The relationship between profitability and stock prices for the banking sector: US versus EU

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Abstract

This paper uses a panel dataset of 18 large banks from the US and the EU to examine the relationship between profitability and stock prices in the banking sector for the period 1995-2024. In the pre-2008 period, profits and prices are positively aligned, both in the US and in the EU. However, in the post-2008 period, the eventual increases in banks' profitability have translated into banks' stock prices increases only in the US. By contrast, in the EU, banks' stock prices have stagnated at crisis troughs, indicating that the profitability increases have not been reflected in stronger investor demand for EU bank stocks. This finding creates concerns about the sustainability of EU bank profits and the stability of the global financial system as a whole. It is possible that a higher level of non-performing loans still weighs more heavily on the balance sheets of banks and the minds of investors in the EU. It is also possible that geopolitical events and continued financial scandals have resulted in a permanently lower confidence in the EU banking system. It remains to be seen whether a ceasefire in the war of Russia against Ukraine or a global tariff war initiated by the US will have an effect in positively re-aligning the profits and stock prices of EU banks.

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I would like to express my sincere gratitude to my thesis supervisor, Professor Vasia Panousi, for her invaluable guidance, expert advice and steadfast support throughout the course of this research. I hereby certify that the work carried out and presented in this submitted thesis is exclusively my own. Any information and material included that has been drawn from other sources has been properly cited in this thesis. Furthermore, I am aware that if it is established that the above declaration is not true, my thesis will be annulled.

1 Introduction

The banking sector plays a critical role for the growth and stability of the global economy. Before the financial crisis of 2008, US and EU banks had price-to-book (P/B) ratios around 2, indicating strong investor trust in future bank profitability and assets.[1] However, after 2008, the P/B ratios of EU banks declined below 1 and have stayed there until recently, whereas those of US banks have returned to pre-crisis levels. This development raises concerns about the stability of banks' stock prices and the future profitability of the banking sector.

This paper is the first to systematically investigate the differing behavior of banks' stock prices in the US versus the EU, with particular emphasis in the changes that emerge after the 2008 financial crisis. Specifically, the paper examines the relationship between profitability and stock prices in a panel dataset of 18 large US and EU banks over the period 1995-2024, using bank-level information from Datastream and annual reports (10-K forms), as well as stock price information from financial databases. The main finding is that the recovery in bank profitability after the crisis has translated into corresponding stock price increases for US banks, but not for EU banks. Because this weakening of the alignment between profits and stock prices for EU banks after 2008, creates concerns for investors' trust in EU banks, and thereby for the stability of the financial system as a whole, this paper also delves into potential reasons for this result.

The main findings of this study are as follows. First, in the pre-2008 period, there is a strong positive relationship between operating profits and stock prices of banks, both in the US and in the EU. The levels of profits and of stock prices are higher in the US than in the EU, but the two series comove strongly positively in both regions.

Second, stock prices and operating profits declined with the financial crisis, first in the US in 2008 and then in the EU around 2010. The US declines were somewhat larger than the corresponding ones in the EU.

Third, in the US after 2010, bank profits and prices have recovered and now stand at levels higher than those before the crisis. Although the positive correlation between profits and prices for US banks is a bit weaker after 2008 than before, the two series are still aligned and overall move together. In other words, the recovery in US bank profitability after the crisis has translated in recovery of US bank stock prices, indicating trust in the current and future conditions of the US banking sector.

[1] The P/B ratio shows how much investors are willing to pay for each dollar of a bank's assets.

Fourth, however, the situation is different for EU banks after 2010. Profits remained at low levels until 2020, but have since recovered, and now stand at about 75% of their pre-crisis peak. Despite this eventual recovery in profitability though, stock prices of EU banks have remained stagnant at crisis trough levels or even lower. In other words, the alignment between profits and stock prices has all but disappeared for EU banks. This means that, despite EU bank profitability, investors remain hesitant or pessimistic about the future growth prospects of the sector, leading to concerns about the sustainability of profits and the growth opportunities for EU banks.

Finally, the paper discusses potential reasons for the differences across US and EU, especially in the post-2008 period. It would appear that higher levels of non-performing loans, a more burdensome tax system, and a lower risk appetite, are potentially holding back investors from investing in EU banks, thereby depressing banks' stock prices, notwithstanding the increases in bank profitability.

The remainder of this paper is organized as follows. Section 2 reviews the related literature. Section 3 describes the data. Section 4 presents the econometric analysis and the results. The possible reasons for the stagnation of EU banks' stock prices are assessed in Section 5. Section 6 concludes.

2 Related literature

The relationship between bank profitability and stock price performance has been a long-standing topic of interest in financial economics. Bayrakdaroglu, Mirgen and Kuyu (2017) use profitability ratios, such as return on assets, to asses this relationship for Turkish banks. Wuryani, Handayani and Mariana (2022) investigate how financial performance and bank size influence the stock prices of Indonesian banks, using variables such as the return on assets, loan-to-deposit ratios, and capital adequacy ratios. Liadaki and Gaganis (2009) explored whether changes in profit- and cost-efficiency are reflected in stock returns of 171 listed banks across 15 EU countries during the period 2003-2006. Ioannidis, Molyneux, and Pasiouras (2008) analyze banking sectors in 19 Asian and Latin American countries, examining how changes in profit- and cost-efficiency are associated with stock returns. The present paper focuses on large banks for both sides of the Atlantic, and uses a larger time period, which allows for investigation of the effects of the 2008 financial crisis.

Most of these studies focus on periods before the financial crisis of 2008, and they find a positive relationship between measures of banks' profitability and banks' stock prices. An expection is the work of Wuryani, Handayani and Mariana (2022), which finds that

profitability does not affect stock prices for Indonesian banks in the post-2008 period. The present thesis demonstrates a positive relationship between profits and stock prices of US and EU banks before the 2008 financial crisis. However, in the post-crisis period, this relationship weakens, particularly for EU banks, a result of similar flavor to that in the Indonesian study.

A study from the European Central Bank (Financial Stability Review, 2006) examines the key factors underlying EU banks' stock returns from 1991 to 2004. The results indicate that stock returns of small banks are mainly influenced by own idiosyncratic news or shocks, whereas those of large banks are mainly influenced by market-wide news or shocks. The present paper examines the response of stock prices for large western banks to the financial crisis of 2008, which represented, at least in part, an unanticipated market-wide shock for these banks.

A few studies have investigated the comparison between US and EU banks, along a number of dimensions. Decressin, Fonteyne and Faruqee (2007) find that, historically, EU banks exhibit lower profitability and weaker capitalization than US banks. Their proposed explanations include lower drive to innovate due to lower competition, as well as stricter regulations on securitization activities. Valverde, Cobau and Fernández (2019) compare the profitability and resilience of US and EU banks from 2009 to 2019, and find that US banks have consistently outperformed European banks in profitability and capitalization. Their proposed explanation relies on the more efficient monetary policy response to the crisis in the US, including stricter and more transparent stress tests, compares to the EU. Schildbach (2013) also explores the profitability gap of US and EU banks during the extended period around the 2008 financial crisis, and finds that US banks recovered faster in terms of profitability and capitalization, compared to EU banks, which faced structural structural and regulatory challenges in an environment without capital-market- and fiscal-policy homogeneity. The present paper also indicates that US banks experienced a swifter and stronger recovery than EU banks after the 2008 financial crisis. However, here, the measure for the comparison is the alignment of the profit-stock price relationship, and not just the level or profits, as in the aforementioned studies. Furthermore, this study also examines changes how the US-EU comparison has changed over time.

3 Data description

This section describes the data and presents descriptive statistics and a graphical analysis.

3.1 Panel dataset

The panel dataset used in the analysis includes bank-level information from 18 large banks, 9 from the US and 9 for the EU, for the period 1995-2024. The panel is balanced and consists of 540 observations in total. The data on operating profits and assets are from Datastream, enriched with hand-collected information from the annual reports (10-K forms) of various banks. The data on stock prices were collected from Yahoo Finance.

3.2 Banks

The sample includes 18 large banks, nine from the US and nine from the EU region. It is noted that the region refers to the region where the bank first originated, while bank operations are global. The selection of banks was based on their total assets, representing the nine largest banks within each region. The US banks are JP Morgan Chase, Bank of America, Citigroup, Wells Fargo, Morgan Stanley, PNC Financial Services, Trust Financial, Capital One, and American Express. The EU banks are BNP Paribas, Banco Santander, Société Générale, Deutsche Bank, Intesa Sanpaolo, UniCredit, Banco Bilbao Vizcaya Argentaria, CommerzBank, and Danske Bank.

3.3 Variable adjustments

The variables used in the analysis were adjusted for prices and exchange rates as follows. First, all stock prices and operating profits were converted into US dollars. The monthly Euro/USD exchange rates were obtained from the European Central Bank Data Portal, while the monthly DKK/USD exchange rates were sourced from Yahoo Finance and Investopedia. Because exchange rate data were not available for the period 1995-1998, an imputation was conducted to address missing values. For example, the 1998 exchange rate was imputed using the average monthly rate from 1999 to 2002, and this method was applied to earlier years. Second, the data were transformed into real US dollars, using 2015 as the base year. This transformation used the yearly US GDP Deflator provided by the database of the Federal Reserve bank of St. Louis (FRED). For the years 2023 and 2024, an imputation was carried out to estimate missing values. Third, operating profits were rescaled by 10,000. Fourth, total assets were adjusted using the same method described above for the other variables, and were rescaled by 1,000.

3.4 Comparison of Datastream and annual reports

For certain years and banks, operating profits were reported differently in Datastream versus the annual report. In those cases, the variable imported in the database was the

one collected from the annual reports. The discrepancies corrected were as follows.

First, during the years 2004 to 2021, the operating profits listed in the annual reports of Société Générale were generally lower than those reported in Datastream. The discrepancy likely arises because Société Générale's reports apply the International Financial Reporting Standards' (IFRS) definition of operating income, including loan loss provisions, litigation, restructuring, etc., which tends to lower operating profit. By contrast, Datastream presents a standardized Earnings Before Interest and Tax (EBIT) metric, excluding provisions and exceptional charges, leading to consistently higher values.

Second, for Morgan Stanley, the operating profits presented in the annual reports were lower than in Datastream between 2006 and 2010. These discrepancies are likely due to differences in accounting presentations. Specifically, in 2006 the adoption of Statement of Financial Accounting Standards (SFAS) Number 157 significantly changed how banks recognized revenue from OTC derivative financial instruments. As a result, Datastream's figures likely reflected earlier recognition of unrealized gains, leading to inflated profits, compared to the more conservative approach in the annual reports. Furthermore, in 2008 there was a change in the fiscal year-end of Morgan Stanley. Before 2008, the fiscal year ended in November, but starting in 2008, it shifted to December. This resulted in two different operating profits for that year. The mean of those two values is the one used in the dataset.

3.5 Descriptive statistics

This section presents descriptive statistics for the key variables used in the analysis. First, Table 1 shows the descriptive statistics of stock prices (SP) for Europe (EU) and the United States (US). The average bank stock price in the US is notably higher than in the EU. Furthermore, the standard deviation (SD) and the variance indicate greater volatility in the stock prices of US banks, compared to EU banks. Skewness is higher for the US, meaning that the US stock-price distribution has a longer right tail or higher proportion of high positive values. Finally, the higher kurtosis in US stock prices suggests a distribution with heavier tails, implying more frequent extreme values than in the EU.

Second, Table 2 illustrates the descriptive statistics of operating profits (OP) for both regions (EU, US). The average operating profit is higher in the US relative to the EU. In addition, the standard deviation and variance reveal that operating profits are more volatile in the US than in the EU. The EU shows higher skewness and kurtosis, indicating a right-skewed distribution with more extreme values.

Table 3 provides the correlation coefficients between stock prices (SP) and operating profits (OP) across different dimensions of the data. The overall correlation between operating profits and stock prices for the full dataset is 0.3. The correlation between cross-sectional averages of stock prices and operating profits for each year is 0.65 for US banks and 0.22 for EU banks. Correlations were also computed separately for the pre- and post-2008 periods, so as to assess the impact of the financial crisis on the relationship between stock prices and operating profits. As shown in the table, for both the EU and the US, the correlation between stock prices and operating profits is higher in the pre-2008 period, compared to the post-2008 period. Specifically, in the EU, the correlation declines from 0.9 before 2008 to 0.6 after 2008, while in the US, it decreases from 0.8 to 0.7, respectively. This suggests that the financial crisis weakened the relationship between stock prices and operating profits, especially in the EU.

3.6 Graphical analysis

This section presents graphically the relationship between operating profits and stock prices. Figure 1 compares the trends of average stock prices and average operating profits over time for US. The dashed line is operating profits and is measured on the right vertical axis. The solid line is stock prices and is measured on the left vertical axis. Overall, there is a strong alignment or comovement between the two lines. Specifically, both exhibit a broadly similar upward trajectory over the long term. A sharp decline is observed around the 2008 financial crisis for both stock prices and operating profits, with stock prices reaching near-zero levels. Both lines recover after their 2008 trough, and, by the end of the observed period, both have returned to, and even surpassed, their pre-2008 levels.

Next, Figure 2 presents the corresponding comparison for the EU. Again, the dashed line is operating profits and the solid line is stock prices. Before 2008, stock prices and operating profits display positive comovements. However, after 2010, the correlation of the two variables fades. Specifically, operating profits collapsed around 2010, when the financial crisis is transmitted from the US to the EU, remained low until about 2020, but have recovered to almost pre-crisis levels since. By contrast, stock prices, which reached a minimum around 2010, have remained at almost that level since and have not recovered. This is in contrast to EU operating profits and in contrast to the post-2008 situation in the US. In other words, operating profits and stock prices are not aligned or do not move together in the post-2008 period.

Figure 3 combines the previously discussed US and EU figures into a single Figure, allowing for a direct comparison across regions and time.

4 Econometric analysis

This section presents a series of econometric specifications describing the relationship between stock prices and operating profits. The specifications include bank fixed effects, to account for unobserved heterogeneity across banks that remains constant over time.[2] Furthermore, the regressions presented examine the contemporaneous relationship between dependent and explanatory variables.

4.1 Baseline specification

The main regression is as follows:

$$SP_{it} = \beta_i + \beta_1 \cdot OP_{it} + \beta_2 \cdot OP_{it} * REGION_i + \epsilon_{it} \tag{1}$$

where β_i are bank fixed effects, SP_{it} is the stock price, OP_{it} is the operating profit, and $REGION_i$ is a dummy variable that takes the value of 1 for US banks and 0 for EU banks. The results of equation (1) are presented in Table 4. Including operating profits and their interaction with the region dummy allows the model to estimate the overall effect of profits on stock prices and to assess whether this relationship differs between US and EU banks. The coefficient on operating profits is 0.12, positive and statistically significant at the 10% level. This indicates a positive relationship between stock prices and operating profits in the sample. Furthermore, the coefficient for the interaction term is 0.18, positive and statistically significant at the 5% level. This suggest that the relationship of operating profits and stock prices is stronger for US banks, compared to EU banks. These findings are consistent with the results in Figure 3, which shows that the relationship between profits and prices is strongly positive in the US in the post-2008 period, whereas it is much weaker in the EU.

4.2 Role of 2008

To delve further into the impact of the 2008 financial crisis, a time dummy is added to the main regression:

$$SP_{it} = \beta_i + \beta_1 \cdot OP_{it} + \beta_2 \cdot OP_{it} * REGION_i + \beta_3 \cdot POST2008_t + \epsilon_{it} \tag{2}$$

where $REGION_i$ is a dummy variable that takes the value of 1 for US banks and 0 for EU banks, and $POST2008_t$ is a time dummy equal to 1 for years after 2008, and 0 otherwise. The results of equation (2) are presented in Table 5. The variables used in this model explain the change in the stock price at the rate of 17.6%. The p-value associated with

[2] As noted by Baum-Snow and Ferreira (2015), the inclusion of fixed effects in a panel regression removes all characteristics that are constant over time from the error term. This helps isolate the effect of time-varying explanatory variables.

the F-test confirms that the model is statistically significant overall. The coefficient of operating profits on stock prices is 0.16, again positive and statistically significant at the 5% level. The coefficient of the interaction between operating profits and region is 0.15, again positive and significant at the 10% level, indicating that the profit-price relationship is stronger for US banks. The coefficient on the time dummy is negative and statistically significant at the 1% level. In particular, after 2008, stock prices decreased on average by approximately 24 units, holding all other variables constant. This suggests that the post-2008 period is associated with a substantial decline in stock prices, reflecting a lasting negative impact of the financial crisis on the banking sector.

4.3 Role of bank assets

To control for bank size, the logarithm of banks' total assets is added to the previous regression:

$$SP_{it} = \beta_i + \beta_1 \cdot OP_{it} + \beta_2 \cdot OP_{it} \cdot REGION_i + \beta_3 \cdot POST2008_t + \beta_4 \cdot log(A_{it}) + \epsilon_{it} \quad (3)$$

where $log(A_{it})$ is the logarithm of total assets. Controlling for bank size helps ensure that the estimated effects of operating profits on stock prices are not confounded by differences in the scale of banks. The results of equation (3) are presented in Table 6. The coefficient on the time dummy is negative and statistically significant at the 1% level, again showing that the 2008 financial crisis negatively affected the level of stock prices. The coefficient on the interaction between profits and region is positive and statistically significant at the 1% level, again indicating that operating profits have a greater positive effect on stock prices for US banks, compared to EU banks. The coefficient on total assets is positive and statistically significant at the 1% level, implying that the size of the bank plays an important role in the relationship between operating profits and stock prices. Moreover, adding total assets in the equation increases the model's explanatory power rate to 25.4%.

4.4 Profit-crisis interaction

As outlined in the descriptive analysis, the 2008 financial crisis had a negative impact on the correlation between stock prices and operating profits, for both regions. The following regression examines this result further:

$$\mathrm{SP}_{it} = \beta_1 \cdot \mathrm{OP}_{it} + \beta_2 \cdot \mathrm{Post2008}_t + \beta_3 \cdot (\mathrm{OP}_{it} \cdot \mathrm{Post2008}_t) + \epsilon_{it} \quad (4)$$

where the interaction term is included to assess whether the relationship between operating profits and stock prices differs in the period following 2008. The results of equation

(4) are presented in Table 7. The interaction term is negative and significant at the 1% level, indicating that, after 2008, the effect of profits on stock prices declined for all banks.

Subsequently, this regression is run separately in each region. For the US, the regression is:

$$\text{SP\_US}_{it} = \beta_1 \cdot \text{OP\_US}_{it} + \beta_2 \cdot \text{Post2008}_t + \beta_3 \cdot (\text{OP\_US}_{it} \cdot \text{Post2008}_t) + \epsilon_{it} \tag{5}$$

For the EU, the regression is:

$$\text{SP\_EU}_{it} = \beta_1 \cdot \text{OP\_EU}_{it} + \beta_2 \cdot \text{Post2008}_t + \beta_3 \cdot (\text{OP\_EU}_{it} \cdot \text{Post2008}_t) + \epsilon_{it} \tag{6}$$

The results of the above equations are presented in Table 8. The value of the interaction term for both equations shows the significant negative effect of the 2008 financial crisis on the link between profits and stock prices in both regions.

Next, the timing of the recovery for both regions is examined. The model for the EU is:

$$\begin{aligned} \text{SP\_EU}_{it} = {} & \beta_0 + \beta_1 \cdot \text{OP}_{it} + \beta_2 \cdot \text{Post2008\_Early}_t + \beta_3 \cdot \text{Post2008\_Mid}_t \\ & + \beta_4 \cdot \text{Post2008\_Late}_t + \beta_5 \cdot (\text{OP}_{it} \cdot \text{Post2008\_Early}_t) \\ & + \beta_6 \cdot (\text{OP}_t \cdot \text{Post2008\_Mid}_t) + \beta_7 \cdot (\text{OP}_{it} \cdot \text{Post2008\_Late}_t) + \epsilon_{it} \end{aligned} \tag{7}$$

where Post2008_Early_t is a time dummy variable indicating the immediate aftermath of the 2008 crisis (2008-2011), Post2008_Mid_t represents the intermediate recovery period (2012-2016), and Post2008_Late_t corresponds to the later post-crisis years (2017-2024).

Similarly, for the US, the regression is:

$$\begin{aligned} \text{SP\_US}_{it} = {} & \beta_0 + \beta_1 \cdot \text{OP}_{it} + \beta_2 \cdot \text{Post2008\_Early}_t + \beta_3 \cdot \text{Post2008\_Mid}_t \\ & + \beta_4 \cdot \text{Post2008\_Late}_t + \beta_5 \cdot (\text{OP}_{it} \cdot \text{Post2008\_Early}_t) \\ & + \beta_6 \cdot (\text{OP}_{it} \cdot \text{Post2008\_Mid}_t) + \beta_7 \cdot (\text{OP}_{it} \cdot \text{Post2008\_Late}_t) + \epsilon_{it} \end{aligned} \tag{8}$$

The results of equations, (7) and (8) are presented in Table 9.

For the EU banks, the main results that emerge are as follows. First, the crisis had a negative and statistically significant effect on stock prices, particularly in the medium-

and long term. This is confirmed in Figure 2, where the level of stock prices remains at or below the crisis trough. Second, the coefficient on the interaction between profits and Post2008_Early$_t$ is negative and significant at the 1% level, indicating a significant weakening of the relationship between operating profits and stock prices immediately after the crisis. By contrast, the interaction terms for the periods 2012-2016 and 2017-2024 are negative but not statistically significant. This indicates that the profit-price relationship was negatively impacted immediately after 2008, whereas subsequent years did not play a role either way. Thus, despite the recovery in profits, stock prices do not follow suit in subsequent stages of recovery.

For US banks, the coefficients on the interaction between operating profits and all post-2008 periods are negative and highly statistically significant, but they decrease in absolute value over time. This indicates that the strength of the relationship between operating profits and stock prices declined after 2008, but this decline becomes weaker over time. In other words, US banks faced a weakening profit-price link post-2008, but this link is gradually re-established over time. This finding is consistent with the results in Figure 1.

These regression results align closely with the patterns observed in Figure 3. In particular, the figure shows that the alignment between profits and stock prices was stronger prior to 2008 for both US and EU banks. In the post-2008 period, a clear disconnect emerges, with the misalignment appearing more pronounced for European banks. This pattern is captured in regressions (7) and (8) through the interaction terms, which reflect the weakening of the profit-stock price relationship observed in the figures.

4.5 Robustness tests

This section presents a number of robustness tests for the regression analysis. The main conclusion is that controlling for robust standard errors yields results qualitatively similar to those in the main regressions.

First, to check for heteroskedasticity in the error term, the Breusch-Pagan test was executed. The null hypothesis is that homoscedasticity is present whereas the alternative hypothesis is that heteroscedasticity is present. For all three models the p-value of this test is close to zero, indicating that the null is rejected, and that, hence, the variance of errors is not constant.

Second, the Pesaran (2004) CD test was used to examine the existence of cross-sectional dependence. As noted in previous studies (Can T. Tugcu, 2018), the CD test remains effective in small-sample panels, which aligns with the structure of the data employed in this

thesis. According to the null hypothesis there is no cross-sectional dependence, whereas the alternative hypothesis suggests that there is cross-sectional dependence. Across all three models, the results imply that cross-sectional problems exist in the data.

Third, Wooldridge's test for serial correlation in fixed effect panels was conducted. Under the null hypothesis, it is assumed that there is no serial correlation, while the alternative hypothesis asserts that autocorrelation exists. The p-value of the test was effectively zero across all three models, indicating the presence of autocorrelation.

The results for the tests above are presented in Table 10. Hence, this analysis confirms that heteroscedasticity, cross-sectional dependence and autocorrelation are present across all the models. For this reason, Driscoll-Kraay robust standard errors were estimated. [3]. The results in Table 11 confirm that the key coefficients remain statistically significant, reinforcing the robustness of the baseline findings.

5 Discussion

This section examines a variety of reasons why the alignment between profits and prices changed across time, with emphasis on 2008, and across regions.

5.1 Post-2008 regulation

After 2008, EU banks have lower valuations due to regulation factors. Specifically, regulatory reforms, such as Basel III, higher capital ratios, and stress tests, mean that profits are more tightly tied to capital buffers since 2008, instead of being free to flow to shareholders. In other words, return on equity (ROE) fell, because banks need to hold more equity capital against the same profit stream.

This increased post-2008 regulatory and bureaucratic burden has been said to affect EU banks more than US banks. However, it is important to note that the present analysis focuses on the largest banks in both regions. These large banks have been subject to the regulations imposed by Basel III and by the corresponding central banks, regardless of region. Nonetheless, to the extent that US banks can more easily bypass these regulations, it could still be the case that the regulatory burden has weighed more heavily on EU banks since 2008, introducing a downward deviation of stock prices from profits, compared to the US.

[3] This approach corrects for biases found in traditional estimations, see Bayrakdaroglu, Mirgen, and Kuyu (2017).

5.2 ZLB vs negative nominal rates

Second, the ECB's negative interest policy, which compressed banks' net profit margins for an extended period after 2008, may have created an environment of permanent investor skepticism about EU banks' future prospects.[4] Thus, even after profitability started increasing, investors continued to discount the sector's long-term earning power.
By contrast, in the US, though nominal interest rates remained at the ZLB for an extended period after 2008, the Fed never adopted the ECB's policy of negative nominal rates. To the extent that this difference across regions has led to a permanent increase in investor risk aversion to monetary policy changes in the EU, it is possible that investor preferences in the EU have introduced a downward deviation of stock prices from profits.

5.3 Non-performing loans (NPLs)

Non-performing loans (NPLs) are loans in default or at high risk of default, in that the borrower has missed scheduled payments for a specified period, often 90 days or more, or is unlikely to repay the loan in full. NPLs are considered impaired assets for a bank, because they no longer generate income and they also pose a significant credit risk. Investors view NPLs as an important factor of bank performance. Specifically, an increase in NPLs raises concerns about whether reported bank profits are real and/or sustainable.

Figure 4 shows NPLs as percent of GDP in the US (solid line) and the EU (dashed line). In 2007, the level of NPLs was comparable in both regions, at about 3%. By 2010, NPLs in the US had increased to 5% of GDP, while by 2014, NPLs in the EU had increased to 8% of GDP. By 2014, NPLs had declined to pre-crisis levels in the US, whereas it took an additional decade for the same to happen in the EU. In other words, the level of NPLs in the EU has remained steadily above that of the US, from 2008 and until recently. This is even more so in the South of Europe, as shown in Figure 5.

Because NPLs have remained a more significant problem in the EU, compared to the US, it is possible that this factor has created a permanent downward deviation of stock prices from profits in the EU, whereas it has not weighed as much on banks' balance sheets and on investors' expectations in the US.

Another way to view the above, is to note that there is a relationship between NPLs and price-to-book (P/B) ratios for banks. In particular, investors view a high NPL ratio as a sign that book value is overstated and that future profitability is at risk. This would imply that EU banks, with their elevated NPL burdens, should trade at a larger discount

[4] A negative rate essentially means that investors pay a fee to their bank to keep their funds safe.

to book, compared to US banks. This is confirmed in Figure 6, which presents P/B ratios for the US (solid line) and the EU (dashed line). As can be seen, in 2007, the P/B ratios were comparable across the two regions, at around 1.8. In the US, the crisis led to a decline in bank P/B ratios to a minimum of 1.4 around 2014, but ratios have increased to almost pre-crisis levels since. By contrast, the P/B ratios of EU banks declined more sharply and quickly, to about 0.6 by 2011, remaining at such low levels until very recently, at which point they inched back to 1 but did not catch up with the US. The present paper has found results of a similar flavor, in that the recovery in bank profitability has not led to increases in banks' stock prices in the EU.

5.4 GDP growth

Post 2008, growth has been faster and more sustained in the US than in the EU. This may have increased uncertainty about future economic prospects, and therefore future profitability, in the EU region. Because stock prices are forward looking, persistent fears about future bank profitability will be reflected in current stock prices, leading to a persistent downward deviation of stock prices from profits in the EU.

5.5 Geopolitical factors

In the EU, geopolitical factors, such as the sovereign debt crisis, Brexit, and wars by Russia, have spanned the entire post-2008 period, increasing uncertainty about future growth prospects. One question here is whether this uncertainty has led to deviations between profits and prices for non-financial companies as well. If not, then this explanation cannot be the main driver of the observed post-2008 changes in the EU banking sector. Additionally, financial markets nowadays are global and interconnected, implying that uncertainties in one region may affect investors in other regions. However, the closer proximity of these geopolitical events to the EU rather than the US, may have introduced more of a downward deviation of bank stock prices from profits in the EU, compared to the US.

5.6 Counterparty credit risk (CCR)

Awareness about CCR has lagged behind in the EU, compared to the US. In the US, the domino effect created by the bankruptcy of Lehman Brothers led to the near-collapses of the money market funds (MMFs) industry and of the (AB)CP markets, illustrating the role of CCR. However, in the EU region, awareness about the effects of CCR increased

only during the pandemic, with the failure of Archegos Capital Management and the near-collapse of pension funds (PFs) in the UK. To the extent that the increasing CCR awareness has affected investors in the EU more than in the US, this factor may have introduced a persistent downward deviation of bank stock prices from profits in the EU, while not affecting the US as much or as long. In the future, as CCR fears subside in the EU, so might the effect of this factor on stock prices.

5.7 Financial scandals

The EU has been affected by continued financial scandals, even after 2008, such as the LIBOR/Euribor manipulation and the forced takeover of Credit Suisse by UBS. Such scandals may have created a more persistently negative view of the financial sector in the EU, compared to the USpotentially introducing a persistent downward deviation of bank stock prices from profits in the EU.

5.8 Risk preferences

Bauer, Bernanke and Milstein (2023) developed a Risk Appetite Index (RAI), building on previous work by Gilchrist and Zakrajšek (2012). The RAI is calculated based on the idea that, when risk appetite increases, risk premiums demanded decline. Corresponding calculations by Boninghausen and Hartmann (2025) for the ECB are shown in Figure 7. Clearly, investors' risk appetite was consistently higher in the EU than in the US pre-2008, and consistently lower in the EU than in the US post-2008. This could explain why prices and profits were aligned in the EU before 2008, whereas this alignment weakened after 2008. However, a decline in risk appetite in the EU should affect all risky industries, and not only the banking sector. Nonetheless, the salience of the financial crisis in the minds of investors may have negatively affected their risk appetite for bank stocks more than for other stocks.

5.9 Taxes

After the financial crisis, many EU countries introduced or increased taxes on the financial sector, to ensure that banks contributed to the costs of the crisis. For example, bank dividends can now be taxed higher than regular corporate dividends in some countries, while bank-specific taxes have been imposed in others. By contrast, the US did not impose permanent, bank-specific taxes on bank dividends or profits after 2008. In fact, in the US, bank dividend taxation overall became more favorable after 2008. This change in the tax treatment of banks after 2008 may account for the reduced attractiveness of bank stocks in the EU, compared to the pre-2008 period, as well as to US bank stocks after 2008.

6 Conclusions

This paper uses a panel dataset of large banks from the US and the EU to examine the relationship between profits and stock prices for the period 1995-2024. In the pre-2008 period, profits and prices are positively aligned, both in the US and in the EU. However, in the post-2008 period, the eventual increases in profitability have translated into stock prices increases only in the US, although the correlation between the two series is slightly weaker than before. By contrast, in the EU, stock prices have stagnated at crisis troughs, indicating that the profitability increases have not been reflected in stronger investor demand for EU bank stocks. It is possible that a higher level of NPLs still weighs more heavily on the balance sheets of banks and the minds of investors in the EU. It is also possible that geopolitical events and continued scandals have resulted in a permanently lower confidence in the EU bank system. It remains to be seen whether a ceasefire in the war of Russia against Ukraine or a global tariff war initiated by the US will have a positive effect in re-aligning the profits and prices of EU banks.

References

Mariarosaria Agostino, Danilo Drago, and Damiano B Silipo. The value relevance of ifrs in the european banking industry. *Review of quantitative finance and accounting*, 36 (3):437–457, 2011.

European Central Bank. *Financial stability review*. European Central Bank, 2006.

Michael D. Bauer, Ben S. Bernanke, and Eric Milstein. Risk appetite and the risk-taking channel of monetary policy. *Journal of Economic Perspectives*, 37(1):77–100, February 2023.

Nathaniel Baum-Snow and Fernando Ferreira. Causal inference in urban and regional economics. In *Handbook of regional and urban economics*, volume 5, pages 3–68. Elsevier, 2015.

Ali Bayrakdaroglu, Cagatay Mirgen, and Ezgi Kuyu. Relationship between profitability ratios and stock prices: an empirical analysis on bist-100. *PressAcademia Procedia*, 6 (1):1–10, 2017.

Paul Bochmann, Maciej Grodzicki, Heinrich Kick, Benjamin Klaus, and Cosimo Pancaro. Euro area bank fundamentals, valuations and cost of equity. *Financial Stability Review, European Central Bank, November*, 2023.

Benjamin Böninghausen and Florian Hartmann. Reading the market's pulse: monitoring investors' risk appetite, 2025.

Jörg Decressin, Wim Fonteyne, and Hamid Faruqee. 4 comparing europe and the united states. In *Integrating Europe's Financial Markets*. International Monetary Fund, 2007.

BANK DEUTSCHE. Bank performance in the us and europe: An ocean apart. *Current issues, global financial markets*, pages 5–23, 2013.

Luca Di Vito, Natalia Fuentes, and João Matos Leite. *Understanding the profitability gap between euro area and US global systemically important banks*. Number 327. ECB Occasional Paper, 2023.

Zuzana Fungáčová, Iftekhar Hasan, and Laurent Weill. Trust in banks. 2016.

Simon Gilchrist and Egon Zakrajšek. Credit spreads and business cycle fluctuations. *American Economic Review*, 102(4):1692–1720, June 2012.

Rachmat Hidayat, Djoko Roespinoedji, and Mohd Haizam Saudi. Effect of return on assets, net profit margin and earning per share on stock prices. *Turkish Journal of Computer and Mathematics Education*, 12(8):1388–1403, 2021.

Christos Ioannidis, Philip Molyneux, and Fotios Pasiouras. The relationship between bank efficiency and stock returns: evidence from asia and latin america. *University of Bath, School of Management, Working Paper*, (2008.10), 2008.

Saleem Janoudi. Banking efficiency and stock performance in the eu markets: The impact of the world financial crisis. *Available at SSRN 2513272*, 2014.

Aggeliki Liadaki and Chrysovalantis Gaganis. Efficiency and stock performance of eu banks: Is there a relationship? *Omega*, 38(5):254–259, 2010.

Elisa Menicucci and Guido Paolucci. The determinants of bank profitability: empirical evidence from european banking sector. *Journal of financial reporting and Accounting*, 14(1):86–115, 2016a.

Elisa Menicucci and Guido Paolucci. Factors affecting bank profitability in europe: An empirical investigation. *African Journal of Business Management*, 10(17):410–420, 2016b.

Ivo Mijoč, Matija Kuzmić, and Matej Vujanić. Estimating the determinants of bank profitability: Comparative study for eu and us banks. *Organizacija*, 58(1):31–47, 2025.

Nicolae Petria, Bogdan Capraru, and Iulian Ihnatov. Determinants of banks' profitability: evidence from eu 27 banking systems. *Procedia economics and finance*, 20:518–524, 2015.

Bojan Markovic Ralph De Haas and Alexander Plekhanov. Reducing non-performing loans in europe. *European Economy*, (2017/1):125–140, 2017.

Z Rehman, SA Khan, A Khan, and A Rahman. Internal factors, external factors and bank's profitability. *Sarhad Journal of Management Sciences*, 4(2):246–259, 2018.

Yong Tan. *Performance, risk and competition in the Chinese banking industry*. Chandos Publishing, 2014.

Tauhidul Islam Tanin, Abu Umar Faruq Ahmad, and Mohammad Omar Farooq. What determines bank profitability? empirical evidence from turkish banking sector. In *Monetary policy, islamic finance, and islamic corporate governance: An international overview*, pages 247–265. Emerald Publishing Limited, 2021.

Can T Tugcu. Panel data analysis in the energy-growth nexus (egn). In *The economics and econometrics of the energy-growth nexus*, pages 255–271. Elsevier, 2018.

S Valverde, Timothy Cobau, and F Fernandez. Analysing differences in bank profitability: Europe versus the us. *Funcas SEFO*, 8(2):5–13, 2019.

Karl Whelan. Comparing fed and ecb monetary policies. 2023.

Eni Wuryani, Susi Handayani, et al. The effect of financial performance and bank size on banking stock prices. In *International Joint Conference on Arts and Humanities 2021 (IJCAH 2021)*, pages 975–979. Atlantis Press, 2021.

Tables and Figures

Table 1: Descriptive Statistics for Stock Prices

Region	Mean_SP	Median_SP	SD_SP	Variance_SP	Range_SP	IQR_SP	Skewness_SP	Kurtosis_SP
EU	37.22	18.06	46.09	2123.87	233.95	42.18	2.22	5.23
US	71.73	46.99	85.23	7263.99	551.44	40.15	3.58	14.22

Table 1 shows descriptive statistics for the stock prices of EU and US banks over the period 1995-2024. See discussion in Section 3.5.

Table 2: Descriptive Statistics for Operating Profits

Region	Mean_OP	Median_OP	SD_OP	Variance_OP	Range_OP	IQR_OP	Skewness_OP	Kurtosis_OP
EU	6233422.56	5015518.21	6523148.96	42551472356053.13	64843261.30	6758287.44	2.41	12.56
US	13406359.82	8810279.72	12461284.82	155283619421089.31	114861962.73	16552434.28	0.45	3.26

Table 2 shows descriptive statistics for the operating profits of EU and US banks over the period 1995-2024. See discussion in Section 3.5.

Table 3: Correlation Between Stock Prices and Operating Profits by Region and Period

Region	Period	Correlation
US & EU	All years	0.30
US	All years (raw)	0.27
US	All years (yearly avg)	0.65
US	Before 2008	0.81
US	2008 onwards	0.70
EU	All years (raw)	0.13
EU	All years (yearly avg)	0.22
EU	Before 2008	0.91
EU	2008 onwards	0.64

Table 3 presents the correlation between stock prices and operating profits. Raw refers to correlations calculated using all individual bank-level data across the entire period, while yearly avg refers to correlations between annual cross-sectional averages of stock prices and operating profits. The table includes results for the US, the EU, and the combined US-EU sample, with separate estimates for the full period, as well as for the pre-2008 and post-2008 sub- periods. See discussion in Section 3.5.

Table 4: Baseline Specification

	(1)
OP_scaled	0.115*
	(0.054)
OP_scaled × Region	0.178**
	(0.064)
Num.Obs.	540
R2	0.133
R2 Adj.	0.101
AIC	5818.7
BIC	5831.6
RMSE	52.63

+ p <0.1, * p <0.05, ** p <0.01, *** p <0.001

Table 4 reports estimation results of the main equation (1). The dependent variable is Stock Price. OP_{scaled} are the operating profits of each individual bank scaled by 10000*. Region is a dummy variable equal to* 1 *if the bank is headquartered in the US, and* 0 *otherwise. The model includes fixed effects and the standard errors of each beta are reported in parentheses. See discussion and model specification in equation 1.*

Table 5: Role of 2008

	(1)
OP_scaled	0.156**
	(0.053)
Post2008	−23.852***
	(4.603)
OP_scaled × Region	0.147*
	(0.062)
Num.Obs.	540
R2	0.176
R2 Adj.	0.144
AIC	5793.5
BIC	5810.7
RMSE	51.32

+ p <0.1, * p <0.05, ** p <0.01, *** p <0.001

Table 5 reports estimation results of equation (2). The dependent variable is Stock Price. OP_{scaled} *are the operating profits of each individual bank scaled by* 10000. *Region is a dummy variable equal to* 1 *if the bank is headquartered in the US and* 0 *otherwise.* $Post2008$ *is a time dummy equal to* 1 *for post-2008 years and* 0 *otherwise. The model includes fixed effects and the standard errors of each beta are reported in parentheses. See discussion and model specification in equation 2.*

Table 6: Role of Total Assets

	(1)
OP_scaled	0.056
	(0.052)
Post2008	−53.541***
	(5.943)
log(TOTAL.ASSETS)	33.764***
	(4.565)
OP_scaled × RegionUS	0.203***
	(0.060)
Num.Obs.	540
R2	0.254
R2 Adj.	0.224
AIC	5741.3
BIC	5762.8
RMSE	48.80

+ p <0.1, * p <0.05, ** p <0.01, *** p <0.001

Table 6 reports estimation results of equation (3). The dependent variable is Stock Price. OP_{scaled} *are the operating profits of each individual bank scaled by* 10000*. Region is a dummy variable equal to* 1 *if the bank is headquartered in the US and* 0 *otherwise.* $Post2008$ *is a time dummy equal to* 1 *for post-2008 years and* 0 *otherwise.* $log(TOTAL.ASSETS)$ *represents the natural logarithm of total assets of each bank. The model includes fixed effects and the standard errors of each beta are reported in parentheses. See discussion and model specification in equation 3.*

Table 7: Profit-crisis Interaction

	(1)
OP_scaled	0.491***
	(0.046)
Post2008	3.434
	(6.381)
OP_scaled × Post2008	−0.308***
	(0.050)
Num.Obs.	540
R2	0.224
R2 Adj.	0.194
AIC	5760.8
BIC	5778.0
RMSE	49.79

+ p <0.1, * p <0.05, ** p <0.01, *** p <0.001

Table 7 reports estimation results of equation (4). The dependent variable is Stock Price. OP_{scaled} are the operating profits of each individual bank scaled by 10000. *Post*2008 *is a time dummy equal to* 1 *for post-2008 years and* 0 *otherwise. The model includes fixed effects and the standard errors of each beta are reported in parentheses. See discussion and model specification in equation 4.*

Table 8: Effect of Post-2008 Period: EU vs. US

	EU	US
OP_scaled	0.439***	0.637***
	(0.074)	(0.066)
post2008	−18.737**	48.259***
	(5.812)	(12.232)
OP_scaled × post2008	−0.318***	−0.471***
	(0.081)	(0.074)
Num.Obs.	270	270
R2	0.292	0.280
R2 Adj.	0.262	0.250
AIC	2631.4	2986.0
BIC	2645.8	3000.4
RMSE	31.16	60.09

+ p <0.1, * p <0.05, ** p <0.01, *** p <0.001

Table 8 reports estimation results of equations (5) and (6). The dependent variable is Stock Price. OP_{scaled} *are the operating profits of each individual bank scaled by* 10000. *Post*2008 *is a time dummy equal to* 1 *for post-2008 years and* 0 *otherwise. The model includes fixed effects and the standard errors of each beta are reported in parentheses. See discussion and model specification in equation 4.*

Table 9: Post-2008 Recovery: EU vs. US

	EU	US
OP_scaled	0.480***	0.631***
	(0.071)	(0.065)
post2008_early	2.784	30.943*
	(8.283)	(15.032)
post2008_mid	−26.039***	46.061**
	(7.593)	(17.577)
post2008_late	−44.613***	71.884***
	(7.819)	(14.995)
OP_scaled × post2008_early	−0.497***	−0.557***
	(0.083)	(0.101)
OP_scaled × post2008_mid	−0.053	−0.555***
	(0.119)	(0.100)
OP_scaled × post2008_late	−0.033	−0.486***
	(0.102)	(0.081)
Num.Obs.	270	270
R2	0.379	0.331
R2 Adj.	0.342	0.292
AIC	2604.2	2974.1
BIC	2632.9	3002.9
RMSE	29.19	57.92

+ p <0.1, * p <0.05, ** p <0.01, *** p <0.001

Table 9, reports estimation results of equation (7) and equation (8). Column EU reports regression results for banks headquartered in the European Union, while column US presents results for banks headquartered in the United States. The dependent variable is Stock Price. OP_{scaled} *are the operating profits of each individual bank scaled by* 10000. *Post*2008 *is a time dummy equal to* 1 *for post-2008 years and* 0 *otherwise. The variables post2008_early, post2008_mid, and post2008_late are time dummies indicating the early (2008-2011), mid (2012-2016), and late (2017 onward) post-crisis periods, respectively. The model includes fixed effects and the standard errors of each beta are reported in parentheses.*

Table 10: Diagnostic Tests (p-values)

Model	Breusch.Pagan..p.	Wooldridge..p.	Pesaran.CD..p.
Model 1	0.00	0.00	0.00
Model 2	0.00	0.00	0.00
Model 3	0.00	0.00	0.00

Table 10 reports the p-values from three standard panel data diagnostic tests: The Breusch-Pagan LM test for heteroskedasticity, the Wooldridge test for autocorrelation, and the Pesaran CD test for cross-sectional dependence, applied to Models 1 to 3. See discussion in Section 4.5.

Table 11: Regression Results with Driscoll-Kraay Standard Errors

	Model 1	Model 3	Model 4
OP_scaled	0.115	0.156*	0.056
	(0.079)	(0.077)	(0.050)
OP_scaled × Region_US	0.178*		
	(0.086)		
Post2008		−23.852**	−53.541***
		(7.768)	(5.935)
OP_scaled × RegionUS		0.147*	0.203***
		(0.071)	(0.060)
log(TOTAL.ASSETS)			33.764***
			(5.220)
Num.Obs.	540	540	540

+ p <0.1, * p <0.05, ** p <0.01, *** p <0.001
Standard errors are Driscoll-Kraay (robust to heteroskedasticity and autocorrelation).

Table 11 presents regression results using Driscoll-Kraay standard errors, which are robust to heteroskedasticity, autocorrelation, and cross-sectional dependence. The dependent variable is Stock Price. OP_{scaled} are the operating profits of each individual bank scaled by 10000. *$Region_{US}$ is a dummy variable equal to* 1 *if the bank is headquartered in the US and* 0 *otherwise. Post*2008 *is a time dummy equal to* 1 *for post-2008 years and* 0 *otherwise. $log(TOTAL.ASSETS)$ represents the natural logarithm of total assets of each bank. See discussion in Section 4.5.*

Figure 1

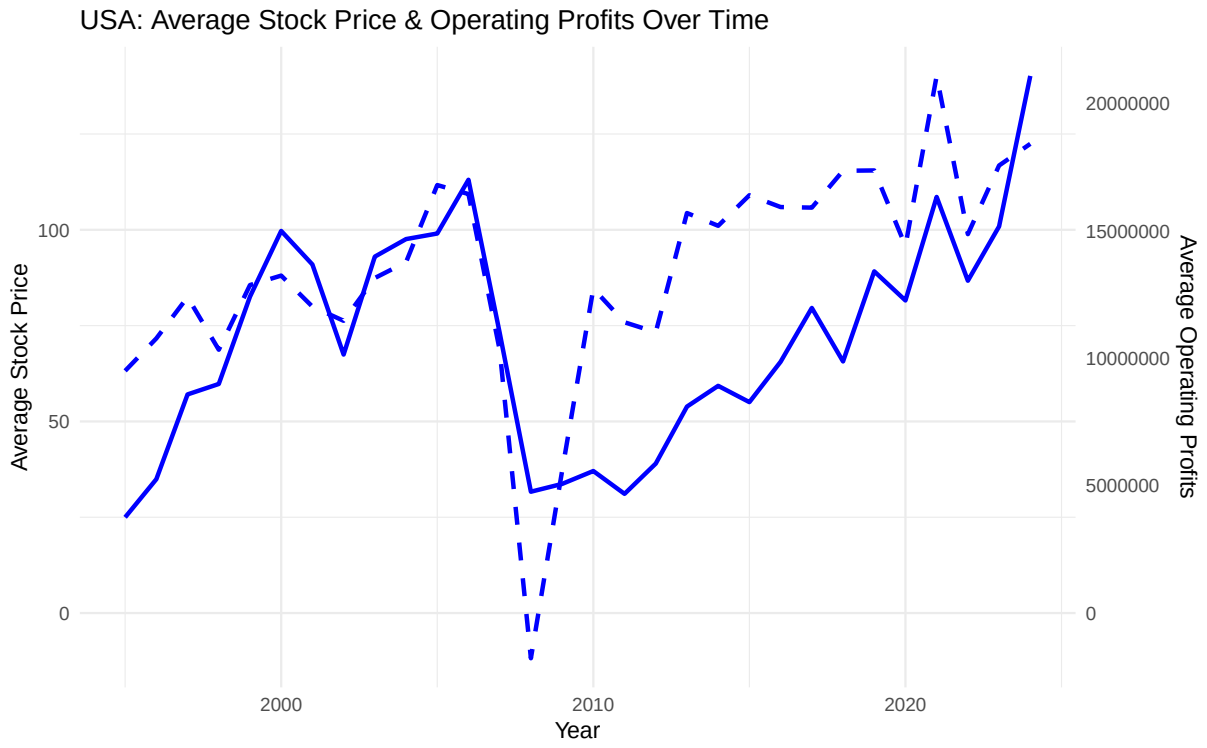


Figure 1 displays trends in average stock prices (solid line) and operating profits (dashed line) for US banks from 1995 to 2024. See discussion in Section 3.6.

Figure 2

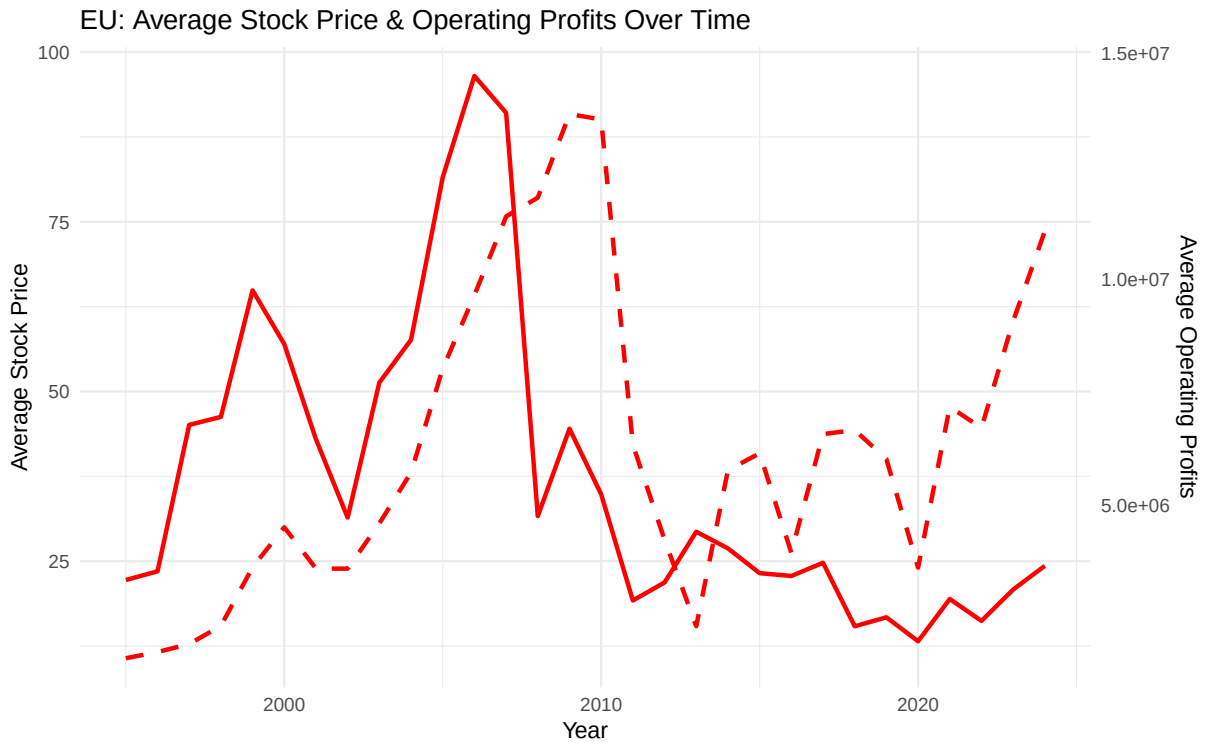


Figure 2 displays trends in average stock prices (solid line) and operating profits (dashed line) for EU banks from 1995 to 2024. See discussion in Section 3.6.

Figure 3

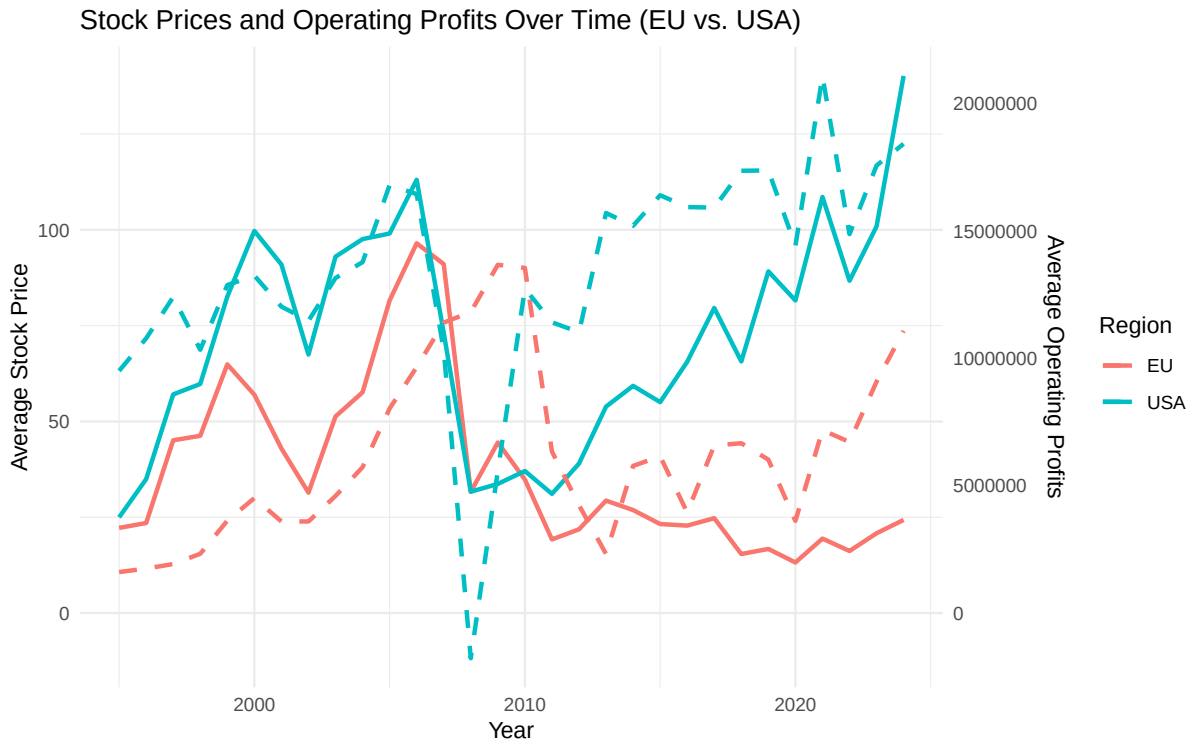


Figure 3 displays average stock prices (solid lines) and operating profits (dashed lines) for banks in the EU and the US from 1995 to 2024. See discussion in Section 3.6.

Figure 4

Non-Performing Loans (NPLs): US vs EU

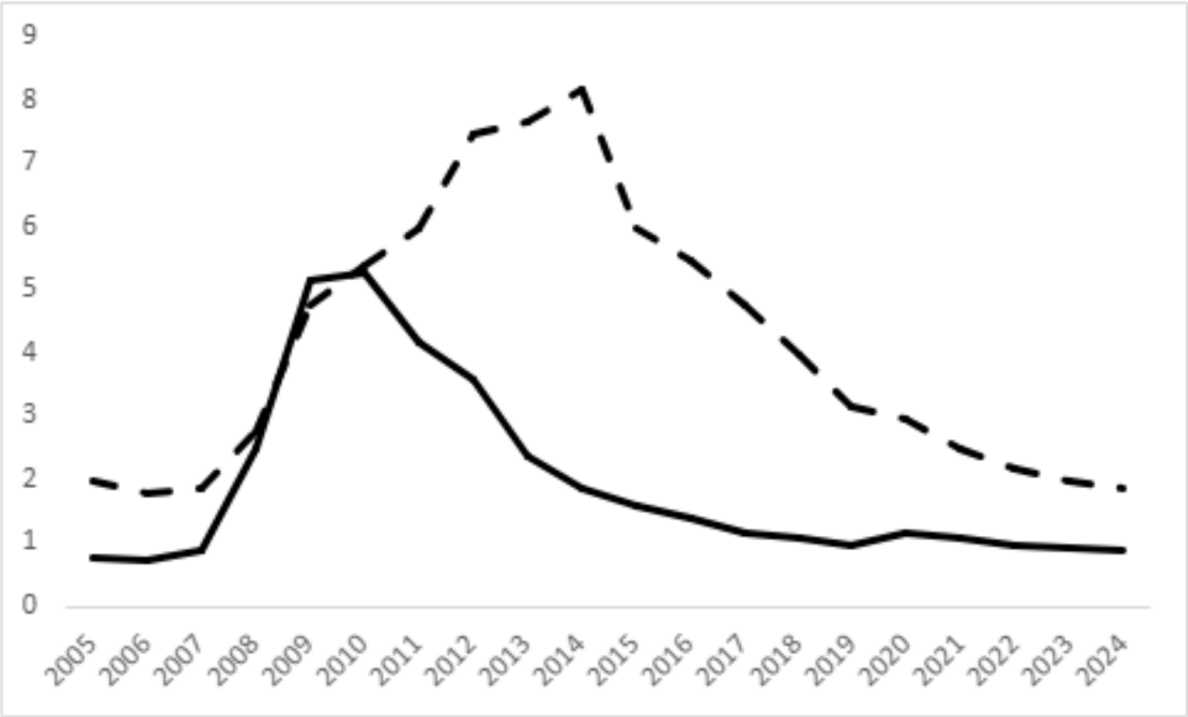
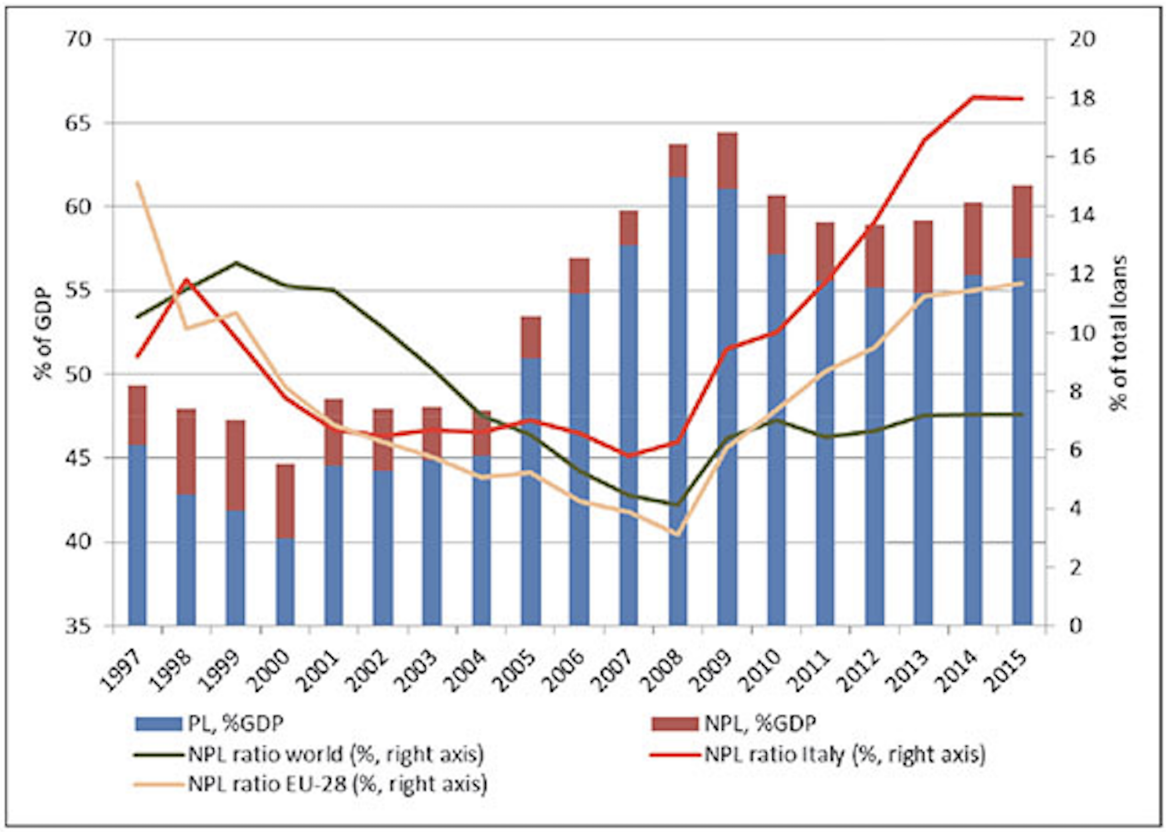


Figure 4 presents non-performing loans (NPLs) as percent of GDP in the US (solid line) and in the EU (dashed line). Author's calculations, using data from FRED and ECB.

Figure 5

NPLs: EU, EU South, and rest of world



Source: World Development Indicators, IMF, authors' calculations.
Note: Unweighted averages, based on a global sample of 135 countries. PL: Performing loans. NPL: Non-performing loans.

Figure 5 presents NPLs for the EU, Italy, and the rest of the world. Source: Ralph De Haas, Bojan Markovic and Alexander Plekhanov (2017), European Economy, 2017(1), pp.125–140.

Figure 6

Bank Price-to-Book Ratios (P/B): US vs EU

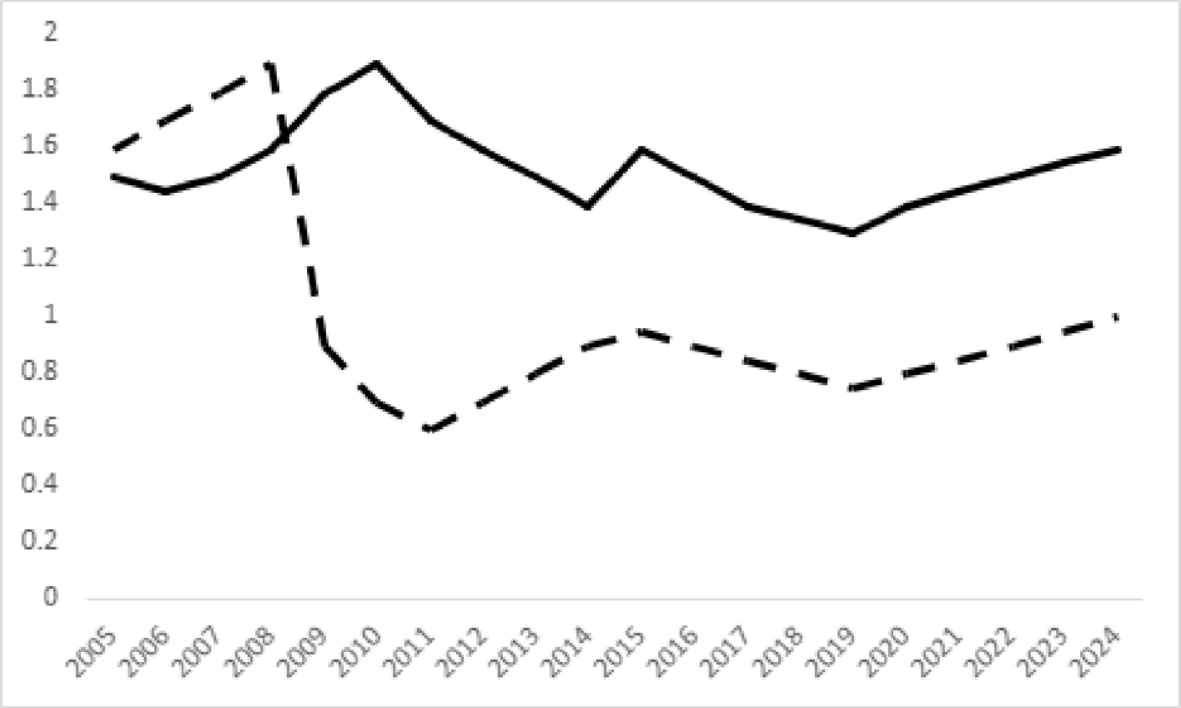


Figure 6 presents average price-to-book ratios for banks in the US (solid line) and in the EU (dashed line). Author's calculations, using data from FRED and ECB.

Figure 7

Risk Appetite: US vs EU

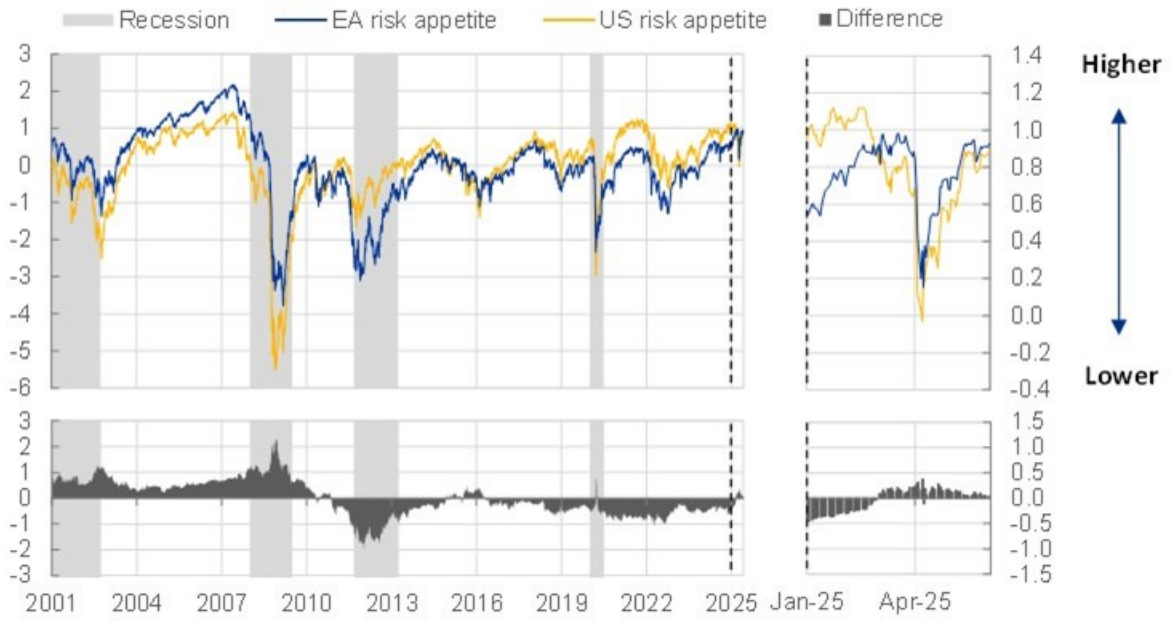


Figure 7 shows the euro area and US risk appetite indices, both normalized to a mean of zero and a standard deviation of one. The top panel presents the index for each region. The bottom panel presents the difference between risk appetite in the EU and risk appetite in the US. A positive number indicates higher risk appetite in the EU, while a negative number indicates higher risk appetite in the US. Source: Böninghausen and Hartmann (2025), The ECB Blog.