
The Impact of CEO Overconfidence on the Bank's Asset Quality

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Abstract:

The prior studies defined overconfidence as a rise in one's self-confidence or self-assessment that leads to optimistic beliefs that can impact decisions. CEO overconfidence is one of the traits that has captured the interest of researchers during the past decades. Many studies have shed light on CEO overconfidence in the corporate environment, particularly in the context of financial markets, however, little is known about its impact on the banking sector. Our research seeks to fill a specific gap in the literature by examining the impact of CEO overconfidence on a bank's asset quality. We depend on an investment-based proxy to measure CEO overconfidence "CAPEX". Our analysis depends on a cross-country sample of sixty-six listed European banks from 2014Q1-2021Q4. The empirical results show that overconfident CEOs tend to underestimate borrowers' creditworthiness and overestimate future returns from loans leading to poor asset quality, high non-performing loans, and high loan loss

provisions. This study contributes to a better understanding of the risk of overconfident executives and hence, the findings should be of interest to regulators and shareholders as it shows that overconfident CEOs can reduce the quality of the bank loans.

Keywords: CEO Overconfidence, Asset quality, NPLs.

1.Introduction

The banking industry is seen as the sustaining backbone of the economy since it offers credit and makes it possible for companies and people to save, invest, and grow their spending. The economy will be paralyzed without banks and access to credit. Thus, poor asset quality and high NPLs are one of the potential risks that could threaten the banking industry. The subprime crisis produced enormous volumes of NPLs, which impacted not only US banks but the whole financial system. During the financial crises, the effective performance of the Western economies which were largely funded by credit marked a sudden drop. There was a rapid deterioration in European banks' credit portfolios and an erosion of their capital base. According to the EBA (2016), the grand financial crises (GFC) caused a significant decline in the credit portfolio of European banks, with the stock of non-performing loans climbing to 900 billion euros at the end of 2016, and the NPL ratio increasing from roughly 3% in

2005 to more than 7% in 2016¹. Although the rapid response of European regulators assisted in containing the spread of the high NPL issue the NPL ratio of EU financial institutions fell to 3% in 2019. However, the pool of non-performing loans (NPLs) remained at risky levels, reaching 600 billion euros in June 2019 (Velliscig, Floreani & Polato, 2023).

The vast majority of research on bank risk-taking to date does not take into account the influence of management traits, and biases on bank decisions. Thus, to fill this gap, this study will examine how behavioral biases particularly overconfidence among banking industry participants can explain how the banking sector fuels credit booms. The focus is on bank CEOs because, in a normal bank, the CEO is seen as the most powerful person and his/ her attitude affects the organization's overall risk preference (Ho et al., 2016). In addition, CEOs are more likely to exhibit overconfidence bias than the general public (Malmendier, Tate, & Yan, 2011). According to Malmendier and Tate (2015), the overconfidence bias is the most widespread prejudice that might possibly affect management decisions. They claimed that this was the case because the media exaggerated the size of the top management. These managers typically display extreme overconfidence in their capacity to manage their companies and

¹ Constancio, V. 2017. Resolving Europe's NPL Burden: Challenges and Benefits. <https://www.ecb.europa.eu/press/key/date/2017/html/sp170203.en.html>

make judgments as a result. Overconfident managers usually overestimate returns while underestimating risk (Heaton, 2002) which can impact several aspects, including mergers and acquisitions (Malmendier & Tate, 2008), innovation (Hirshleifer et al., 2012), company value (Ahmed & Duellman, 2013).

The current study makes a number of contributions to the body of literature. The majority of research on psychological biases particularly overconfidence is applied to the corporate environment and very few research concentrates on the banking sector. Additionally, the scant research on overconfidence in the banking industry primarily considers how it affects systemic risk and overall risk-taking decisions. Thus, this work will add to the existing literature by examining its impact on the bank's asset quality in specific. Additionally, there has been extensive literature examining overconfidence in the US and some of the developed countries, but empirical studies on the impact of overconfidence in the European banking sector are quite few, so this paper will examine this issue in Europe. Furthermore, Applying to Europe will allow researchers to gain a more in-depth overview of the CEO overconfidence phenomenon in a diverse variety of banks from other countries.

The research findings show that banks with overconfident CEO have lower asset quality. Overconfident CEOs were found to underestimate the customer's creditworthiness and to

overestimate future returns such as loan collection resulting in higher NPLs and LLPs ratios.

This work is organized as follows: The second section will discuss a theoretical background of research variables, the third section will present the literature review and the main predictions; the fourth section will provide the methodological aspects and the research model. The fifth section will show the analysis and finally the conclusion.

2. Theoretical Background

2.1. Asset Quality

The loans provided by commercial banks are listed as assets on the balance sheet and are considered the most sizable items in the bank's assets. The quality of those assets indicates the banks' credit risk (Athanasoglou, Brissimis & Delis, 2008). Asset quality is one of the crucial factors in assessing a bank's general condition and indicates its profitability (Salike and Ao, 2018). It works as an important tool for the resilience of the financial system and the enhancement of economic development.

The ongoing reduction in the bank loan quality as shown by the huge amounts of non-performing loans (NPLs), ruins the public trust in the financial sector and discourages banks from providing fresh loans. It also decreases private investment and impacts economic growth (Arrawatia; Dawar; Maitra & Dash,

2019). The subprime mortgage crisis left a sizable amount of NPLs which posed a threat to the banking system around the world, making even the most powerful economies appear vulnerable (Jabbouri, Naili & Nouina 2019). According to Beltrame et al., (2018), Higher NPLs lower the banks' profitability because banks have to bear the costs of loans that are no longer generating income. NPLs also limit managerial productivity and necessitate increased capital buffers to protect against high loan losses (Berger and DeYoung, 1997).

In the previous research, different macroeconomic factors were examined as determinants for the increasing amounts of NPLs and low asset quality such as; the level of unemployment, GDP, interest rate, and inflation, however; literature is scarce about the impact of behavioral biases (i.e. overconfidence bias) on a bank's asset quality.

The following is an explanation of the independent variable "CEO overconfidence".

2.2. CEO Overconfidence

CEOs are the most influential personnel in the banks as they can influence risk decisions with their powers and attitudes. According to the prior literature, some CEOs can have psychological biases such as overconfidence that are said to impact the bank's risk-taking and overall performance and could lead to economic swings (Malmendier and Tate 2005).

The concept of overconfidence was shown in the psychology literature in the 1960s (Adams & Adams, 1960). Later on, researchers started to incorporate results from psychology into economic models. They started to explore the influence of overconfidence in the areas of financial markets and corporate finance (Niu, 2010; Malmendier and Tate, 2015; Daniel and Hirshleifer, 2015). The word overconfidence was defined in prior research as an increase in one's self-confidence or self-assessment leading to optimistic beliefs about judgments, decisions, and estimations (Hayward and Hambrick, 1997; Hiller and Hambrick, 2005). It was sometimes used interchangeably with hubris (Hayward and Hambrick, 1997) and optimism (Bouwman, 2014). Overconfidence was illustrated in the prior research through 4 concepts namely: over-precision, over-estimation, over-placement, and over-optimism. Over-precision refers to people's excessive belief that they know the truth, they also overstate the accuracy of information and forecasts (Ben-David & Graham, 2013). Over-estimation means that decision-makers overestimate their abilities, performance, level of control, and chances of success (Moore & Healy, 2008; Bollaert & Petit, 2010). Over-placement is the perception of superiority over others (Merkle & Weber, 2011). Over-optimism is the propensity to have unrealistic expectations for the future and underestimate the likelihood that negative events will occur (Heaton, 2002; Campbell et al., 2011). These four aspects highlight various

sources of overconfidence, yet they all represent people's exaggerated beliefs of themselves.

Overconfidence has attracted research attention because this personality trait can affect the firm value and profitability. The prior literature explained overconfidence and its impact on risk-taking including through several theories as shown below.

2.3. Theories addressing how CEO overconfidence affects risk-taking choices

Overconfidence among some managers has captured the interest of researchers since this personality characteristic was claimed to reduce corporate value and impact its profitability. Several preceding theories, including the theory of Hubris, the theory of Positive illusions, and the Upper Echelons hypothesis, explain CEO overconfidence and its influence on risk-taking and asset quality.

First: the Theory of Hubris². According to Raj and Forsyth (2003), hubris is trust in one's talents. They explained that prior accomplishment is one of the hubris causes that contributes to a sense of superiority. Hubris is seen as one of the causes of organizational failure because of judgments made by managers based on their high self-confidence (Kahneman & Tversky, 1995).

² The term "hubris" has a Greek origin, it's described as a person's extreme self-confidence or pride that makes him/her avoid following rules and standards (Hayward and Hambrick, 1997).

In the prior literature, some researchers presented three operative mechanisms that encourage hubris CEOs to take excessive risks in firms. The three mechanisms are The CEO's overestimation of his ability in problem-solving (Moore and Healy, 2008), the underestimation of needed resources, and the underestimation of the firm's uncertainties in the surrounding environment (Kahneman & Lovallo, 1993). These mechanisms drive the overconfident CEOs to perceive decision situations as less risky than they are and overestimate the chances of project success, even though it is fraught with risk (Chatterjee and Hambrick, 2007). According to the behavioral theory of the company, this overestimation of success tends to raise the CEO's "aspiration level"; a criterion decision-makers use to assess organizational performance. When this aspiration level is increased, the attributed performance can get worse, and decision-makers can become more risk-takers (Cyert and March 1963).

The second theory is the theory of positive illusions. Positive illusions are explained by (Taylor, 1989, p. 228) as "systematic small distortions of reality that make things appear better than they are". Positive illusions, in other words, are a person's systematic ability to have very optimistic impressions about himself/herself. According to this theory, when compared to a normal person, those who have positive illusions believe that the positive personality qualities describe them more, while the negative ones are believed to describe them less (Brown, 1986). So, CEOs overestimate their abilities

because they have a positive self-image that increases their feelings of self-worth (Blanton, Pelham, DeHart & Carvallo, 2001). Three positive illusions were used by researchers to describe overconfidence in the psychology literature, namely: the better-than-average effect, the illusion of control, and unrealistic optimism.

The better than the average effect is described by Brown, (2011) as the propensity for certain individuals to have an overly optimistic view of themselves. They think of themselves as extraordinary employees, especially in comparison to their counterparts. In addition to being more capable and less prone to mistakes, they think they have more morals, better talents, and they are less prone to errors.

The illusion of control occurs when people believe they can affect events that are controlled entirely by chance. For example, when people predict certain consequences and those events occur, they are more likely to assign them to their actions rather than chance (Taylor and Brown 1988).

Unrealistic optimism was defined by Taylor and Brown (1988, p. 197) as "*The future will be great, especially for me*". This exaggerated optimism makes them falsely assess future events because they see themselves as always winners and their chances of winning are better than all other people (Taylor and Brown, 1988).

According to these three positive illusions, overconfident CEOs believe they are superior to others in terms of talents and managing ability. They are too hopeful about future prospects.

They also believe they are always winners, regardless of the circumstances, and as a result, overconfident CEOs overestimate future profits and pursue excessive risk-taking techniques that may ruin the firm's value.

The Upper Echelons Theory is the third theory. Hambrick and Mason initially proposed the Upper Echelons concept in 1984. It asserts that senior executives' qualities and attributes can predict organizational results, planned decisions, and degree of performance (Hambrick and Mason, 1984). It emphasizes the crucial importance of managerial behaviors, values, knowledge, and abilities in influencing strategic decisions made by the organization.

3. Related literature and main predictions

CEOs are considered the spine of the bank, they are the most influential individuals since they can influence risk decisions with their powers and attitudes. They participate in essential investment and financing decisions. However, some of them can have psychological traits such as overconfidence which is claimed to affect the bank's operations, and risk-taking, and cause economic swings (Malmendier and Tate 2005).

Overconfidence has been extensively researched in the corporate environment, particularly in the context of financial markets. Several studies provided evidence that overconfident CEOs increase the firm's risk-taking and the likelihood of corporate failure. For example, using a sample of Chinese public

companies from 2000-2017, Ali and Tauni (2021) showed that overconfident CEOs mistakenly believe they are taking actions to maximize shareholder value, when in fact they are increasing the company's future level of risk. However, they also found that institutional investors such as mutual funds and foreign institutional investors play a role in corporate governance by minimizing the impact of CEOs' over-confidence on the level of corporate risk. In the United States, Lin, Chen, Ho & Yen, (2020) show that overconfident CEOs can increase corporate risk through collateral. They illustrate that banks typically ask high-risk borrowers only to pledge collateral. Overconfident CEOs, on the other hand, may give downside protection to banks even if their firms' failure probability is low and banks are ready to lend without collateral or covenants. They do so because they perceive themselves as better than others when they negotiate a lower interest rate. Furthermore, Aabo, Hvistendahl & Kring, (2021) show through a ten-year investigation from 2007 to 2016 of 1500 S&P companies that firms with overconfident CEOs are associated with a 6 % increase in corporate risk, especially when they are paid higher incentive compensation.

Leng, Ozkan & Trzeciakiewicz, (2021) show that entities operated by overconfident CEOs in the UK are more likely to fail. This has been found in firms with more R&D spending because overconfident CEOs have better chances to take more risks in innovative environments. It was also pronounced in

businesses with inadequate accounting conservatism because overconfident CEOs delay their response to bad news. Their analysis also shows that both internal and external corporate governance mechanisms can reduce the effect of overconfidence on bankruptcy risk.

In addition, several researchers prove that overconfident managers are inclined to make more investments and choose risky projects because they overestimate both the future cash flows from these investment projects and their ability to achieve promising results (Goel and Thakor, 2008; Campbell et al., 2011). Malmendier and Tate (2005) show that after observing negative feedback about certain projects, rational CEOs would lower their expectations about these projects, however, overconfident CEOs attempt to ignore the negative feedback and continue to perceive these projects as value-creating. Thus, overconfident CEOs can proceed with negative NPV projects for extended periods leading to bad news hoarding until poor performance gets accumulated causing a stock price crash (Kim et al., 2015; Liang et al., 2020).

Concerning financing decisions, the pecking order theory states that corporations prioritize their sources of financing based on their costs (Myers, 1984). Corporations prefer internal financing first, then debt, and, as a last resort, obtaining new equity (Myers, 1984). However, even though they have access to

public securities markets, overconfident managers invest in more debt than equities (Malmendier et al., 2011; Huang, Tan & Faff, 2016; He, Chen & Yue, 2019). They overestimate their ability to repay short-term debt at a reduced rate in the future if favorable news emerges (Huang et al., 2016). However, this often leads to a huge reduction in the shareholder's wealth and, large losses that can exceed millions of dollars (Malmendier et al., 2011).

In the banking sector, limited studies show how overconfident CEOs impacted risk-taking in banks. Liu, Le, & Thompson, (2020) empirically show that banks with overconfident CEOs have higher systemic risk. They make more investments in mortgage-backed assets and engage in more debt, particularly during the financial crisis of 2007–2008. Their findings highlighted the importance of giving more focus to psychological traits rather than agency conflicts when explaining the bank's increased risk-taking activities. Safi et al., (2021) examine how financial institutions participate in China's systemic risk. They show that banks particularly managed by overconfident CEOs have more contribution to China's systemic risk than normal banks. They argue that their results do not necessarily mean avoiding hiring overconfident managers but establishing policies and standards that can restrict their biases from impacting the whole economy. Niu, (2010) constructed a data set of 108 publicly traded U.S. banks from 1994 to 2002 and finds that banks operated by overconfident CEOs are 7% riskier

than regular banks. Besides, Mahdi and Abbes (2018) used a sample of 96 conventional and 37 Islamic banks from 2005 to 2016. They examine the impact of overconfidence on risk-taking and show that overconfident CEOs lead to excessive risk-taking, especially over the long term as a result of their underestimation of risk and their optimistic belief about future returns.

Using a data set of 383 micro-finance institutions (MFIs), Fersi and Boujelbène, (2021) argue that overconfident loan officers significantly increase the credit risk-taking in MFIs, reduce the asset quality and increase the bank's solvency risk. This is attributable to several factors: first, overconfident loan officers frequently underestimate the customer's creditworthiness which causes them to set lower interest rates and loan loss provisions. Second, overconfident loan officers may overestimate future returns from borrowers which results in aggressive lending decisions. Ho et al., (2019) examine the impact of CEO overconfidence during the financial crises on NPLs and bank performance in a sample of US publicly listed banks between 1994–2009. They find that before the crises, banks managed by overconfident CEOs were having higher leverage than other regular banks. During the crisis years, they had higher NPLs because they relaxed the lending standards assuming higher future returns. Bacha and Azouzi, (2019) examine the impact of emotional and gender bias of the bank CEOs on the credit decision. They find that overconfident male CEOs were more risk-takers and less conservative than their overconfident female counterparts.

As shown from the prior literature, CEO overconfidence can impact the bank's decisions and performance. It can also impact credit risk because they underestimate the customer's creditworthiness which makes them set lower interest rates and loan loss provisions. They also overestimate future returns from borrowers which results in aggressive lending decisions.

Accordingly, the following hypothesis can be reached

H: There is a negative association between CEO overconfidence and the Bank's asset quality

4. Data and Methodology

This section shows the data collection sources and provides details about the sample composition. Furthermore, it focuses on discussing the measurements of Asset quality, CEO overconfidence, Board gender Diversity, and other control variables.

4.1. Sample and Data.

The empirical analysis is based on unbalanced panel data of 66 listed banks from 20 European countries. It was selected according to the availability of quarter information on the commercial bank's asset quality and overconfidence measures. The initial sample consisted of 176 banks from 25 countries obtained from the Thomson Reuters Eikon database. The sample was reduced to include commercial listed banks only to

concentrate on the type of banks that are most vulnerable to credit risk. To collect a sufficient number of observations, the sample period extends from Q1-2014 to O4-2021. Data is trimmed at the 5 and 95 percentiles to reduce the influence of outliers. All data is in Euros. The sample countries and bank names are displayed in Appendix A.

4.2. Methodology

The following OLS regression model is used to examine our hypothesis

$$AQ_{i,t} = \alpha + \beta_1 CAPEX_{i,t} + \beta_2 BANK-SIZE_{i,t} + \beta_3 PROF_{i,t} + \beta_4 AGE_{i,t} + \beta_5 BOARD-SIZE_{i,t} + \varepsilon_{i,t}$$

Where $AQ_{i,t}$ = is a dependent variable that defines Asset Quality for bank i in quarter t ,. $CAPEX_{i,t}$ = independent variable representing the capital expenditure used to measure CEO overconfidence for bank i in quarter t . $BANK-SIZE_{i,t}$ = the bank size for bank i in quarter t . $PROF_{i,t}$ = bank's profitability. $AGE_{i,t}$ = bank age for bank i in quarter t . $Board SIZE_{i,t}$ = Board size for bank i in quarter t .

Below are the measures of each of the research variables

4.2.1. Asset Quality: The first measure of asset quality used in this paper is the ratio of non-performing loans (NPLs) to gross loans (Kadioglu and Telceken, 2017;

Balakrishnan and Ertan, 2018) where a higher ratio shows a lower bank's asset quality. NPLs are defined as loans where borrowers have defaulted, or are no longer able to repay the loan with its interest for a specific period (Alton and Hazen, 2001). Higher non-performing loans impact the bank's profitability and lead to bank failures because banks have to bear the costs of loans that are no longer generating income (Beltrame, Previtali & Scip, 2018). This measure will be referred to as AQ1

Another measure of asset quality is the loan loss provision (LLP) ratio (LLP/GL%). When borrowers fail to repay all or part of their loans, banks keep appropriate provisions for losses on defaulted loans. So, the ratio of LLP to GL is an indicator of loan portfolio problems. Higher provisioning shows that a greater portion of risk has already been taken into account in the profit and loss statement, leading to lower asset quality (Velliscig, Floreani, Polat, 2023). This measure will be referred to as AQ2

4.2.2. CEO Overconfidence: Overconfidence was defined in prior research as an increase in one's self-assessment leading to optimistic beliefs about judgments, decisions, and estimations (Hayward and Hambrick, 1997). The prior literature showed how CEO overconfidence affects the investment choices made by firms (Malmendier and Tate,

2005, 2008; Ben-David, Graham, and Harvey, 2010). So, depending on the CEO's recent investment choices, we employ an investment-based overconfidence proxy (CAPEX) which is a dichotomous variable set equal to one if the capital expenditures divided by total assets in a given quarter is greater than the median level in that quarter/, otherwise zero. This proxy is used by Ahmed and dulleman, (2013) and it is based on research from Ben-David, Graham, and Harvey (2010) that shows businesses with overconfident CEOs spend more on capital projects, as well as research from Malmendier and Tate (2005) that shows overconfident managers overinvest in capital projects.

4.2.3. Control Variables

We use the following explanatory variables in the analysis.

4.2.3.1. Bank size (BANK SIZE_{it}):

According to the prior literature; larger banks have greater access to capital markets, impose higher interest rates on the provided loans and invest in risky assets (Ariss, 2010). Although large banks are expected to have better risk management strategies and effective monitoring of the borrowers and default rates, however; some researchers found that this can be difficult since large banks take large risks. However; another strand of literature argues that the larger banks are less prone to risk, as they have better diversification (Kabir and Worthington, 2017), and have larger buffers that make them cover future uncertainties

such as liquidity problems or obligations, also they have better risk management systems and better asset quality and a lower amount of (NPL) (Kabir and Worthington, 2017). Thereby, the bank size impact on asset quality and non-performing loans is still ambiguous. Bank size is measured as the natural logarithm of the total assets of bank i at year t .

4.2.3.2. Bank's Profitability ($Prof_{it}$)

There are two opposing views in the literature concerning the impact of the bank's profitability on the bank's risk-taking and asset quality. One view finds that banks with higher profits are expected to grant more risky loans, thus having higher non-performing loans and affecting the bank's asset quality (Delis and Kouretas, 2011; Sarkar and Sensarma, 2016). The other view finds that banks with higher profits are more conservative when taking risk, they have higher cushions to absorb losses and they can get through financial crises successfully compared to lower profitability banks (Holod, Kitsul & Torna, 2020; Mohsni and Otchere, 2018). Bank's profitability is measured through the ROA ratio (which is the ratio of Net-income after taxes to total assets of bank i at year t) since it shows how the management can generate profits from its assets effectively (Khan, Scheule & Wu, 2017).

4.2.3.3. Bank's Age ($AGE_{i,t}$)

It is acknowledged that the older the bank age, the more experienced officers they have. They select better investment projects and engage in less risk, thus higher asset quality. Bank's

age is measured as the number of years since incorporation (Berger et al., 2005).

4.2.3.4. Board Size (BOARD-SIZE_{it})

According to Andres and Vallelado (2008), a large board should be preferred over a small one, because it allows for more efficient monitoring and advisory tasks. Larger boards have individuals with various experiences that assist management in making better decisions for the firm, including credit risk (Nakano and Nguyen, 2012; Switzer and Wang, 2013). However, this may be outweighed by the added cost of poor communication and decision-making associated with larger groups (Yermack, 1996). Furthermore, Abou-El-Sood (2017) showed that smaller-sized boards are associated with less risky investments. Thus the impact of board size on asset quality is still ambiguous. Board size is measured by the total number of directors on the bank board at the end of each fiscal year.

The variables measures are presented in Appendix B

5. Results

5.1. Descriptive statistics

Table 1 presents the descriptive statistics of the dependent variable Asset quality measured by NPL/GL and LLP/GL, the independent variable measured by

CAPEX, and finally control variables. This table shows the summary statistics for the whole sample, as it presents the mean, median, standard deviation, minimum and maximum values, p99, skewness, and Kurtosis of each variable used in the analysis. The NPL/GL mean (median) is 0.091 (.046382), and its min and (max) are 0.005(0.435). LLP/GL mean (median) is .00158 (.000920), and its min and (max) are 0 (0.007). The CAPEX mean (median) is 0.499 (0) and the BGD mean (median) is 53.291 (56.0049), its min and (max) are 0 and 97.619. All variables are normally distributed.

Table 1: Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max	Median	p99	Skew.	Kurt.
AQ1	2007	0.091	0.115	0.005	0.435	.046382	0.435	1.94	5.705
AQ2	2034	.00158	.001869	0	0.007	.000920	0.007	1.498	4.412
CAPEX	1,880	0.499	0.5001	0	1	0	1	0.004	1
Prof	2048	0.0027	0.002	0.000	0.006	.001484	0.006	1.042	3.964
Bank SIZE	2048	25.039	1.948	19.633	28.604	24.9787	28.453	-0.255	2.405
Board SIZ	1952	2.488	0.358	1.386	4.143	2.48490	3.091	-0.393	3.842
AGE	2073	5.044	0.976	2.197	6.695	4.79164	6.669	-0.069	1.989

5.2. Pairwise correlations

Table 2: Pairwise correlations

Table 2 depicts the correlation among all variables embedded in the research model. Moreover, it shows the collinearity between variables. NPL/GL & LLP/ GL are positively correlated with CAPEX at a significant level of 0.01 which implies that higher levels of overconfidence measured by CAPEX are significantly correlated with higher levels of AQ1 measured by NPL/GL and higher levels of AQ2 measured as LLP/ GL.

Regarding the multicollinearity, coefficients obtained from all explanatory variables in Pearson's correlation matrix are all below 0.8 thus there is no multicollinearity between predictors.

Table 2: Pairwise correlations

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) AQ1	1.000							
(2) AQ2	0.423 (0.000)	1.000						
(3) CAPEX	0.150 (0.000)	0.258 (0.000)	1.000					
(4) Prof	-0.099 (0.000)	-0.026 (0.234)	0.139 (0.000)	1.000				
(5) BANK-SIZE	-0.156 (0.000)	-0.072 (0.001)	-0.323 (0.000)	-0.378 (0.000)	1.000			
(6) BOARD-SIZE	-0.138 (0.000)	-0.076 (0.001)	0.155 (0.000)	-0.224 (0.000)	0.384 (0.000)	1.000		
(7) AGE	0.130 (0.000)	0.056 (0.011)	0.048 (0.035)	-0.283 (0.000)	0.204 (0.000)	0.193 (0.000)	1.000	
(8) COVID	-0.185 (0.000)	-0.027 (0.213)	0.012 (0.605)	-0.073 (0.001)	0.052 (0.018)	-0.006 (0.793)	0.043 (0.050)	1.000

5.3. Regression Results

Table (3) OLS Regression

Variables	Asset quality					
	AQ1 (A)			AQ2 (B)		
	Pred	Coeff	P-value	Pred.	Coeff	P-value
CAPEX	+	.02012***	0.000	+	.000682***	0.000
PROF	-	-7.018***	0.000	-	-.02489	0.326
Board Size	-	-.0332***	0.000	-	-.00088***	0.000
Bank Size	-	-.0078***	0.000	-	-.0006**	0.047
Age	-	-.0058***	0.004	-	-.0009***	0.008
COVID	+	.00946*	0.100	+	.00065***	0.000
Bank Fixed Effect	Yes			Yes		
Country Fixed Effect	Yes			Yes		
Year Fixed Effect	Yes			Yes		
P-value	0.0000			0.0000		
R-Square	0.6297			0.4584		
Adjusted R-squared	0.6243			0.4506		
Observations	1,816			1,838		
Number of Banks	66			66		

*** $p < .01$, ** $p < .05$, * $p < .1$

Table (3) shows that an OLS panel estimator with bank cross-section fixed effects is used. This test works well when evaluating a sample with a large number of cross-sectional observations over a short period, which matches the sample structure employed in this article. The regression used the two proxies of Asset quality: AQ1

(NPL/ GL), AQ2 (LLP/GL), and the OVC measured by CAPEX. Model (A) where AQ1 is used, shows that the coefficient of CAPEX is positive and statistically significant at a p-value less than 1% suggesting a negative association between OVC and asset quality. Model (B), where AQ2 is used shows also a positive coefficient and is statistically significant at the 1% level. Consequently, these results confirm H1. This shows that banks with higher overconfidence have lower asset quality. These results support prior literature findings that overconfident CEOs undertake more risk than normal CEOs (Niu, 2010; Liu, Le, & Thompson, 2020). They underestimate the customer's creditworthiness and are more optimistic about future returns such as returns from loan collection. Accordingly, they set lower interest rates, relax the lending standards and exhibit higher loan growth rates which result in higher NPLs and higher provisions and lower credit quality (Ho et al., 2019, Mahdi and Abbes 2018; Bacha and Azouzi, 2019; Fersi and Boujelbène, 2021). As for the control variables, all variables (except for profitability in the second model) are with significant coefficient estimates and they all possess the expected sign in all model variations.

6. Conclusion

The main objective of this research work is to study the bank's asset quality through overconfidence behavioral bias. This objective is achieved through the empirical verification of the hypothesis stating that CEO overconfidence has a negative significant influence on the bank's asset quality. The analysis

was conducted using OLS regressions for a sample of 66 listed commercial banks from 20 European countries during the period of Q12014-Q42021.

The empirical analysis confirmed the first hypothesis by revealing the significant negative influence of CEO overconfidence on the bank's asset quality using its two proxies (NPL/GL & LLP/GL). This finding suggests that overconfident CEOs' risk-taking attitudes may be influenced by an underestimation of risk, an overestimation of future returns, and an overestimation of risk management capabilities. The impact of overconfidence on asset quality can be explained in 2 ways. First, overconfident CEOs tend to underestimate borrowers' creditworthiness, which leads them to impose lower interest/profit margins. Second, overconfident CEOs may overestimate future returns from loan collection and their ability to withstand future downturns, which results in following aggressive loan strategies and highly non-performing loans.

Overall, the study highlights the importance of monitoring CEO behavior and its impact on bank asset quality. Banks should recognize the potential hazards posed by CEO overconfidence and take appropriate measures like enhancing their credit risk management strategies. This may involve stricter lending standards, improving credit assessment processes, and monitoring loan portfolios more closely to identify potential risks and take timely corrective actions. Furthermore, banks should

carefully evaluate and select CEOs. They should identify and select executives possessing the necessary skills and risk management capabilities. Moreover, selection should not only depend on technical expertise but also on leadership qualities and behavioral traits that promote responsible decision-making.

Future research in this area can focus on exploring the underlying causes of overconfidence and how it can be minimized. Additionally, researchers can examine the impact of different management structures as independent and diverse boards on this association. There are few limitations to the study; the generalizability of the results is subject to certain limitations. It only depends on 20 from 50 European countries due to the unavailability of data. Therefore, the study cannot generalize the results to all the European banking systems. Furthermore, the study relies on an investment-based proxy only "CAPEX" to measure CEO overconfidence and does not take into account other proxies such as options or net stock purchases also due to the unavailability of data.

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Appendix A:

Displays the sample countries and bank names

Country	Bank Name	Number of Banks
Austria	Erste Group Bank AG	5
	Raiffeisen Bank International AG	
	BAWAG Group AG	
	BKS Bank AG	
	Bank fuer Tirol und Vorarlberg AG	
Belgium	Kbc Groep NV	1
Cyprus	Hellenic Bank PCL	2
	TCS Group Holding PLC	
Czech Republic	Komerčni Banka as	2
	Moneta Money Bank as	
Denmark	Danske Bank A/S	3
	Jyske Bank A/S	
	Sydbank A/S	
Finland	Alandsbanken Abp	2
	Nordea Bank Abp	
France	Societe Generale SA	2
	Credit Agricole SA	
Germany	Commerzbank AG	1
Greece	Piraeus Financial Holdings SA	4
	Alpha Services and Holdings SA	
	National Bank of Greece SA	
	Eurobank Ergasias Services and Holdings SA	
Hungary	OTP Bank Nyrt	1
Italy	Intesa Sanpaolo SpA	6

	UniCredit SpA	
	Credito Emiliano SpA	
	Bper Banca SpA	
	Mediobanca Banca di Credito Finanziario SpA	
	Banca Monte dei Paschi di Siena SpA	
Netherlands	ING Groep NV	
	ABN Amro Bank NV	2
Norway	Sparebank 1 Sorost-Norge	
	Sparebanken Sor	
	DNB Bank ASA	
	Sparebank 1 Ringerike Hadeland	
	Sparebank 1 SMN	
	Sparebank 1 Nord-Norge	
	Sogn Sparebank	
	Sparebank 1 Helgeland	8
Poland	Bank Millennium SA	
	ING Bank Slaski SA	
	mBank SA	
	Santander Bank Polska SA	
	Bank Handlowy w Warszawie SA	
	Bank Polska Kasa Opieki SA	
	Getin Holding SA	
	Powszechna Kasa Oszczednosci Bank Polski SA	
	BNP Paribas Bank Polska SA	
	Alior Bank SA	10
Portugal	Banco Comercial Portugues SA	1
Russia	Sberbank Rossii PAO	1
Spain	Banco Bilbao Vizcaya Argentaria SA	
	Bankinter SA	5

	Banco Santander SA	
	Caixabank SA	
	Unicaja Banco SA	
Sweden	Skandinaviska Enskilda Banken AB	3
	Svenska Handelsbanken AB	
	Swedbank AB	
Switzerland	Valiant Holding AG	1
United Kingdom	Barclays PLC	5
	Natwest Group PLC	
	Standard Chartered PLC	
	HSBC Holdings PLC	
	Bank of Georgia Group PLC	
20 Country		66 Banks

Appendix B:

Type of Variable	Name	Measure
Dependent Variables	Asset Quality (AQ)	<i>Measured by two proxies</i> 1) <i>NPL/GI</i> . The ratio of non-performing loans to gross loans for bank i at quarter t. (AQ1) 2) <i>LLP/ GL</i> The Ratio of Loan loss provisions to gross loans bank i at quarter t. (AQ2)
Independent Variables	CEO overconfidence (OVC)	1) <i>Measured by (CAPEX)</i> which is a dichotomous variable set equal to one if the

		capital expenditures divided by total assets in a given quarter is greater than the median level in that quarter/, otherwise zero banks i at quarter t .
Control Variables	<ol style="list-style-type: none"> 1. Bank Size (BANK-SIZE it) 2. Bank's Age (Age): 3. Bank's Profitability (PROFit) 4. Corona Virus (COVID) 5. Board size (BOARD-SIZEit) 	<ol style="list-style-type: none"> 1) Measured by the natural logarithm of total assets of bank i at quarter t. 2) Measured by the number of years since it was founded. 3) Measured by the ratio of Net-income after taxes to total assets of bank i at quarter t. "ROA". 4) Measured as a dummy variable takes 0 before the pandemic and 1 afterward 5) Measured by: The total number of directors on the bank board at the end of each fiscal year.