

# WORKING PAPER

## EUROPEAN BANK PROFITABILITY: THE GREAT CONVERGENCE?

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# European bank profitability: the Great Convergence?\*

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## Abstract

Have Euro Area banks restored viability in the post-crisis era? We investigate profitability convergence for Euro Area banks over the period 2009-2020 using the concepts of  $\beta$  and  $\sigma$  convergence and a club clustering algorithm. Our evidence is consistent with a slow catch up of the weaker banks, but we also document that better performing banks converge towards a lower profit level, suggesting a ‘great convergence’ towards the middle. Moreover, we identify a cluster of banks exhibiting dismal profit dynamics, indicating the need for a restructuring of part of the Euro Area banking sector.

*JEL classification:* C38; G20; G21.

*Keywords:* Euro Area banks, bank profitability,  $\beta$  convergence,  $\sigma$  convergence, club clustering analysis

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# 1 Introduction and motivation

Banking crises are of all times (Laeven & Valencia, 2013) and they produce adverse effects on the real economy (Dell’Ariccia et al., 2008). For Euro Area banks, the Global Financial Crisis (GFC) and the sovereign debt crisis constituted major shocks, resulting in widespread bank distress and weak profitability. The question we address is: Was the euro area banking sector able to recover post-crisis? Do we observe convergence in terms of profitability and a lower dispersion across banks? Or do some banks fail to recover and remain non-viable? These are important questions because if this were the case, the banking system would require restructuring in the form of consolidation or resolution.

In the period 2008-2013, European banks were hit by two major disruptions to their profitability. In the GFC, a substantial number of banks only survived because they were rescued by their governments (Acharya et al., 2020). The second shock was the sovereign debt crisis during which a considerable number of banks were exposed to losses in government securities (Acharya & Steffen, 2015), resulting in a doom loop between banks and sovereigns (Lamers et al., 2022). In the ensuing recession, many banks accumulated non-performing loans which exerted additional negative pressure on profitability. As a result, the Euro Area bank landscape was characterized by a wide range of bank return profiles, with some agile banks weathering the storm relatively unscathed, while vulnerable banks exhibited very negative profitability.

Why then do we expect post-crisis convergence, i.e. a catching-up of the weak banks towards profitability levels of the stronger ones? First, because governments intervened. Banks receiving government support are recapitalized and can attract funding at a reasonable cost. There is evidence that bank performance improved after bailouts, although not necessarily for all banks (Gerhardt & Vander Vennet, 2017). Second, banks are subject to the same type of post-GFC regulation. The cornerstone is Basel 3 with strengthened capital regulation and new liquidity rules. The new rules oblige banks to maintain higher capital buffers, hold more liquid assets and attract more deposit funding. This may incentivize banks to adopt similar strategies so that banks become more alike in terms of funding and asset structure, causing their profitability to converge.

On a broader regulatory front, steps were taken to establish a European Banking Union. As the single supervisor, the ECB may impose discipline on bank management (Loipersberger, 2018), by assessing the business model viability of the banks under its supervision and issuing recommendations for improved governance. Similarly, the Single Resolution Board obliges banks to establish recovery and resolution plans which reinforces banks' risk management. Moreover, systemic banks are required to hold bail-inable debt, which may strengthen market discipline. Together, these supervisory requirements should incentivize banks to improve their profitability and strengthen the viability of their business model.

Another force supporting convergence is that the macroeconomic and monetary context is similar for all Euro Area banks. The ECB has introduced various conventional and unconventional monetary policy measures resulting in lower interest rates and a flatter yield curve. Altavilla et al. (2018) claim that the accommodative monetary policy of the ECB is broadly neutral for bank profitability. But eventually, low-for-long rates have a detrimental impact on the banks' net interest margin and return on assets (Borio et al., 2017; Claessens et al., 2018; Molyneux et al., 2019; Present et al., 2021). Banks may try to compensate pressure on the net interest margin by increasing non-interest income (Brei et al., 2020).

Taking these trends together, we empirically test whether bank profitability converges following the GFC and the sovereign debt crisis. Do bad performers catch up? Does the dispersion of bank profitability decline? To do so, we use the concepts of  $\beta$  and  $\sigma$  convergence as well as a club clustering algorithm for Euro Area banks over the post-2008 period. These methodologies have been used to examine convergence of efficiency and productivity in European banks (Matousek et al., 2015; Degl'Innocenti et al., 2017). Our study is also related to Bongini et al. (2019) who examine the drivers of profitability shocks for European banks. We contribute to this literature by investigating whether or not Euro Area bank profitability recovers following two major distress periods.

## 2 Data and methodology

The sample consists of the 115 financial institutions under the supervision of the ECB at the end of 2020. We obtain yearly bank data at the consolidated level from S&P Capital IQ

Pro for the period 2008 to 2020. To measure bank profitability we use the return on assets (ROA) and return on equity (ROE). We also consider the market-to-book ratio (M/B) to capture the long-term profit potential of the listed banks (Simoens & Vander Vennet, 2021). Table 1 provides summary statistics for the three profitability variables.

Name	Description	N	Mean	SD	Min	Max
ROA (%)	Net income as a percent of average assets	1218	0.23	1.26	-6.74	3.51
ROE (%)	Net income as a percent of average equity	1206	2.39	15.80	-89.47	30.58
M/B (%)	Price as a percent of book value per share	430	74.13	43.48	6.85	337.62

**Table 1:** Descriptive statistics for the profitability measures. The variables are winsorized at the 1<sup>st</sup> and 99<sup>th</sup> percentile. The list of Member States for which banks are included is: Austria, Belgium, Bulgaria, Cyprus, Estonia, Finland, France, Germany, Greece, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Portugal, Slovenia and Spain.

To assess convergence of profitability, we apply the concept of  $\beta$  and  $\sigma$  convergence introduced by Barro & Sala-i Martin (1992). We estimate the following equation:

$$\Delta PROF_{i,t} = \alpha + \beta PROF_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

where  $\Delta PROF_{i,t} = PROF_{i,t} - PROF_{i,t-1}$ .  $PROF$  represents the profitability measure ( $ROA$ ,  $ROE$  or  $M/B$ ). When the coefficient  $\beta$  is negative, this implies  $\beta$  convergence, also known as the ‘catch-up’ effect. Banks with a lower level of profitability experience a larger change to their profitability in the next period. Conversely, banks with a higher level of profitability exhibit a smaller or even negative change.  $\beta$  convergence is a necessary, but not sufficient condition for bank profitability to converge. For this to happen, we assess  $\sigma$  convergence using the following regression:

$$\Delta W_{i,t} = \alpha + \sigma W_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

where  $W_{i,t} = PROF_{i,t} - \overline{PROF}_t$  and  $\Delta W_{i,t} = W_{i,t} - W_{i,t-1}$ . When the  $\sigma$  coefficient is negative, we conclude  $\sigma$  convergence. The profitability of each bank then gradually converges towards the cross-sectional average over time and the dispersion of profitability across banks decreases.

Since  $\beta$  and  $\sigma$  convergence test for convergence in the full sample of banks, they do not provide information on the possible existence of convergence clubs or clusters. A convergence club originates when, e.g., the most profitable banks converge towards a similar level of profitability which is different from the level to which less profitable banks converge. To test this type of convergence, we follow Phillips & Sul (2007, 2009) and run a log t regression test for convergence within subsamples of banks. The test first derives a relative transition parameter  $h_{i,t}$  which measures the transition path of each bank in relation to the evolution of the sample average. Next the convergence of the relative transition parameters is tested using the log t regression:

$$\log \left( \frac{H_1}{H_t} \right) - 2 \log L(t) = a + b \log t + u_t \quad (3)$$

where  $H_t$  is the cross-sectional variance <sup>1</sup> of the relative transition parameter  $h_{i,t}$  and  $L(t)$  is a function diverging to infinity over time, here  $\log(t)$ . Convergence within the tested sample is reached when the  $b$  coefficient is negative. Repeating the different steps of the club convergence algorithm allows to detect different groups of banks with different profit dynamics.

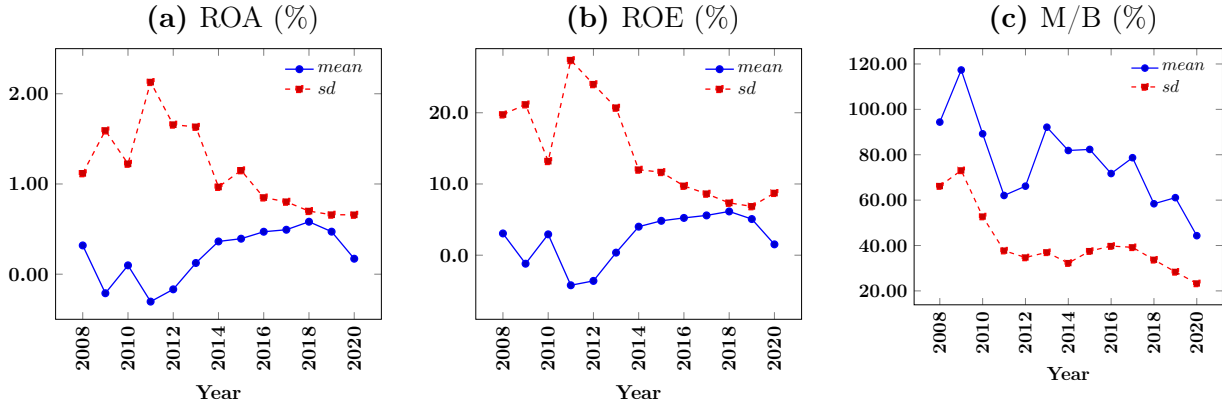
## 3 Results

### 3.1 Post-GFC $\beta$ and $\sigma$ convergence

Our main hypothesis is that bank profitability in the post-GFC era converges. We show graphical and econometric evidence to analyze whether or not convergence occurs. Figure 1 depicts the evolution of the average and the standard deviation of ROA, ROE and the M/B ratio, while Tables 2 and 3 show the estimation results for  $\beta$  and  $\sigma$  convergence. In the tables, we consider two periods, one covering the entire post-GFC era (2009-2020) and a

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<sup>1</sup>As under the condition of convergence, the relative transition parameter  $h_{i,t}$  should approach 1, the cross-sectional variance is calculated as  $H_t = \frac{1}{N} \sum_{i=1}^N (h_{i,t} - 1)^2$ , with  $N$  the number of banks and  $h_{i,t} = \frac{X_{i,t}}{N^{-1} \sum_{i=1}^N X_{i,t}}$



**Figure 1:** This figure shows the evolution of the profitability measures. The mean and standard deviation are plotted.

second covering the period following the sovereign debt crisis (2013-2020).<sup>2</sup>

Figure 1 shows that the average ROA and ROE of Euro Area banks recovers in the post-crisis period. At the same time, we observe that the dispersion of ROA and ROE, measured as the standard deviation across banks, declines, suggesting convergence of the Euro Area banks' accounting profitability.

	(1) ROA	(2) ROA	(3) ROE	(4) ROE	(5) M/B	(6) M/B
$\alpha$	0.109*** (0.035)	0.219*** (0.033)	1.396*** (0.508)	2.836*** (0.534)	13.400*** (2.905)	10.091*** (2.719)
$\beta$	-0.524*** (0.059)	-0.532*** (0.060)	-0.603*** (0.040)	-0.661*** (0.063)	-0.235*** (0.038)	-0.193*** (0.041)
LT conv. level	0.209 (0.063)	0.412 (0.062)	2.316 (0.797)	4.293 (0.651)	56.925 (5.543)	52.251 (6.142)
Start	2009	2013	2009	2013	2009	2013
End	2020	2020	2020	2020	2020	2020
N-obs.	1,164	842	1,142	831	413	295
Adj. R <sup>2</sup>	0.277	0.353	0.329	0.447	0.153	0.098

**Table 2:** Estimations of the  $\beta$  convergence specification (equation 1) for the full sample of the three profitability measures. Estimates obtained using pooled OLS. The numbers in parentheses are standard errors, clustered at the bank level. Standard errors on the long-term convergence level are obtained using a Taylor expansion for the ratio of two normally distributed variables. \*, \*\* and \*\*\* indicate significance at 10%, 5% and 1% respectively.

<sup>2</sup>One concern with the choice of the periods is that the inclusion of 2020 may affect the estimations since it was the year in which Covid-19 exerted a downward impact on bank profitability, a phenomenon that is visible in Figure 1 for the three measures of bank profitability. However, leaving out 2020 does not alter the results.

	(1)	(2)	(3)	(4)	(5)	(6)
	ROA	ROA	ROE	ROE	M/B	M/B
$\alpha$	-0.013 (0.033)	-0.004 (0.031)	-0.135 (0.478)	-0.090 (0.441)	-0.337 (1.137)	-0.140 (1.093)
$\sigma$	-0.531*** (0.059)	-0.530*** (0.061)	-0.606*** (0.040)	-0.664*** (0.063)	-0.214*** (0.033)	-0.178*** (0.040)
Start	2009	2013	2009	2013	2009	2013
End	2020	2020	2020	2020	2020	2020
N-obs.	1,164	842	1,142	831	413	295
Adj. R <sup>2</sup>	0.283	0.346	0.334	0.441	0.172	0.115

**Table 3:** Estimations of the  $\sigma$  convergence specification (equation 2) for the full sample of the three profitability measures. Estimates obtained using pooled OLS. The numbers in parentheses are standard errors, clustered at the bank level. \*, \*\* and \*\*\* indicate significance at 10%, 5% and 1% respectively.

This graphical pattern is confirmed in Tables 2 and 3. The coefficients  $\beta$  and  $\sigma$  are negative and statistically significant, which is consistent with the convergence hypothesis. The results indicate that profitability of the banks evolves towards a common level, while at the same time dispersion across banks decreases. The  $\beta$  and  $\sigma$  values are similar for both post-crisis periods. In the  $\beta$  convergence table, we also report *LT convergence level*, i.e. the hypothetical long-term value to which ROA or ROE would converge in the steady state, given the estimated coefficients of  $\alpha$  and  $\beta$ . From Table 2 we can see that the LT convergence levels are higher in the post-2013 period compared to the full post-2009 era, indicating a slight pickup of achievable longer-term profitability following the sovereign debt crisis. Overall, we find support for the hypothesis that there is convergence of the accounting profitability of Euro Area banks, potentially driven by common regulation and macroeconomic conditions.

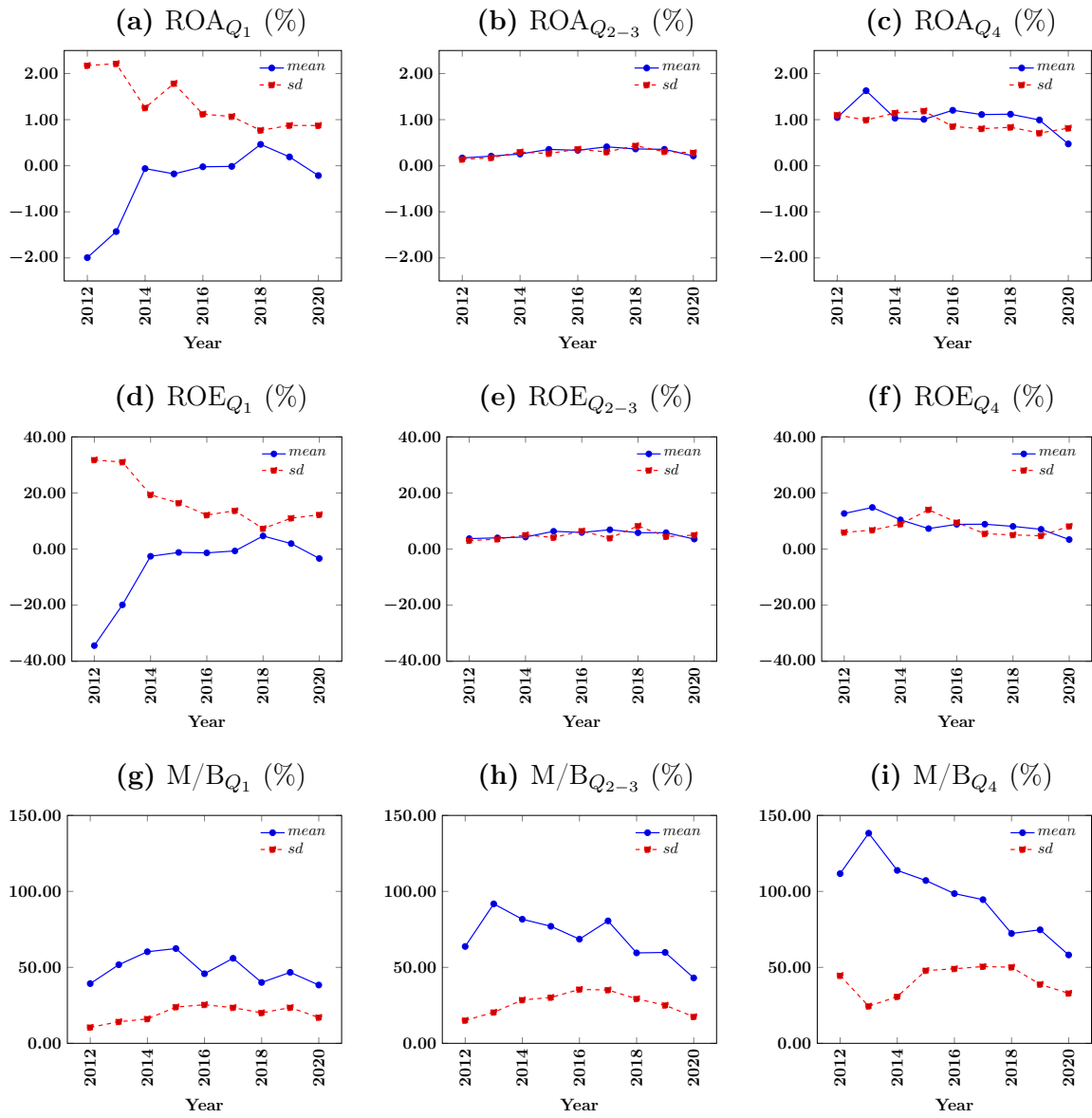
Figure 1 and Tables 2 and 3 also contain the analysis for the forward-looking M/B ratio. The findings are consistent with the convergence hypothesis, since the dispersion of M/B ratios is found to decrease in Figure 1, while both  $\beta$  and  $\sigma$  are negative and significant in Tables 2 and 3. However, Figure 1 indicates that the convergence is towards a substantially lower level of M/B, indicating that stock market investors judge that a more stringent regulatory environment and a long period of monetary accommodation are associated with lower profit potential for Euro Area banks. The average M/B ratio declines from around 100% to around 60%. These findings are in line with Simoens & Vander Vennet (2021) who show that M/B ratios of European banks have been negatively impacted by the low-for-long interest



rate environment. The below 100% average M/B ratios are also consistent with the finding that Euro Area banks on average fail to achieve a return on equity that matches their cost of equity (Andersson et al., 2018; Enria, 2021).

Next, we consider whether or not the finding of overall convergence hides different profit dynamics in subgroups of banks characterized by different levels of profitability. We divide the banks into quartiles based on their ROA, ROE or M/B in 2012-2013, and group banks into three categories:  $Q_1$  contains the banks with the weakest initial performance,  $Q_4$  the banks with the highest profit metrics, and  $Q_{2-3}$  are the middle performers. This setup allows us to investigate whether the well performing banks are able to maintain their profit level while the low performers succeed in catching up. Figure 2 displays the evolution of the average and standard deviation of the three profit metrics for the banks in  $Q_1$ ,  $Q_{2-3}$  and  $Q_4$ .

The pattern can be summarized as follows. Overall, the evidence is consistent with profitability convergence. ROA and ROE experience a drop in the crisis periods, but increase thereafter for all bank quartiles (blue lines in Figure 2). Moreover, the standard deviation (red lines in Figure 2) decreases, indicating lower dispersion across banks. The graphical pattern is confirmed by the negative and significant coefficients for  $\beta$  and  $\sigma$  in Table 4. However, Figure 2 shows a different pattern across the profit quartiles. ROA and ROE for the worst performing banks (Figure 2a and 2d) rebound after the steep drop in the crisis years. Yet, for the middle group of banks (Figure 2b and 2e)) post-crisis profitability is restored but hardly reaches the initial levels. The best performers never return to their initial profit levels (Figure 2c and 2f), a finding consistent with evidence in Bongini et al. (2019). Hence, we observe convergence, but not in the sense that all banks are able to achieve a high level of profitability, the observed pattern is one of convergence to a common mean. One could label it ‘the great convergence’ to an average ROE. The finding that bank performance is under pressure in the most recent years is consistent with Borio et al. (2017) and Present et al. (2021) who show that persistently low interest rates erode bank interest margins and profitability. For M/B the results in Table 4 are consistent with convergence, however both  $\beta$  and  $\sigma$  are much lower than for ROA and ROE, indicating a much slower speed of convergence. Figure 2, moreover, shows that for banks in all quartiles, M/B convergence is towards a lower level over the post-crisis period.

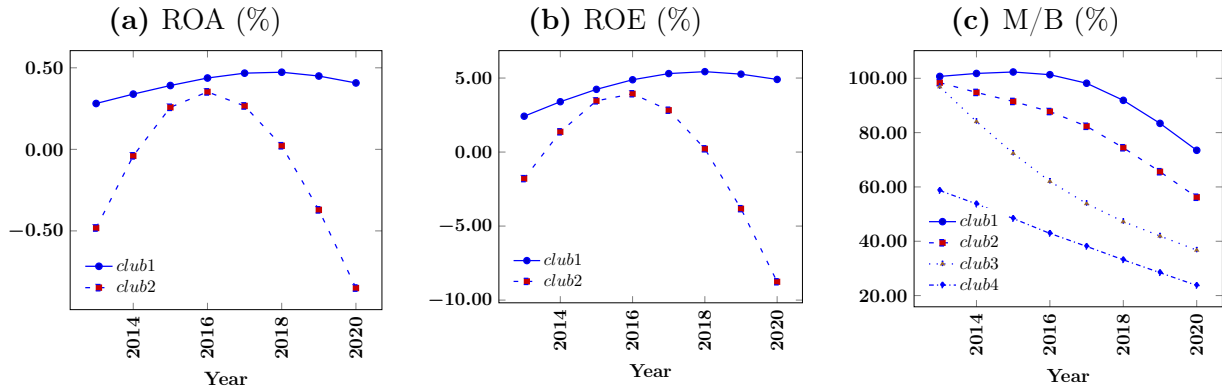


**Figure 2:** This figure presents the evolution of the different profitability measures for the different quartiles based on the average of the measures over the years 2012 and 2013. The mean and standard deviation are plotted.

	(1)	(2)	(3)	(4)	(5)	(6)
	ROA	ROE	M/B	ROA	ROE	M/B
<i>Panel A: Q<sub>1</sub>, low initial profitability</i>						
$\alpha$	-0.049 (0.086)	-1.511 (1.285)	13.964*** (3.295)	-0.353*** (0.086)	-5.314*** (1.339)	-2.241 (2.652)
$\beta$	-0.724*** (0.054)	-0.812*** (0.076)	-0.280*** (0.057)			
$\sigma$				-0.745*** (0.056)	-0.847*** (0.081)	-0.204*** (0.052)
LT conv. level	-0.067 (0.120)	-1.861 (1.602)	49.865 (7.456)			
N-obs.	211	207	72	211	207	72
Adj. R <sup>2</sup>	0.460	0.533	0.116	0.453	0.528	0.065
<i>Panel B: Q<sub>2-3</sub>, average initial profitability</i>						
$\alpha$	0.108*** (0.020)	2.435*** (0.507)	13.900** (6.270)	-0.052*** (0.016)	0.262 (0.216)	-0.012 (1.738)
$\beta$	-0.341*** (0.074)	-0.468*** (0.113)	-0.234** (0.088)			
$\sigma$				-0.412*** (0.066)	-0.502*** (0.089)	-0.195** (0.076)
LT conv. level	0.317 (0.036)	5.207 (0.497)	59.391 (9.207)			
N-obs.	415	412	125	415	412	125
Adj. R <sup>2</sup>	0.159	0.219	0.086	0.232	0.270	0.086
<i>Panel C: Q<sub>4</sub>, high initial profitability</i>						
$\alpha$	0.362** (0.138)	2.435*** (0.533)	5.949 (5.802)	0.177** (0.083)	0.563 (0.473)	0.116 (2.829)
$\beta$	-0.391*** (0.140)	-0.383*** (0.066)	-0.134* (0.062)			
$\sigma$				-0.380*** (0.124)	-0.399*** (0.059)	-0.152* (0.075)
LT conv. level	0.927 (0.112)	6.356 (1.199)	44.353 (28.996)			
N-obs.	196	195	62	196	195	62
Adj. R <sup>2</sup>	0.204	0.176	0.044	0.215	0.235	0.080

**Table 4:** This table presents the results of estimating the  $\beta$  and  $\sigma$  convergence specifications (equation 1 and 2) for the different quartiles of the profitability measures. Panel A provides results for banks in the quartile with lowest average profitability in 2012-2013. Panel B reports the result for banks in the middle two quartiles. Panel C presents results for banks with the highest average profitability in 2012-2013. The sample period runs from 2013 to 2020. The numbers in parentheses are standard errors, clustered at the bank level. Standard errors on the long-term convergence level are obtained using a Taylor expansion for the ratio of two normally distributed variables. \*, \*\* and \*\*\* indicate significance at 10%, 5% and 1% respectively.

In the final stage of our analysis we investigate the existence of clusters with diverging performance dynamics. We perform the Phillips & Sul (2007, 2009) clustering algorithm for the three profit metrics and show the results in Figure 3. The algorithm generates 2 clubs for ROA, ROE and 4 clubs for M/B. For ROA and ROE, club 1 contains the banks which exhibit a mild profitability recovery in the post-crisis period, although it levels off at the end. The majority of the Euro Area banks (93%) in the sample belong to this cluster, again supporting the convergence hypothesis. The second cluster of banks exhibits a steep decline in profitability in the crisis years followed by a recovery which subsequently reverses to poor performance. This cluster is populated by a smaller number of banks, typically headquartered in countries hit hardest by the GFC or the sovereign debt crisis (examples are Allied Irish Bank, Bank of Ireland and Eurobank Ergasias) or banks that were unable to restore profitability (examples in this club are Bankia (was recapitalized by the Spanish government), HSBC France (was sold in 2021) and Banca Carige in Italy (currently being sold by the Italian deposit guarantee fund)). For M/B the algorithm identifies 4 clusters of banks. Most banks are situated in clubs 1 and 2, exhibiting slowly declining M/B ratios. Examples of underperformers in club 3 are Société Générale, Eurobank Ergasias, National Bank of Greece, Bank of Ireland, Banco Comercial Portugues. Among the strong underperformers in cluster 4 are Commerzbank, Deutsche Bank, Banco Sabadell and Banca Monte dei Paschi di Siena. The source of severe underperformance differs for these banks (e.g. unclear business model, frequent fines, very high cost/income ratios, high levels of non-performing loans), but their persistently low stock market valuations indicate that stock market investors doubt their longer-run viability.



**Figure 3:** This figure shows the time evolution of the average profitability measure within the different clubs formed using the algorithm developed in Phillips & Sul (2007). The estimation period runs from 2013 until 2020.

## 4 Conclusion

An important policy question is whether or not the Euro Area banking sector is able to recover in the post-crisis period or that some banks remain underperformers, casting doubt on their long-term viability. While our evidence for the accounting measures (ROA and ROE) is consistent with a slow catch up of the banks with relatively low profitability, we also find that the better performing banks converge towards a lower profit level. Hence, post-crisis bank profitability exhibits a ‘great convergence’ towards the middle. For the forward-looking market-based market/book ratio, we document convergence towards a substantially lower value in the post-crisis period, indicating that stock market investors have re-assessed the profit potential of Euro Area banks. While this may be due to the low-for-long interest environment caused by the long period of policy accommodation by the ECB, for some banks, ill adapted business models may also play a role since we identify a relatively small cluster of banks which exhibit dismal profit dynamics, indicating that this group of persistent underperformers has a non-viable business model.

These findings suggest policy implications in various dimensions. For the banks, it is important to assess the viability of their business model, because adaptation to the new regulatory and macroeconomic environment will determine their future profit potential. For the banking industry, restructuring may occur through managerial action or through mergers or acquisitions in which better performing banks upgrade the profit potential of the laggards.

ECB policymakers openly advocate consolidation as an avenue to improve the profitability of Euro Area banks (see Enria, 2021). If consolidation fails to happen and if certain badly performing banks do not succeed in improving their efficiency and making their business model future-proof, resolution of the weaker banks may be inevitable to restructure part of the non-viable banking system.

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