







“The effect of decreasing interest rates on European banks’ earnings quality”

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THE EFFECT OF DECREASING INTEREST RATES ON EUROPEAN BANKS' EARNINGS QUALITY

Abstract

Earnings quality (EQ) is an indicator generally defined as a mix of many components like persistence, predictability, volatility and smoothing of earnings. This study is based on the hypothesis that in the banking sector, any changes in interest rates make a remarkable effect on these characteristics of earnings, and thus may influence EQ. Between 2007 and 2015, there has been a general decreasing trend in interest rates across Europe, with varying slopes in different countries. Using data of 128 European banks from 27 countries, it is examined how the extent of interest rate decrease influenced the EQ of banks. It was found that the extent of interest decrease negatively affects earnings quality, meaning that the EQ of banks located in countries with less drastic relative interest cuts between 2007 and 2015 (typically less developed Central and Eastern European countries) is higher than the EQ of banks from developed countries with significant relative interest cuts in the same period.

Keywords

earnings quality (EQ), interest rate, interest cut, banking sector, Europe

JEL Classification

E43, G21, M41

INTRODUCTION

A distinguished indicator of the performance of firms is their earnings (net income) shown in the income statement. This is strictly followed by each relevant stakeholder (managers, owners, investors) to monitor how the firm can meet the expectations stated by them. In the related literature, an increasing attention is paid to the quality of earnings. High quality of earnings means that it serves as an accurate measure of performance and of returns realized, and helps investors to minimize the risk of their decisions, so the net income presented in the income statement is a key in making decisions (Schipper & Vincent, 2003). The earnings quality (EQ) is usually measured by creating a complex indicator, which considers the persistence, the predictability, the volatility and the smoothing of earnings (Paoloni et al., 2017).

In the banking sector, the size of earnings undoubtedly depends on the level of interest rates. However, the literature is not unanimous about how exactly the level of interest rates affects the banks' profitability. This question has received more and more attention in the last 10-12 years, due to the significant fall in interest rates in Europe (although the extent of interest cuts was not the same in different countries). According to Gros et al. (2016), two opposing standpoints exist regarding the effect of interest decrease on the earnings of banks. One is that a decreasing level of interest makes an adverse effect on banks' earnings, as their revenues are strongly dependent on the interest income realized on the capital they disburse. The other standpoint is that low interests may increase the demand for loans, and thus a decrease in the rate leads to a higher lending volume, which improves

earnings of financial institutions. During the literature review, it was found that there is still no consensual standpoint about the relationship between interest rate changes and earnings in the banking sector. Furthermore, the recent empirical studies mostly focus on how a fall in interest rates affects the size of earnings, but they hardly deal with the relationship between interest changes and earnings quality. This study addresses this research gap, and examines how the extent of interest cuts influences the EQ of European banks.

1. LITERATURE REVIEW

The questions of earnings quality (EQ) have been given increasing attention both in academic research and in practical applications. Scholars generally agree that high quality earnings give a reliable indication about the real economic performance of the firm, which means the income presented is informative and useful for making decisions (Dechow & Schrand, 2004; Dechow et al., 2010; An, 2017). According to other authors, high EQ also means that earnings are well predictable, so current earnings are reliable predictors of later periods' earnings (Penman, 2003; Hodge, 2003; Mikhail et al., 2003). Others mention the usefulness of net income for valuing the firm's shares (Kirschenheiter & Melumad, 2004) or its strong correlation with operating cash flows (Cohen, 2003) as a sign of high EQ.

Some studies define earnings quality as a combined indicator. Francis et al. (2004) identify seven factors that, in their view, properly indicate the company's EQ. These factors are accounting quality, persistence, predictability, smoothing, value relevance, timeliness and conservatism of earnings. Gaio (2010) divides these seven factors into two categories, labeling the first four (accounting quality, persistence, predictability, smoothing) as accounting-based and the other three (value relevance, timeliness and conservatism) as market-based components.

One of the most recent studies in this field is that of Paoloni et al. (2017), who argue that, from the seven factors defined by Francis et al. (2004), the three market-based components have lower relevance in measuring earnings quality, as they are derived from market data that change quickly and are often uncertain. Therefore, they only use the four accounting-based components, namely persistence (PERS), predictability (PRED), volatility (VAR) and smoothing (SMOOTH) of earnings for computing EQ. The first component, persistence

(PERS), is the maximum likelihood based estimate for the $\Phi_{1,j}$ coefficient from the $X_{j,t} = \Phi_{0,j} + \Phi_{1,j} \cdot X_{j,t-1} + v_{j,t}$ autoregressive model (where $X_{j,t}$ and $X_{j,t-1}$ express the current and the previous year's earnings, $\Phi_{0,j}$ is the constant, while $v_{j,t}$ is the error adjustment). Persistence is the indicator of future sustainability of earnings, where values nearer to 1 indicate higher and values nearer to 0 indicate lower persistence and thus lower quality of earnings. The second component is predictability (PRED), which is computed as the standard deviation of the error adjustment ($v_{j,t}$) in the same autoregressive model. Lower values refer to better predictability and thus to better earnings quality. The VAR component expresses the volatility of the firm's net income, calculated as the standard deviation of earnings in the examined period, where lower volatility indicates higher earnings quality.

Finally, Paoloni et al. (2017) use earning smoothing (SMOOTH) as an EQ component, which, according to their definition, is a legal technique often used by companies to artificially decrease the natural fluctuations of earnings. Smoothing is applied because investors regard shares of companies with less volatile earnings as safer investments compared to those presenting highly fluctuating income. Smoothing is measured as the ratio of standard deviations of earnings and operating cash flows. High values of the SMOOTH variable refer to the fact that earnings fluctuate more than cash flows, meaning that the extent of applying artificial earnings smoothing by the firm is little. Therefore, high SMOOTH values indicate low earnings quality. Table 1 summarizes the four components of EQ discussed above.

In the current research, the above discussed approach of Paoloni et al. (2017) is used to measure earnings quality.

The relationship between interest rates and the profitability of banks has been investigated by

Table 1. Components of earnings quality (EQ)

EQ component	Denotation	Definition
Earnings persistence	PERS	Estimated value of $\Phi_{1,i}$ coefficient in the autoregressive model $X_{it} = \Phi_{0,i} + \Phi_{1,i} \cdot X_{it-1} + v_{it}$, where X_{it} and X_{it-1} stand for the current and the previous year's net income, respectively
Earnings predictability	PRED	Standard deviation of the error adjustment in the autoregressive model $X_{it} = \Phi_{0,i} + \Phi_{1,i} \cdot X_{it-1} + v_{it}$ $PRED = \sigma(v_{it})$
Earnings volatility	VAR	Standard deviation of net income (X_{it}) within the examined period $VAR = \sigma(X_{it})$
Earnings smoothing	SMOOTH	Ratio of the standard deviations of net income (X_{it}) and operating cash flows (CFO_{it}) $SMOOTH = \sigma(X_{it}) / \sigma(CFO_{it})$

several studies, although not in the same context as this research, and with contradictory results. Some examples of such investigations are those of Arpa et al. (2001) and Beckmann (2007), who showed a negative impact of long-term interest rates on bank profitability. On the other hand, Albetrazzi and Gambacorta (2009) and Genay and Podjasek (2014) found a positive correlation between interest rates and earnings of banks. This was also confirmed by Busch and Memmer (2015), who concluded that in Germany, higher interest rates generate higher net interest margins in the long run. Alessandri and Nelson (2015) obtained similar results for the UK. Based on these contradictory results, it is obvious that there is room for further investigation in this field, and the question of how interest rates and banks' earnings quality are associated, is still unanswered.

2. AIMS

The current empirical examination concentrates on the relationship between the extent of interest rate changes and earnings quality in the European banking sector, in light of the gener-

al negative trend of European countries' long-term interest rates. The analysis is focusing on 27 European countries (Austria, Belgium, Croatia, Cyprus, Denmark, Finland, France, Germany, Great Britain, Greece, Hungary, Ireland, Italy, Luxembourg, Montenegro, Norway, Poland, Portugal, Romania, Russia, Slovakia, Slovenia, Spain, Sweden, Switzerland, the Netherlands, Turkey) and on the period from 2007 to 2015. The reason for selecting this period is that, in these years, there has been a general negative trend of long-term interest rates in Europe (after 2015, the trend turned back and interests rose remarkably in 2016 and 2017). Figure 1 shows the curve of the average interest rate in the 27 selected countries between 2007 and 2015.

In order to obtain the basis for a more sophisticated analysis, three clusters were created based on the extent of interest decrease between 2007 and 2015 (Table 2).

It can be stated that in Cluster 1, typically developed, Western European countries are present, which made significant interest cuts in the period 2007–2015. In Cluster 2, there are Western European and Scandinavian countries with mod-

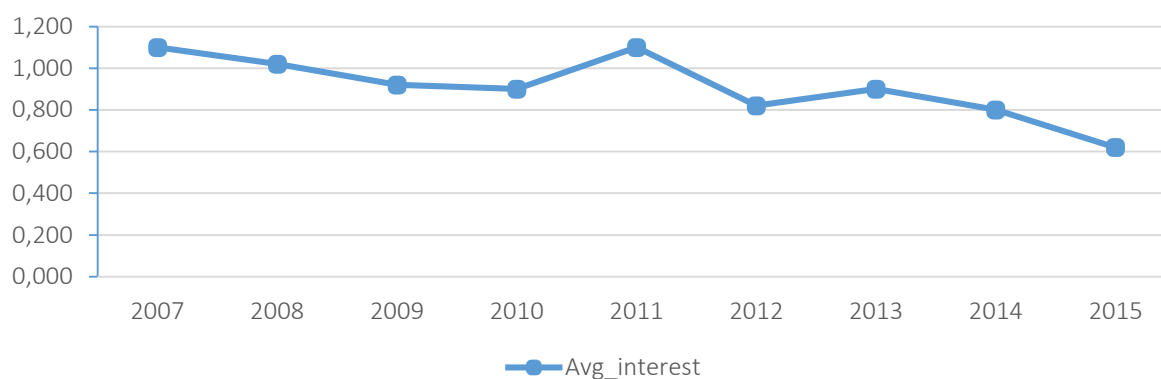
**Figure 1.** Average interest rate (%) of 27 European countries between 2007 and 2015

Table 2. Definition and content of the three examined clusters

Cluster	Criteria	Countries
Cluster 1	The interest rate decreased more than 10% from 2007 to 2015 (Base index 2015/2007 < 0.9)	Belgium, Germany, Luxembourg, Slovakia, Switzerland, the Netherlands
Cluster 2	The interest rate decreased between 5% and 10% from 2007 to 2015 ($0.9 \leq \text{Base index 2015/2007} \leq 0.95$)	Austria, Denmark, Finland, France, Ireland, Italy, Norway, Portugal, Slovenia
Cluster 3	The interest rate decreased less than 5% or increased from 2007 to 2015 (Base index 2015/2007 > 0.95)	Cyprus, Greece, Great Britain, Croatia, Hungary, Montenegro, Poland, Romania, Spain, Sweden, Russia, Turkey

erate interest cuts in the same period, while in Cluster 3, with some exceptions, less developed, Central and Eastern European countries can be found with only slightly decreasing or increasing interest rates between 2007 and 2015. Figure 2 illustrates the differences in interest rate trends in the three clusters.

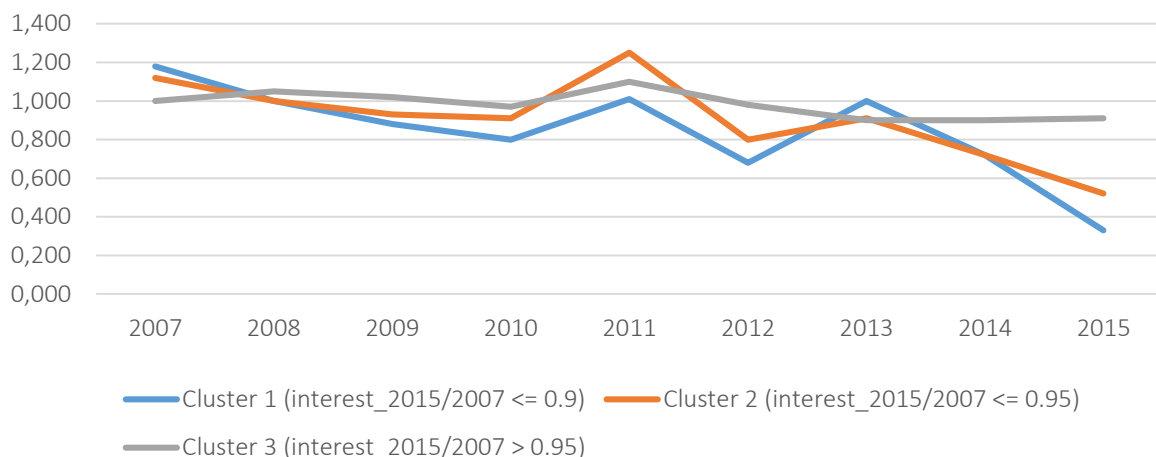
Based on these trends, the aim of the current research is to discover how the extent of decrease in interest rates affects the earnings quality of banks in these countries/clusters. The investigation will be conducted using data from the European banking sector and from the period 2007–2015. During the literature survey, no other studies were found dealing with the same question with an identical industry focus. Therefore, it is believed that the existing literature can be extended by new empirical results.

3. METHODS

The examination is based on an own-collected database containing data of 128 European banks from the selected 27 European countries (listed in Table 2) for the period between 2007 and 2015.

Earnings and cash flow data were taken from the banks' public financial statements available on their websites, while country-specific interest rates were retrieved from www.tradingeconomics.com. When constructing the sample, the size and economic strength of the countries, the number of large banks located there and the availability of their data for the period 2007–2015 were considered. As a result, 21 banks were selected from Italy, 13 from Germany, 9-9 from France, Russia, Spain and Turkey, 7 from Great Britain, 6-6 from the Netherlands and Switzerland, 5 from Sweden, 4-4 from Denmark and Greece, 3-3 from Austria, Belgium and Slovenia, 2-2 from Finland, Hungary, Ireland, Norway and Portugal, and 1-1 from Croatia, Cyprus, Luxembourg, Montenegro, Poland, Romania and Slovakia, that is altogether 128 banks.

To measure earnings quality, the concept of Paoloni et al. (2017) is used and earnings quality (EQ) is defined as a mix of four components, namely persistence (PERS), predictability (PRED), volatility (VAR) and smoothing (SMOOTH) of earnings. The definitions of these components were discussed earlier and are presented in Table 1.

**Figure 2.** Average interest rates (%) in the three clusters between 2007 and 2015

According to the definitions of the four components (with a reference to Paoloni et al., 2017), high values of PERS (better sustainability), and low values of PRED (smaller error in earnings predictions), VAR (low volatility) and SMOOTH (effective smoothing activities) refer to better quality of earnings. After calculating the raw values of the components for each bank, rankings of all 128 banks in the sample were created by each component, by giving the highest rank (that is, 128) for the bank showing the best value from the viewpoint of earnings quality, and giving the lowest rank (that is, 1) for the worst value. Then, a simple average of the four ranks was calculated, and then this average was divided by 128. Thus, earnings quality (EQ) indicator for each bank was obtained, which (as a result of the normalizing step at the end) ranges from 0 to 100 per cent. Let this be illustrated with an example. Assume that bank i has the best persistence, the fifth best predictability and the tenth best volatility measure, but at the same time the least effective smoothing among all banks in the sample. Then it will receive ranks of 128 (PERS), 124 (PRED), 119 (VAR) and 1 (SMOOTH). The average of these four ranks is $(128+124+119+1)/4 = 93$, thus the earnings quality of the bank (EQ_i) will be $93/128 = 0.7266$, that is 72.66%.

Based on the above concept, two types of analysis was conducted. The first is a comparison of average EQ in the three clusters. After conducting the necessary calculations, the banks are ordered into the three clusters based on their countries, and an average EQ for each cluster is computed. Simply comparing these average EQs of the three clusters may give an illustrative indication of how the extent of long-term interest rate cut influences the quality of earnings in the European banking sector. The second is regression analysis. A single

variate linear regression model is build up to statistically prove or deny the relationship between extent of decrease in interest rates and earnings quality. The regression model is as follows:

$$EQ_i - \overline{EQ} = \alpha + \beta \cdot dINTCHANGE_i + u_i. \quad (1)$$

The dependent variable is the difference between the particular bank's earnings quality (EQ_i) and the average EQ of all 128 banks \overline{EQ} , while the explanatory variable $dINTCHANGE_i$ is the difference between the particular bank's interest base index (2015 interest rate related to the 2007 level) and the average base index of the 27 countries examined:

$$dINTCHANGE_i = \frac{r_i^{2015}}{r_i^{2007}} - \frac{\bar{r}^{2015}}{\bar{r}^{2007}}. \quad (2)$$

Note that, although this variable is determined for each bank in the sample, it is rather a country-specific indicator, as its value is identical in case of banks located in the same country. Based on the testing results of this model, it will be possible to accept or reject the hypothesis that there is a relationship between the extent of interest change and banks' earnings quality.

4. RESULTS AND DISCUSSION

Using the method described in the previous section, the average earnings quality (EQ) for the three clusters was computed. Results are shown in Table 3.

These results indicate that, in the examined period, the earnings quality was higher for banks in those countries, where the long-term interest rate decreased less than 5% (or increased) in the period 2007–2015, compared to banks in coun-

Table 3. Average EQ in the three clusters

Cluster	Countries	Interest base index (r^{2015}/r^{2007})	No. of banks in the cluster	Average EQ of banks in the cluster (%)
Cluster 1	Belgium, Germany, Luxembourg, Slovakia, Switzerland, the Netherlands	$r^{2015}/r^{2007} < 0.9$	30	47.01
Cluster 2	Austria, Denmark, Finland, France, Ireland, Italy, Norway, Portugal, Slovenia	$0.9 \leq r^{2015}/r^{2007} \leq 0.95$	48	50.57
Cluster 3	Cyprus, Greece, Great Britain, Croatia, Hungary, Montenegro, Poland, Romania, Spain, Sweden, Russia, Turkey	$r^{2015}/r^{2007} > 0.95$	50	52.26

Table 4. Descriptive statistics for the variables

Variable	Mean	Median	Minimum	Maximum	Std. dev.
$EQ_i - \overline{EQ}$	0.000	-0.487	-42.972	48.048	21.689
dINTCHANGE _i	-0.133	-0.293	-0.670	1.312	0.380

Table 5. Testing results for the regression model

Independent variables	Coefficient	Std. dev.	t-ratio	p value
α (constant)	1.12467	1.93013	0.5827	0.5611
dINTCHANGE _i	12.7924	5.07299	2.5220	0.0129**

Note: Dependent variable $EQ_i - \overline{EQ}$, R squared 4.8%.

tries, where the decrease of interest was between 5% and 10% or more than 10%. The lowest EQ can be seen in those developed countries, where the interest base index (2015 versus 2007) is lower than 0.9. This indicates that a significant fall in interest rates makes a negative effect on the quality of banks' earnings. This contributes to the findings of Albetrazzi and Gambacorta (2009) and Genay and Podjasek (2014), who showed that lower long-term interests generate lower earnings for banks.

In the next step, the regression model shown in equation (1) was tested in order to find confirmation for the above conclusion. Descriptive statistics for the variables and testing results are shown in Table 4 and Table 5.

These testing results confirm the findings. The R square is relatively low, but in case of econo-

metric analyses this is not rare, the results can be relevant despite this fact, as stated by Takacs and Szucs (2017), for example. It is much more important that the model is significant at a 5% level ($p = 0.0129$), so it is statistically proved that the relationship between interest decrease and earnings quality stated in the hypothesis does exist. Another important information is that the coefficient of the explanatory variable (which, as explained earlier, shows the deviation of the particular bank's interest base index from the average base index) is positive. This means that an above-average base index (that is, a below-average interest cut) is typically matched with an above-average EQ indicator, while a below-average base index (which expresses an above-average decrease in the interest rate) leads to a below-average EQ . In other words, higher-than-average interest cuts may make an adverse effect on the EQ of banks.

CONCLUSION

The empirical results can be summarized as follows. Between 2007 and 2015, a general decreasing trend could be observed in European countries' long-term interest rates. It was analyzed how the extent of this decrease influences the earnings quality in the banking sector, using own-collected data of 128 banks from 27 European countries. It was found that the extent of interest rate decrease negatively affects the earnings quality of banks, meaning that EQ computed for the period 2007–2015 was generally higher for banks located in countries where the relative interest rate cut was lower, than that of banks from countries with higher relative interest cuts. The most likely explanation for this phenomenon is that banks' earnings are highly dependent on the level of interest, and thus a serious decrease in the interest rate may cause stronger fluctuations in their net income, which may remarkably worsen the persistence, the predictability and the volatility of their earnings, and these all make a negative effect on earnings quality.

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