Bank performance in Europe and the US: a divergence in market-to-book ratios

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Abstract

In the 2007-2017 period, the market-to-book ratios of European and US banks diverged markedly. We use panel regressions to investigate the determinants of M/B ratios for 112 European and US banks. We show that higher US valuations were driven by profitability and cost efficiency. The underperformance in Europe was associated with declines in the net interest margin and low policy rates, as well as with inadequate resolution of non-performing loans and an increasing share of deposits. Our results stress the importance of provisioning and NPL resolution in Europe. Moreover, low-for-long policy rates may be detrimental for bank franchise values.

Keywords: market-to-book ratio, European banks, US banks, franchise value, bank performance

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1. Introduction and motivation

We investigate the determinants of the market-to-book (M/B) ratios of European and US banks in 2007-2017. During this period, M/B ratios of European and US banks strongly diverged, with European banks underperforming their US counterparts. The performance gap has been a cause for concerns raised by

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central bankers and supervisors (Constâncio, 2017; ECB, 2019; IMF, 2017).

Before and after the crisis, studies discussed bank M/B ratios or related Tobin's Q ratios. Jordan et al. (2011) primarily focus on the impact of obtaining funds under the Troubled Asset Relief Program, but also find a positive influence of cost efficiency and non-interest income, as well as a negative impact of assets in non-accrual or foreclosed status on M/B ratios. Their study, however, is limited to US banks in 2006-2009. Calomiris and Nissim (2014) also limit their focus to the M/B ratios of US banks and find that the decrease in M/B ratios is not due to unrecognized losses, but due to the declining value of customer relationships. Bogdanova et al. (2018) consider a pre- versus post-crisis setup and expand the analysis to a worldwide sample. According to this study, non-performing loans, return on equity, non-interest expenses and dividends are the main drivers of performance. Chousakos and Gorton (2017) link low post-crisis Tobin's Q ratios in the US and the euro area to the macroeconomy. They also compare performance after the financial crisis with crises in other advanced economies. None of these papers, however, focus on a performance comparison between European and US banks in the post-crisis period. Schildbach and Wenzel (2013) do compare European and US bank performance, but their study is limited to a descriptive comparison. Hence, our paper contributes to the literature by analyzing the difference in M/B ratios between European and US banks in 2007-2017, using panel regressions.

Similar to Bogdanova et al. (2018), we find that profitability was an important driver of post-crisis M/B ratios. Moreover, it contributed to the widening performance gap between Europe and the US mainly due to decreasing net interest margins in Europe and an increase in cost efficiency in the US. The importance of cost efficiency for US banks is also stressed by Jordan et al. (2011). Second, we find that an increase in the share of deposit funding was associated with lower performance for European banks. Indeed, Calomiris and Nissim (2014) mention the potential reduction in value of deposit funding due to low interest rates. Third, our results reveal a negative impact of non-performing loans on bank valuations, similar to Bogdanova et al. (2018), but only for European banks, whereas Jordan et al. (2011) find similar results for US banks. For both European and US banks, adequate provisioning of loan losses was associated with higher market valuations in the 2007-2017 period. Finally - after controlling for profitability, asset quality, etc. - we find a negative relationship between low policy rates and European M/B ratios, also partially explaining the performance gap. In the US, this influence of monetary policy is not found.

2. Methodology and data

We focus on the M/B ratio, because it is an often used measure for bank franchise value, i.e. long-term performance potential (Demsetz et al., 1996). Banks with high M/B ratios (above one) are awarded a premium by the market above the book value of their equity. M/B ratios below one are a sign of market distrust, e.g. due to delayed loss recognition or an unfit business model.

To analyze the determinants of the M/B ratio, we estimate a panel regression model for European and US banks, using data with yearly frequency:

$$M/B_{i,t} = \alpha_i + \sum_{j=1}^{J} \beta_j BV_{j,i,t} + \sum_{k=1}^{K} \gamma_k MV_{k,i,t} + \epsilon_{i,t} \tag{1}$$

The M/B ratio (bank i, year t) is regressed on J bank ($BV_{j,i,t}$) and K market ($MV_{k,i,t}$) variables, using bank fixed effects[3] (hence α_i) and clustering errors at bank level. First, we estimate the regression for the full sample of European and US banks. Second, we estimate the specification for European and US banks

[3] Unreported random effects estimations confirm the results. Sargan-Hansen tests, however, reject random effects in our samples. Time fixed effects are not used because of the inclusion of cross-section invariant variables (e.g. policy rate in the US subsample).

separately, hence allowing differences in the effect of the explanatory variables.

By interpreting the results of these regressions, we can only analyze which variables influence the M/B ratio. To determine the variables that explain the performance gap between Europe and the US, we therefore also consider how the values of the variables changed over time and whether a different evolution in Europe and the US can be noticed, using Welch-Satterthwaite tests.[4]

We consider the influence of 11 bank variables and 3 market variables. We include the natural log of total assets to control for any size-related effects (Moenninghoff et al., 2015). We capture the composition of bank balance sheets with the loans/assets and deposits/assets ratios, as in Mergaerts and Vander Vennet (2016). We examine the influence of the equity/assets ratio since better capitalized banks should be more resilient to shocks (Sarin and Summers, 2016) and perform better in crisis periods (Berger and Bouwman, 2013). In terms of profitability, we include return on assets (ROA) and hypothesize a positive relationship with the M/B ratio, as in Bogdanova et al. (2018). We also consider the components of profitability by examining the impact of the net interest margin, non-interest income and cost efficiency. Higher non-interest income provides diversification, but may also be more volatile (Baele et al., 2007). Regarding asset quality, we include non-performing loans (NPL as a percentage of equity), as well as the coverage ratio, i.e. the share of NPL covered by loan loss provisions. We expect NPL to have a negative impact on bank performance, in line with Bogdanova et al. (2018). Finally, we include the natural log of the Z-score, as a distance-to-default measure (Delis et al., 2012). In terms of market variables, we include the level of the STOXX Europe 600 or S&P 500 to control

[4]For instance, if a variable has a significantly positive coefficient in both the European and US subsample, higher values of this variable (over time) are associated with higher performance. This, however, does not necessarily explain the performance gap between European and US banks, as the variable might also have evolved similarly in both subsamples.

for the general evolution of the stock market. We also include the policy rate[5] of the Central Bank of the country in which the bank is headquartered, as well as the 10-year government bond spread with Germany to capture the effect of monetary policy. A detailed description can be found in Table 1.

We select listed banks with assets exceeding EUR 20 billion in 2017 and with loans and deposits above 20% of assets to focus on banks engaged in intermediation. This yields a sample of 112 banks: 67 in Europe[6], 45 in the US.

Table 1: Data description

Variable	Description	Source
M/B	Market value of equity as % of book value	Eikon, S&P Global
ln(assets)	Natural log of total assets	S&P Global
loans/assets	Total net loans as % of total assets	S&P Global
deposits/assets	Total deposits as % of total assets	S&P Global
equity/assets	Total equity (book value) as % of total assets	S&P Global
ROA	Return on average assets	S&P Global
NIM	Net interest margin	S&P Global
nonint/income	Non-interest income as % of total income	S&P Global
cost/income	Total costs as % of total income	S&P Global
NPL/equity	Non-performing loans as % of equity	S&P Global
LLP/NPL	Loan loss provisions as % of non-performing loans	S&P Global
Z-score	(equity/assets + ROA) / stdev. ROA over last 3 years	Own calculations
ln(Z)	Natural log of Z-score	Own calculations
policy rate	Euro area: deposit facility rate	ECB
	Switzerland: average of 3-month Libor target range	SNB
	Denmark: interest rate on certificates of deposit	Danmark Nationalbank
	Norway: sight deposit rate	Norges Bank
	Sweden: deposit rate	Riksbank
	UK: base rate	Bank of England
	US: average of Federal Funds target rate range	Federal Reserve
market	Europe: level of STOXX Europe 600 (start: 100)	Eikon
	US: level of S&P 500 (start: 100)	Eikon
spread	10Y government bond yield − 10Y German Bund yield	Eikon

Data collected from S&P Global Market Intelligence (former SNL Financial and S&P Capital IQ), Refinitiv Eikon (Thomson Reuters) and Central Bank databases. End-of-year data (yearly frequency, 2007-2017) is used for all variables except the market value of equity, the STOXX Europe 600 and the S&P 500 level. To mitigate potential endogeneity issues and since we assume that end-of-year data is made public during the first quarter of the subsequent year, we collect data for the market value of equity, the STOXX Europe 600 and the S&P 500 at the end of March. Spreads are only included for European banks.

[5] The analysis is robust to the inclusion of other interest rates, e.g. OIS rates.

[6] Austria 4, Belgium 1, Switzerland 12, Germany 2, Denmark 2, Spain 8, Finland 1, France 3, UK 7, Greece 4, Ireland 3, Italy 12, the Netherlands 2, Norway 2, Portugal 1, Sweden 3.

3. Results

M/B ratio gap. The top-left panel of Figure 1 shows that mean M/B ratios in Europe and the US were above 1 at the start of the crisis. In 2008, banks' M/B ratios plummeted, both in Europe and the US, to 0.75. From that almost identical level, the divergence started. In Europe, a new trough was reached during the sovereign debt crisis and bank performance remained poor (mean M/B ratio around or below one) afterwards. US bank M/B ratios, on the other hand, recovered steadily (except for 2015). Consequently, a very large performance gap emerged: US banks' mean M/B ratio reached 1.5 in 2017, whereas the M/B ratio of the average European bank was still stuck below 0.9.

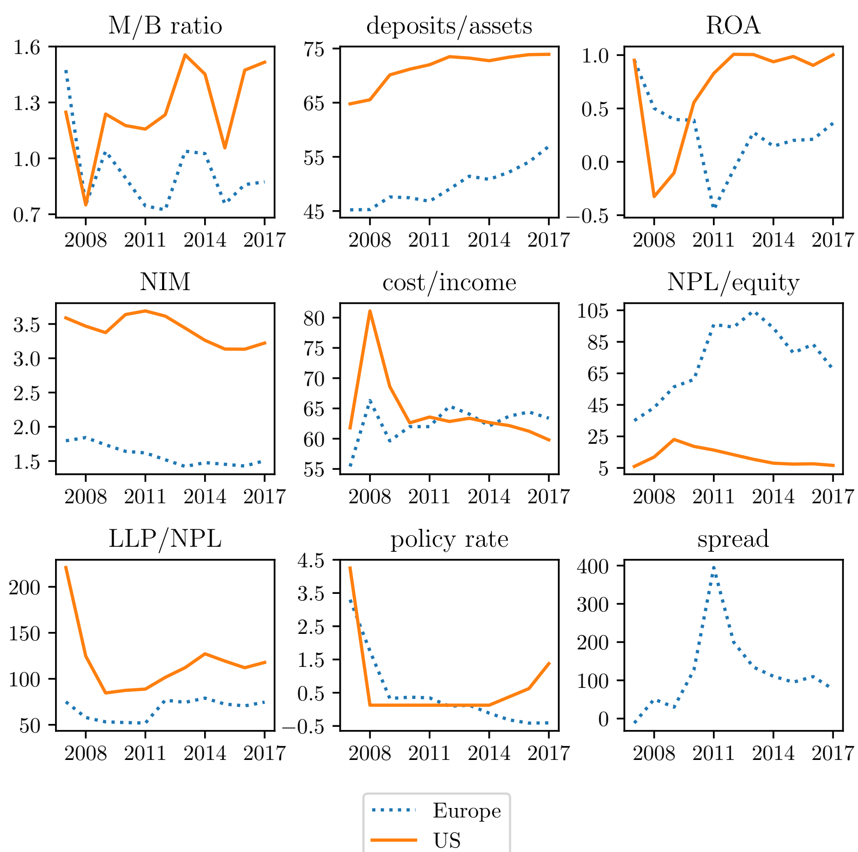

Figure 1: Yearly means of key variables: Europe versus US

Regression results: explanatory power of bank and market variables. Table 2 shows the results of the panel regressions. First, we observe a negative impact of size on the M/B ratio in all samples, in line with Minton et al. (2019). Second, in the European subsample, higher shares of deposits are associated with lower bank performance. Regarding capital structure, an increasing equity/assets ratio is associated with decreasing bank performance. The negative effect seems to be driven especially by the European subsample, which might be due to the simultaneous occurrence of low crisis-induced M/B ratios and the increase in capital ratios due to the gradual adherence to the Basel III capital requirements (i.e. a mechanical explanation). In terms of profit capacity, ROA is an important driver of M/B ratios, both in Europe and the US. This result is in line with earlier studies, reporting a positive impact of ROA on the M/B ratio (Bogdanova et al., 2018; ECB, 2019). When we disentangle profitability, the net interest margin is found to be most important in Europe, while cost efficiency is the main driver for US banks. Regarding loan quality, the coverage ratio seems to be a key variable: higher coverage ratios are associated with higher M/B ratios, both in Europe and the US. Similar to Bogdanova et al. (2018), we also find a negative relationship between non-performing loans (as a percentage of equity) and bank performance, but this is driven by the European subsample only.

Turning to the market variables, we observe a clear dichotomy for the effect of policy rates on bank M/B ratios between European and US banks. The coefficient of the Central Bank policy rate is significantly positive in Europe, but it is insignificant in the US[7], suggesting that higher policy rates are associated with higher European bank performance, after correcting for profitability, non-performing loans, etc. Finally, lower government bond yield spreads - e.g.

[7] Note that the difference between Europe and the US in terms of the coefficient of the policy rate is not driven by the inclusion of the spread variable in Europe. Unreported regressions without the spread variable yield qualitatively similar results.

Table 2: Panel estimations of the M/B ratio (2007-2017)

Sample:	Full (1)	Full (2)	Europe (1)	US (1)	Europe (2)	US (2)
Dependent var.:	M/B	M/B	M/B	M/B	M/B	M/B
$\ln(\text{assets})_s$	-8.726***	-7.821***	-9.342***	-10.292**	-7.141***	-9.806***
	(2.414)	(2.409)	(2.322)	(4.023)	(2.460)	(3.456)
loans/assets_s	0.727	-0.415	0.398	3.533	0.746	1.270
	(1.593)	(1.526)	(1.727)	(2.612)	(1.702)	(2.162)
deposits/assets_s	-0.687	-0.421	-3.559**	3.719	-3.849**	4.064
	(1.464)	(1.757)	(1.487)	(3.260)	(1.589)	(3.332)
equity/assets_s	-12.229***	-13.162***	-11.152***	-12.244	-11.545***	-13.487
	(4.629)	(4.921)	(2.797)	(7.603)	(2.578)	(8.027)
ROA_s	13.154***		18.415***	9.779***		
	(2.526)		(2.801)	(2.991)		
NIM_s		5.583*			6.472**	5.285
		(3.143)			(3.002)	(3.891)
nonint/income_s		7.910			2.510	20.548
		(7.252)			(2.992)	(16.455)
cost/income_s		-4.056			-1.111	-8.681**
		(3.425)			(3.600)	(3.801)
NPL/equity_s	-4.535*	-5.627**	-4.002	3.609	-5.181*	0.795
	(2.623)	(2.506)	(3.257)	(2.476)	(3.061)	(2.201)
LLP/NPL_s	4.932**	4.879**	7.864**	6.115**	8.230**	5.219**
	(2.416)	(2.435)	(3.408)	(2.626)	(3.422)	(2.505)
$\ln(Z)_s$	0.876	2.287	-0.235	3.711	1.203	4.231
	(1.690)	(1.685)	(1.670)	(2.597)	(1.684)	(2.720)
policy rate_s	1.309	1.800	6.578**	-2.933	7.337**	-2.863
	(2.147)	(2.232)	(2.627)	(3.571)	(2.830)	(3.372)
market_s	16.570***	18.310***	13.832***	20.281***	14.203***	21.068***
	(2.214)	(2.691)	(2.120)	(4.934)	(2.229)	(5.326)
spread_s	-15.174***	-16.176***	-14.541***		-18.628***	
	(3.354)	(3.576)	(3.898)		(4.151)	
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
R^2_{within}	0.325	0.317	0.393	0.356	0.361	0.369
No. of banks	109	109	66	43	66	43
No. of observ.	1,022	999	579	443	568	431

This table shows the panel regression results for the 2007-2017 period, estimated with bank fixed effects. Columns 1-2 are obtained using the full sample of banks, columns 3-6 using the European and US subsamples. For every sample, two specifications are estimated: (1) with ROA, (2) with the net interest margin, share of non-interest income and cost-income ratio. Variables are standardized using their within standard deviation (subscript 's'), to make the resulting coefficients comparable. The numbers in parentheses are standard errors, clustered at bank level. *, ** and *** indicate significance at 10%, 5% and 1% respectively.

caused by the ECB's 2012 OMT program (clearly visible in the bottom-right panel of Figure 1) - are associated with higher M/B ratios in Europe.

Welch-Satterthwaite tests: explaining the divergence. The significant variables in Table 2 explain bank performance in Europe and the US over time, but are unable to explain the performance gap. To do so, we need to consider differences between Europe and the US in the evolution of the values of these variables. In the top-left panel of Figure 1, we see that the mean M/B ratios in Europe and the US were almost identical (0.75) in 2008, but diverged afterwards. In order to identify the variables associated with this divergence, we analyze the evolution of the main M/B ratio determinants in the post-2008 period for European and US banks. To go beyond a purely descriptive approach, which could be done based on Figure 1, we compare in Table 3 the means of these variables in 2008 and 2017 using the Welch-Satterthwaite test (Derrick et al., 2016).

First, Table 3 shows that the mean deposits/assets ratio significantly increased in Europe between 2008 and 2017. Combined with the negative coefficient in the European subsamples in Table 2, this suggests that increasing shares of deposits can partially explain the post-crisis performance gap between European and US banks. It can be argued that, in a low or negative interest rate environment, the zero-lower bound on (customer) deposits can turn this once cheap source of funding into a costly burden (Heider et al., 2019).

Second, ROA was a key explanation for the performance gap between Europe and the US in the post-crisis period. We conclude from the regressions that a higher ROA is associated with a higher M/B ratio and Table 3 shows that ROA in Europe decreased (although not significant) between 2008 and 2017, while it improved significantly in the US. These results confirm the concerns of central bankers, e.g. Constâncio (2017), regarding European banks' low profitability.

Next, when we disentangle the ROA components, we find that the net interest margin, which is positively associated with European M/B ratios, decreased significantly between 2008 and 2017 in Europe - under pressure from the ECB's accommodative monetary policy - but did much less so in the US. Moreover, the coefficient of the policy rate in the panel regressions is significantly positive in Europe, indicating that lower rates go hand in hand with lower bank perfor-

Table 3: Evolution of explanatory variables over time

		Europe			US		
		mean	stdev.	% change	mean	stdev.	% change
ln(assets)	2008	18.7	1.7	0,8%	17.2	1.7	4,7%**
	2017	18.8	1.4		18.0	1.3	
deposits/assets	2008	45.3	17.7	25,8%***	65.5	11.2	12.8%***
	2017	56.9	12.7		73.9	8.7	
equity/assets	2008	6.0	2.6	28,9%***	10.8	3.3	8,3%
	2017	7.7	2.5		11.7	2.3	
ROA	2008	0.5	0.6	-27,8%	-0.3	2.7	407,8%***
	2017	0.4	0.6		1.0	0.4	
NIM	2008	1.8	0.8	-18,3%**	3.5	0.8	-7,1%
	2017	1.5	0.6		3.2	0.6	
cost/income	2008	66.3	36.4	-4,4%	81.1	54.1	-26,3%**
	2017	63.4	14.2		59.8	7.7	
NPL/equity	2008	43.3	47.1	55.9%*	11.9	8.5	-44.6%***
	2017	67.5	91.0		6.6	4.8	
LLP/NPL	2008	57.9	25.2	29.0%	124.7	71.4	-5,5%
	2017	74.7	78.6		117.8	105.5	
policy rate	2008	1.8	0.7	-123,2%***	0.1	NA	1000.0%
	2017	-0.4	0.4		1.4	NA	
market	2008	57.7	NA	110,2%	60.3	NA	231.0%
	2017	121.2	NA		199.7	NA	
spread	2008	50.7	96.1	51.5%	NA	NA	NA
	2017	76.9	117.8		NA	NA	

In this table, the Welch-Satterthwaite test is used to compare mean values of key variables in 2008 and 2017. *, ** and *** indicate a significant difference at 10%, 5% and 1% respectively.

mance, after controlling for other channels (ROA, NPL, market). At the same time, we find that the policy rate indeed decreased in Europe in 2008-2017, suggesting that the accommodative monetary policy of the ECB is associated with low European bank M/B valuations. In general, our findings therefore support recent concerns about the low-for-long interest rates in Europe (Heider et al., 2019; Borio et al., 2017; Claessens et al., 2018). In the US, the main profit-related channel seems to be cost efficiency: the mean US cost/income ratio significantly decreased between 2008 and 2017, which had a positive impact on bank valuations. In Europe, this channel cannot be found, possibly due to a lack of cost efficiency progress, as reported in ECB (2019).

In terms of asset quality, Table 3 indicates no significant evolution in the coverage ratio, although the average level in the US was much higher than in Europe. Table 3 does show an increase in NPL for European banks between 2008 and 2017 due to the European debt crisis. Based on the negative coefficient in the regressions, NPL contributed significantly to low M/B ratios in Europe. Our findings are therefore consistent with too slow NPL resolution and forbearance (Lamers et al., 2019) and support regulators' NPL-related warnings and recommendations towards European banks (ECB, 2019). For the US, on the contrary, the share of NPL decreased over time.

4. Conclusions

Our results show that one of the main drivers of bank M/B ratios in the 2007-2017 period was profitability. While ROA increased considerably in the US after the crisis, it remained very low in Europe. In the US, the improvement in cost efficiency was a key driver of improved profitability, whereas the pressure on the net interest margin hurt European banks. When European banks want to sustainably improve their M/B ratios, cost efficiency will be an essential driver.

Second, policy rates are found to be positively related to European (but not US) banks' M/B ratios, after correcting for other channels such as profitability and non-performing loans. Therefore, a persistent period of low interest rates in Europe could have negative effects on bank franchise values and M/B valuations. Additionally, this analysis shows that increasing shares of deposits in post-crisis Europe were linked with lower performance, which might be due to the low-for-long monetary policy environment eroding the value of deposit funding. The ECB's OMT program, on the other hand, pushed down government bond yield spreads in Europe, which was associated with higher bank performance.

Finally, our results with respect to asset quality call for decisive action in tackling legacy assets and the clean-up of non-performing loans in Europe. This requires resolution actions on the part of supervisors as well as a harmonization of bankruptcy and litigation regulations across Europe. Moreover, the analysis also stresses the importance of adequate provisioning in Europe and the US.

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