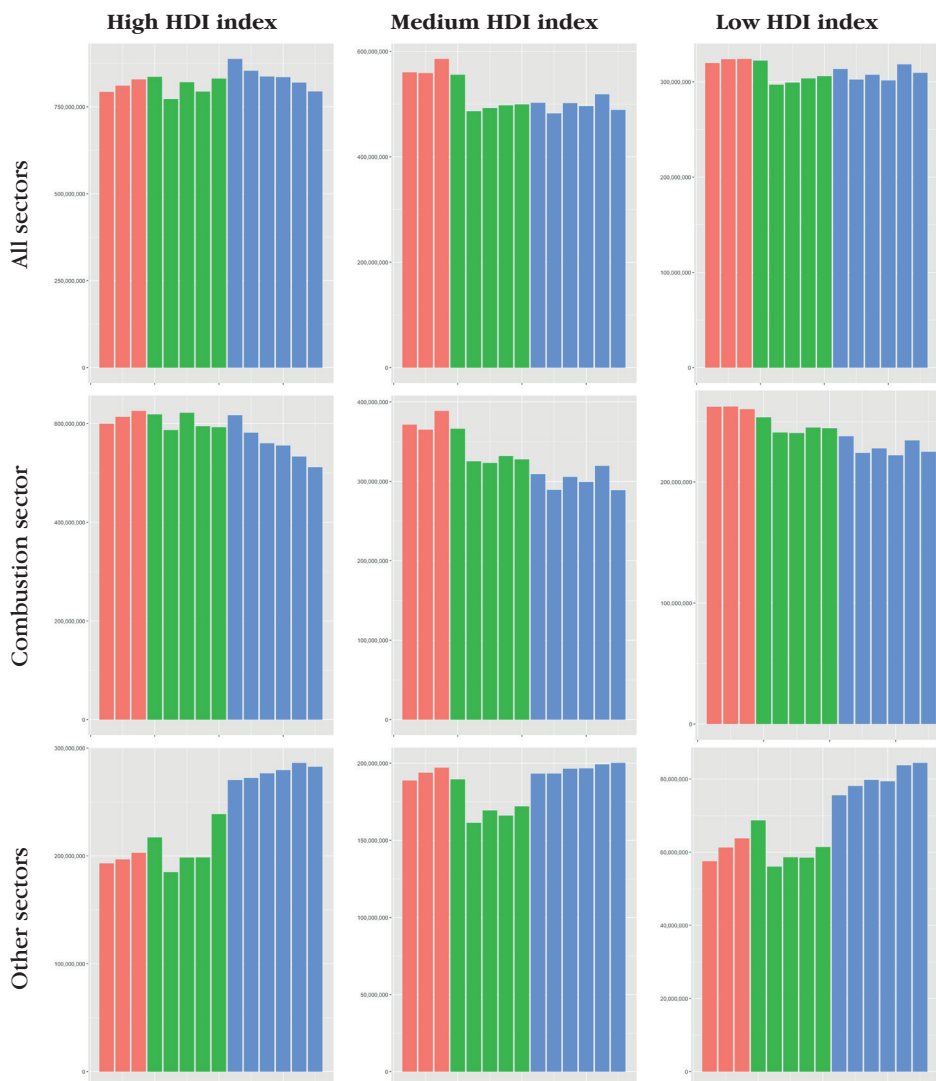
**Figure 3.** Comparison of boxplots on free allowances and verified emissions for combustion sectors during the three EU ETS phases





**Figure 4.** Comparison of boxplots on free allowances and verified emissions for other sectors during the three EU ETS phases

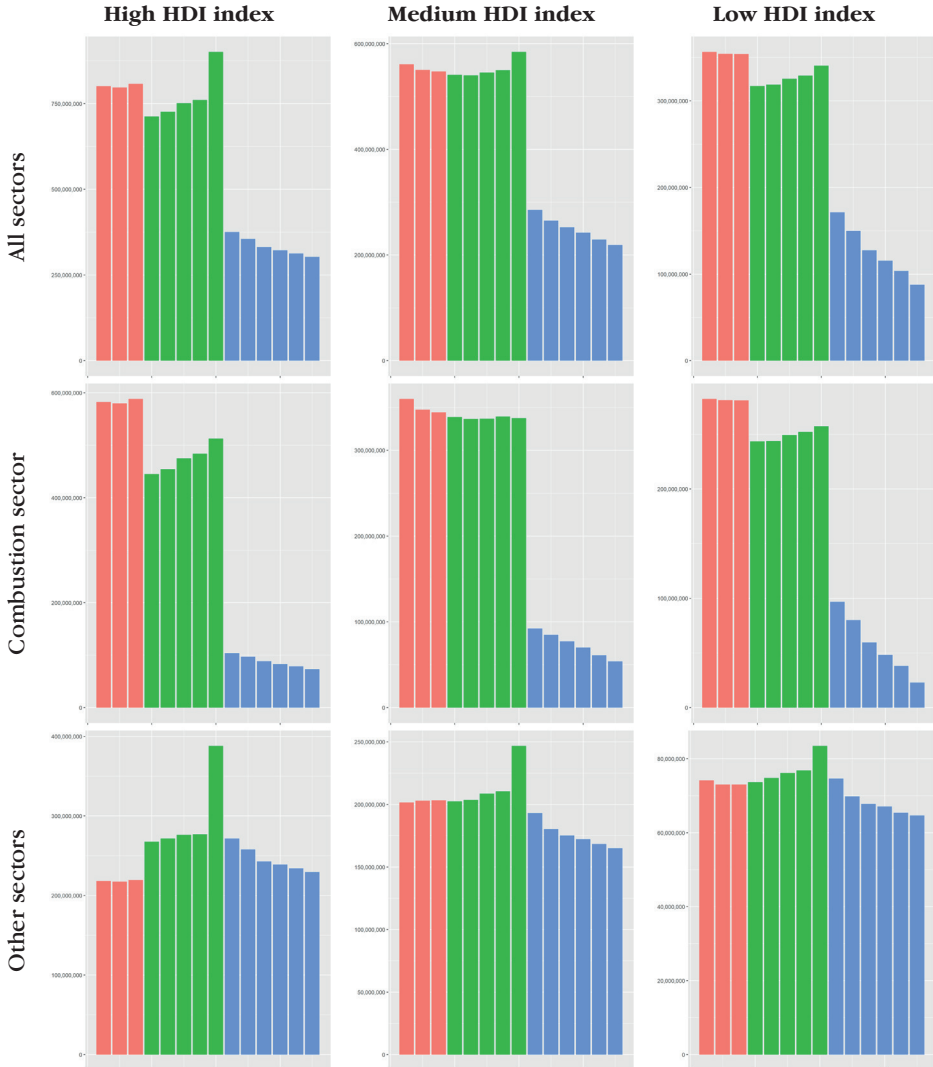
It is also worth illustrating how the actual emissions were distributed over the three phases of EU ETS program. The division was made with regard to the level of development of the countries and the types of groups of sectors. Details are presented in Figure 5.



**Figure 5.** Actual emissions with respect to the level of HDI and types of sectors

Source: Own elaboration. The red colour indicates the pilot phase, the second phase is in green and the third Phase of EU ETS is in blue

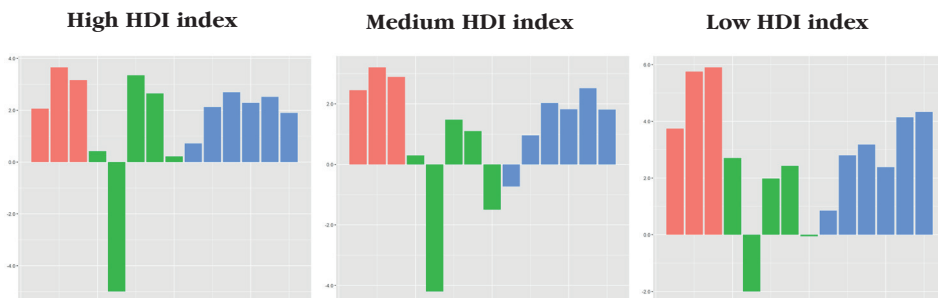
As can be concluded from Figure 5, there was a drop in actual emissions in combustion sector and a rise of actual emissions in other sectors during the operating of EU ETS in all groups of countries. In later phases of the programme, one could notice higher levels of emissions in other sectors.



**Figure 6.** Allowance allocation with respect to level of HDI and types of sectors

Source: Own elaboration. The red colour indicates the pilot phase, the second phase is in green and the third Phase of EU ETS is in blue

In turn, the data presented in Figure 6 proves that there was very meaningful drop of allowance allocation in the combustion sector during the EU ETS Phase 3. Because of that, the summarised allowance allocation also reduced significantly. Interestingly, in 2012 there was a significant peak in the level of allocation in other sectors.



**Figure 7.** GDP growth with respect to level of social development

Source: Own elaboration. The red colour indicates the pilot phase, the second phase is in green and the third Phase of EU ETS is in blue

As can be seen in Figure 7, the financial crisis of 2009 had a strongest impact on the countries with the highest HDI in EU. The moderately developed countries had experienced 3 years with negative GDP growth. The highest values of growth were recorded in low developed countries during EU ETS Phases 1 and 3.

The analysis of the plots presented in Figures 2–4 leads to an important conclusion with respect to econometric modelling of the WCCGC data. Namely, it suggests that in the formal econometric analyses one should use a dummy variable capturing the effects of 2009 crisis that significantly hit GDP and verified emission (comp. Figure 5 and 7) but did not had a similar impact on free allowances (comp. Figure 6). Thus, when constructing respective panel models we will use a dummy variable (denoted  $d_{2009}$ ) equal to 1 for the year 2009 and zero otherwise.

#### 4. Methodology

In order to verify the main research hypotheses listed in Section 2, one should use dynamic panel models with fixed effects to examine the dataset discussed in Section 3. The setting examined in this study is rather typical for dynamic panel models as we focus on large cross-sectional dimension and short time dimension. As shown by Nickell (1981), classical OLS-based regression methods cannot

be applied in such a case because of endogeneity bias that does not disappear asymptotically if cross sectional dimension rises and time dimension is kept fixed. A typical solution is to use generalized method of moments (GMM) estimators (comp. Hansen, (1982), Anderson and Hsiao (1982), Holtz-Eakin et.al (1988), Arellano and Bond (1991), Arellano and Bover (1995), Blundell and Bond (1998), among others). GMM estimators are usually applied in two variants: difference GMM estimator (Arellano and Bond,1991; Holtz-Eakin et al., 1988) in which lags of the endogenous variables are used as instruments and the system GMM estimator (Blundell and Bond, 1998) that uses additional moment conditions (Sigmund and Ferstl, 2019).

In order to verify Hypotheses 1–3, we will estimate a set of linear dynamic panel-data models of the form:

$$E_{i,t} = a_i + a_0 E_{i,t-1} + a_1 A_{i,t} + a_2 A_{i,t}^{phase2} + a_3 A_{i,t}^{phase3} + a_{2009} d_{2009} + \varepsilon_{i,t} \quad (1)$$

where  $\varepsilon_{i,t}$  stands for the idiosyncratic errors with no autocorrelation,  $i$  belongs to the set of installations examined and  $t$  is the time point. The element  $a_i$  captures time-independent individual effects across the examined set of installations while  $a_0$  allows taking into account autoregressive nature of time series of verified emissions.<sup>12</sup> The  $a_1$  coefficient gives insights on the impact of level of free allowances on the level of actual emissions in the Phase 1 of the EU ETS. The sum  $a_1 + a_2$  captures the impact of free allowances on the level of actual emissions in the Phase 2 of EU ETS, while  $a_1 + a_3$  measures the intensity of this impact in the third phase of EU ETS. Finally, the coefficient  $a_{2009}$  captures the effects of 2008–2009 crisis that significantly hit verified emission but had only a minor impact on free allowances (comp. Figures 4 and 5).

In order to verify Hypothesis 4 we will move onto analysing the aggregated emission data and estimating a set of linear dynamic panel-data models of the form:

$$GDP_{c,t} = b_c + b_X X_{c,t} + b_0 GDP_{c,t-1} + b_1 \bar{A}_{c,t} + b_2 \bar{A}_{c,t}^{phase2} + b_3 \bar{A}_{c,t}^{phase3} + b_{2009} d_{2009} + \eta_{c,t} \quad (2)$$

where  $\eta_{c,t}$  stands for the idiosyncratic errors with no autocorrelation,  $c$  is the member of the country group examined, and  $t$  is the time point. Further,  $X_{c,t}$  denotes a set of control variables. The coefficient  $b_c$  captures time-independent individual effects across the countries, while  $b_0$  allows the autoregressive nature of time series of GDP to be taken into account.<sup>13</sup> The  $b_1$  coefficient gives insights on the impact that the level of free allowances in EU ETS has on the current year

---

<sup>12</sup> We did not find any statistically significant evidence to consider more than one lag in equation (1).

<sup>13</sup> Similarly to model (1) also in the case of equation (2) the respective inclusion tests provided no support for considering more than one lag.

GDP growth rate. Analogically to (1) the sums  $b_1 + b_2$  and  $b_1 + b_3$  capture the impact of free allowances on current GDP growth rate in Phase 2 and Phase 3 of EU ETS, respectively. Finally, the coefficient  $b_{2009}$  captures the effects of 2008–2009 crisis that significantly hit GDP in EU countries (comp. Figure 7).

## 5. Empirical results

In this chapter we present results of the estimation of the respective GMM models given in (1) and (2).<sup>14</sup> Table 3 presents the results of estimating models (1) for groups of countries listed in Table 2. Similar results for GDP-focused GMM models are given in Table 4.

Hypothesis 1 stated that assigning fewer free allowances had a statistically significant impact on lowering the level of actual emissions in the EU ETS. Moreover, according to Hypothesis 1, this effect should be especially strong in countries with high air pollution. The results presented in Table 3 (more precisely the data on coefficient  $a_1$  that is responsible for measuring the effect described in Hypothesis 1) prove the hypothesis is true in countries with high usage of renewable energy sources, countries with low air pollution and the countries with high and moderate level of social development. In low air polluting countries, as well as in countries with high usage of renewable energy sources, lowering the level of free allowances had very meaningful effect in reduction of greenhouse gas emissions.

A comparison of the results obtained for combustion and other sectors allows for the claim that it does not matter in which group of installations the reduction of free allowances takes place. In case of installations listed in the combustion sector, lowering allowances was statistically significant for reducing actual emissions for Western Europe countries, high renewable energy countries as well as high and medium HDI index countries. The cases of high statistical significance are almost exactly identical in case of models constructed for all installations and combustion-related installations.

Lowering the level of free allowances in the installations listed in other sectors had a significant impact on lowering actual emissions in the case of countries with a high and low usage of renewable energy, high air pollution and low HDI index. In other words, the groups of countries in which lowering free allowances had a significant impact on lowering actual emissions are slightly different for models constructed for installations listed in the combustion sector and models constructed for other sectors. Anyhow, these results provide no evidence supporting Hypothesis 2.

---

<sup>14</sup> We used a first difference GMM estimator with the Windmeijer (2005) correction for the two-step covariance matrix.

**Table 3**  
Results of GMM estimation of models (1) for different groups of countries

|                       | $a_0$      |       | $a_1$       |       | $a_2$       |       | $a_3$       |       | $a_{2009}$ |       | Hansen test |       |             |
|-----------------------|------------|-------|-------------|-------|-------------|-------|-------------|-------|------------|-------|-------------|-------|-------------|
|                       | coef.      | pval. | coef.       | pval. | coef.       | pval. | coef.       | pval. | coef.      | pval. | stat.       | pval. |             |
| Western Europe        | All        | 0.60  | <b>0.00</b> | 0.12  | 0.13        | -0.06 | <b>0.01</b> | 0.03  | 0.70       | -0.01 | 0.00        | 24.93 | <b>0.01</b> |
|                       | Combustion | 0.45  | 0.00        | 0.15  | <b>0.04</b> | -0.07 | 0.06        | -0.18 | 0.22       | 0.00  | 0.41        | 23.17 | <b>0.01</b> |
|                       | Other      | 0.80  | <b>0.02</b> | 0.08  | 0.43        | -0.04 | <b>0.00</b> | 0.01  | 0.92       | -0.03 | <b>0.00</b> | 2.40  | 0.30        |
| High renewable energy | All        | 0.10  | 0.49        | 0.30  | 0.00        | -0.08 | 0.01        | 0.22  | 0.16       | -0.01 | 0.00        | 23.36 | <b>0.00</b> |
|                       | Combustion | 0.07  | 0.73        | 0.31  | <b>0.00</b> | -0.09 | 0.07        | 0.25  | 0.06       | 0.00  | 0.00        | 18.00 | <b>0.02</b> |
|                       | Other      | -0.45 | 0.01        | 0.49  | <b>0.02</b> | -0.03 | 0.14        | 0.33  | 0.00       | -0.01 | <b>0.00</b> | 3.42  | 0.18        |
| Low renewable energy  | All        | 0.98  | <b>0.02</b> | 0.03  | 0.75        | 0.00  | 0.98        | 0.02  | 0.66       | -0.03 | <b>0.00</b> | 1.60  | 0.45        |
|                       | Combustion | 1.06  | 0.51        | 0.00  | 0.98        | 0.05  | 0.67        | 0.08  | 0.40       | -0.02 | 0.28        | 4.24  | 0.12        |
|                       | Other      | -0.35 | 0.65        | 0.33  | <b>0.02</b> | -0.05 | 0.41        | -0.06 | 0.25       | -0.01 | 0.32        | 3.22  | 0.20        |
| High air pollution    | All        | -0.12 | 0.36        | 0.13  | 0.36        | -0.03 | 0.34        | 0.11  | 0.12       | -0.02 | <b>0.01</b> | 3.28  | 0.19        |
|                       | Combustion | 0.21  | 0.54        | 0.03  | 0.63        | -0.04 | 0.07        | 0.00  | 0.96       | -0.01 | 0.00        | 6.05  | 0.20        |
|                       | Other      | -0.17 | 0.41        | 0.39  | <b>0.00</b> | 0.03  | 0.23        | 0.20  | 0.13       | -0.01 | <b>0.00</b> | 0.20  | 0.91        |
| Low air pollution     | All        | 0.32  | 0.03        | 0.13  | 0.01        | -0.13 | <b>0.00</b> | -0.04 | 0.34       | -0.01 | <b>0.01</b> | 1.47  | 0.48        |
|                       | Combustion | 0.38  | <b>0.00</b> | 0.11  | 0.13        | -0.18 | <b>0.00</b> | 0.12  | 0.23       | 0.00  | 0.77        | 1.72  | 0.42        |
|                       | Other      | 0.12  | 0.77        | 0.02  | 0.85        | -0.06 | 0.08        | -0.07 | 0.48       | -0.01 | 0.00        | 27.77 | <b>0.00</b> |
| High HDI index        | All        | 0.33  | 0.22        | 0.10  | <b>0.00</b> | -0.01 | 0.83        | 0.04  | 0.25       | -0.02 | <b>0.00</b> | 0.74  | 0.69        |
|                       | Combustion | 0.44  | 0.11        | 0.11  | <b>0.00</b> | 0.01  | 0.71        | 0.24  | 0.05       | -0.02 | <b>0.00</b> | 1.54  | 0.46        |
|                       | Other      | 0.17  | 0.56        | 0.05  | 0.33        | -0.05 | <b>0.01</b> | -0.07 | 0.11       | -0.02 | <b>0.00</b> | 10.11 | 0.12        |
| Medium HDI index      | All        | 0.71  | 0.00        | 0.15  | 0.00        | -0.07 | <b>0.00</b> | -0.02 | 0.86       | -0.02 | <b>0.00</b> | 2.56  | 0.28        |
|                       | Combustion | 0.69  | 0.00        | 0.14  | 0.00        | -0.08 | <b>0.00</b> | -0.17 | 0.22       | -0.02 | <b>0.00</b> | 2.52  | 0.28        |
|                       | Other      | 0.75  | 0.06        | 0.12  | 0.41        | -0.06 | <b>0.00</b> | 0.01  | 0.89       | -0.03 | <b>0.00</b> | 0.73  | 0.69        |
| Low HDI index         | All        | 0.43  | 0.45        | 0.03  | 0.53        | 0.02  | 0.63        | 0.06  | 0.06       | -0.02 | <b>0.00</b> | 3.81  | 0.15        |
|                       | Combustion | 0.70  | 0.20        | 0.05  | 0.37        | 0.01  | 0.61        | 0.05  | 0.27       | -0.01 | 0.06        | 1.58  | 0.45        |
|                       | Other      | -0.19 | 0.36        | 0.36  | <b>0.00</b> | -0.03 | 0.39        | -0.02 | 0.71       | -0.02 | <b>0.00</b> | 2.44  | 0.29        |

Hypothesis 3 stated that in the later phases of EU ETS the actual-emission-reducing effect of free allowances became stronger. This expectation was motivated by the fact that in the first phase of EU ETS the allowances were not distributed optimally, a factor which was later significantly corrected. Although in later stages of EU ETS programme the levels of free allowances were significantly reduced, the empirical results presented in Table 3 provide evidence to claim that during the Phase 3 this reduction did not have almost any effect on lowering actual emissions. Only in the case of installations listed in other sectors in countries which use relatively large amounts of renewable energy did coefficient  $a_3$  turn out to be statistically significant at 1% level. To some extent, this questions the validity of a further reduction of free allowances, which seem to have a sagging effect on reducing air pollution within the EU ETS program.

The levels of free allowances set in the Phase 2 of EU ETS turned out to be partially important in reducing actual emissions in Western Europe (with the exception of the combustion sector), in high renewable energy countries (this was confirmed only in the models covering all installations), low air polluting countries (in the case of the model constructed for all installations and the model for installations listed in the combustion sector) and countries at a high level of social development (a model constructed for installations listed in other sectors). On the other hand, the results presented in Table 3 prove that during Phase 2 of EU ETS the levels of free allowances had a very strong and statistically significant impact on reducing actual emissions in countries with a moderate HDI index. To summarize, it can be seen that the pilot and second phase of EU ETS were periods in which the levels of free allowances played a crucial role in reducing actual emissions. In this context, Phase 3 had virtually no effect, which suggests the rejection of Hypothesis 3.

Results outlined in Table 3 were obtained using data for selected groups of countries. Therefore, only eight GMM dynamic panel models were presented and discussed. We also estimated the same types of dynamic panel models for the 22 individual EU countries covered in the WCCGC database. Detailed results can be found in the Appendix placed at the end of this paper (comp. Table A2). To the best of our knowledge, there are no similar thorough analyses of EU ETS database in the current literature that would provide detailed results obtained for installations in individual countries and selected groups of countries. Moreover, one of the biggest advantages of this study is the provision of the R script included in the Appendix that allows not only a replication of the presented results but also a straightforward regular update of the empirical outcomes (e.g. by reorienting the scope of the analysis towards different groups of countries/industries, by using the data on EU ETS Phase 4, etc.). The latter makes the included R code a flexible tool that opens a way for a wide range of EU-ETS-focused quantitative analyses.



**Table 4**  
Results of GMM estimation of models (2) for different groups of countries

|                       | $b_0$ |             | $b_1$  |             | $b_2$  |             | $b_3$   |       | $b_{2009}$ |             | Hansen test |       |
|-----------------------|-------|-------------|--------|-------------|--------|-------------|---------|-------|------------|-------------|-------------|-------|
|                       | coef. | pval.       | coef.  | pval.       | coef.  | pval.       | coef.   | pval. | coef.      | pval.       | stat.       | pval. |
| Western Europe        | -0.43 | <b>0.00</b> | 32.75  | 0.13        | 12.25  | 0.51        | 61.70   | 0.27  | -4.41      | <b>0.00</b> | 3.82        | 0.97  |
| High renewable energy | 0.07  | 0.69        | 24.11  | <b>0.01</b> | -8.33  | 0.17        | -4.75   | 0.21  | -10.85     | <b>0.00</b> | 4.91        | 0.94  |
| Low renewable energy  | -0.42 | 0.58        | -52.41 | 0.47        | -24.27 | <b>0.04</b> | -113.38 | 0.16  | -6.63      | <b>0.01</b> | 1.02        | 1.00  |
| High air pollution    | 0.05  | 0.79        | 11.34  | 0.57        | -11.01 | 0.65        | -3.77   | 0.63  | -10.29     | <b>0.00</b> | 3.62        | 1.00  |
| Low air pollution     | -0.36 | 0.12        | 25.21  | 0.27        | -11.82 | 0.38        | -0.57   | 0.88  | -7.48      | <b>0.00</b> | 4.24        | 0.96  |
| High HDI index        | -0.27 | <b>0.00</b> | 10.27  | 0.46        | -5.22  | 0.47        | -3.30   | 0.54  | -5.75      | <b>0.00</b> | 6.39        | 0.85  |
| Medium HDI index      | 0.05  | 0.89        | -6.82  | 0.84        | -22.76 | 0.60        | -58.90  | 0.74  | -6.18      | <b>0.01</b> | 4.27        | 1.00  |
| Low HDI index         | 0.14  | 0.59        | 0.12   | 1.00        | -2.02  | 0.90        | 0.19    | 0.99  | -7.92      | 0.08        | 4.03        | 1.00  |

Note: Set of control variables in models (2) contains only a constant

The fourth hypothesis stated that the level of free allowances did not have a statistically significant effect on GDP growth rate. Referring to the results of estimation of the respective dynamic panel models (comp. Table 4), it can be seen that this hypothesis turned out to be true in the case of almost every examined group of countries. Only for countries that use relatively large amounts of energy from renewable sources was a statistically significant coefficient corresponding to the level of free allowances noticed.

The level of free allowances in Phase 2 of EU ETS had a statistically significant impact on GDP growth rate for those EU countries which use relatively low amounts of energy from renewable sources. On the other hand, the financial crisis of 2008 had a very meaningful impact on lowering GDP growth rate in 2009 for every group of countries, except for countries characterized by a low level of social development.

For every model estimated we conducted a Sargan-Hansen<sup>15</sup> test to check the validity of instrument subsets. In every case the null hypothesis was not rejected, thus one may assume a correct specification of the GMM estimators. In the case of model (2) adding control variables such as **Foreign Direct Investment or Labour Supply** (both these variables were taken from World Bank Database)<sup>16</sup> did not have a noticeable influence on the estimation results compared to the benchmark variant presented in Table 4. Therefore, we do not present these additional results in the main text.

## 6. Conclusions

The goal of this paper was to add value to the current economic literature that lacks any econometric analyzes devoted to examining free allowances-verified emissions-GDP linkages in the reliable and detailed Wegener Center for Climate and Global Change database on EU ETS emission levels. We made a preliminary assessment of the effectiveness of the EU ETS in terms of reducing the actual emissions to the air while preserving the economic growth of EU member states. The extensive empirical analysis was focused on examining the issues in question for three phases of the EU ETS and various groups of EU economies that vary in terms of economic development and the overall air pollutant emission.

In general, the empirical results provided solid evidence to claim that lowering the level of free allowances in EU ETS had a statistically significant impact

---

<sup>15</sup> This test allows checking for over-identifying restrictions. Null hypothesis states that the restrictions are valid. In other words, the test verifies if the GMM model specification is correct (Hansen, 1982).

<sup>16</sup> <https://data.worldbank.org/>

on reducing the level of actual emissions. Moreover, this impact was found to be especially strong in low polluting EU economies.

At the same time, we rejected the hypothesis that the impact of lowering allowances in EU ETS on reducing the level of actual emissions was much weaker for combustion sectors compared to other EU sectors. We also did not find solid statistical evidence to claim that the positive impact of lowering the level free allowances in EU ETS on reducing the level of actual emissions intensified during the later stages of EU ETS in all sectors and countries.

However, we found solid support for claiming that lowering the level free allowances in EU ETS did not have a statistically significant impact on reducing the GDP growth rate of EU economies. The latter may be partly driven by the ongoing process of shifting the EU economy toward services and other activities characterized by low GHG emission levels and installation of new eco-efficient technologies. Last but not least, this also proves that the overall framework of EU ETS, including the system of penalties for extensive pollutants, seems to work (nearly) as planned.

## References

- [1] Alberola, E. (2006) 'The informational efficiency of the EU ETS: An empirical evaluation on the spot and futures prices', Working Paper, University of Paris, France.
- [2] Anderson, B. and Corrado Di, M. (2011) 'Abatement and Allocation in the Pilot Phase of the EU ETS', *Environmental and Resource Economics*, vol. 48, pp. 83–103, [Online], Available: <https://doi.org/10.1007/s10640-010-9399-9> [1 Sep 2020].
- [3] Anderson, T.W. and Hsiao, C. (1982) 'Formulation and Estimation of Dynamic Models Using Panel Data', *Journal of Econometrics*, vol. 18(1), pp. 47–82.
- [4] Arellano, M. and Bond, S. (1991) 'Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations', *The Review of Economic Studies*, vol. 58(2), pp. 277–297.
- [5] Arellano, M. and Bover, O. (1995) 'Another Look at the Instrumental Variable Estimation of Error-components Models', *Journal of Econometrics*, vol. 68(1), pp. 29–51.
- [6] Bayer, P. and Aklin, M. (2020) 'The European Union Emissions Trading System reduced CO<sub>2</sub> emissions despite low prices', Proceedings of the National Academy of Sciences of the United States of America, vol. 117, pp. 8804–8812.

- [7] Blundell, R. and Bond, S. (1998) 'Initial Conditions and Moment Restrictions in Dynamic Panel Data Models', *Journal of Econometrics*, vol. 87(1), pp. 115–143.
- [8] Bocklet, J., Hintermayer, M. Schmidt, L. and Wildgrub, T. (2019) 'The reformed EU ETS – Intertemporal emission trading with restricted banking', *Energy Economics*, vol. 84, art. no 104486, [Online], Available: <https://doi.org/10.1016/j.eneco.2019.104486> [1 Sep 2020].
- [9] Borghesi, S. and Flori, A. (2018) 'EU ETS facets in the net: Structure and evolution of the EU ETS network', *Energy Economics*, vol. 75, pp. 602–635, [Online], Available: <https://doi.org/10.1016/j.eneco.2018.08.026> [1 Sep 2020].
- [10] Burke, M. (2006) 'Drop in EU carbon prices baffles analysts', *Environmental Science and Technology*, 40, pp. 4534–4535.
- [11] Cañón-de-Francia, J. and Garcés-Ayerbe, C. (2019) 'Factors and Contingencies for the “It Pays to Be Green Hypothesis”. The European Union’s Emissions Trading System (EU ETS) and Financial Crisis as Contexts', *International Journal of Environmental Research and Public Health*, vol. 16, art. no 2988, [Online], Available: doi: 10.3390/ijerph16162988 [1 Sep 2020].
- [12] Cludius, J., Bruyn, S. de, Schumacher, K. and Vergeer, R. (2020) 'Ex-post investigation of cost pass-through in the EU ETS – an analysis for six industry sectors', *Energy Economics*, vol. 91, art. No. 104883, [Online], Available: <https://doi.org/10.1016/j.eneco.2020.104883> [1 Sep 2020].
- [13] European Commission (2015) 'EU ETS handbook', [Online], Available: [https://ec.europa.eu/clima/sites/clima/files/docs/ets\\_handbook\\_en.pdf](https://ec.europa.eu/clima/sites/clima/files/docs/ets_handbook_en.pdf) [1 Sep 2020].
- [14] Hansen, L.P. (1982) 'Large Sample Properties of Generalized Method of Moments Estimators', *Econometrica*, vol. 50(4), pp. 1029–1054.
- [15] Holtz-Eakin, D., Newey, W. and Rosen, H.S. (1988) 'Estimating Vector Autoregressions with Panel Data', *Econometrica*, vol. 56(6), pp. 1371–1395.
- [16] Jaraite, J. and Di Maria, C. (2014) 'Did the EU ETS Make a Difference? An Empirical Assessment Using Lithuanian Firm-Level Data', CERE Working Paper 2, [Online], Available: <https://ssrn.com/abstract=2382663> [1 Sep 2020].
- [17] Lin, W., Chen, J., Zheng, Y. and Dai, Y. (2019) 'Effects of the EU Emission Trading Scheme on the international competitiveness of pulp-and-paper industry', *Forest Policy and Economics*, vol. 109, [Online], Available: <https://doi.org/10.1016/j.forpol.2019.102021> [1 Sep 2020].
- [18] Marcu, A., Alberola, E., Caneill, JY., Mazzoni, M., Schleicher, S., Stoefs, W., Vailles, C. and Vangenechten, D. (2018) 'State of the EU ETS Report', Brussels: CEPS.
- [19] Marcu, A., Vangenechten, D., Alberola, E., Olsen, J., Caneill, JY., Schleicher, S. and Rafael de, R. (2020) 'State of the EU ETS Report', Brussels: CEPS.

- [20] Martin, R., Muùls, M., Preux de, L.B. and Wagner, U.J. (2014) ‘On the empirical content of carbon leakage criteria in the EU Emissions Trading Scheme’, *Ecological Economics*, vol. 105, pp. 78–88.
- [21] Niblock, S.J. and Harrison, J.L. (2011) ‘European carbon markets and the global financial crisis’, paper presented to the 2011 Global Business Conference, Sibenik, Croatia, 21–24 September.
- [22] Nickell, S. (1981) ‘Biases in Dynamic Models with Fixed Effects’, *Econometrica*, vol. 49(6), pp. 1417–1426.
- [23] Sigmund, M. and Ferstl, R. (2019) ‘Panel vector autoregression in R with the package panelvar’, *The Quarterly Review of Economics and Finance*, [Online], Available: <https://doi.org/10.1016/j.qref.2019.01.001> [1 Sep 2020].
- [24] Teixidó, J., Verde, S.F. and Nicolli, F. (2019) ‘The impact of the EU Emissions Trading System on low-carbon technological change: The empirical evidence’, *Ecological Economics*, vol. 164, art. no 106347.
- [25] Verde, S.F., Graf, C. and Jong, T. (2019) ‘Installation entries and exits in the EU ETS: patterns and the delay effect of closure provisions’, *Energy Economics*, vol. 78, pp. 508–524, [Online], Available: <https://doi.org/10.1016/j.eneco.2018.11.032> [1 Sep 2020].
- [26] Windmeijer, F. (2005) ‘A Finite Sample Correction for the Variance of Linear Efficient two-step GMM Estimators’, *Journal of Econometrics*, vol. 126(1), pp. 25–51.

## Appendix

### Part 1. Online resources

- Visit [https://github.com/PiterCidry/EU\\_ETS\\_Article](https://github.com/PiterCidry/EU_ETS_Article) to download the complete R script that allows the replication of all the outcomes discussed in the main text as well as a straightforward regular update of the empirical outcomes (e.g. by reorienting the scope of the analysis towards different groups of countries, by using the data on EU ETS Phase 4, etc.). The dataset provided in the link is generated randomly merely to show the structure of the desired data file. In order to get access to real data about emissions, please contact Wegener Center for Climate and Global Change (<https://wegcenter.uni-graz.at/de/>).
- Visit [https://1drv.ms/u/s!AqWMx9MoY65Rk2iY-F6sq-hC\\_hLa?e=IzflEa](https://1drv.ms/u/s!AqWMx9MoY65Rk2iY-F6sq-hC_hLa?e=IzflEa) to download the detailed empirical results. These were obtained using both the full

panel dataset on EU ETS installations as well as the datasets for individual countries, and various combinations of sectors and groups of countries. In addition to the benchmark estimation technique (i.e., a two-step difference GMM) also pooled/FE/RE panel models were estimated and verified. In general, using the attached R script we estimated and examined 1,404 different specifications of panel models. Table A1 summarizes the statistics on the number of different models examined.

- Visit <https://1drv.ms/u/s!AqWMx9MoY65Rk2nzyxNhejHpIXOe?e=YnNyvM> to find more plots and visualisations of the dataset.

**Table A1**  
Number of panel models examined

| Dataset                | Dependent variable | Pooled regression | One-way FE (individual effects) | One-way FE (time effects) | Two-way FE | RE  | PVAR | Total |
|------------------------|--------------------|-------------------|---------------------------------|---------------------------|------------|-----|------|-------|
| Full dataset           | Emission           | 3                 | 3                               | 3                         | 3          | 3   | 3    | 18    |
|                        | GDP                | 3                 | 3                               | 3                         | 3          | 3   | 3    | 18    |
| Groups (countries)     | Emission           | 24                | 24                              | 24                        | 24         | 24  | 24   | 144   |
|                        | GDP                | 24                | 24                              | 24                        | 24         | 24  | 24   | 144   |
| Groups (installations) | Emission           | 24                | 24                              | 24                        | 24         | 24  | 24   | 144   |
|                        | GDP                | 24                | 24                              | 24                        | 24         | 24  | 24   | 144   |
| Countries              | Emission           | 66                | 66                              | 66                        | 66         | 66  | 66   | 396   |
|                        | GDP                | 66                | 66                              | 66                        | 66         | 66  | 66   | 396   |
| Total                  |                    | 234               | 234                             | 234                       | 234        | 234 | 234  | 1404  |

## Part 2. Results obtained for individual countries

Results of GMM estimation of models (1) for individual countries are presented in Table A2.

**Table A2**  
Results of GMM estimation of models (1) for individual countries

|    | $a_0$      |       | $a_1$ |       | $a_2$ |       | $a_3$ |       | $a_{2009}$ |       | Hausen test |       |      |
|----|------------|-------|-------|-------|-------|-------|-------|-------|------------|-------|-------------|-------|------|
|    | coef.      | pval. | coef. | pval. | coef. | pval. | coef. | pval. | coef.      | pval. | stat.       | pval. |      |
| AT | All        | -0.61 | 0.00  | 0.41  | 0.00  | -0.02 | 0.38  | 0.57  | 0.00       | -0.01 | 0.01        | 1.05  | 0.59 |
|    | Combustion | 0.93  | 0.00  | 0.01  | 0.95  | 0.11  | 0.10  | 0.21  | 0.32       | -0.02 | 0.04        | 3.98  | 0.14 |
|    | Other      | -0.28 | 0.00  | 0.71  | 0.00  | 0.02  | 0.34  | 0.52  | 0.00       | -0.01 | 0.17        | 1.43  | 0.49 |
| BE | All        | 1.27  | 0.00  | -0.05 | 0.62  | 0.05  | 0.44  | 0.02  | 0.81       | -0.01 | 0.15        | 0.78  | 0.68 |
|    | Combustion | 1.05  | 0.00  | 0.03  | 0.86  | -0.15 | 0.22  | -0.18 | 0.16       | 0.01  | 0.13        | 4.66  | 0.10 |
|    | Other      | -1.19 | 0.54  | -0.10 | 0.09  | 0.13  | 0.04  | 0.15  | 0.03       | 0.00  | 0.94        | 1.79  | 0.41 |
| CZ | All        | 0.61  | 0.00  | 0.16  | 0.04  | -0.10 | 0.00  | -0.04 | 0.56       | -0.02 | 0.06        | 0.12  | 0.94 |
|    | Combustion | 0.56  | 0.01  | 0.18  | 0.03  | -0.10 | 0.00  | -0.01 | 0.88       | -0.02 | 0.16        | 0.17  | 0.92 |
|    | Other      | 0.38  | 0.02  | 0.07  | 0.27  | 0.00  | 0.74  | -0.02 | 0.17       | -0.01 | 0.06        | 3.60  | 0.17 |
| DE | All        | -0.16 | 0.46  | 0.07  | 0.04  | -0.01 | 0.82  | 0.03  | 0.45       | -0.02 | 0.00        | 0.62  | 0.73 |
|    | Combustion | -0.12 | 0.59  | 0.08  | 0.03  | 0.00  | 0.90  | 0.46  | 0.01       | -0.02 | 0.00        | 0.63  | 0.73 |
|    | Other      | -0.06 | 0.73  | 0.17  | 0.03  | -0.08 | 0.02  | -0.03 | 0.28       | -0.02 | 0.00        | 0.86  | 0.65 |
| DK | All        | 0.94  | 0.02  | -0.13 | 0.70  | -0.19 | 0.17  | -0.20 | 0.34       | 0.00  | 0.99        | 4.04  | 0.13 |
|    | Combustion | 0.91  | 0.04  | 0.05  | 0.89  | -0.15 | 0.43  | 0.19  | 0.73       | 0.00  | 0.68        | 4.17  | 0.12 |
|    | Other      | 0.57  | 0.00  | -0.24 | 0.01  | -0.21 | 0.00  | -0.30 | 0.00       | -0.02 | 0.29        | 0.00  | 0.00 |
| EE | All        | -0.96 | 0.00  | 0.20  | 0.03  | 0.22  | 0.02  | 0.93  | 0.00       | -0.10 | 0.11        | 0.00  | 0.00 |
|    | Combustion | -1.06 | 0.00  | 0.20  | 0.04  | 0.25  | 0.01  | 1.01  | 0.00       | -0.13 | 0.12        | 0.00  | 0.00 |
|    | Other      | 0.40  | 0.31  | 0.29  | 0.01  | -0.16 | 0.50  | -0.24 | 0.43       | -0.09 | 0.34        | 0.00  | 0.00 |
| ES | All        | 0.36  | 0.00  | 0.24  | 0.05  | -0.26 | 0.00  | -0.17 | 0.09       | -0.01 | 0.31        | 13.86 | 0.03 |
|    | Combustion | 0.55  | 0.00  | -0.19 | 0.41  | -0.35 | 0.00  | -0.50 | 0.00       | 0.00  | 0.72        | 10.47 | 0.03 |
|    | Other      | 0.46  | 0.02  | 0.16  | 0.23  | -0.08 | 0.00  | -0.06 | 0.42       | -0.02 | 0.00        | 1.11  | 0.57 |

Table A2 cont.

|    | $a_0$      |       | $a_1$       |       | $a_2$       |       | $a_3$       |       | $a_{2009}$  |       | Hansen test |       |             |
|----|------------|-------|-------------|-------|-------------|-------|-------------|-------|-------------|-------|-------------|-------|-------------|
|    | coef.      | pval. | coef.       | pval. | coef.       | pval. | coef.       | pval. | coef.       | pval. | stat.       | pval. |             |
| FI | All        | -0.46 | 0.01        | 0.30  | <b>0.02</b> | -0.12 | 0.18        | -0.16 | 0.20        | -0.01 | <b>0.00</b> | 4.54  | 0.10        |
|    | Combustion | -0.22 | 0.10        | 0.49  | <b>0.01</b> | -0.13 | 0.07        | 0.30  | 0.38        | -0.01 | <b>0.02</b> | 4.38  | 0.11        |
|    | Other      | 2.38  | 0.19        | -0.20 | 0.22        | 0.02  | 0.31        | 0.16  | 0.06        | -0.02 | 0.01        | 1.66  | 0.44        |
| FR | All        | 0.34  | <b>0.04</b> | 0.19  | 0.20        | -0.07 | 0.00        | -0.18 | 0.03        | -0.01 | <b>0.03</b> | 0.90  | 0.64        |
|    | Combustion | 0.11  | 0.59        | 0.40  | <b>0.00</b> | -0.01 | 0.89        | -0.21 | <b>0.02</b> | 0.00  | 0.93        | 1.74  | 0.42        |
|    | Other      | 0.33  | <b>0.00</b> | 0.07  | 0.54        | -0.15 | <b>0.00</b> | -0.19 | 0.07        | -0.01 | <b>0.00</b> | 6.16  | 0.19        |
| GB | All        | 0.97  | <b>0.00</b> | -0.10 | 0.47        | -0.02 | 0.61        | 0.12  | 0.06        | -0.06 | <b>0.00</b> | 3.62  | 0.16        |
|    | Combustion | 0.52  | 0.08        | 0.69  | <b>0.00</b> | -0.01 | 0.97        | 0.30  | 0.13        | -0.02 | 0.01        | 13.03 | <b>0.01</b> |
|    | Other      | 1.30  | <b>0.02</b> | -0.04 | 0.82        | -0.05 | <b>0.01</b> | 0.07  | 0.39        | -0.06 | 0.26        | 1.30  | 0.52        |
| GR | All        | 0.58  | 0.00        | 0.21  | 0.00        | 0.04  | 0.50        | 0.19  | <b>0.05</b> | -0.03 | 0.24        | 3.08  | 0.21        |
|    | Combustion | 0.28  | 0.03        | 0.22  | <b>0.00</b> | -0.02 | 0.68        | 1.29  | <b>0.00</b> | 0.01  | 0.89        | 0.00  | <b>0.00</b> |
|    | Other      | 0.79  | 0.00        | 0.60  | 0.02        | -0.07 | <b>0.04</b> | 0.04  | 0.67        | -0.04 | 0.03        | 0.00  | <b>0.00</b> |
| HU | All        | -0.04 | 0.97        | 0.16  | 0.25        | 0.03  | 0.70        | -0.05 | 0.29        | -0.01 | 0.56        | 3.82  | 0.15        |
|    | Combustion | 0.18  | 0.70        | 0.15  | 0.08        | -0.01 | 0.51        | -0.08 | 0.11        | 0.00  | 0.24        | 4.96  | 0.08        |
|    | Other      | 2.17  | 0.28        | 0.22  | 0.34        | 0.01  | 0.93        | -0.17 | 0.37        | -0.06 | 0.36        | 0.00  | <b>0.00</b> |
| IE | All        | 1.18  | 0.10        | -0.16 | 0.47        | 0.07  | 0.20        | -0.08 | 0.71        | -0.02 | 0.09        | 2.41  | 0.30        |
|    | Combustion | 0.35  | 0.23        | 0.30  | 0.05        | -0.11 | 0.04        | 0.30  | <b>0.00</b> | 0.00  | 0.54        | 1.77  | 0.41        |
|    | Other      | 2.07  | <b>0.00</b> | -0.18 | 0.32        | -0.12 | 0.00        | -0.58 | 0.00        | -0.18 | 0.04        | 0.00  | <b>0.00</b> |
| IT | All        | 1.05  | <b>0.00</b> | 0.03  | 0.20        | 0.02  | 0.56        | 0.01  | 0.78        | -0.03 | <b>0.00</b> | 0.89  | 0.64        |
|    | Combustion | 1.06  | <b>0.00</b> | 0.02  | 0.43        | 0.05  | 0.17        | 0.54  | 0.03        | -0.04 | <b>0.03</b> | 1.24  | 0.54        |
|    | Other      | 0.43  | <b>0.04</b> | 0.11  | 0.06        | -0.06 | 0.01        | -0.13 | 0.00        | -0.02 | 0.00        | 9.68  | <b>0.05</b> |



Table A2 cont.

|    |            |       |      |       |      |       |      |       |      |       |      |      |      |
|----|------------|-------|------|-------|------|-------|------|-------|------|-------|------|------|------|
| IT | All        | 1.38  | 0.29 | -0.09 | 0.75 | 0.34  | 0.28 | 0.45  | 0.44 | -0.02 | 0.28 | 0.00 | 0.00 |
|    | Combustion | 0.39  | 0.07 | 0.09  | 0.00 | 0.14  | 0.22 | -0.26 | 0.00 | -0.01 | 0.25 | 0.00 | 0.00 |
|    | Other      | 0.38  | 0.93 | 0.77  | 0.92 | -0.13 | 0.99 | -0.24 | 0.99 | 0.33  | 0.99 | 0.00 | 0.00 |
| IV | All        | 0.16  | 0.56 | -0.19 | 0.12 | 0.01  | 0.67 | -0.08 | 0.03 | -0.01 | 0.09 | 0.00 | 0.00 |
|    | Combustion | 1.53  | 0.24 | -0.65 | 0.05 | 0.02  | 0.61 | 0.06  | 0.37 | 0.00  | 0.54 | 0.00 | 0.00 |
|    | Other      | 0.53  | 0.10 | 0.17  | 0.22 | -0.05 | 0.00 | -0.11 | 0.00 | -0.02 | 0.06 | 0.00 | 0.00 |
| NL | All        | 0.43  | 0.30 | 0.32  | 0.00 | 0.01  | 0.79 | -0.01 | 0.87 | -0.01 | 0.18 | 7.05 | 0.13 |
|    | Combustion | 0.48  | 0.40 | 0.28  | 0.03 | -0.04 | 0.48 | -0.90 | 0.00 | 0.01  | 0.82 | 3.55 | 0.17 |
|    | Other      | -0.10 | 0.74 | 0.38  | 0.02 | 0.02  | 0.39 | 0.03  | 0.12 | -0.02 | 0.03 | 1.66 | 0.44 |
| PL | All        | 0.45  | 0.27 | -0.02 | 0.71 | -0.02 | 0.65 | 0.02  | 0.68 | -0.01 | 0.00 | 4.93 | 0.30 |
|    | Combustion | 0.43  | 0.39 | -0.04 | 0.62 | -0.01 | 0.73 | 0.02  | 0.57 | -0.01 | 0.31 | 5.62 | 0.23 |
|    | Other      | -0.59 | 0.04 | 0.34  | 0.00 | -0.02 | 0.75 | -0.17 | 0.00 | -0.02 | 0.04 | 1.42 | 0.49 |
| PT | All        | 0.99  | 0.00 | -0.26 | 0.00 | 0.03  | 0.49 | 0.20  | 0.13 | -0.01 | 0.26 | 1.00 | 0.61 |
|    | Combustion | 0.61  | 0.08 | -0.11 | 0.36 | -0.01 | 0.95 | 0.29  | 0.38 | 0.08  | 0.34 | 0.00 | 0.00 |
|    | Other      | 0.75  | 0.04 | -0.05 | 0.88 | -0.05 | 0.49 | -0.03 | 0.91 | -0.01 | 0.26 | 4.12 | 0.13 |
| SE | All        | 0.05  | 0.49 | 0.21  | 0.01 | -0.02 | 0.55 | 0.02  | 0.81 | 0.00  | 0.03 | 4.33 | 0.11 |
|    | Combustion | 0.54  | 0.18 | 0.01  | 0.97 | 0.27  | 0.43 | 0.31  | 0.34 | 0.00  | 0.81 | 3.49 | 0.17 |
|    | Other      | -0.01 | 0.89 | 0.05  | 0.40 | -0.01 | 0.69 | -0.03 | 0.67 | -0.01 | 0.05 | 4.20 | 0.12 |
| SI | All        | 0.71  | 0.00 | 0.07  | 0.00 | -0.06 | 0.00 | -0.13 | 0.00 | -0.01 | 0.14 | 0.00 | 0.00 |
|    | Combustion | 0.69  | 0.00 | 0.08  | 0.00 | -0.06 | 0.00 | 0.01  | 0.45 | -0.01 | 0.41 | 0.00 | 0.00 |
|    | Other      | 2.77  | 0.01 | -0.27 | 0.59 | -0.06 | 0.72 | -0.18 | 0.52 | -0.03 | 0.06 | 0.00 | 0.00 |
| SK | All        | 0.68  | 0.00 | 0.15  | 0.13 | -0.10 | 0.02 | -0.08 | 0.24 | -0.03 | 0.01 | 1.46 | 0.48 |
|    | Combustion | 0.64  | 0.00 | 0.04  | 0.63 | -0.11 | 0.01 | -0.22 | 0.00 | -0.01 | 0.29 | 2.44 | 0.30 |
|    | Other      | 0.86  | 0.07 | 0.22  | 0.51 | -0.03 | 0.00 | 0.25  | 0.06 | -0.07 | 0.07 | 0.00 | 0.00 |

Note. Abbreviations of country names were set according to Table 2



Jessica Hastenteufel\*, Lena Fuchs\*\*

## **Low Interest Rates – A Real Threat to German Banks or First-Class Whining?!**

---

### **1. Introductory overview**

German banks occupy a leading position in complaining about the low interest rate environment and the regulatory tsunami (Frühauf, 2019, 14). Both the low interest rates and the increasing regulation are noticeably changing the environment for German banks. A change that poses difficult challenges for credit institutions (Waschbusch et al., 2018a, 916; Schuster, Hastenteufel, 2019, 19–21; Hastenteufel, Kiszka, 2020a, 64). In addition, other issues such as the ongoing digitization and the market entry of new competitors such as fintechs, as well as changing customer requirements and customer behaviour, also challenge banks. Overall, this leads to predicting difficult times for German credit institutions (Dombret, 2017d; Schuster, Hastenteufel, 2019, 19–21). In addition, there is the ongoing corona pandemic that is characterised by great uncertainty and affects all economic sectors – including the banking industry.

However, the subject of this paper is the current interest rate situation and its effects on German credit institutions. The expansive, sometimes unconventional monetary policy pursued by the European Central Bank to stabilize the precarious situation following the financial crisis starting in 2007 and the currently historically low interest rates have repeatedly been criticized (Peters, 2020, 385). In this context, the focus is on the effects on a banks' interest income, which suffers a significant slump because of the low interest rates and thus has a direct impact on the profitability of credit institutions (Waschbusch et al., 2018a, 916; Schenck, 2020, 77–78). Above all, German banks are particularly severely affected

---

\* IUBH International University of Applied Sciences and Saarland University, e-mail: [j.hastenteufel@iubh-fernstudium.de](mailto:j.hastenteufel@iubh-fernstudium.de).

\*\* Verband Pflege GmbH, e-mail: [fuchs.lena96@yahoo.de](mailto:fuchs.lena96@yahoo.de)

by this due to their high dependency on their interest income (Hastenteufel/Kiszka, 2020b, 5).

Regarding the fact that an end to the low interest rate phase cannot be foreseen now, the question is whether the persistently low interest rates do pose a real threat to banks (Waschbusch et al., 2018b, 418) or whether this is just whining on a very high level.

Therefore, we will first consider the effects of low interest rates on bank profitability. Furthermore, we will explain what influence low interest rates have on the procurement of equity and the resilience of credit institutions. Subsequently, we will present selected possibilities on how banks can act in this situation, and finally draw some conclusions.

## **2. Low interest rates – A challenge for banks**

### **2.1. The effects on earnings**

#### **2.1.1. The situation of German banks**

Among others, the interest margin, the cost-income ratio, and the return on equity can be used as indicators to assess the economic situation and the performance of banks (Schuster, Hastenteufel, 2019, 33).

The interest margin results from the ratio of the net interest income to the balance sheet total and thus corresponds to the relative net interest income of the respective period (Deutsche Bundesbank, 2014, 61–65). This key figure is an indicator of a bank's profitability, especially for those with a focus on deposit banking and lending business (Fr re et al., 2008, 9). In recent years the interest margin of German banks has been relatively stable (Buchholz et al., 2019, 16). However, in the long term a sustained downward trend can be determined (Schuster, Hastenteufel, 2019, 36). Although the factors influencing the interest income are diverse, the low interest rate phase contributes to this in particular (Schuster, Hastenteufel, 2019, 36–37).

The cost-income ratio regards the administrative expenses in relation to the gross profit or to the operating income, which is an indicator of cost efficiency (Richter et al., 2018, 30). It describes the administrative effort that a bank incurs in order to generate one euro (Renker, 2018, 15; Waschbusch et al., 2018a, 919). There is a trend towards increasing expenses and stagnating or decreasing income (Koch et al., 2019, 14). For the former, the regulation of banks is particularly important (Slegers, 2018, 6). This key figure indicates the weak points of German banks, whose cost-income ratio is more than 70% in recent years (Kent et al., 2020, 6). This value is above the internationally comparative value of 60–65%

(Schuster, Hastenteufel, 2019, 40). Compared with banks from other countries, the German credit institutions bring up the rear with these results (Hastenteufel, Kiszka, 2020b, 5–6). The effects on income associated with the low interest rates and the flattening of the yield curve have contributed to an increase in this key figure in recent years (Schuster, Hastenteufel, 2019, 40–42).

The return on equity represents the ratio of profit (e.g. annual surplus) to balance sheet equity (Bieg et al., 2016, 6). It is used to assess a bank's profitability. The return on equity can be important in terms of risk provisioning and in terms of interest of potential investors in a bank (Schuster, Hastenteufel, 2019, 34–35). In recent years, the return on equity of German banks has been relatively volatile. However, it has decreased particularly in recent years. The return on equity for all banking groups was around 4% in 2017 and it fell to 2.4% in 2018 (Deutsche Bundesbank, 2019a, 84). In 2019, the average return on equity was only 1% (Oberhuber, 2020, 98). Here, too, the German banks show weaknesses in an international comparison (Rocholl, 2018, 4; Lakhani et al., 2019, 5). Many banks in this country are currently unable to earn their equity costs of around 5–10% (Schuster, Hastenteufel, 2019, 51–52) which is definitely problematic (n. u., 2014). This weakness in earning power is due, among other things, to the high level of dependency on interest-bearing business, the effects of the persistently low interest rate level, the rigid cost structures and the general structure of the German banking market. The low return on equity can also have negative effects on a bank's equity procurement (Schuster, Hastenteufel, 2019, 50–54).

The development of these key figures shows how the economic situation of German banks has changed in recent years and raises the question of the future viability of traditional business models in banks.

### **2.1.2. Low interest rates causing income problems**

It is not surprising that low interest rates are a considerable challenge for many German banks (Dombret, 2017a) as the net interest income is their most important source of income (Bontrup, 2018, 29–39; Rocholl, 2018, 5). Moreover, the negative interest rates on the credit institutions' deposits in the euro system are also considered an influencing factor for their reduced net interest income and their lower profitability (Stadtman et al., 2020, 208). In addition to their structurally-related weak earnings (Deutsche Bundesbank, 2017a, 77–78), extremely low or even negative interest rates present banks with additional challenges that affect both the assets and liabilities side of their balance sheet (Koch et al., 2019, 13). For this reason, the earnings prospects of German banks are increasingly declining in the wake of the ongoing low interest rate environment (Dahmen, Kurrent, 2017, 30). It can therefore be assumed that the longer the

period of low interest rates lasts, the bigger the problems for the institutions (Menhart, 2019, 16).

For German banks, the effects on net interest income can be observed since 2015, because this key figure has fallen continuously and a downward trend has been discernible for all banking groups since then (BaFin, 2019, 81). The net interest income, which results directly from the interest-bearing business, fell for all banking groups in 2017 from € 76.4 billion to € 71.1 billion (Deutsche Bundesbank, 2017b, 54). This was due, among other things, to the expiry of past transactions with a higher interest rate and the reluctance of banks to pass interest on in deposit banking. The interest income fell to a greater extent than the interest expenses in relation to the balance sheet total (Deutsche Bundesbank, 2018a, 34–57). In some cases, however, slightly increasing interest expenses offset the falling interest income.

Moreover, the negative interest-bearing deposit facility and the negative interest-bearing excess reserve also play a role in the falling net interest income, since banks mostly have high excess liquidity (Stadtman et al., 2020, 208). The negative interest paid by German banks for excess liquidity held at the Bundesbank amounted to € 2.17 billion in 2017, € 2.45 billion in 2018 and € 2.37 billion in 2019. (Deutsche Bundesbank, 2017c, 68; Deutsche Bundesbank, 2018b, 68; Deutsche Bundesbank, 2019b, 67). This challenges the profitability of banks (Stadtman et al., 2020, 208).

The net interest income is influenced by low interest rates in different ways (Hasten-teufel, Kiszka, 2020b, 4). Therefore, the effects of low interest rates on the conditions contribution and on the structural contribution need to be examined.

On the one hand, the low interest rate environment affects customer business on the assets side of a bank's balance sheet (Waschbusch et al., 2018a, 916). The development of the credit volume and the condition margin are important for changes in the active conditional contribution (Waschbusch et al., 2018b, 420). The demand for loans has risen continuously over the last few years (Deutsche Bundesbank, 2020a), with an increase mainly in retail banking. In the past, the increase in the loan volume always played an important role in achieving a stable active conditional contribution (Waschbusch et al., 2018b, 420–421). With the active condition margin, it is therefore fundamental to consider that there is a positive relationship between the margin and the absolute level of the market interest rate (Klein, 2020, 10). With regard to the amount of the active condition margin, the interest that a bank can enforce in lending business is important and the increasing regulatory requirements when setting the lower price limit must be considered. Moreover, growing competition is important (Perli, Thieme, 2020, 14). The competitive pressure in the interplay with an oversupply of loans in recent years was expressed through a reduction in the margins on new loan

commitments (Altrock, Mosebach, 2016, 189). This means that, in this context, pricing based solely on costs and risks is hardly possible for banks (Waschbusch et al., 2018b, 421). In some cases, the effects of the low interest rates did not take full effect, as long-term, higher-interest transactions from the past have in some cases not yet expired (Hastenteufel, Kiszka, 2020b, 4). However, this will happen in the coming years and these transactions will then have to be replaced by lower-interest transactions (Perli, Thieme, 2020, 14–15). As the higher-interest loans collapse, they are gradually being assimilated to the low interest rate level, which means that the income that was still supportive will become obsolete over time (Klein, 2020 11). Thus, the active condition margin is under pressure due to the low or negative interest rates (Lucas et al., 2017, 33). So far, the active condition contribution remained constant (Boka, 2018, 25–26) and is expected to remain relatively stable in the future (Waschbusch et al., 2018b, 421).

On the other hand, low interest rates also affect the liabilities side of a bank's balance sheet (Waschbusch et al., 2018a, 916). Both the deposit volume and the passive condition margin are important for the condition contribution on the liabilities side. With regard to the deposit volume, despite the low interest rate level, there have been no slumps in the past few years, but often increases in short-term deposits (Deutsche Bundesbank, 2020b, Deutsche Bundesbank, 2020c, 62–63). For the passive condition margin, it is particularly important that the room for manoeuvre is increasingly limited (Mitschele, Schmid, 2016, 317). In deposit banking, many banks do not pass negative interest rates on to their customers (Bindseil, Kamin, 2018, 8; Buchholz et al., 2019, 3). Considering the strong and continuously intensifying competition in banking, the majority of credit institutions are currently unable to lower the interest rates on the liabilities side any further (Dombret, 2017b, 518). However, from an economic point of view this would be necessary in the prevailing low interest rate environment and with regard to net interest income (Waschbusch et al., 2018b, 422). Therefore, some banks have already switched to paying negative interest on customer deposits (Pertil, 2019, 63–64). This provides banks with an opportunity for stabilization (Deutsche Bundesbank, 2018a, 39). While negative interest rates were initially only passed on to corporate customers (Heider et al., 2018, 15), this now also affects retail customers, especially those with high demand deposits (n.u., 2020a). If the institutions cannot or do not want to pass the negative interest on to their customers, the passive condition margin decreases (Stadtman et al., 2020, 213). Such a development is also forecast for the future (Deutsche Bundesbank, 2018a, 39). This means that banks can benefit less or no longer from an interest rate advantage of deposit financing over those on the money and capital markets (Waschbusch et al., 2018b, 422). This mainly affects the short period. For those banks that do not want to pass on negative interest rates to their customers, it is

therefore becoming increasingly difficult to generate a passive condition margin (Hölscher et al., 2016, 177). The rising total deposit does not help. On the contrary, the increased pressure on the interest rate margin, in this context, results primarily from the problem of deposit interest, which due to the competitive situation cannot be fully adjusted to the interest rate environment (Klein, 2020, 3).

In addition to the customer business, the components of the structural contribution – i.e. the profit contribution from non-customer business – are also influenced by low interest rates (Waschbusch et al., 2018b, 419–420). With regard to maturity transformation contribution as part of the structural contribution, it has been important in recent years that the fall in short-term interest rates initially resulted in a steeper interest structure curve (Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung, 2015, 180) from which German banks benefited (Reuse, 2019, 23). While active transactions were tied to higher interest rates due to their longer-term orientation, the refinancing expenses decreased due to lower short-term interest rates (Hagemann, Wohlmann, 2017, 216). The gap between short-term and long-term interest rates widened and higher contributions could be generated from maturity transformation, from which the net interest income benefited (Deutsche Bundesbank, 2014, 58). Since long-term transactions have expired or will expire over time, new investments have to be made. However, the current lower interest rate environment and the effects of the monetary policy of the European Central Bank on long-term interest rates influence this (Hagemann, Wohlmann, 2017, 216). By flattening the yield curve because of the expansionary monetary policy, using the positive effects of the maturity transformation contribution is sometimes considerably difficult (Hastenteufel, Kiszka, 2020b, 4). The short- and long-term interest rates have therefore gradually converged, whereby the contributions from the maturity transformation decrease (Lister, 2018, 6; Buschmann, 2020), which influences the structural contribution (Waschbusch et al., 2018b, 419–422; Perli, Thieme, 2020, 14). This reduces the interest income and ultimately also the interest surplus. A yield curve with a slight slope is particularly important for those institutions who mainly generate their income from maturity transformation (Michels, 2019, 4–5). Their profitability is particularly affected by this development, which is even more difficult in a long-lasting low interest rate environment (Hönsch et al., 2016, 24). If the yield curve continues to decline, this can leave a lasting damage to the economic situation of banks (Koch et al., 2016, 28). In addition, effects on the structural contribution from the return on investments are observed. Above all, the falling income from government bonds in the context of low interest rates is important (Freiberger, 2013). In the past, this income has made an important contribution to the interest result (Deutsche Bundesbank, 2017d). However, there is the problem of substituting expiring and high-interest rates in



the current low-interest environment (Flesch, Gebauer, 2015, 604–605). Due to a lack of adequate investment opportunities, a decline in contributions has been recorded (n.u., 2020b, 42).

It should be noted that a burden on net interest income results from a persistent low or negative interest rate environment and thus the banks' main source of income is being permanently attacked (Waschbusch et al., 2018a, 916). This particularly affects the passive condition contribution as well as the structural contribution (Hastenteufel, Kiszka, 2020b, 4). This also goes hand in hand with an impact on the profitability of banks and the pressure on their earnings situation is continuously increasing (Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung, 2019, 37–38). All of this will affect the banks' business models (Waschbusch et al., 2018a, 916). A low-for-long scenario definitely leads to the erosion of profitability (Deutsche Bundesbank, 2018c, 49).

Overall, with regard to future developments, it can be assumed that both the persistent environment of low interest rates but also the increasing expenditure due to regulation and the effects of advancing digitization will lead to challenges for many banks (Pertl, 2019, 45). In the following, we will analyse to what extent these developments – especially low interest rates – will have negative effects on the procurement of equity for German banks.

## 2.2. Difficulties in raising equity

Equity is extremely important for German banks, as it ensures their functionality and serves as a risk buffer (Guindos, 2019, 1–2). It is therefore of outstanding importance for the security and solidity of the whole banking sector (Lakhani et al., 2019, 3), on the one hand, and the entire economy on the other hand (Schäuble, 2017, 3). However, the current earnings situation makes it difficult for banks to build up equity capital by means of retained earnings (Altavilla et al., 2018, 533–534). One consequence of this obstacle to building up equity can be the increased susceptibility to shocks or economic problems (Altavilla et al., 2018, 534).

In recent years, the favourable valuation results and the low risk provisioning have had a beneficial effect in this context (Brei et al., 2019, 11). However, it should be noted that, for example, in the context of an economic downturn, there will be an increase in loan defaults and thus increased individual or general bad debt allowances (Weidmann, 2017). For this reason, the capital buffers accumulated should not be reduced, and the existing risks should not be underestimated (Deutsche Bundesbank, 2017a, 68; Deutsche Bundesbank, 2018d, 64–83). It is therefore expected that risk provisioning will continue to increase in the future (Flögel, Gärtner, 2020, 4–5). Moreover, it is not surprising that the banks in the

euro zone were able to strengthen their capital position in 2019, both through retained profits and by means of external capital procurement (ECB, 2020, 26). Finally, yet importantly, the institutions have significantly strengthened their equity base for regulatory reasons since the financial crisis of 2007 (n.u., 2020d, 375).

Overall, it will be more difficult for banks to build up capital both now and in the near future. This becomes even more serious the longer the environment of low interest rates persists, since the build-up of excess capital is then only possible to a lesser extent (Deutsche Bundesbank, BaFin, 2019a). Nonetheless, the current capital resources of German banks are (still) good (n.u., 2020c 320).

The decline in profitability and problems in raising equity make banks more vulnerable to shocks (Guindos, 2019, 1). Depending on the individual situation of a bank, its risk-bearing capacity can be impaired (Wolberg, 2014, 1000). As a result, profitability is important with regard to the solidness of banks and its financial stability (Guindos, 2019, 1). In this context, Dombret sees the German banks lagging behind and expresses a need for action due to the long-term low interest rate phase and it's not foreseeable end (Dombret, 2015).

However, when it comes to absorbing losses, the equity base plays a major role in the resilience of banks (Deutsche Bundesbank, 2019a, 85; Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung, 2019, 218). The core capital tier 1 ratio can be seen as the most important key figure in this context (BaFin, 2020, 30). Due to the strengthening of core capital tier 1, the equity base of German credit institutions can generally be described as solid (n.u., 2020d, 375). It contributes to the institutions' risk-bearing capacity and thus promotes the stability of the entire financial system (Thiele, 2017). However, it should be noted that in the course of the persistent low interest rate environment (in the future) difficulties might arise in the procurement of equity, which in turn would adversely affect the resilience of banks (Waschbusch et al., 2018b, 423). The increase in the core capital tier 1 ratio asked for in the last LSI stress test was quantified by the participating institutions at an average of 0.3 percentage points up to the year 2023 (Deutsche Bundesbank, BaFin, 2019a). The stress test to determine the regulatory target capital ratio showed that the German small and medium-sized institutions have a solid capital base despite the stress scenario (BaFin, 2020, 30).

Overall, an increased risk-bearing capacity and resilience can be attested, whereby especially the effects of the low interest rates must always be viewed critically (Deutscher Bundestag, 2019, 2). The German Bundestag assumes that the good capital resources, especially with regard to the core capital ratio, will benefit the German banks in mitigating the effects of the low interest rate phase (Deutscher Bundestag, 2019, 6). The BaFin states that German banks have sufficient capital resources to survive in this phase (BaFin, 2016, 16; BaFin, 2017, 19). Thus, the resilience of the German banks is given (Dombret et al., 2017, 18; n.u., 2020d, 375).

### 3. Recommendations for banks

Banks generally have the option of making changes in interest-based business and/or realigning their business model in order to tap new sources of income. On the one hand, negative interest rates could be passed on to customers, maturity transformations could be adjusted, lending could be expanded, or investments could be diversified. On the other hand, expanding commission business, reducing costs, actively using opportunities from digitization, and further concentrations on the banking market could generate (new) sources of income and new business models could be developed.

#### 3.1. Passing on negative interest rates to customers

With regard to the options for action within the interest-based business model, negative interest in deposit banking could be passed on to the customers (Perli, Thieme, 2020, 16). As already mentioned, some credit institutions are already passing on negative interest rates to their customers to stabilize their financial situation (Siejka, 2017, 199). By now, negative interest rates are only applied to large-volume deposits only (Bouazza, Schad, 2020, 61).

In the first quarter of 2020, biallo.de investigated 1,300 institutions of which 211 charge their customers negative interest, 113 of them also in retail banking (Biallo, 2020a). In the second quarter of 2020, they found around 250 banks passing on negative interest to their customer (150 in retail banking) (Biallo, 2020b). Usually, exemptions apply, which, however, vary greatly according to the deposit amount (Schwendrat, Stolbrink, 2020, 217–218). With corporate customers in particular, many banks from all banking groups pass on negative interest rates (Altavilla et al., 2019, 3). A persistent environment of negative interest rates will make it more and more difficult for the banks not to pass on the negative interest rate to their customers, so it can be assumed that this cannot be avoided in the long term (Suendorf-Bischof, 2019, 279). However, the acceptance of negative interest rates by customers is extremely low (Perli, Thieme, 2020, 16; Tietz, 2020). There is a risk that customers will switch to another bank that has not (yet) introduced negative interest rates for its customers (Hainz et al., 2017, 40). In addition, customers might prefer to store their money at home instead of accepting negative interest rates (Dombret, 2016, 3; Drescher et al., 2016, 2).

Overall, the number of institutions that charge negative interest rates on sight deposits is increasing continuously (n.u., 2020f). Thus, the volume of the deposits affected by this is also increasing (Deutsche Bundesbank, 2018a, 39). In September 2019, 58% of the credit institutions included in the MFI interest rate statistics reported a negative volume-weighted average interest rate for sight

deposits from companies (23% for private customers) (Deutsche Bundesbank, 2019c, 32). The MFI interest rate statistics for June 2020 revealed that in Germany the interest rate for deposits of new private customers is 0% and for non-financial corporations -0.08% (ECB, 2020, 16).

So far, the passing on of negative interest rates has not yet prevented banks from a falling net interest income (Sinn, Schmundt, 2018, 10–17). Thus, the willingness to pass on negative interest is increasing (Deutsche Bundesbank/BaFin, 2019b, 9; Biallo, 2020a), so that it can be expected that the number of credit institutions that will pass on negative interest rates to their customers will increase in the future (Schwendrat, Stolbrink, 2020, 218). However, the negative interest on customer deposits is a decision that banks must consider very carefully, as this poses a great risk to the stability and durability of customer relationships. There are also individual institutions that not only pass on the negative interest rate of the European Central Bank to their customers but charge even higher negative interest on deposits in order to generate additional income from this. Although banks have to generate income and, in this context have to develop new sources of income in order to remain profitable, this is an extremely dangerous undertaking.

### **3.2. Expand maturity transformation**

Furthermore, an expansion of the maturity transformation is possible (Jansen, Portisch, 2019, 161). An expansion of the maturity transformation can help to support the interest result. Especially small and medium-sized banks have followed this strategy in the past (Claußen et al., 2017, 86–87). On the one hand, there is an increased amount of short-term deposits and, on the other hand, fixed interest rates on the assets are expanded. There is also an increase in the number of long-term loans in the non-bank sector (Deutsche Bundesbank, 2018d, 52–81).

The maturity transformation, however, is associated with the interest rate risk. With the expansion of the maturity transformation, this risk also increases (Jansen, Portisch, 2019, 161), making banks more vulnerable to an abrupt rise in interest rates (Dombret, 2017b, 519). If such a rise in interest rates occurs as a surprise, deficits in the interest rate business and negative effects on market-valued assets are to be expected (AFS, 2018, 2). Many German banks have high interest rate risks due to an extended maturity transformation (Deutsche Bundesbank, 2019d, 57). With a view to the Basel interest rate risk coefficient, this particularly affects small and medium-sized credit institutions (Deutsche Bundesbank, 2019d, 68). In this context, the Basel interest rate risk coefficient is used as a risk measure (Deutsche Bundesbank, 2017a, 75). It has increased noticeably in recent years, especially at savings banks and cooperative banks (Deutsche Bundesbank, 2019d, 68–69).

In addition, the Net Stable Funding Ratio (structural liquidity ratio) must be considered in this context, which limits the possibility of maturity transformation and thus in particular its expansion (Claußen et al., 2016, 51). This ensures stable and sustainable refinancing and thus a resilient liquidity risk profile. A minimum rate of 100% is considered over a 12-months period, which must be present in relation to the amount of stable refinancing available and the amount of secure refinancing required. If a bank fulfils this requirement, the liquidity is sufficient for the one-year period (Krämer, 2020, 1461–1462).

The banks can, however, come up against their limits, as the potential is often already largely exhausted and the scope is limited by legal requirements (Dombret, 2017b, 519). Only a considerable extension of the term would still have a positive impact on the return, which in turn would, however, go hand in hand with increasing interest rate risks. It must be recognized that extending the maturity transformation cannot be viewed as a permanent solution, but merely represents a measure to gain time (Dombret, 2017a).

### 3.3. Expansion of lending

An expansion of lending and the volume has already been initiated by the institutes or can be considered by them in order to fight the falling interest income with a view to the active conditional contribution. In connection with an expansion of lending, however, an increased risk can arise (Klein, 2020, 2–14); if for example, banks grant riskier loans (Claußen et al., 2016, 62). If there is an economic downturn, the risk of rising risk costs are also important in this context (Wolberg, 2020, 65).

In general, the lending business of German banks has grown in recent years (n.u., 2020e, 11). In addition, it should be noted that with the expansion of lending, more and more loans were granted in higher-risk segments (EBA, 2020, 20). In mid of 2020, however, the German banks reported for the first time since the end of 2017 a decline in demand for private real estate finance (Deutsche Bundesbank, 2020d, 22). In contrast, the demand for loans in corporate finance has increased significantly (Deutsche Bundesbank, 2020d, 10). In times of the corona pandemic, lending is being expanded primarily in the context of short-term loans to secure liquidity (Osman, 2020b). Loans are granted to support the economy and to bridge the crisis (Atzler, 2020; Flögel, Gärtner, 2020, 4; Schneider et al., 2020). The institutes' current willingness to take risks is limited (Osman, 2020a; Osman 2020b). In the context of the Corona crisis, banks must also increasingly expect loan defaults and thus deductions on their receivables and make provisions for contingent loan losses (Theurer, 2020). Moreover, banks have expanded their riskier commitments in recent years and have granted loans in sectors that are now particularly economically affected by the pandemic (Flögel, Gärtner, 2020, 4–5).

Credit growth cannot fully compensate for the effects of low interest rates (Jobst, Lin, 2016, 25; Klein, 2020, 14). The main limitations of this are the prevailing competitive pressure and a limited demand (Stuska, Ritter, 2019, 3). Nonetheless, the growth in loan volume is helping to ensure that banks are not fully affected by the negative effects of the low interest rate phase (Koch et al., 2019, 13; n.u., 2020e, 11).

### **3.4. Investment diversification**

With capital investments, there may be room for manoeuvre to stabilize the structural contribution, whereby a change in the structure of the capital investment or further diversification may be considered (Schuster, Hastenteufel, 2019, 55). Sustainability, for example, is a topic that is becoming increasingly important in many different areas of life (Niedermüller, Röder, 2020, 69) and is important in this context (Müller, 2020, 572–574; Rosenthal, Stickling, 2020, 14). For many customers, the sustainability of their bank is important, so that the improved image due to a sustainable orientation can be an advantage when acquiring new customers (Hastenteufel, Kiszka, 2020c, 261–264). As a result, in view of the earnings problem, it is necessary for banks to consider investments with a higher risk and thus mostly with a higher return (Dombret, 2017b, 519). Following the principle of no, risk/no return, in the area of investments it should be checked whether additional income opportunities could be used by consciously taking higher risks (Ihring, 2016, 115). In doing so, however, the banks must always consider their risk strategy and risk capacity (Waschbusch et al., 2018b, 420), so that it should avoid taking higher and inappropriate risks when looking for new return opportunities (Dombret, 2017b, 519). Even if higher returns can be generated in the short term, in the long term this can result in dangers from increasing risk costs (Waschbusch et al., 2018b, 424).

Overall, banks can very well succeed in stabilizing their structural contribution and their earnings position if they embark on further diversification and always keep an eye on possible risks and their risk strategy (Ihring, 2016, 115).

### **3.5. Adjusting the business model and developing new sources of income**

The increase in income from fees and commissions is directly linked to the development of new sources of income (Waschbusch et al., 2018a, 919). With regard to the problem of the low interest rate phase and its effects, there is an opportunity to compensate for the falling income and to stabilize profitability

through further diversification and the expansion of (non-interest-related) sources of income (Dombret, 2014, 1181). This is also intended to reduce the dependency on interest rates, with increasing importance being attached to commission income in particular (Deutsche Bundesbank, 2016, 76) especially in the areas of current accounts, payment transactions, securities and insurance contracts (Waschbusch et al., 2018a, 919).

In the past, German banks often offered many banking services free of charge (Pertl, 2019, 62). It is understandable that this still corresponds to the expectations and ideas of customers who got used to this so-called free culture over the years (Schuster, Hastenteufel, 2019, 56). While this was only possible through cross-subsidization through the interest-bearing business (Funk, 2017, 2), this possibility is no longer available during this current low interest rate (Fohrer, 2016, 64). Another reason for this was the increasing competition for customers and market shares with more and more free services such as current accounts, credit cards or advice (Koch et al., 2019, 13). It should be borne in mind, however, that all banking services incur costs for banks (Köhler, 2015, 32). For this reason, it should be normal for them to be able to price their services appropriately (Krüger, 2017, 8). This must be conveyed to the customers in order to detach them from the imprinted free culture (Pertl, 2019, 62). If banks had always priced their services appropriately and not rested on the high interest income in the past, they would currently have no problems in enforcing a normal and service-appropriate pricing of their products.

Options for introducing fees that have already been used by some banks relate, for example, to withdrawing money at the counter or ATM (Schiereck et al., 2020, 550–554). In addition, there is significant potential with debit cards, which have so far been often offered free of charge, as well as paper-based bank transfers. In addition, banks can expand their product range and offer additional services for their customers (Hagenow, Klenk, 2019, 34–36). In order to increase the commission result, the quality of customer advisory service is also of great importance (Hastenteufel, Kiszka, 2020b, 13). In this context, genuinely holistic advice geared towards customers and their needs will play an important role in the future. The quality of advice has an impact on customer satisfaction and loyalty and thus also on their earnings situation (Schuster, Hastenteufel, 2019, 65; Hastenteufel, Kiszka, 2020b, 13). The topic of sustainability can also be important in this context. Many customers are interested in sustainable investments and related advice. Thus, it would be conceivable, for example, to offer suitable banking transactions related to the energy transition as well as advice that e.g. includes funding programs for this purpose. There may well be opportunities for banks to strengthen their commission income as well as increasing customer satisfaction and loyalty. With a consciously sustainable financial investment and advice,

there is a large, so far (almost) untapped income potential for credit institutions (Hastenteufel, Kiszka, 2020c, 263–264).

All in all, it must be taken into account that there are limitations with regard to increasing the commission income, such as growing competition or customer needs (Göbel, 2018, 19), but there is still potential to grow. However, this can only partially compensate for the lower interest results in the future (Pertl, 2019, 90).

In addition to the above-mentioned reactions for increasing earnings, there are also opportunities for savings or an optimization of expenses (Pertl, 2019, 64). One possible starting point for potential savings is the closure of branches (Waschbusch et al., 2018a, 919). Even though a trend towards closures can be observed (Mihm, Frank, 2016, 35), the branches remain fundamentally important for some customers (Fischer et al., 2019; Schuster, Hastenteufel, 2019, 83). Thus, it is also important to modernize existing branches and to further develop their concepts (Waschbusch et al., 2018a, 919). However, experts expect that branch closings alone will not be enough to handle the existing cost pressure (Siedenbiedel, 2015). In addition, the potential for savings in branch closings should mostly be limited to the savings banks and cooperative banks as those still have the most extensive branch network (Mausbach, 2020, 13). At the same time, however, the corporate philosophy of these banks is based on regionality and customer proximity (Grandke, 2019, 495). A reduction in staff can also be considered (Waschbusch et al., 2018a, 919), which, among other things, goes hand in hand with branch reduction (Pertl, 2019, 64–71). Moreover, the bundling of functions and/or the outsourcing of certain tasks and processes to external providers could also be considered (Ermrich, 2019, 493).

It usually takes a longer period for such measures to take effect (Dombret, 2017b, 520). In addition, when realizing potential savings, it should be kept in mind that negative effects can also occur, which is why pros and cons should always be considered (Koch et al., 2019, 42; Schuster, Hastenteufel, 2019, 55). Overall, the cost savings alone cannot help overcome the problem of low interest rates (Hirdina et al., 2020, 207). Nevertheless, it is important to establish an active and sustainable cost management and understand it as an ongoing process (Judt, Klausegger, 2020, 229).

In addition, digitization plays an important role in securing the future viability of banks (Walter, 2016, 34). Despite the fact that digitization also poses challenges for the banks, this is also a great opportunity (Schuster, Hastenteufel, 2019, 76). On the one hand, digitization goes hand in hand with potential savings in expenses through automation and standardisation (Pommerening, 2020, 9). On the other hand, there are also opportunities on the earnings side (Flötotto, Koch, 2016, 14).



Ever-advancing digitization means that the technology associated with it is becoming more and more part of everyday life (Pommerening, 2020, 6), and thus, spatial and temporal boundaries can be overcome (Grabher et al., 2017, 6). This also has an impact on banking (Hastenteufel, Hagmann, 2020, 4). For many people, the flexible use of banking services that is independent from space or time has become extremely important (Thiele, 2017). However, this also results in an increase or adjustment of customer expectations (Grandke, 2019, 495). It is therefore important to accelerate automation and further expand and develop digital channels and offers. Currently, around 70% of banking transactions are already carried out digitally (Hastenteufel, Kiszka, 2020b, 11). This shows how important the topic of digitization is (Ermrich, 2019, 493). Digitization enables a new type of customer proximity, which, in addition to personal contact, now also relates to technical aspects (Hastenteufel, Kiszka, 2020b, 7). Further trends such as platform economy, mobile payment, blockchain technology, robo-advisors, cloud computing or artificial intelligence can also represent points of contact for the banks to take action (Hastenteufel, Hagmann, 2020, 5–13). New technologies, for example, help to make tailor-made, personalized services easier and better (Hastenteufel, Kiszka, 2020b, 22). In addition, it is precisely these types of services that customers want (zeb, 2019, 6). In this context, the data collected by the banks play an important role, which customers are willing to share for a personalized range of services (Schäfer, 2020, 216). The demand-oriented and specifically adapted offer can lead to a competitive advantage. Furthermore, there are opportunities for banks from cooperating with fintechs (Praeg, Schmidt, 2016, 44), who for this reason should not only be viewed as a threat (Jonietz et al., 2018, 379).

Regarding the corona pandemic and the associated (compulsory) increase in the use of digitized products, both customer behaviour and customer expectations could change permanently (Kröner, 2020). This situation can also provide the credit institutions with information about the areas in which customers are accepting digital offers. The banks can use these empirical values for the future (Jue, 2020, 392). In addition, inadequacies in the use of bank offers can be identified (Messenböck, Schwarz, 2020, 27).

If the banks ignore digitization or react to late, customers and, as a result, important income will be lost to digital competitors (Waschbusch et al., 2018a, 917). It will therefore be necessary to continue investing in this area (Pommerening, 2020, 214). Thus, for banks the digital transformation is no longer an option, it is essential for their survival (Stollarz, 2018, B5).

There is also the option of market consolidation (Dombret, 2017a). This can occur e.g. in the form of banks leaving the market, mergers or downsizing (Dombret, 2017b, 520). In the German banking market in particular, there is

still potential due to the large number of credit institutions and bank branches (Dombret, 2014, 1181). Consolidation projects can lead to an increase in profitability and productivity (Grabher, Schettler, 2016, 35). In the future, some banks will not be able to implement the adjustments required due to their changing environmental conditions on their own, thus, that the possibility of consolidation can or even must be considered (Sinn, Schmundt, 2017, 18).

There has been an increase in consolidations in recent years. In 2019, the number of credit institutions in Germany decreased to 1,717 institutions. This corresponds to a reduction of 66 banks. In comparison: In 1994, there were still 3,872 banks in Germany (Deutsche Bundesbank, 2020e). Experts assume that there will be about 1,200 banks in Germany by 2025 (Sinn, Schmundt, 2016, 28). The number of branches is also steadily declining (Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung, 2019, 208). In 2019, 1,220 branches were closed permanently (Deutsche Bundesbank, 2020e). Many banks are also open to a merger in the future or are already in this process (Dombret, 2017c, 21). However, a bank does not always only benefit from its size (Stuska, Ritter, 2019, 2). The important thing is to ensure a merger makes strategic sense, because mergers alone do not help to overcome the problems resulting from the low interest rate phase (Mausbach, 2016, 37).

To sum up, the implementation of various measures helps banks to meet the challenges of the low interest rate phase (n.u., 2020d, 376). However, the challenges associated with the low interest rate environment do not end with the end of low interest rates (Rocholl, 2018, 10). Because although an exit from the low interest rate policy is repeatedly called for (n.u., 2018, 7), it would be a fallacy to assume that such an exit would only have positive effects (Deutsche Bundesbank, 2018a, 38).

## **4. Final conclusion**

After a phase of low interest rates that has now lasted for several years due to the expansionary monetary policy of the European Central Bank as a reaction to the upheavals resulting from the financial crisis of 2007 (Deutsche Bundesbank, 2019e, 46), there is still no end in sight (n.u., 2020d, 376). This issue poses enormous challenges for German banks.

Net interest income, the banks' most important source of income, is negatively impacted by the low interest rates, which also affects the profitability of credit institutions. As a result, the pressure on a bank's earnings situation constantly increases (Waschbusch et al., 2018a, 916; Waschbusch et al., 2018b, 423). These developments are particularly important for a large number of German banks

due to their weak earnings and the associated high level of dependency on the interest result as well as their frequent focus on traditional deposit banking and lending business (Thiele, 2017). Even if their earnings weakness is not exclusively caused by low interest rates (Dombret, 2017a; Weidmann, 2017), it is undisputed that the net interest income in particular and the income in general are negatively affected by low interest rates (Bikker, Vervliet, 2018, 3). The longer this phase lasts, the greater the potential dangers for banks (Thiele, 2017). In other words, both a persistence and a further decline in the interest rate level will harm credit institutions (Deutsche Bundesbank, BaFin, 2019b, 8). In the future, this will also have an impact on the procurement of equity. However, most German banks currently have a good and solid capital base, which has a positive effect on their resilience (n.u., 2020c, 320). Thus, the robustness and the capital resources of most German banks are still considered sufficient (n.u., 2020d, 375).

The challenges resulting from the low interest rate environment will have a lasting impact on the income and asset of banks, especially in the next years. Therefore, the risk of harmful effects of permanently low interest rates on German banks are obvious (Bräuer, 2013, 43). Most institutes can cope with these challenges (Dombret et al., 2017, 17–18), if they take appropriate countermeasures (Koch et al., 2016, 33–47). The banks must take advantage of the opportunities that arise on both the income and expense side and must have the necessary courage to go new or unknown paths (Waschbusch et al., 2018b, 426). There are various starting points for tackling the necessary change (Waschbusch et al., 2018a, 921). However, each bank must consider its individual circumstances and use them to decide which steps to take to overcome its challenges (Schuster/Hastenteufel, 2019, 225). However, if the credit institutions do not take action, this will have serious consequences for them (Waschbusch et al., 2018a, 921).

A glimpse into practice shows that German banks have been able to limit the negative effects resulting from the phase of low interest rates at least to some extent (n.u., 2020e, 11). While many banks have already taken necessary measures to succeed in a constantly changing environment (Thiele, 2017), not all of them did (Kröner, Osman, 2020, 30).

Despite the possibility of countermeasures, the phase of low interest rates is and remains a huge challenge for German banks (Perli, Thieme, 2020, 14–18). In some cases, however, it is a matter of whining at a high level, and the banks themselves need to find the right answers to the challenges that arise in the context of the changing external conditions (Hastenteufel, Kiszka, 2020b, 23). For this reason, banks should not constantly complain about the low level of interest rates, but rather think about and implement effective adjustments with the focus on usefulness. Therefore, the banks are by no means faced with an insoluble

challenge and the prospects are by no means hopeless, provided they are willing and ready to make the necessary changes (Bindseil, Kamin, 2018, 47). Because in every challenge there is at least an equal opportunity. It is therefore up to the banks themselves to initiate the necessary changes, break out of their outdated structures, and leave their comfort zone. Because as John F. Kennedy once said: “Change is the law of life. And those who look only to the past or the present are certain to miss the future” (Kennedy, 1963, 16).

## References

- [1] AFS (2018) Fünfter Bericht an den Deutschen Bundestag zur Finanzstabilität in Deutschland, [Online], Available: <https://www.bundesbank.de/resource/blob/744586/a95bcb395b5a730b5cc40c55e335c18a/mL/2018-06-26-afs-bericht-data.pdf> [9 Nov 2020].
- [2] Altavilla, C., Boucinha, M. and Peydró, J.-L. (2018) ‘Monetary policy and bank profitability in a low interest rate environment’, *Economic Policy*, vol. 33, pp. 531–586.
- [3] Altavilla, C., Burlon, L., Giannetti, M. and Holton, S. (2019) Is there a zero lower bound?: The effects of negative policy rates on banks and firms, [Online], Available: <https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2289~1a3c04db25.en.pdf> [09 Nov 2020].
- [4] Altrock, F. and Mosebach, C. (2016) ‘Einfluss negativer Zinsen auf die Kreditwirtschaft’, *Zeitschrift für das gesamte Kreditwesen*, vol. 69, pp. 186–191.
- [5] Atzler, E. (2020) Trotz Warnungen der Aufseher: Sparkassen und Volksbanken sehen sich gut gerüstet, [Online], Available: [https://www.handelsblatt.com/finanzen/banken-versicherungen/faule-kredite-trotz-warnungen-der-aufseher-sparkassen-und-volksbanken-sehen-sich-gut-geruestet/25910842.html?share=fb&fbclid=IwAR0Ksn9LTExg-MJfVF7dQ43L3EK2tO4ZBoR5bwJDsp1MDJG1eHKO\\_K1oXM&ticket=ST-11046191-xaMiFsPFTOSegjLsCVwP-ap5](https://www.handelsblatt.com/finanzen/banken-versicherungen/faule-kredite-trotz-warnungen-der-aufseher-sparkassen-und-volksbanken-sehen-sich-gut-geruestet/25910842.html?share=fb&fbclid=IwAR0Ksn9LTExg-MJfVF7dQ43L3EK2tO4ZBoR5bwJDsp1MDJG1eHKO_K1oXM&ticket=ST-11046191-xaMiFsPFTOSegjLsCVwP-ap5) [9 Nov 2020].
- [6] BaFin (2016) Jahresbericht 2015 der Bundesanstalt für Finanzdienstleistungsaufsicht, [Online], Available: [https://www.bafin.de/SharedDocs/Downloads/DE/Jahresbericht/dl\\_jb\\_2015.pdf?\\_\\_blob=publicationFile&v=13](https://www.bafin.de/SharedDocs/Downloads/DE/Jahresbericht/dl_jb_2015.pdf?__blob=publicationFile&v=13) [9 Nov 2020].
- [7] BaFin (2017) Jahresbericht 2016 der Bundesanstalt für Finanzdienstleistungsaufsicht, [Online], Available: [https://www.bafin.de/SharedDocs/Downloads/DE/Jahresbericht/dl\\_jb\\_2016.pdf?\\_\\_blob=publicationFile&v=10](https://www.bafin.de/SharedDocs/Downloads/DE/Jahresbericht/dl_jb_2016.pdf?__blob=publicationFile&v=10) [9 Nov 2020].
- [8] BaFin (2019) Jahresbericht 2018 der Bundesanstalt für Finanzdienstleistungsaufsicht, [Online], Available: [https://www.bafin.de/SharedDocs/Downloads/DE/Jahresbericht/dl\\_jb\\_2018.pdf?\\_\\_blob=publicationFile&v=6](https://www.bafin.de/SharedDocs/Downloads/DE/Jahresbericht/dl_jb_2018.pdf?__blob=publicationFile&v=6) [9 Nov 2020].

- [9] BaFin (2020) Jahresbericht 2019 der Bundesanstalt für Finanzdienstleistungsaufsicht, [Online], Available: [https://www.bafin.de/SharedDocs/Downloads/DE/Jahresbericht/dl\\_jb\\_2019.pdf?\\_\\_blob=publicationFile&v=4](https://www.bafin.de/SharedDocs/Downloads/DE/Jahresbericht/dl_jb_2019.pdf?__blob=publicationFile&v=4) [9 Nov 2020].
- [10] Biallo (2020a) Mehr als 210 Banken und Sparkassen kassieren Negativzinsen, [Online], Available: <https://www.biallo.de/geldanlage/ratgeber/so-vermeiden-sie-negativzinsen/> [9Nov 2020].
- [11] Biallo (2020b) Rund 250 Banken und Sparkassen kassieren Negativzinsen, [Online], Available: <https://www.biallo.de/geldanlage/ratgeber/so-vermeiden-sie-negativzinsen/> [09 Nov 2020].
- [12] Bieg, H., Kußmaul, H. and Waschbusch, G. (2016) Finanzierung, München: Vahlen.
- [13] Bikker, J.A. and Vervliet, T.M. (2018) ‘Bank profitability and risk-taking under low interest rates’, *International Journal of Finance & Economics*, vol. 24, pp. 3–18.
- [14] Bindseil, U. and Kamin, S.B. (2018) Financial stability implications of a prolonged period of low interest rates, [Online], Available: <https://www.bis.org/publ/cgfs61.pdf> [9 Nov 2020].
- [15] Boka, N. (2018) Autokorrelationen in der historischen Simulation: Analyse der autokorrelationsarmen Abbildung von Zinsänderungsrisiken, Wiesbaden: Springer Gabler.
- [16] Bontrup, H.-J. (2018) ‘Finanzmarktkrise und wirtschaftliche Entwicklung des deutschen Bankensektors’, *Vierteljahrshefte zur Wirtschaftsforschung*, vol. 87, pp. 27–45.
- [17] Bouazza, M. and Schad, P. (2020) ‘Über die Zulässigkeit von Negativzinsen’, *die bank*, pp. 60–65.
- [18] Bräuer, M (2013) ‘Chancen und Risiken einer anhaltenden Niedrigzinsphase’, *Zeitschrift für das gesamte Kreditwesen*, vol. 66, pp. 41–43.
- [19] Brei, M., Borio, C. and Gambacorta, L. (2019) Bank intermediation activity in a low interest rate environment, [Online], Available: <https://www.bis.org/publ/work807.pdf> [9 Nov 2020].
- [20] Buchholz, M., Schmidt, K. and Tonzer, L. (2019) Do conventional monetary policy instruments matter in unconventional times?, [Online], Available: <https://www.bundesbank.de/resource/blob/803676/a6ee2f3c2c12101df87fcb254a1796fd/mL/2019-08-13-dkp-27-data.pdf> [9 Nov 2020].
- [21] Buschmann, G. (2020) Banken bekämpfen Spareinlagen: und locken Kunden in teure Alternativen, [Online], Available: <https://www.wiwo.de/my/finanzen/geldanlage/der-fischzug-banken-bekaempfen-spareinlagen-und-locken-kunden-in-teure-alternativen/25587338.html?ticket=ST-10633602-oYBfuXFyx-NLymvfr63da-ap5> [9 Nov 2020].
- [22] Claußen, C., Maidl, C., Pfungsten, A. and Woyand, C. (2016) ‘Zinsänderungsrisiken von Kreditinstituten im aktuellen Niedrigzinsumfeld’, *Vierteljahrshefte zur Wirtschaftsforschung*, vol. 85, pp. 45–64.

- [23] Claußen, C., Maidl, C., Pfingsten, A. and Woyand, C. (2017) Rolle rückwärts zugunsten der Bankenindustrie: Die neuen Basler Regelungen für das Zinsänderungsrisiko im Anlagebuch, *Perspektiven der Wirtschaftspolitik*, vol. 18, pp. 86–96.
- [24] Dahmen, M. and Kurrent, C. (2017) Effizienz hoch drei, *die bank*, pp. 30–33.
- [25] Deutsche Bundesbank (2014) Die Ertragslage der deutschen Kreditinstitute im Jahr 2013, [Online], Available: <https://www.bundesbank.de/resource/blob/664172/e7faae437572c76d8fea6b40b4320cbf/mL/2014-09-monatsbericht-data.pdf> [9 Nov 2020].
- [26] Deutsche Bundesbank (2016) Die Ertragslage der deutschen Kreditinstitute im Jahr 2015, [Online], Available: <https://www.bundesbank.de/resource/blob/665030/8229edf50506f3f23a30556ca88a2e18/mL/2016-09-monatsbericht-data.pdf> [9 Nov 2020].
- [27] Deutsche Bundesbank (2017a) Finanzstabilitätsbericht 2017, [Online], Available: <https://www.bundesbank.de/resource/blob/665554/56c6d0e3ee21c4acb4824ca6f1f5d295/mL/2017-finanzstabilitaetsbericht-data.pdf> [9 Nov 2020].
- [28] Deutsche Bundesbank (2017b) Die Ertragslage der deutschen Kreditinstitute im Jahr 2016, [Online], Available: <https://www.bundesbank.de/resource/blob/665470/02abccf09b7ebf3c9635b89405ead7e7/mL/2017-09-monatsbericht-data.pdf> [9 Nov 2020].
- [29] Deutsche Bundesbank (2017c) Geschäftsbericht 2017, [Online], Available: <https://www.bundesbank.de/resource/blob/670174/4359c845fa349eeb634fa013cca58715/mL/2017-geschaeftsbericht-data.pdf> [9 Nov 2020].
- [30] Deutsche Bundesbank (2017d) Niedrige Zinsen belasten Banken und Sparkassen weiterhin, [Online], Available: <https://www.bundesbank.de/de/aufgaben/themen/niedrige-zinsen-belasten-banken-und-sparkassen-weiterhin-644186> [9 Nov 2020].
- [31] Deutsche Bundesbank (2018a) Die Ertragslage der deutschen Kreditinstitute im Jahr 2017, [Online], Available: <https://www.bundesbank.de/resource/blob/759804/9c53ce2c87bfb16297665b148a0e5c5f/mL/2018-09-monatsbericht-data.pdf> [9 Nov 2020].
- [32] Deutsche Bundesbank (2018b) Geschäftsbericht 2018, [Online], Available: <https://www.bundesbank.de/resource/blob/779078/7948403e83979a08d7f49c93a59ed94e/mL/2018-geschaeftsbericht-data.pdf> [9 Nov 2020].
- [33] Deutsche Bundesbank (2018c) Die Bedeutung von Profitabilität und Eigenkapital der Banken für die Geldpolitik, [Online], Available: <https://www.bundesbank.de/resource/blob/665602/43350826453879db52e29958ddab87d9/mL/2018-01-monatsbericht-data.pdf> [9 Nov 2020].
- [34] Deutsche Bundesbank (2018d) Finanzstabilitätsbericht 2018, [Online], Available: <https://www.bundesbank.de/resource/blob/766402/ae2c3a9afbc12eac760a9c48d119af44/mL/2018-finanzstabilitaetsbericht-data.pdf> [9 Nov 2020].

- [35] Deutsche Bundesbank (2019a) Die Ertragslage der deutschen Kreditinstitute im Jahr 2018, [Online], Available: <https://www.bundesbank.de/resource/blob/807246/668f742eca72b07f3ae83116605a88f5/mL/2019-09-monatsbericht-data.pdf> [9 Nov 2020].
- [36] Deutsche Bundesbank (2019b) Geschäftsbericht 2019, [Online], Available: <https://www.bundesbank.de/resource/blob/826444/2c3907ce358f4eba94627e06f458dbba/mL/2019-geschaeftsbericht-data.pdf> [9 Nov 2020].
- [37] Deutsche Bundesbank (2019c) Geldpolitik und Bankgeschäft, [Online], Available: <https://www.bundesbank.de/resource/blob/814802/e21a81a11308c4ace1bacad949a00eff/mL/2019-11-monatsbericht-data.pdf> [9 Nov 2020].
- [38] Deutsche Bundesbank (2019d) Finanzstabilitätsbericht 2019, [Online], Available: <https://www.bundesbank.de/resource/blob/814400/0dd73987ece5830d7a8089fe10a70744/mL/2019-finanzstabilitaetsbericht-data.pdf> [9 Nov 2020].
- [39] Deutsche Bundesbank (2019e) Zinsweitergabe im Niedrigzinsumfeld, [Online], Available: <https://www.bundesbank.de/resource/blob/793790/fe14349c7d4f06c3a09fa7b631d5b9ad/mL/2019-04-monatsbericht-data.pdf> [9 Nov 2020].
- [40] Deutsche Bundesbank (2020a) Zeitreihe BBK01.OU0083: Wichtige Aktiva und Passiva der Banken (MFIs) in Deutschland nach Bankengruppen [Online], Available: <https://www.bundesbank.de/dynamic/action/de/statistiken/zeitreihen-datenbanken/zeitreihen-datenbank/723452/723452?tsId=BBK01.OU0083> [9 Nov 2020].
- [41] Deutsche Bundesbank (2020b) Zeitreihe BBK01.OU0191: Wichtige Aktiva und Passiva der Banken (MFIs) in Deutschland nach Bankengruppen [Online], Available: [https://www.bundesbank.de/dynamic/action/de/statistiken/zeitreihen-datenbanken/zeitreihen-datenbank/723452/723452?tsTab=0&tsId=BBK01.OU0191&listId=www\\_s100\\_mb2425\\_2\\_04&id=0](https://www.bundesbank.de/dynamic/action/de/statistiken/zeitreihen-datenbanken/zeitreihen-datenbank/723452/723452?tsTab=0&tsId=BBK01.OU0191&listId=www_s100_mb2425_2_04&id=0) [9 Nov 2020].
- [42] Deutsche Bundesbank (2020c) Bankenstatistik Februar 2020 [Online], Available: <https://www.bundesbank.de/resource/blob/825950/120b06de0d577950fc71aa19ba403b0e/mL/2020-02-bankenstatistik-data.pdf> [9 Nov 2020].
- [43] Deutsche Bundesbank (2020d) Bank Lending Survey des Eurosystems: Ergebnisse für Deutschland, [Online], Available: <https://www.bundesbank.de/resource/blob/602550/aec64dbeee988acd94abbb1307c87330/mL/bank-lending-survey-nettosaldo-data.pdf> [9 Nov 2020].
- [44] Deutsche Bundesbank (2020e) Bankstellenbericht 2019: Entwicklung des Bankstellennetzes im Jahr 2019, [Online], Available: <https://www.bundesbank.de/resource/blob/832678/bae51a1e763697557352b80f60f055fd/mL/bankstellenbericht-2019-data.pdf> [9 Nov 2020].
- [45] Deutsche Bundesbank, BaFin (2019a) Ergebnisse des LSI-Stresstests 2019: Gemeinsame Pressemitteilung mit der BaFin, [Online], Available: <https://www.bundesbank.de/de/presse/pressemeldungen/ergebnisse-des-lsi-stresstests-2019-807574> [9 Nov 2020].

- [46] Deutsche Bundesbank, BaFin (2019b) Ergebnisse des LSI-Stresstests 2019: Pressekonferenz am 23. September 2019, [Online], Available: <https://www.bundesbank.de/resource/blob/807590/8cd2b931f02825341c51c1de19b62354/mL/2019-09-23-stresstest-anlage-data.pdf> [9 Nov 2020].
- [47] Deutscher Bundestag (2019) BT-Drucks. 19/11546, [Online], Available: <http://dipbt.bundestag.de/dip21/btd/19/115/1911546.pdf> [9 Nov 2020].
- [48] Dombret, A. (2014) ‘ Eine Kultur, in der alles erlaubt ist, was nicht explizit verboten ist, darf nicht die Zukunft sein ’, *Zeitschrift für das gesamte Kreditwesen*, vol. 67, pp. 1179–1181.
- [49] Dombret, A. (2015) Die Lage im deutschen Bankensektor: Herausforderungen zwischen Ertragsschwäche und Niedrigzinsumfeld [Online], Available: <https://www.bundesbank.de/de/presse/reden/die-lage-im-deutschen-bankensektor-herausforderungen-zwischen-ertragsschwaechе-und-niedrigzinsumfeld-664718> [9 Nov 2020].
- [50] Dombret, A. (2016) Banks navigating uncharted waters, [Online], Available: <https://www.bis.org/review/r161205h.pdf> [9 Nov 2020].
- [50] Dombret, A. (2017a) Der Blick der Bundesbank auf die Kreditinstitute in Deutschland: Vortrag bei der 5. Aufsichtsrechtlichen Fachtagung, [Online], Available: <https://www.bundesbank.de/de/presse/reden/der-blick-der-bundesbank-auf-die-kreditinstitute-in-deutschland-665478#tar-1> [9 Nov 2020].
- [51] Dombret, A. (2017b) Die Niedrigzinspolitik der EZB: Fluch oder Segen für Wirtschaft, Verbraucher und Banken?, [Online], Available: <https://www.wko.at/site/WirtschaftspolitischeBlaetter/dombret-4-2017.pdf> [9 Nov 2020].
- [52] Dombret, A. (2017c) ‘Ertragslage und Widerstandsfähigkeit des deutschen Bankensektors auf dem Prüfstand: Ergebnisse der bankaufsichtlichen Niedrigzinsumfrage 2017’, *ifo Schnelldienst*, vol. 70, pp. 19–24.
- [53] Dombret, A. (2017d) Keine rosigen Zeiten für deutsche Kreditinstitute, [Online], Available: <https://www.der-bank-blog.de/herausforderungen-fuer-deutsche-kreditinstitute/strategie/26643/> [9 Nov 2020].
- [54] Dombret, A., Gündüz, Y. and Rocholl, J. (2017) Will German banks earn their cost of capital?, [Online], Available: <https://www.bundesbank.de/resource/blob/665226/21936b67437d22251eab02b3c6670dd0/mL/2017-01-27-dkp-01-data.pdf> [9 Nov 2020].
- [55] Drescher, C., Ruprecht, B., Gründer, M., Papageorgiou, M., Töws, E. and Brinkmann, F. (2016) Die Krux mit den Einlagen: Niedrige Zinsen belasten Margen der Kreditinstitute, [Online], Available: <https://www.bundesbank.de/resource/blob/729468/acab0957a97952f70fba2f832cc8dc42/mL/2016-04-research-brief-data.pdf> [09 Nov 2020].
- [56] EBA (2020) The EU Banking Sector: First Insight Into The COVID-19 Impacts [Online], Available: [https://eba.europa.eu/sites/default/documents/files/document\\_library/Risk%20Analysis%20and%20Data/Risk%20Assessment%20](https://eba.europa.eu/sites/default/documents/files/document_library/Risk%20Analysis%20and%20Data/Risk%20Assessment%20)



- Reports/2020/Thematic%20notes/883986/Thematic%20note%20-%20Preliminary%20analysis%20of%20impact%20of%20COVID-19%20on%20EU%20banks%20%E2%80%93%20May%202020.pdf [9 Nov 2020].
- [57] ECB (2020) The euro area bank lending survey: Fourth quarter of 2019, [Online], Available: [https://www.ecb.europa.eu/stats/ecb\\_surveys/bank\\_lending\\_survey/pdf/ecb.blssurvey2019q4~34a62b4261.en.pdf](https://www.ecb.europa.eu/stats/ecb_surveys/bank_lending_survey/pdf/ecb.blssurvey2019q4~34a62b4261.en.pdf) [9 Nov 2020].
- [58] Ermrich, M. (2019) ‘Zukunftsfähige Sparkassen’, *Zeitschrift für das gesamte Kreditwesen*, vol. 72, pp. 492–493.
- [59] Fischer, R., Chouliaras, E. and Gündling, M. (2019) Die Bankfiliale der Zukunft: Erfolgsfaktoren für die Filialstrategie der Zukunft, um Kunden und Erträge nachhaltig zu sichern, [Online], Available: [https://www.oliverwyman.de/content/dam/oliver-wyman/v2-de/publications/2019/dec/POV\\_Oliver\\_Wyman\\_Zukunft\\_der\\_Filiale\\_2019.pdf](https://www.oliverwyman.de/content/dam/oliver-wyman/v2-de/publications/2019/dec/POV_Oliver_Wyman_Zukunft_der_Filiale_2019.pdf) [09 Nov 2020].
- [60] Flesch, J.R., Gebauer, B. (2015) ‘Nullzinspolitik der EZB: Existenzbedrohung für die Banken’, *Zeitschrift für das gesamte Kreditwesen*, vol. 68, pp. 603–605.
- [61] Flögel, F., Gärtner, S. (2020) Die COVID-19-Pandemie und das Bankenwesen, [Online], Available: [https://www.iat.eu/discussionpapers/download/IAT\\_Discussion\\_Paper\\_20\\_01.pdf](https://www.iat.eu/discussionpapers/download/IAT_Discussion_Paper_20_01.pdf) [9 Nov 2020].
- [62] Flötotto, M. and Koch, P. (2016) ‘Von Trends profitieren’, *Bank Information*, pp. 12–14.
- [63] Fohrer, H. (2016) ‘Aktuelle Herausforderungen im bankbetrieblichen Umfeld aus genossenschaftlicher Bankensicht’, in Hellenkamp, D. and Fürderer, K. (ed.) *Handbuch Bankvertrieb: Theorie und Praxis im Zukunftsdialog*, Wiesbaden: Springer Gabler.
- [64] Frère, E., Reuse, S. and Svoboda, M. (2008) *Aktuelle Probleme im deutschen Bankensektor: eine kritische Analyse und mögliche Lösungsansätze*, Essen: Akademie Verlag.
- [65] Funk, W. (2017) ‘Alles hat seinen Preis: Mehr Einlagen und mehr Kredite doch der Niedrigzins hinterlässt Spuren’, *Sparkassen Zeitung*, vol. 80, p. 2.
- [66] Göbel, K.-B. (2018) ‘Stabile Ertragslage im Niedrigzinsumfeld schaffen: aber wie?’, *bank und markt*, vol. 47, pp. 17–20.
- [67] Grabher, C. and Schettler, H.J. (2016) ‘Fusionen 2.0: für Genossenschaftsbanken und Sparkassen’, *bank und markt*, vol. 45, pp. 35–39.
- [68] Grabher, C., Schettler, H.-J., Schirl, E., Losert, C. and Obermayr, S. (2017) *Digitalisierung: Entwicklungen, Perspektiven, Strategien*, [Online], Available: [https://www.confidum.com/fileadmin/user\\_upload/pdf/download/PP\\_07\\_2017\\_Digitalisierung\\_Entwicklungen\\_Strategien\\_Perspektiven\\_D2.pdf](https://www.confidum.com/fileadmin/user_upload/pdf/download/PP_07_2017_Digitalisierung_Entwicklungen_Strategien_Perspektiven_D2.pdf) [9 Nov 2020].
- [69] Grandke, G. (2019) ‘Sparkassen: Modell mit Zukunft’, *Zeitschrift für das gesamte Kreditwesen*, vol. 72, pp. 494–495.

- [70] Guindos, L. (2019) Challenges for bank profitability, [Online], Available: <https://www.bis.org/review/r190502a.pdf> [09 Nov 2020].
- [71] Hagemann, D. and Wohlmann, M. (2017) ‘Der Transmissionsmechanismus der Geldpolitik: Warum springt die Kreditvergabe nicht an?’, *Wirtschaftsdienst*, vol. 97, pp. 213–218.
- [72] Hagenow, F. and Klenk, P. (2019) ‘Girokonto: Der Weg zur nachhaltigen Ertragssteigerung im Zahlungsverkehr’, in Klenk, P. (ed.) *Ihr Weg zur PRICING EXCELLENCE*, Heidelberg: Finanz Colloquium.
- [73] Hainz, C., Marjenko, A. and Wildgruber, S. (2017) ‘Die Auswirkungen der Niedrigzinspolitik der EZB auf Unternehmen: Ergebnisse der Sonderfrage der ifo Konjunkturumfrage zu Negativzinsen auf Einlagen’, *ifo Schnelldienst*, vol. 70, pp. 38–41.
- [74] Hastenteufel, J. and Hagmann, U. (2020) Banking 4.0: Wo die Reise hingehet, [Online], Available: [https://www.iubh-university.de/wp-content/uploads/DP\\_BusMan\\_Hastenteufel\\_02.pdf](https://www.iubh-university.de/wp-content/uploads/DP_BusMan_Hastenteufel_02.pdf) [09 Nov 2020].
- [75] Hastenteufel, J. and Kiszka, S. (2020a) ‘Der Mythos der ganzheitlichen Beratung’, *bank und markt*, vol. 49, pp. 64–68.
- [76] Hastenteufel, J. and Kiszka, S. (2020b) Die Bedeutung von Kundenerwartungen für das Fortbestehen von Kreditinstituten: Das klägliche Scheitern des aktuellen Betreuungsansatzes, [Online], Available: <https://www.iubh-university.de/wp-content/uploads/IUBH-DiscussionPaper-Hastenteufel-Kiszka.pdf> [09 Nov 2020].
- [77] Hastenteufel, J. and Kiszka, S. (2020c) ‘Klimaschutz als Chance zur Ertrags- und Vertrauenssteigerung’, *bank und markt*, vol. 49, pp. 260–264.
- [78] Heider, F., Saidi, F. and Schepens, G. (2018) Life below zero: bank lending under negative policy rates, [Online], Available: <https://www.ecb.europa.eu/pub/pdf/scpwps/ecb.wp2173.en.pdf> [09 Nov 2020].
- [79] Hirdina, R., Michler, A. and Seitz, F. (2020) ‘Konventionelle und unkonventionelle Maßnahmen des Eurosystems im Zuge der Staatsschuldenkrise: Ökonomische und rechtliche Aspekte’, in Haucap, J. and Budzinski, O. (ed.) *Recht und Ökonomie*, Baden-Baden: Nomos.
- [80] Hölscher, R., Kalhöfer, C. and Helms, N. (2016) ‘Ergebnisstruktur und Ergebnisentwicklung von Genossenschaftsbanken und Sparkassen vor dem Hintergrund der Finanzmarktkrise’, *Zeitschrift für das gesamte Genossenschaftswesen*, vol. 66, pp. 176–194.
- [81] Hönsch, H., Jonas, M., Kleinle, W., Plath, R., Schell, H.-G., Schneider, E., Schruff, W. and Ueberschär, M. (2016) IDW Positionspapier zu Auswirkungen von anhaltend niedrigen Zinsen, negativen Zinsen und Zinswende auf Unternehmen, Individuen und Gesellschaft, [Online], Available: <https://www.idw.de/blob/95516/f503f437fc7edab97b59c82dcb83faac/down-presseinfo-2016-08-anlage-positionspapier-zinsen-data.pdf> [09 Nov 2020].

- [82] Ihring, F. (2016) 'Managementansätze für Handlungsfelder im Zinstief', in Utz, E.R. (ed.) *Niedrigzinsen: Neue ökonomische Herausforderungen in Sparkassen*, Stuttgart: Deutscher Sparkassen Verlag.
- [83] Jansen, G. and Portisch, W. (2019) 'Benchmarkorientierte Zinsbuchsteuerung in einer Großbank', *Bank-Praktiker*, pp. 159–166.
- [84] Jobst, A. and Lin, H. (2016) Negative Interest Rate Policy (NIRP) Implications for Monetary Transmission and Bank Profitability in the Euro Area, [Online], Available: <https://www.imf.org/external/pubs/ft/wp/2016/wp16172.pdf> [09 Nov 2020].
- [85] Jonietz, C., Mesch, S. and Peters, A. (2018) 'Chancen und Herausforderungen der Digitalisierung in Banken und Sparkassen', in Fend, L. and Hofmann, J. (ed.) *Digitalisierung in Industrie-, Handels- und Dienstleistungsunternehmen: Konzepte, Lösungen, Beispiele*, Wiesbaden: Springer Gabler.
- [86] Judt, E. and Klausegger, C. (2020) 'Kostenmanagement', *bank und markt*, vol. 49, pp. 229–230.
- [87] Jue, N. (2020) 'Corona als Katalysator?', *Zeitschrift für das gesamte Kreditwesen*, vol. 73, pp. 390–392.
- [88] Kennedy, J.F. (1963) 'Text of President Kennedy's Address Pledging Continued Defense of Europe', *The New York Times*, pp. 16.
- [89] Kent, S., Chikova, D., Kamyk, K., Pastore, E., Freddi, R. and Pethe, S. (2020) New decade, new crisis: European Retail Banking Radar, [Online], Available: <https://www. Kearney.com/documents/20152/23369618/Retail+Banking+Radar+Articles.pdf/ae39a46a-9bac-09e9-66f3-55f6beb0e5db?t=1594664226399> [09 Nov 2020].
- [90] Klein, M. (2020) Implications of negative interest rates for the net interest margin and lending of euro area banks, [Online], Available: <https://www.bundesbank.de/resource/blob/828040/6d665b0623fdb7343b2065b5cd51317c/mL/2020-03-13-dkp-10-data.pdf> [09 Nov 2020].
- [91] Koch, P., Flötotto, M., Weigl, U. and Schröck, G. (2016) The road ahead: Perspectives on German banking, [Online], Available: <https://www.mckinsey.com/~media/McKinsey/Industries/Financial%20Services/Our%20Insights/The%20road%20ahead%20Perspectives%20on%20German%20banking/The-road-ahead-Perspectives-on-German-banking.ashx> [09 Nov 2020].
- [92] Koch, P., Flötotto, M., Weigl, U., Ferlic, F., Seilern-Aspang, D. and Spreng, S. (2019) The road to success: Perspectives on German banking, [Online], Available: [https://www.mckinsey.de/~media/mckinsey/locations/europe%20and%20middle%20east/deutschland/publikationen/2019-05-20%20banking%20report/190520\\_perspectives%20on%20german%20banking\\_full%20report\\_final.ashx](https://www.mckinsey.de/~media/mckinsey/locations/europe%20and%20middle%20east/deutschland/publikationen/2019-05-20%20banking%20report/190520_perspectives%20on%20german%20banking_full%20report_final.ashx) [09 Nov 2020].
- [93] Köhler, M. (2015) 'Ertragssteigerung für Genossenschaftsbanken und Sparkassen', *bank und markt*, vol. 44, pp. 30–33.

- [94] Krämer, G. (2020) Net Stable Funding Ratio (NSFR), [Online], Available: <https://www.gabler-banklexikon.de/definition/net-stable-funding-ratio-nsfr-70477> [09 Nov 2020].
- [95] Kröner, A. (2020) Banken-Präsident Zielke: «Müssen Geschäftsmodell nach Corona überprüfen», [Online], Available: <https://www.handelsblatt.com/finanzen/banken-versicherungen/schub-fuer-digitalisierung-banken-praesident-zielke-muessen-geschaeftsmodell-nach-corona-ueberpruefen/25766168.html?share=fb&fbclid=IwAR1nqa5ChGigR90uno2wYmnH9TIXR5oA-7JiCjgKek0UzyzXprMKjLy63h6w&ticket=ST-957131-NDvnmZobWtv-Dn46KnYb6-ap5> [09 Nov 2020].
- [96] Kröner, A. and Osman, Y. (2020) 'Nicht alle haben den Schuss gehört', *Handelsblatt*, no. 54, pp. 30–31.
- [97] Krüger, M. (2017) 'Von Zinsen und Strukturen', *Bank Information*, pp. 8–9.
- [98] Lakhani, K., Reid, J. and Templeman, L. (2019) How to fix European banking... and why it matters, [Online], Available: [https://www.dbresearch.com/PROD/RPS\\_EN-PROD/PROD0000000000488973/How\\_to\\_fix\\_European\\_banking%E2%80%A6\\_and\\_why\\_it\\_matters.pdf](https://www.dbresearch.com/PROD/RPS_EN-PROD/PROD0000000000488973/How_to_fix_European_banking%E2%80%A6_and_why_it_matters.pdf) [09 Nov 2020].
- [99] Lister, M. (2018) 'Die Perspektiven deutscher Kreditinstitute unter dem Druck von Niedrigzinsen, Regulierung und Digitalisierung', in Böhnke, W. and Rolfes, B. (ed.) *Neue Erlösquellen oder Konsolidierung? Geschäftsmodelle der Banken und Sparkassen auf dem Prüfstand*, Wiesbaden: Springer Gabler.
- [100] Lucas, A., Schaumburg, J. and Schwaab, B. (2017) Bank business models at zero interest rate, [Online], Available: <https://www.ecb.europa.eu/pub/pdf/scpwpwps/ecb.wp2084.en.pdf> [09 Nov 2020].
- [101] Mausbach, C. (2016) 'Die fetten Jahre sind vorbei', *Bankmagazin*, vol. 19, pp. 36–38.
- [102] Mausbach, C. (2020) 'Den Menschen nicht aus den Augen verlieren', *die bank*, pp. 5–13.
- [103] Menhart, M. (2019) 'Gewinner oder Verlierer: die Risiken steigen für alle', *ifo Schnelldienst*, vol. 72, pp. 15–18.
- [104] Messenböck, R. and Schwarz, B. (2020) 'Die Digitalisierung ist unausweichlich', *Bank Information*, pp. 26–29.
- [105] Michels, J. (2019) 'Zuviel des (ursprünglich) Guten', *ifo Schnelldienst*, vol. 72, pp. 3–5.
- [106] Mihm, O. and Frank, B. (2016) 'Zukunft der Filiale: wie digital will der Kunde es wirklich?', *bank und markt*, vol. 45, pp. 35–38.
- [107] Mitschele, A. and Schmid, M. (2016) 'Langfristige Sicherung des Vertriebs Erfolgs durch abgestimmtes Produkt- und Risikomanagement', in Hellenkamp, D. and Fürderer, K. (ed.) *Handbuch Bankvertrieb: Theorie und Praxis im Zukunftsdialog*, Wiesbaden: Springer Gabler.
- [108] Müller, J.-P. (2020) 'Erneuerbare Energie: Klimaschutz als Investitionschance nutzen', *Zeitschrift für das gesamte Kreditwesen*, vol. 73, pp. 572–574.

- [109] Niedermüller, S. and Röder, K. (2020) 'Lohnt sich nachhaltige Kapitalanlage?', *Corporate Finance*, vol. 11, pp. 69–74.
- [110] n. u. (2018) 3 Fragen an... Marija Kolak, Hans-Walter Peters & Helmut Schleweis, in [Online], Available: <https://veranstaltungen.handelsblatt.com/journal/banking-4-0-download/> [09 Nov 2020].
- [111] n. u. (2020a) Negativzinsen, [Online], Available: <https://www.verivox.de/geldanlage/themen/negativzinsen/> [09 Nov 2020].
- [112] n. u. (2020b) 'Podiumsdiskussion «Innovationspodium»', in Rolfes, B. and Wessling, H. (ed.) *Innovative Strategien für bekannte Herausforderungen: Optimistischer Ausblick in die Zukunft?*, Wiesbaden: Springer Gabler.
- [113] n. u. (2020c) 'Redaktionsgespräch mit Raimund Röseler: «Die Widerstandsfähigkeit ist grundsätzlich gegeben»', *Zeitschrift für das gesamte Kreditwesen*, vol. 73, pp. 320–324.
- [114] n. u. (2020d) 'Redaktionsgespräch mit Joachim Wuermeling: «Die Frage nach der Profitabilität stellt sich nicht erst seit gestern»', *Zeitschrift für das gesamte Kreditwesen*, vol. 73, pp. 374–376.
- [115] n. u. (2020e) 'Licht und Schatten', *bank und markt*, vol. 49, pp. 11.
- [116] Oberhuber, N. (2020) 'Deutschlands kranke Banken', *Capital*, vol. 63, pp. 98.
- [117] Osman, Y. (2020a) Corona beendet den Boom bei den Baukrediten, [Online], Available: [https://app.handelsblatt.com/finanzen/banken/bundesbank-umfrage-corona-beendet-den-boom-bei-den-baukrediten/26003646.html?utm\\_source=pocket-newtab-global-de-DE&ticket=ST-6710468-NEbDn6Bjnehygw2gGM2Y-ap4](https://app.handelsblatt.com/finanzen/banken/bundesbank-umfrage-corona-beendet-den-boom-bei-den-baukrediten/26003646.html?utm_source=pocket-newtab-global-de-DE&ticket=ST-6710468-NEbDn6Bjnehygw2gGM2Y-ap4) [09 Nov 2020].
- [118] Osman, Y. (2020b) Krisenboom am Kreditmarkt: Unternehmen saugen sich mit Fremdkapital voll, [Online], Available: <https://app.handelsblatt.com/finanzen/banken/zwischenbilanz-der-kfw-krisenboom-am-kreditmarkt-unternehmen-saugen-sich-mit-fremdkapital-voll/25921260.html> [09 Nov 2020].
- [119] Perli, A. and Thieme, J. (2020) 'Mit kreativen Ideen dem Ernst der Lage trotzen', *die bank*, pp. 14–18.
- [120] Pertl, P. (2019) *Regionalbanken zwischen Digitalisierung, Regulierung und Niedrigzinsumfeld: So bleiben Sparkassen und Genossenschaftsbanken profitabel*, Wiesbaden: Springer Gabler.
- [121] Peters, H.-W. (2020) 'Bewegte Zeiten und dicke Bretter', *Zeitschrift für das gesamte Kreditwesen*, vol. 73, pp. 385–387.
- [122] Pommerening, C. (2020) *New Leadership im Finanzsektor: So gestalten Banken aktiv den digitalen und kulturellen Wandel*, Wiesbaden: Springer Gabler.
- [123] Praeg, C.-P. and Schmidt, C. (2016) *Trendstudie Bank & Zukunft 2016: Neue Wege gehen*, Stuttgart: Fraunhofer IAO.
- [124] Renker, C. (2018) *Business Model Innovation in Banken: Robustes Geschäftsmodell durch Kunden- und Mitarbeiterzentrierung*, Wiesbaden: Springer Gabler.

- [125] Reuse, S. (2018) 'Nachhaltigkeit der Geschäftsmodelle von Banken und Sparkassen im Kontext von Niedrigzinsen und SREP', in Michalke, A., Rambke, M. and Zeranski, S. (ed.) *Vernetztes Risiko- und Nachhaltigkeitsmanagement: Erfolgreiche Navigation durch die Komplexität und Dynamik des Risikos*, Wiesbaden: Springer Gabler.
- [126] Reuse, S. (2019) 'Definition und Ausprägung des Zinsänderungsrisikos', in Reuse, S. (ed.) *Zinsrisikomanagement*, 3<sup>rd</sup> ed., Heidelberg: Finanz Colloquium.
- [127] Richter, F., Christians, U. and Hartl, F. (2018) 'Effizienz der Banken: Eine empirische Analyse der Kreditgenossenschaften', *Zeitschrift für das gesamte Genossenschaftswesen*, vol. 68, pp. 29–47.
- [128] Rocholl, J. (2018) 'Ertragssituation und -perspektiven der deutschen Kreditwirtschaft', in Früh, A. et al. (ed.) *Bankrechtstag 2017*, Berlin–Boston: DeGruyter.
- [129] Rosenthal, O. and Stickling, H.-G. (2020) Positionierungschancen nach der Pandemie, *Bank Information*, pp. 12–15.
- [130] Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung (2015) *Zukunftsfähigkeit in den Mittelpunkt: Jahresgutachten*, [Online], Available: [https://www.sachverstaendigenrat-wirtschaft.de/file-admin/dateiablage/gutachten/jg201516/wirtschafts-gutachten/jg15\\_ges.pdf](https://www.sachverstaendigenrat-wirtschaft.de/file-admin/dateiablage/gutachten/jg201516/wirtschafts-gutachten/jg15_ges.pdf) [09 Nov 2020].
- [131] Sachverständigenrat zur Begutachtung der gesamtwirtschaftlichen Entwicklung (2019) *Den Strukturwandel meistern: Jahresgutachten*, [Online], Available: <https://www.sachverstaendigenrat-wirtschaft.de/jahresgutachten-2019.html>, [09 Nov 2020].
- [132] Schäfer, S. (2020) Alternativen zum Zinsertrag: ein Weckruf an europäische Banken, *bank und markt*, vol. 49, pp. 215–216.
- [133] Schäuble, W. (2017) *Stabile Finanzmärkte sind unabdingbar*, [Online], Available: <https://veranstaltungen.handelsblatt.com/journal/banking-4-0-download/> [09 Nov 2020].
- [134] Schenck, M. (2020) 'Herausforderungen der europäischen Finanzindustrie', in Rolfes, B. and Wessling, H. (ed.) *Complexity Kills: Banken im Dickicht von Regulierung und verkrusteten Strukturen*, Wiesbaden: Springer Gabler.
- [135] Schiereck, D., Heppding, L. and Teso, J.E. (2020) 'Entgelte für Barabhebungen bei Sparkassen und Genossenschaftsbanken', *Zeitschrift für das gesamte Kreditwesen*, vol. 73, pp. 550–555.
- [136] Schneider, N., Pieske, R.G., Walkhoff, B. and Nawroth, C. (2020) *Corona-Virus: Handlungsbedarf für das operative Kreditgeschäft! Herausforderungen resultierend aus der Corona-Krise*, [Online], Available: <https://bankinghub.de/banking/research-markets/operatives-kreditgeschaeft> [09 Nov 2020].
- [137] Schuster, H. and Hastenteufel, J. (2019) *Die Bankenbranche im Wandel: Status Quo und aktuelle Herausforderungen*, 2<sup>nd</sup> ed., Baden-Baden: Nomos.

- [138] Schwendrat and T., Stolbrink, P. (2020) ‘Negativzinsen bei VR-Banken: Möglichkeit und Grenzen’, *bank und markt*, vol. 49, pp. 217–220.
- [139] Siedenbiedel, C. (2015) Der langsame Abschied von der kleinen Bank, [Online], Available: <https://www.faz.net/aktuell/finanzen/fonds-mehr/folgendes-niedrigzins-der-langsame-abschied-von-der-kleinen-bank-13832664.html> [09 Nov 2020].
- [140] Siejka, M. (2017) ‘Mit Geschäftsmodell- und Produktinnovationen aus dem Teufelskreis «Niedrigzinsumfeld»’, in Smolinski, R., Gerdes, M., Siejka, M. and Bodek, M.C. (ed.) *Innovationen und Innovationsmanagement in der Finanzbranche*, Wiesbaden: Springer Gabler.
- [141] Sinn, W. and Schmudt, W. (2016) Deutschlands Banken 2016: Die Stunde der Entscheider, [Online], Available: [https://www.bain.com/contentassets/7857d773569343949df3f77e7e6ba86d/bain-studie\\_deutschlands\\_banken\\_2016\\_ds\\_final2.pdf](https://www.bain.com/contentassets/7857d773569343949df3f77e7e6ba86d/bain-studie_deutschlands_banken_2016_ds_final2.pdf) [09 Nov 2020].
- [142] Sinn, W. and Schmudt, W. (2017) Deutschlands Banken 2017: Metamorphose im laufenden Betrieb, [Online], Available: [https://www.bain.com/contentassets/b48fc2570a36401bb131bc6180a63460/bain-studie\\_deutschlands-banken-2017\\_final.pdf](https://www.bain.com/contentassets/b48fc2570a36401bb131bc6180a63460/bain-studie_deutschlands-banken-2017_final.pdf) [09 Nov 2020].
- [143] Sinn, W. and Schmudt, W. (2018) Deutschlands Banken 2018: Schneller, stärker ... und rentabler?, [Online], Available: [https://www.bain.com/contentassets/4a1a0a5acb694e89abc6d227c25526cf/bain-studie\\_deutschlands-banken2018\\_vf.pdf](https://www.bain.com/contentassets/4a1a0a5acb694e89abc6d227c25526cf/bain-studie_deutschlands-banken2018_vf.pdf) [09 Nov 2020].
- [144] Slegers, A. (2018) ‘Stabilität gibt es nicht gratis’, *Börsen-Zeitung*, vol. 82, p. 6.
- [145] Stadtmann, G., Moritz, K.-H. and Berthold, K. (2020) Weitergabe von Negativzinsen, *bank und markt*, vol. 49, pp. 208–214.
- [146] Stollarz, M. (2018) ‘Digitalisierung in der Finanzbranche ist kein Selbstzweck’, *Börsen-Zeitung*, vol. 82, p. B5.
- [147] Stuska, T. and Ritter, K. (2019) Fünf Gedanken zum Banking von Morgen, [Online], Available: [https://www.moonroc.de/fileadmin/user\\_upload/201909\\_MOONROC\\_on\\_Retail\\_Banking\\_Fuenf\\_Gedanken\\_zum\\_Banking\\_von\\_Morgen\\_.pdf](https://www.moonroc.de/fileadmin/user_upload/201909_MOONROC_on_Retail_Banking_Fuenf_Gedanken_zum_Banking_von_Morgen_.pdf) [09 Nov 2020].
- [148] Suendorf-Bischof, U. (2019) Negative Zinsen bei Sicht-, Termin- und Sparanlagen im Geschäft der Kreditinstitute mit Verbrauchern, *Zeitschrift für Bank- und Kapitalmarktrecht*, vol. 21, pp. 279–286.
- [149] Theurer, M. (2020) Härtetest für die Banker, [Online], Available: [https://www.faz.net/aktuell/wirtschaft/unternehmen/haeretetest-fuer-die-banker-16813509.html](https://www.faz.net/aktuell/wirtschaft/unternehmen/haertetest-fuer-die-banker-16813509.html) [09 Nov 2020].
- [150] Thiele, C.-L. (2017) Wohin geht die Reise? Die Zukunft des Bankensektors im Niedrigzinsumfeld, [Online], Available: <https://www.bundesbank.de/de/presse/reden/wohin-geht-die-reise-die-zukunft-des-bankensektors-im-niedrigzinsumfeld-710984> [09 Nov 2020].

- [151] Thieme, J. and Perli, A. (2019) 'Ertragspotenziale erkennen und nutzen', *die bank*, pp. 26–30.
- [152] Tietz, V. (2020) Bundesbankvorstand verteidigt Negativzinsen: Banken sind in einer Zwickmühle, [Online], Available: [https://www.focus.de/finanzen/boerse/bundesbank-vorstandsmitglied-wuermeling-banken-in-deutschland-probleme-und-aussichten-der-traditionshaeuser\\_id\\_11605542.html](https://www.focus.de/finanzen/boerse/bundesbank-vorstandsmitglied-wuermeling-banken-in-deutschland-probleme-und-aussichten-der-traditionshaeuser_id_11605542.html) [09 Nov 2020].
- [153] Walter, G.F. (2016) 'Geschäftsmodelle von Banken in Zeiten fundamentalen Wandels: Ein kleiner Strategiediskurs im Kontext «Digitalisierung»', in Seidel, M. (ed) *Banking & Innovation 2016: Ideen und Erfolgskonzepte von Experten für die Praxis*, Wiesbaden: Springer Gabler.
- [154] Waschbusch, G., Reinstädler, G. and Ruffing, M. (2018a) Aktuelle Ertragslage von Banken – Belastungsfaktoren und Wege aus der Ertragskrise, *Zeitschrift für das gesamte Kreditwesen*, vol. 71, pp. 916–921.
- [155] Waschbusch, G., Rolle, A. and Berg, S.C. (2018b) Herausforderungen für Banken durch das Niedrigzinsumfeld: Eine Analyse des Zinsüberschusses anhand der Marktzinsmethode, *ÖBA*, vol. 66, pp. 418–428.
- [156] Weidmann, J. (2017) Herausforderungen für den Bankensektor, [Online], Available: [https://bankenverband.de/newsroom/reden\\_und\\_interviews/weidmann-herausforderungen-fur-den-bankensektor/](https://bankenverband.de/newsroom/reden_und_interviews/weidmann-herausforderungen-fur-den-bankensektor/) [09 Nov 2020].
- [157] Wolberg, H.-B. (2014) 'Aufgaben einer genossenschaftlichen Zentralbank im Wandel der Zeit', *Zeitschrift für das gesamte Kreditwesen*, vol. 67, pp. 999–1001.
- [158] Wolberg, H.-B. (2020) 'SREP: Neues Prüfungskonzept der Bankenaufsicht', in Rolfes, B. and Wessling, H. (ed.) *Complexity Kills: Banken im Dickicht von Regulierung und verkrusteten Strukturen*, Wiesbaden: Springer Gabler.
- [159] zeb (2019) Europäische Retailbanking-Studie: Zurück in die Zukunft Drei Wege für mehr Profitabilität 2019, [Online], Available: [https://zeb-consulting.com/files/media/documents/2019-12/zeb\\_RetailBankingStudie\\_D\\_2019.pdf](https://zeb-consulting.com/files/media/documents/2019-12/zeb_RetailBankingStudie_D_2019.pdf) [5 Aug 2020].



Manfred Jürgen Matschke\*, Gerrit Brösel\*\*,  
Patrick Thielmann\*\*\*

## **Functional business valuation – The theoretical foundation of argumentation value and its underlying function**

---

### **1. Introduction**

Carrying out a business valuation requires a task analysis because the enterprise value (firm value, company value) depends on the respective task – in this context also known as purpose or function – which the valuation should support. A company does not only have a specific value for each valuator or, generally, each valuation subject (i.e. the potential investor), but it can – depending on the task – also have quite a different value. Thus, business valuation is always purpose-dependent: It is vital to acknowledge that an “only true” company value and a solely appropriate method for its calculation do not exist. The principle of purpose dependency is the basis of the functional business valuation theory, which originated in Germany. In addition to the principle of purpose dependency, this theory relies on the principle of subjectivity, the principle of future-orientation, and the principle of total valuation (overall rating).

The functional business valuation theory differentiates between main and minor functions (Matschke, Brösel 2011, 2013, 2018 and 2021). The main functions are related to interpersonal conflicts. Therefore, it is about those valuations that are aimed at a change of ownership of the (share of the) company to be valued or at the delimited business units to be assessed (Matschke 1979, p. 17).

---

\* Ernst-Moritz-Arndt-Universität Greifswald, e-mail: matschke@uni-greifswald.de.

\*\* FernUniversität in Hagen, e-mail: gerrit.broesel@fernuni-hagen.de.

\*\*\* Formerly FernUniversität in Hagen, e-mail: lehrstuhl.broesel@fernuni-hagen.de.

Nevertheless, it does not matter whether the change of ownership is only considered or has actually occurred.

Among the occasions that entail a “change of ownership” are:

- occasions in which a “change of ownership” really occurs (e.g. purchase/sale);
- opportunities where there is “no change of ownership”, but the same ownership (in form of an unchanged circle of shareholders/owners) results in an altered ownership structure with regard to the valuation object (e.g. merger/demerger).

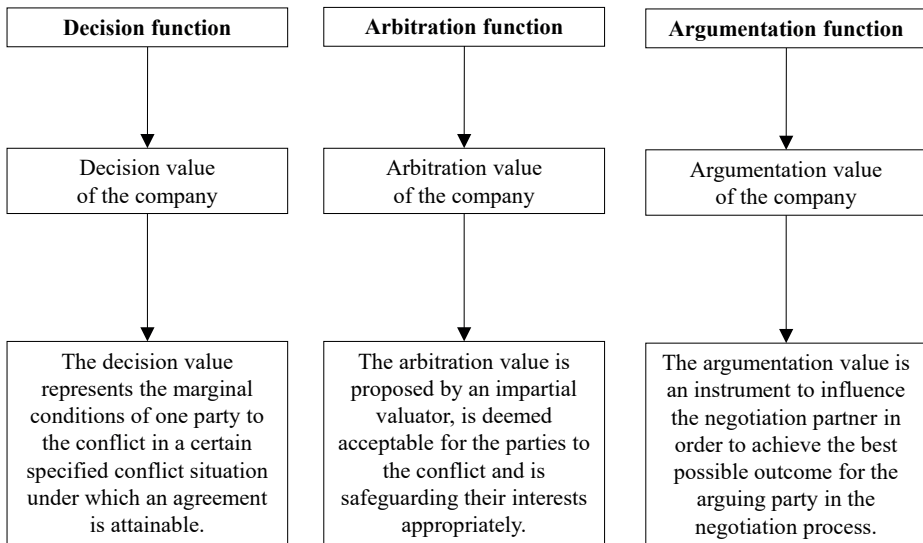
Business valuations in the context of minor functions are those that are not directed toward a change of ownership. Occasions are, for instance, valuations for accounting and taxation purposes, valuations for “value-based” management and control, and valuations in the context of credit analyses. Therefore, minor functions include but are not limited to the credit support function, the management control function, and the standard / statute (law) reading function, the latter of which comprises both the information and the tax base assessment function (Brösel 2006).

On the other side, there are three main functions: the decision function, the arbitration function, and the argumentation function (cf. Figure 1, Matschke, Brösel 2011, p. 13; Matschke, Brösel 2013, p. 52; Matschke, Brösel 2018, p. 14).

The result of a business valuation within the decision function is called the decision value of the enterprise. The term “decision function” considers the purpose of valuation to lay the foundations of rational decision-making for a very specific valuation subject (decision maker, e.g. buyer, seller) in a highly particular decision and conflict situation (e.g. acquisition, divestiture). For a given target system and decision field, the decision value indicates the conditions under which the execution of a particularly scheduled action just does not diminish the level of goal achievement (use value or utility value) attainable without this very action. It refers to all relevant conditions for the agreement between the conflicting parties (so-called conflict resolution relevant issues) and states which (combinations of) characteristics of these issues can still be accepted in the event of an agreement. Therefore, the decision value, which must be considered as the base value or underlying value for all main functions, represents the concession limit of a party in a specific conflict situation, and should hence not become known to the opposite side.

The arbitration value, on the other hand, is the result of a business valuation in the context of the arbitration function (mediation) and is intended to facilitate

or bring about an agreement on the conditions of change of ownership of the valuation object (e.g. the company) between the buyer and the seller. It is a value proposed by an impartial (“neutral”) appraiser/valuator/evaluator, on the basis of which they, as mediators, consider a conflict resolution possible. The arbitration value should be regarded as a compromise that is deemed acceptable for the parties involved and that ultimately safeguards their interests appropriately. Therefore, it is necessary that the appraiser determines the respective supposed decision values of the conflicting parties up front.



**Figure 1.** Main functions of functional business valuation

Finally, the argumentation value is the result of a business valuation in the sense of the argumentation function. It is an instrument for influencing the negotiating partner in order to achieve the best possible conflict resolution for the arguer. The argumentation value is thus a partially biased value. More importantly, it cannot be reasonably determined without the knowledge of one’s own decision value and without assumptions about the counterparty’s decision value, because only the relevant decision values allow one party to state which negotiation results are consistent with a rational behavior and should be attained by means of a reasonable argumentation value.

While the arbitration function (mediation) focuses on each conflicting party involved in the contemplation, both the decision and argumentation function are aimed at only one party to the conflict. While the results of the decision function represent confidential self-information (internal orientation in the negotiation process), the results of the argumentation function are information directed to the negotiating partner (external orientation in the negotiation process).

Since the argumentation function has so far been the least penetrated function within the body of research, this function will be dealt with in more detail below. First, a comprehensive definition is given. Second, an overview of the possible applications is presented. Then, conceivable internal and external usages are showcased. After that, the characteristics of the argumentation value are systematized. Finally, the insights will be summarized.

## **2. Basics of the argumentation value and the argumentation function**

### **2.1. Definition and substance/nature**

The argumentation value is the result of a business valuation in the sense of the argumentation function (Matschke 1976; Matschke 1977a; Matschke 1977b; Matschke, Mucheyer 1977; Wagenhofer 1988a; Wagenhofer 1988b; Hafner 1993; Gorny 2002; Hering, Olbrich 2002; Barthel 2004; Brösel 2004; Brösel, Burchert 2004; Hering, Brösel 2004; Barthel 2005; Matschke, Brösel 2008; Olbrich et al. 2009; Matschke et al. 2010; Matschke, Brösel 2011, p. 279; Brösel et al. 2012; Matschke, Brösel 2013, p. 607; Olbrich et al. 2015; Toll, Hering 2017; Follert et al. 2018; Matschke, Brösel 2018, p. 289; Rapp et al. 2018; Follert 2020; Matschke, Brösel 2021, p. 259). The argumentation value does not denote a single value size (Tichy 1994, p. 160), but rather the totality of justifications (arguments) which one negotiating party reveals or makes available with the aim of improving one's own bargaining position or even weakening the position of the negotiating partner and, in turn, ultimately reaching a more favorable negotiation result (Barthel 2005, p. 36; Barthel 2010; Barthel 2011; Frey, Rapp 2011). They represent partisan values, the importance of which within the negotiation manifests itself in the crucial support of the own views and demands with the aim of influencing (Semann 1970) the opposite party (Barthel 2005, p. 33).

The aspect of striving for a change in the behavior of the negotiating party, or at least in their point of view, with the help of a business valuation is an

important reason why the argumentation function has been the least theoretically permeated or accepted main function of a business valuation to date (Eichmann 1992, p. 48). The notion that there are “no general rules for the determination of argumentation values” (Mandl, Rabel 1997, p. 22) might be a little prematurely because a thorough analysis of the argumentation function has not taken place yet. This theoretical neglect is all the more astounding because of the task at hand, to render argumentation aid for and during negotiations, is likely to be practiced commonly. One might venture the assumption that all reports which are presented at the negotiating table by one party were simply made available because the respective party promises themselves additional support in their own bargaining position (Barthel 1990, p. 1147; Barthel 2005, p. 32). Any and all disclosed reports are here understood in the sense of “argumentation values”. Therefore, it is neither recommendable nor useful to anyone to close the “eyes of science” to the complex of influencing the counterparty by partially biased information, and to ignore this area of the business valuation entirely. It is just the way it is that business valuations are used as argumentation aids – this fact must be taken into consideration during negotiations in which business valuations play a key role.

## 2.2. Overview of possible applications

Usually, a series of arguments is deliberately introduced in the negotiation process, mostly in the form of supposed decision values or presented in the form of seemingly impartial arbitration values. If the negotiation is agreement-seeking, the change of ownership of the company should be realized on conditions that are as far as possible from one’s own concession limit and as close as possible to the suspected concession limit of the opposite party. However, the derivation of appropriate argumentation values requires not only the knowledge of one’s own decision value<sup>1</sup> and an educated guess about the opposing decision value<sup>2</sup>, but also an idea about the desired negotiation result. If negotiators know their own decision values and also recognize them, argumentation values do not provide any “instruments of over-reaching” (Matschke 1976, p. 520).

An argumentation value is always partial which is not necessarily congruent with one-sided. Those who use argumentation values would like to gain benefits that they otherwise would not have reached it at all or at least not so quickly. Conversely, they would like to avoid or mitigate possible disadvantages.

---

<sup>1</sup> The knowledge of one’s own decision value is particularly important within a constructive argumentation strategy because it is aiming at a compromise on which both parties can easily agree to.

<sup>2</sup> If a non-dominated conflict situation is agreement-seeking, an area of agreement has to exist. Hence, the decision value of the buyer must be higher than the decision value of the seller.

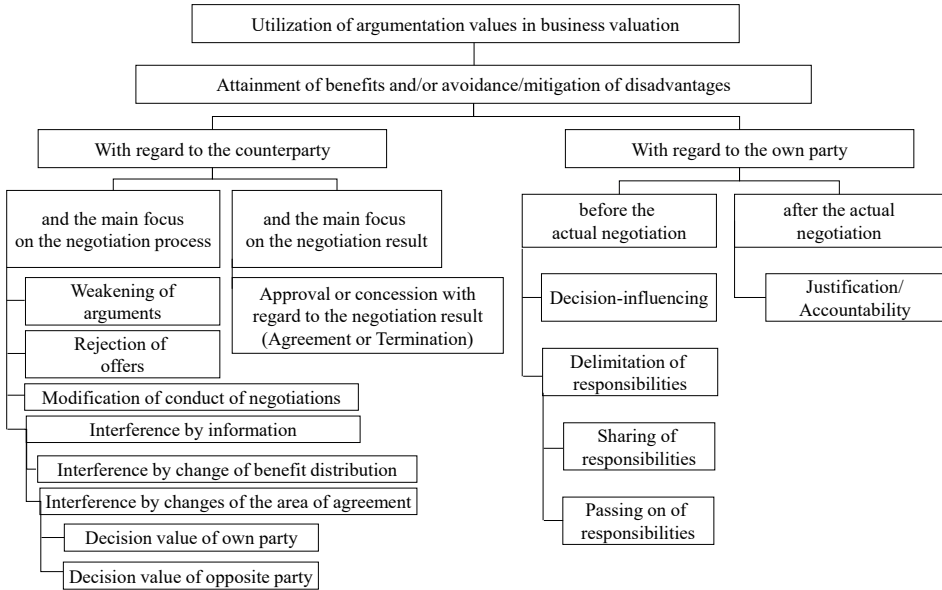
The negotiating position of a party can be strengthened in several ways:

- Arguments may be provided that allow the other negotiating party to make concessions or to agree to a specific negotiation outcome.
- The negotiating party may also receive information by which:
  - arguments of the opposing side of the negotiation are invalidated,
  - offers of negotiations are rejected for obvious reasons,
  - offers of negotiations may be modified in a manner favorable to one's own benefit.

Besides, in order to be able to influence the opposing party and thereby to alter the negotiation result, influencing the impartial expert (e.g. valuator) or the courts may also be advisable (Barthel 2010, p. 2236). The usage of argumentation values is not limited to the actual negotiation process with the counterparty, e.g. the buying and selling of a company, but can also be deployed in negotiation-tactical intention in the preliminary and subsequent negotiations between internal conflicts parties (Coenenberg, Sieben 1976, p. 4076; Matschke 1977a, p. 91; Born 2003, p. 24). After the actual negotiation, it is conceivable that argumentation values are required, for instance, to justify a business acquisition or the termination of a negotiation process, respectively, to the supervisory bodies or the shareholders.

As far as the use in the run-up to the actual negotiation is concerned, this assumes one multi-level decision maker. Argumentation values can then serve to communicate and to gain better acceptance with higher level decision makers (such as the group management) or within a decision-making body (such as within the board of directors). Moreover, they might be useful to induce those high-level decision makers – from the point of view of the arguer – to the desired decision, such as commencing negotiations or acquiring a business.

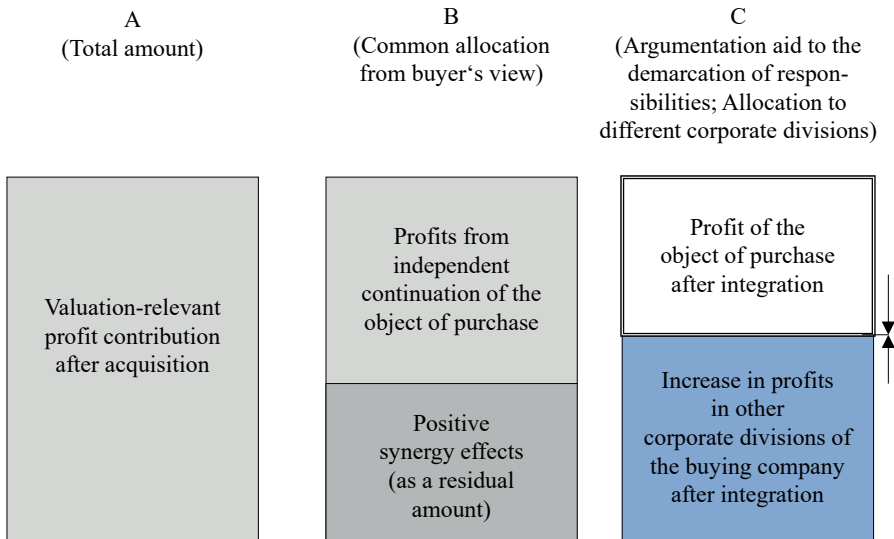
In addition to this decision influencing, business valuations may also have the purpose of delimitation of responsibilities in in-house negotiation processes. On the one hand, it may be intended to distribute the responsibility for a potentially wrong decision at an early stage on as many shoulders as possible, so that the own future bargaining position is affected as little as possible by a false decision that was backed or even initiated (sharing of responsibility). On the other hand, it could be that particularly those, who originally forced the acquisition of a property and after an acquisition also have to assume the line responsibility for this object of purchase, already took precautions for this eventuality during the advocating business valuation, so that their subsequent activity is not burdened from the outset with “a mortgage difficult to redeem” (passing on of responsibility). Figure 2 summarizes some application possibilities of argumentation values (Barthel 2005, p. 37; Matschke, Brösel 2011, p. 283; Matschke, Brösel 2011, p. 613; Matschke, Brösel 2018, p. 293; Matschke, Brösel 2021, p. 263).



**Figure 2.** Utilization of argumentation values in business valuation

**2.3. Internal usage of argumentation values**

Now, let’s consider the aspect of the delimitation of responsibility which is related to one’s own party to the conflict and precedes the external conflict. Point of departure for an argumentative business valuation for the passing on of responsibility might be the valuation relevant success (economic benefit) of the company to be evaluated for the valuation subject. Success is here in the sense of (accounting) profit and for reasons of simplification it is assumed that the profit is fully and immediately available to the buyer company. Figure 3 (Matschke 1977a; Matschke, Brösel 2011, p. 284; Matschke, Brösel 2011, p. 614; Matschke, Brösel 2018, p. 294; Matschke, Brösel 2021, p. 264) showcases three different representations for the same issue, whereby each time the entire valuation-relevant profit contribution of the object of purchase from the point of view of the buying company (the valuation subject) is addressed, which was estimated to its full extent in a realistic manner and without any intention of manipulation. In the future, the object of purchase will continue to be legally independent from the buying company as a wholly owned subsidiary, but economically managed as an integral part of the newly expanded company.



**Figure 3.** Allocation of the valuation-relevant profit contribution considering an internal demarcation of responsibilities

In representation A, the valuation-relevant profit contribution is reported as a total amount. In representation B, it is composed of two values. On the one hand, one amount is expected from the company in the case of independent continuation of the purchase object by the buyer company. On the other hand, there is a supposed increase of profits as a result of economies of scope (synergy effects) after the acquisition and integration of the object of purchase. Representation B corresponds to a usual allocation and procedure for the profit estimation for business valuations. The representations A and B are completely sufficient if it were only a question of determining the appropriate decision value from the point of view of the buyer company with an assumed profit objective. However, if the business valuation should also be used as an internal argumentation aid to delimitate later responsibilities, both representation A and representation B are not very expedient, because, for instance, representation B does not clearly show whether the supposed profit increase is to be expected in the object of purchase itself or in other areas of the buyer company.

As an argumentation aid to the demarcation of responsibility (in the sense of a transfer of responsibility) for a later profit realization, representation C is rather suitable. There, the entire valuation-relevant profit contribution is allocated to different corporate divisions in which it is created and reported. If those responsible



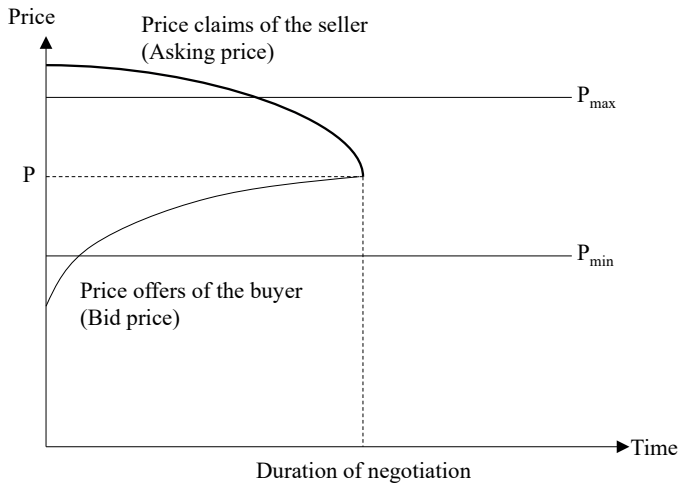
for the business valuation should also bear responsibility for that purchase object after the actual acquisition, their immediate responsibility is limited to the profit in the amount of the double-framed area. This profit could – within an overall realistic estimate – then be valued rather pessimistically by them, whereas the expected increase in profits in other divisions of the buyer company would likely be fairly optimistic. That way, the internal arguers could try to reach both their desired acquisition of the object of purchase and an extensive passing on of responsibility for later profit realizations.

#### **2.4. External usage of argumentation values**

However, it is not likely that the company-internal decision-influencing and also the internal delimitation of responsibilities are at the center of attention of the argumentative use of business valuations, but rather the negotiations with company externals (the counterparty) instead. In such negotiations, conditions are specified under which the intended change of ownership of the company to be valued should be executed. In the case of a purchase/sale, it is particularly the amount of the price payable that will be the subject of negotiation, whereas in the case of merger/demerger, the distribution of property rights (e.g. shares) will likely play the most prominent role between the parties.

A business valuation as an argumentation aid would be dispensable in such negotiations, for example, if the parties in a buying/selling constellation would float their respective purchase/selling offers unfoundedly and an agreement would ultimately come about on a mere sequence of price concessions on both sides. In such a case, it would be sufficient for a rational negotiation of the parties that they know and also follow their respective decision values. The buyer must know how much he can pay at the maximum, the seller how much he must at least claim. Figure 4 explains the negotiation situation just described, in which a company valuation is dispensable as an argumentation aid because the agreement results from a mere sequence of unfounded price offers. The continuous presentation was chosen for reasons of simplification (Matschke 1969, p. 60).

On the abscissa, the duration of the negotiation is plotted, whereas on the ordinate the result of the negotiation is displayed. The price claims of the seller become lower as negotiations last longer, while the price offers of the buyer will likely increase. After a certain time of negotiation, demand and offer will (hopefully) match. Both parties have agreed on a certain price. This price is acceptable from the point of view of both parties because it is both below the price ceiling of the buyer ( $P_{max}$ ) as well as above the bottom price ( $P_{min}$ ) of the seller. However, during the negotiation process the parties only know their respective decision limit.



**Figure 4.** Negotiation as a mere sequence of price claims

The negotiation situation, which is depicted in Figure 4 in the manner of an “oriental bazaar”, seems to apply for “negotiations” about the price of a company rather only in exceptional cases, for instance, in M&A auctions. For conflict resolution processes when buying/selling a company, it is rather characteristic (Matschke 1977a, p. 95) that

- the parties justify their offers based on business valuation results;
- The agreement is less directly reached by direct price concessions rather than by a **cooperative search** (Barthel 2005, p. 34) for the “right” parameters of a business valuation in the context of a particular business valuation method, the application of which the conflicting parties have agreed upon;
- the concessions of the parties particularly refer to those valuation parameters.

In such negotiation situations, the own decision value for the respective party does not represent a sufficient basis for negotiations, because on the basis of the own decision value a party shouldn’t argue if they do not want their bargaining position weakened decisively. Therefore, the parties in reality have to cope with the problem how to justify their offers as convincingly and as less vulnerably as possible on the one hand, while simultaneously trying to impede or even prevent inferences with regard to their own decision value based on the presented justification.

In order to solve this problem, the parties resort to argumentation values of the company. Thus, they might also be regarded as communication media (Kußmaul 1996, p. 267) in order to ultimately bridge the existing conflicts of interest, e.g. the price level, between buyer and seller and to reach an agreement.

At this point, it is even hypothesized that argumentation values are accepted by the conflicting parties as part of the laws of the game of a purchase negotiation and that they – despite their apparent intention to influence – do not constitute any instruments of overreaching as long as the parties know and honor their own decision value in the negotiation process.

As far as the intention to influence is concerned, the following differentiation seems appropriate: there is an argument with regard to the distribution of benefits within the assumed agreement area and/or there is an argument with respect to influencing that assumed agreement area.

The argumentation values used in the first case are means to separate as much as possible from the suspected, realizable advantage in the amount of the difference between ceiling price and bottom price. For this purpose, for example, argumentation values, which lie in the vicinity of the presumed decision value of the counterparty, might be introduced in the negotiation in order to underpin corresponding price claims. It is part of a thorough negotiation preparation that the decision-making situation of the opposite side is analyzed, their interests are ideally fully recognized, and their concession limit(s) are estimated. Such argumentation values have, for reasons of credibility and also for its usefulness as an instrument of influence, to be construed realistically and must not show up as “exorbitant prices”, because who thinks that one could impress the negotiation partner on the basis of unilateral arguments, which are translated into an obviously unrealistic value (Born 2003, p. 25), is likely to be severely misled.

But the intention to influence can also – as the second case expresses – be aimed at changing the area of agreement itself in a way that is beneficial for the own negotiation strategy, be it in a rather **manipulative intent** with regard to a shift of the area of agreement toward the suspected decision value of the counter side, or be it more in a **cooperative intention** to create an agreement area or to expand an already existing one and thereby enlarge the potential benefits for both parties in case of an agreement (Barthel 2005, p. 34).

The cooperative use of argumentation values is particularly significant. For example, it may appear that information about the argumentation value is communicated to the negotiating partner which is suitable to expand an existing agreement area. But the information could also create the prerequisites for an agreement by prompting the negotiating partner to a revision of its own decision value which proves favorable in terms of agreement-seeking endeavors. For instance, the seller could point the buyer to integration options, which the buyer has not yet perceived and which also would allow a rise of the maximum payable price so that a previously rather unacceptable price claim of the seller would become more acceptable (Semann 1970, p. 143).

In the context of considering the argumentation function of business valuation, it is therefore not recommended to start from the assumption of the less

expedient picture of the negotiation as an “overreaching event”, but rather of the positively connoted image of the negotiation as a “cooperative benefit enhancement event”. With regard to the latter point of view, the joint creation and the aligned perception of additional benefits are occupying the center stage of negotiation efforts. In this way, the always given conflict of interest between the negotiating parties – because of the distribution of benefits – can be mitigated, less stressed and hence also bridged more likely. To negotiate creatively means to discover differences and to coordinate those in such a way that cooperation profits (benefits/gains) arise (Siebe 1996, p. 206). In this sense, argumentation values should be introduced in the negotiation process.

### 3. Characteristics of argumentation values

#### 3.1. Overview

Hereinafter, the numerous properties of argumentation values are summarized and systematized. These are attributable to three main features, the feature of camouflage, the feature of party orientation, and the feature of conflict solution orientation. Figure 5 shows a possible systematization of the properties of the argumentation value based on Brösel (2004, p. 518).

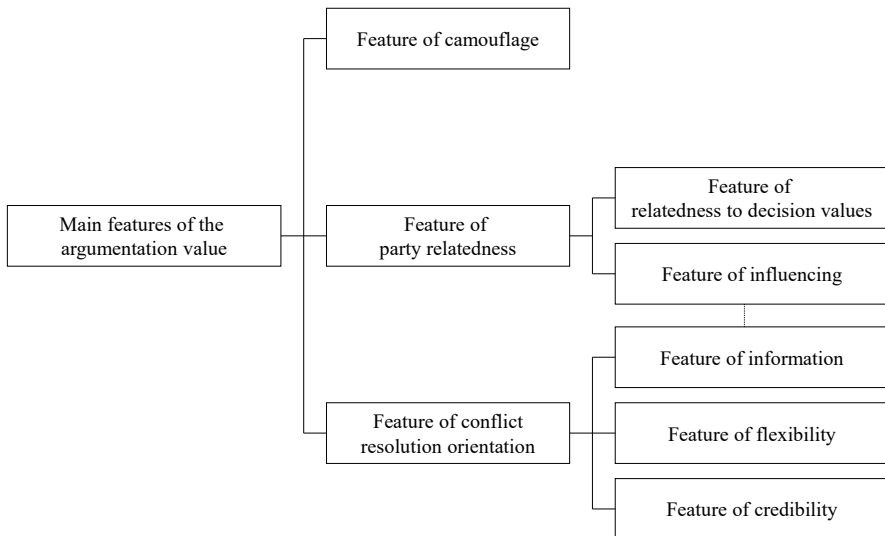


Figure 5. Main characteristics of argumentation values

### **3.2. Feature of camouflage**

Since argumentation values are not introduced in a negotiation in their proper form, but rather as supposed or ostensible decision or arbitration values, the characteristic of camouflage applies to them. True, it is part of the mimicry of the argumentation value that it denies its genuine character (Matschke 1977a, p. 102). Attention should be paid to the fact that depending on the justification of bids and offers, the drawing of conclusions about the decision value of the arguing party might be complicated or even hindered entirely.

### **3.3. Feature of party orientation and characteristics derived thereof**

According to the feature of party orientation, argumentation values are values of one negotiation side, designed to a specific negotiating situation and thus to a concrete negotiating partner, and should invigorate the bargaining position in the negotiation process (Matschke 1977a, p. 91).

Consequences of this main property are the feature of relation to decision values and the feature of influencing. The latter states that with the help of the argumentation function of the business valuation a change in behavior of the negotiation partner is sought. That party should be induced by argumentation values to even consciously concede certain conflict resolution issues or desired negotiation results.

The feature of relatedness to decision values aims at two directions. On the one hand, one's own decision value is the last line of retreat for the argumentation value (Coenenberg, Sieben 1976, col. 4076; Coenenberg 1992, p. 92). Hence, by presenting argumentation values in the negotiation neither the own decision value should be announced, nor should the opposite side be enabled to draw valuable conclusions about it. On the other hand, argumentation values should be directed toward the alleged decision value of the counterparty (Matschke 1976, p. 521; Gorny 2002, p. 156; Born 2003, p. 24).

### **3.4. Feature of conflict resolution orientation and characteristics derived thereof**

The feature of conflict resolution orientation comes into play by the fact that argumentation values are usually introduced to the negotiation with the purpose to reach an agreement or non-agreement (Gorny 2002, p. 11; Ballwieser, Hachmeister 2016, p. 2) with regard to a change of ownership of the valuation object (i.e. the company).

Since argumentation values are usually not equivalent to price quotations that are simply floated arbitrarily, but represent well-founded price notions instead, they serve to bridge the existing conflicts of interest between the negotiation partners, especially with regard to the price level or also other parameters, and finally to achieve a conflict resolution. This can be done by a cooperative search for conflict resolution relevant issues supported by argumentation values and a subsequent agreement on corresponding characteristics of these parameters (Matschke 1977a, p. 96). The conflict resolution orientation is reflected in the subordinate features of information, flexibility, and credibility.

The feature of information distinguishes the argumentation values because the negotiating parties try to justify their offers with these values (Matschke 1977a, p. 96). As a result, the negotiating partner gains information about the asking price of the other party and may also possibly infer the negotiating tactics chosen by that party. Furthermore, the negotiating partners might be able to gain previously unknown information about the valuation object from the use of both external and internal argumentation values – in particular, if they are introduced into the process as arbitration values by “independent” appraisers/valuators (Matschke 1976, p. 521). With the use of argumentation values – like already presented – information can also be deliberately “leaked” to the negotiating partner to expand the presumed range of agreement, i.e. the difference between one’s own decision value and the alleged decision value of the counterparty, particularly by an intended correction of the decision value of the other party to the conflict (Matschke 1977a, p. 98). This shows the close connection of the feature of information with the characteristic of influencing.

On the one hand, the feature of flexibility describes the ability of argumentation values to take into account newly obtained information and intermediate results of the negotiation (Sieben 1993, p. 4319). On the other hand, within the context of the argumentation function the applied valuation methods should be both easy to manage and be customizable because these methods allow several starting points for an argument, especially in order to not appear untrustworthy to the negotiating partner. This emphasizes the close link to the feature of credibility discussed below (Coenenberg, Sieben 1976, col. 4076; Coenenberg 1992, p. 92).

Eventually, an argumentation value only proves to be useful if the feature of credibility applies (Coenenberg, Sieben 1976, col. 4076; Coenenberg 1992, p. 92; Sieben 1993, p. 4319; Barthel 2004, p. 409; Barthel 2006; Barthel 2009, p. 1030; Knackstedt 2019, p. 224). Hence, argumentation values should represent convincing, less vulnerable, “realistic” values, the determination of which is tolerated and will ultimately be accepted as a substantiated offer (Matschke 1977a, p. 97).

With regard to the renown of the profession of certified public accountants (external auditors), their prepared valuation reports are quite suited as long as the negotiating partner doesn't realize their limited usability for decision purposes. Thus, the valuation reports of auditors are used as argumentation values if it is beneficial for the conflicting parties, because basically it can be assumed that the facts and figures of the report have not been put together with the intent to deceive or even to defraud (Matschke 1976, p. 521).

#### **4. Conclusions**

Both the argumentation function and argumentation values are considerably versatile. Although both have still not received a sufficiently broad theoretical acceptance in research, the argumentation function is most likely to be the by far most utilized function in the practice of business valuation so that calculated or otherwise determined enterprise values have typically to be classified as argumentation values. Nonetheless, the present article could successfully demonstrate that both the argumentation function and argumentation values are theoretically well-founded.

On the one hand, argumentation values are used in negotiations with a conflicting party in which an agreement on the transaction of a company is sought. Argumentation values should primarily be employed to influence the negotiation result, but they can influence the negotiation process, too.

On the other hand, argumentation values can also be introduced within a company. This can be done before the actual negotiation starts in order to ensure a desired decision of the superiors, e.g. management, or to achieve an early limitation and distribution of the responsibilities. Furthermore, its application is conceivable after the negotiation is concluded in order to better justify the transaction in retrospect.

Argumentation values must fulfill the feature of camouflage, the feature of party-relatedness, and the feature of conflict resolution orientation in order to be usable in the sense of the argumentation function. Note that the characteristic of camouflage is the essential component because argumentation values are disclosed, but regularly stated as decision values.

In practice, the concrete determination of the argumentation value both in Germany and in the USA might chiefly take place by means of applying DCF methods, in particular the WACC approach including the CAPM to calculate the cost of equity. By utilizing these popular "objectifying" methods, parties to the conflict can press their point of view particularly well in negotiations, as long as

they are capable of using and of interpreting both the techniques and the calculated results to their own advantage.

## References

- [1] Ballwieser, W. and Hachmeister, D. (2016) *Unternehmensbewertung*, 5th ed., Stuttgart: Schäffer-Poeschel.
- [2] Barthel, C.W. (1990) 'Unternehmenswert: Der Markt bestimmt die Bewertungsmethode', *Der Betrieb*, vol. 43, pp. 1145–1152.
- [3] Barthel, C.W. (2004) 'Unternehmenswert: Schwächen und Stärken von Bewertungsverfahren in Verhandlungen', *Unternehmensbewertung & Management*, vol. 2, pp. 405–412.
- [4] Barthel, C.W. (2005) 'Unternehmenswert: Dominanz der Argumentationsfunktion', *FinanzBetrieb*, vol. 7, pp. 32–38.
- [5] Barthel, C.W. (2006) 'Unternehmenswert: Glaubwürdigkeitsattribution von Argumentationswerten', *Finanz-Betrieb*, vol. 8, pp. 436–471.
- [6] Barthel, C.W. (2009) 'Unternehmenswert: Konsequenzen aus der Subprime-Krise', *Der Betrieb*, vol. 62, pp. 1025–1032.
- [7] Barthel, C.W. (2010) 'Unternehmenswert: Das Problem der Scheingenaugkeit', *Der Betrieb*, vol. 63, pp. 2236–2242.
- [8] Barthel, C.W. (2011) 'Unternehmenswert: Das Problem der Scheingenaugkeit', *Der Betrieb*, vol. 64, pp. 2107–2109.
- [9] Born, K. (2003) *Unternehmensanalyse und Unternehmensbewertung*, 2nd ed., Stuttgart: Schäffer-Poeschel.
- [10] Brösel, G. (2004) 'Die Argumentationsfunktion in der Unternehmensbewertung – «Rotes Tuch» oder «Blaues Band» für Wirtschaftsprüfer?', in Brösel, G. and Kasperzak, R. (eds.) *Internationale Rechnungslegung, Prüfung und Analyse*, München, Wien: Oldenbourg, pp. 515–523.
- [11] Brösel, G. (2006) 'Eine Systematisierung der Nebenfunktionen der funktionalen Unternehmensbewertungstheorie', *Betriebswirtschaftliche Forschung und Praxis*, vol. 58, pp. 128–143.
- [12] Brösel, G. and Burchert, H. (2004) 'Die Akquisition von Unternehmen in Osteuropa und die Bedeutung der weichen Faktoren', in Meyer, J.-A. (ed.) *Kooperationen von kleinen und mittleren Unternehmen in Europa*, Lohmar, Köln: EUL, pp. 331–363.
- [13] Brösel, G., Toll, M. and Zimmermann, M. (2012) 'Lessons learned from the financial crisis – unveiling alternative approaches within valuation and accounting theory', *Financial Reporting*, vol. 4, pp. 87–107.
- [14] Coenberg, A.G. (1992) 'Unternehmensbewertung aus der Sicht der Hochschule', in Busse von Colbe, W. and Coenberg, A.G. (eds.) *Unternehmensakquisitionen und Unternehmensbewertung*, Stuttgart: Schäffer-Poeschel, pp. 89–108.



- [15] Coenenberg, A.G. and Sieben, G. (1976) 'Unternehmensbewertung', in Grochla, E. and Wittmann, W. (eds.) *Handwörterbuch der Betriebswirtschaft*, vol. 3, 4th ed., Stuttgart: Schäffer-Poeschel, col. 4062–4079.
- [16] Eichmann, K. (1992) *Marketingorientierte Unternehmensbewertung*, Augsburg: FGM.
- [17] Follert, F. (2020) 'Squeeze-Out and Business Valuation in Germany – A Law and Economics Analysis of Judicial Decision-Making', *Accounting, Economics, and Law*, [Online], Available: <https://doi.org/10.1515/ael-2020-0118> [1 Sep 2020].
- [18] Follert, F., Herbener, J.M., Olbrich, M. and Rapp, D.J. (2018) 'Agree or Disagree? On the Role of Negotiations for the Valuation of Business Enterprises', *Quarterly Journal of Austrian Economics*, vol. 21, pp. 315–338.
- [19] Frey, N. and Rapp, D. (2011) 'Unternehmensbewertung: Das Problem der Schein-genauigkeit', *Der Betrieb*, vol. 64, pp. 2105–2107.
- [20] Gorny, C. (2002) *Unternehmensbewertung in Verhandlungsprozessen*, Wiesbaden: Gabler.
- [21] Hafner, R. (1993) 'Unternehmensbewertungen als Instrumente zur Durchsetzung von Verhandlungspositionen', *Betriebswirtschaftliche Forschung und Praxis*, vol. 45, pp. 79–89.
- [22] Hering, T. and Brösel, G. (2004) 'Der Argumentationswert als „blinder Passagier“ im IDW S 1 – Kritik und Abhilfe', *Die Wirtschaftsprüfung*, vol. 57, pp. 936–942.
- [23] Hering, T. and Olbrich, M. (2002) 'Einige grundsätzliche Bemerkungen zum Bewertungsproblem beim Börsengang junger Unternehmen', *Zeitschrift für Betriebswirtschaft*, vol. 72, EH 5, pp. 147–161.
- [24] Knackstedt, H.W. (2019) *Klein- und Mittelunternehmen (KMU) richtig bewerten*, 2nd ed., München: AVM.
- [25] Kußmaul, H. (1996) 'Gesamtbewertung von Unternehmen als spezieller Anwendungsfall der Investitionsrechnung', *Der Steuerberater*, vol. 47, pp. 262–268 (Part I).
- [26] Mandl, G. and Rabel, K. (1997) *Unternehmensbewertung – Eine praxisorientierte Einführung*, Wien, Frankfurt am Main: Überreuter.
- [27] Matschke, M.J. (1969) 'Der Kompromiß als betriebswirtschaftliches Problem bei der Preisfestsetzung eines Gutachters im Rahmen der Unternehmensbewertung', *Zeitschrift für betriebswirtschaftliche Forschung*, vol. 21, pp. 57–77.
- [28] Matschke, M.J. (1976) 'Der Argumentationswert der Unternehmung – Unternehmensbewertung als Instrument der Beeinflussung in der Verhandlung', *Betriebswirtschaftliche Forschung und Praxis*, vol. 28, pp. 517–524.
- [29] Matschke, M.J. (1977a) 'Die Argumentationsfunktion der Unternehmensbewertung', in Goetzke, W. and Sieben, G. (eds.) *Moderne Unternehmensbewertung und Grundsätze ihrer ordnungsmäßigen Durchführung*, Köln: Gebera, pp. 91–103.

- [30] Matschke, M.J. (1977b) 'Traditionelle Unternehmungsbewertungsverfahren als Argumentationsbasis für Verhandlungen über den Preis einer Unternehmung', in Goetzke, W. and Sieben, G. (eds.) *Moderne Unternehmungsbewertung und Grundsätze ihrer ordnungsmäßigen Durchführung*, Köln: Gebera, pp. 158–174.
- [31] Matschke, M.J. (1979) *Funktionale Unternehmensbewertung*, vol. II, *Der Arbitriumwert der Unternehmung*, Wiesbaden: Gabler.
- [32] Matschke, M.J. and Brösel, G. (2008) 'Podstawy funkcjonalnej wyceny przedsiębiorstwa', *Ekonomia Menedżerska*, vol. 4, pp. 7–25.
- [33] Matschke, M.J. and Brösel, G. (2011) *Wycena przedsiębiorstwa – funkcje, metody, zasady*, Warszawa: Oficyna.
- [34] Matschke, M.J. and Brösel, G. (2013) *Unternehmensbewertung. Funktionen – Methoden – Grundsätze*, 4th ed., Wiesbaden: Springer.
- [35] Matschke, M.J. and Brösel, G. (2018) *Ocenka przedsiębiorstaj. Funkcyj – Metody – Principy* [Оценка предприятий. Функции – Методы – Принципы], Moskwa: KnoRus.
- [36] Matschke, M.J. and Brösel, G. (2021) *Business Valuation – Functions, Methods, Principles*, München: UVK.
- [37] Matschke, M.J., Brösel, G. and Matschke, X. (2010) 'Fundamentals of Functional Business Valuation', *Journal of Business Valuation and Economic Loss Analysis*, vol. 5, pp. 1–39, [Online], Available: <https://doi.org/10.2202/1932-9156.1097> [1 Oct 2020].
- [38] Matschke, M.J. and Mucheyer, H. (1977) 'Die Nutzung der traditionellen Unternehmungsbewertungsverfahren zur Argumentation in der Preisverhandlung', in Goetzke, W. and Sieben, G. (eds.) *Moderne Unternehmungsbewertung und Grundsätze ihrer ordnungsmäßigen Durchführung*, Köln: Gebera, pp. 179–183.
- [39] Olbrich, M., Brösel, G. and Haßlinger, M. (2009), 'The Valuation of Airport Slots', *Journal of Air Law and Commerce*, vol. 74, pp. 897–917.
- [40] Olbrich, M., Quill, T. and Rapp, D.J. (2015) 'Business Valuation Inspired by the Austrian School', *Journal of Business Valuation and Economic Loss Analysis*, vol. 10, pp. 1–43.
- [41] Rapp, D.J., Olbrich, M. and Venitz, Ch. (2018) 'Subjectivity, Arbitrariness, Austrian Value Theory, and a Reply to Leithner', *Quarterly Journal of Austrian Economics*, vol. 21, pp. 60–70.
- [42] Semann, N. (1970) *Preisverhandlungen beim Wechsel des Unternehmenseigners. Die gegenseitige Beeinflussung der Parteien im Verhandlungsprozess*, Köln.
- [43] Siebe, W. (1996) 'Management der Differenzen: Das Raiffa-Programm der analytischen Verhandlungsberatung', *Zeitschrift für Betriebswirtschaft*, vol. 66, pp. 203–219.

- [44] Sieben, G. (1993) 'Unternehmensbewertung', in Wittmann, W., Kern, W., Köhler, R., Küpper, H.U., Wysocki, K. (eds.) *Handwörterbuch der Betriebswirtschaft*, vol. 3, 5th ed., Stuttgart, col. 4315–4331.
- [45] Tichy, G.E. (1994) *Unternehmensbewertung in Theorie und Praxis*, Wien: Linde.
- [46] Toll, Ch. and Hering, Th. (2017) 'Valuation of Company Merger from the Shareholders' Point of View', *Amfiteatru Economic*, vol. 19, pp. 836–853.
- [47] Wagenhofer, A. (1988a) 'Der Einfluß von Erwartungen auf den Argumentationspreis in der Unternehmensbewertung', *Betriebswirtschaftliche Forschung und Praxis*, vol. 40, pp. 532–552.
- [48] Wagenhofer, A. (1988b) 'Die Bestimmung von Argumentationspreisen in der Unternehmensbewertung', *Zeitschrift für betriebswirtschaftliche Forschung*, vol. 40, pp. 340–359.



## Summaries

---

Piotr Gretszel, Henryk Gurgul, Łukasz Lach, Stefan Schleicher: **Testing for the economic and environmental impacts of EU Emissions Trading System: A panel GMM approach** ▪ *Managerial Economics* 2020, Vol. 21, No. 2

*JEL codes:* C23, Q43, Q52

**Keywords:** *EU ETS, GMM, panel data*

The COVID-19 pandemic has had a great impact on the economies of the EU, also with regard to the future of EU climate policy. The plan to rebuild and support the EU economy seems to place less emphasis on environmental issues as the main focus has been shifted to a quick economic recovery. One of the issues discussed in this context is the continued operation of the EU ETS. From this perspective, empirical research devoted to a thorough analysis of the impact of the EU ETS is of particular importance. At the same time, the current economic literature lacks any econometric analyzes devoted to the issues in question that would use detailed and reliable databases on EU ETS like the one provided by the Wegener Center for Climate and Global Change. The aim of this paper is to make a preliminary assessment of the effectiveness of the EU ETS in terms of reducing the actual emissions while preserving the economic growth of EU member states. The extensive empirical analysis is focused on examining the issues in question for different phases of the EU ETS and various groups of EU economies that vary in terms of economic development and the overall air pollutant emission.

Jessica Hastenteufel, Lena Fuchs: **Low Interest Rates – A Real Threat to German Banks or First-Class Whining?!** ▪ *Managerial Economics* 2020, Vol. 21, No. 2

*JEL classification:* E40, E43, E52, G21

**Keywords:** *interest, low interest rate phase, banking, monetary policy*

The current phase of low interest rates poses major challenges for banks. A continuous decline in the interest result, which is so important for the profitability of banks, has been observed for years, as it is becoming increasingly difficult for banks to generate sufficient income from the interest margin. This is partly due to the European Central Bank's expansive monetary policy. However, other factors, such as advancing digitization, also play a role here. The structure of the German banking market and the mostly strong focus of German banks on interest-bearing business are also increasingly becoming a problem. Still, the question arises, whether the current phase of low interest rates is actually a serious threat to banks or whether they are complaining at a high level.

Manfred Jürgen Matschke, Gerrit Brösel, Patrick Thielmann: **Functional business valuation – The theoretical foundation of argumentation value and its underlying function** ■ *Managerial Economics* 2020, Vol. 21, No. 2

*JEL classification:* G30, G32, G40.

**Keywords:** *Business Valuation, argumentation function, argumentation value, negotiation*

Functional business valuation is the prevailing doctrine in the theoretically well-founded German-language literature, because the value of a company is primarily dependent on the purpose (function) of the valuation. This paper deals with one of the three main functions of business valuation: the argumentation function. This is where the argumentation value of the business is determined. The argumentation function is the function that has been the least theoretically developed and accepted to date, but is probably the most commonly used one in the real world. This article shows for the first time in the English-language literature the core ideas of the theoretical foundation of this function.

## Instruction for authors

---

Before submitting the paper we encourage the authors to use English language editing support.

Papers which are to be published in *Managerial Economics* should be prepared according to the following guidelines.

All illustrations, figures, and tables are placed within the text at the appropriate points, rather than at the end.

Title page should include a footnote, giving the author(s) affiliation(s) (including postal and e-mail addresses of all authors).

Figures must be prepared in a form suitable for direct reproduction. Digital artwork at least 300 dpi resolution is accepted. Photographs, on glossy paper (9 by 13 cm or larger), should display sharp contrast. Figures, tables and photographs should be numbered according to their reference in text.

Illustrations should be edited in CorelDraw (\*.CDR), DrawPerfect (\*.WPG) or in any other vector graphics form e.g. HPGL, Encapsulated PostScript (\*.EPS), Computer Graphics Metafile \*.CGM) or bitmaps (\*.TIF, \*.PCX).

Mathematical equations within the text should be written in separate lines, numbered consecutively (numbers within round brackets) on the right-hand side. Greek characters must be written out clearly.

Summary and 3–5 keywords should be submitted in separate file containing the name of the author, title of the paper with the heading “Summary”.

Authors using Word are requested to employ, as far as possible, text form of mathematical symbols leaving graphic form for the equations longer than single line.

## Reference style

In general, the authors should use the Harvard style of referencing. References to literature within the text should be given in the form: the name of the author(s) and the year of publication (in parentheses), e.g. “Smith (1990) underlines...”, “As shown in Smith (1990)...”. In case of more than two authors of the cited publication the “et al.” shortcut should be used.

Lists of references should be written in alphabetical-chronological order, numbered and follow the rules:

- JOURNAL ARTICLE

Muller, V. (1994) ‘Trapped in the body: Transsexualism, the law, sexual identity’, *The Australian Feminist Law Journal*, vol. 3, August, pp. 103–107.

- BOOKS

*Book with one author*

Adair, J. (1988) *Effective time management: How to save time and spend it wisely*, London: Pan Books.

*Book with two authors*

McCarthy, P. and Hatcher, C. (1996) *Speaking persuasively: Making the most of your presentations*, Sydney: Allen and Unwin.

*Book with three or more authors*

Fisher, R., Ury, W. and Patton, B. (1991) *Getting to yes: Negotiating an agreement without giving in*, 2nd edition, London: Century Business.

*Book – second or later edition*

Barnes, R. (1995) *Successful study for degrees*, 2nd edition, London: Routledge.

*Book by same author in the same year*

Napier, A. (1993a) *Fatal storm*, Sydney: Allen and Unwin.

Napier, A. (1993b) *Survival at sea*, Sydney: Allen and Unwin.



*Book with an editor*

Danaher, P. (ed.) (1998) *Beyond the ferris wheel*, Rockhampton: CQU Press.

*A chapter in a book*

Byrne, J. (1995) 'Disabilities in tertiary education', in Rowan, L. and McNamee, J. (ed.) *Voices of a Margin*, Rockhampton: CQU Press.

- WORLD WIDE WEB PAGE

Young, C. (2001) English Heritage position statement on the Valletta Convention, [Online], Available: <http://www.archaeol.freeuk.com/EHPostionStatement.htm> [24 Aug 2001].

- CONFERENCE PAPERS

Hart, G., Albrecht, M., Bull, R. and Marshall, L. (1992) 'Peer consultation: A professional development opportunity for nurses employed in rural settings', *Infront Outback – Conference Proceedings, Australian Rural Health Conference, Toowoomba*, pp. 143–148.

- NEWSPAPER ARTICLES

Cumming, F. (1999) 'Tax-free savings push', *Sunday Mail*, 4 April, p. 1.

All the items cited in the main text, and no other items, must be placed in the list of references.

Authors should include 2–3 JEL codes with manuscript during submission. For more details on the JEL classification system [CLICK HERE](#).

Information about the journal and the deadlines for submitting articles for next issues are presented at

<http://www.managerial.zarz.agh.edu.pl>



## Double blind peer review procedure

---

1. In order to assess a quality of submitted publication the Editorial Board consults at least two outside referees (not affiliated to any of the authors' institutions) which are recognized experts in the specific field.
2. At least one of the referees must represent a foreign institution (i.e. an institution located in other country than the home institution of each author).
3. The journal uses double blind peer review policy, i.e. neither the author nor the referee knows the identity of the other. In addition, each referee signs a declaration of no conflict of interests, whereby the conflict of interest is defined as a direct personal relationship (kinship to the second degree, legal relationships, marriage) or a professional scientific cooperation between the referee and the author which took place at least once in the past two years preceding the year of accepting the invitation to review.
4. Only written referee reports are considered (journal does not accept face-to-face or phone-call- based reports). Each report should clearly express the referee's final recommendation (i.e. whether the article should be accepted for publication, revised or rejected). The referees are kindly requested to fill the review form which can be found in "For reviewers" section. In general, the referees are asked to:
  - assess:
    - the scientific importance of the submission's topic,
    - the quality of research;
  - verify whether:
    - the Abstract is concise and informative,
    - the facts and interpretations are satisfactorily separated in the text,
    - the interpretations and conclusions follow from the data,
    - the length and structure of the paper is appropriate,
    - the paper can be shortened without loss of quality,

- all the tables and figures are necessary,
  - the diagrams and photographs are of good quality,
  - there are all essential figures that should be prepared,
  - all the references are exact,
  - the manuscript requires proof reading by native speaker,
  - there is sufficient attention given to previous research.
5. The names of the referees of particular articles are classified.
  6. Once a year the journal publishes the complete list of referees.