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Tom Berglund–Mikko Mäkinen

**Learning from Financial Crisis:
The Experience of Nordic Banks**



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Learning from Financial Crisis: The Experience of Nordic Banks¹

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Tom Berglund* and **Mikko Mäkinen****

Abstract: To study whether banks retain their lessons from the experience of a severe financial crisis, we examine the effects of the systemic banking crisis of the early 1990s in three Nordic countries (Finland, Norway, and Sweden). While this crisis largely bypassed the rest of Europe, we hypothesize that banks in the three affected Nordic countries took their crisis experiences to heart and as a result outperformed other European banks during the 2008 global financial crisis. Based on a large panel data set of Nordic and European banks for the period 1994–2010, our findings support our main hypothesis that the Nordic banks learned from the 1990s crisis and adjusted their business models accordingly. Our descriptive analysis of Nordic banks finds evidence of “lessons learned” in such precautions as robust capital cushions, improvements in management efficiency and higher credit quality demands relative to the rest of Europe.

JEL Codes: G01; G21; G34

Keywords: financial crises, European banks, learning, bank performance

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1. Introduction

A growing body of finance literature suggests that the experiences of executives and investors can significantly affect their subsequent behavior and performance (e.g. Bertrand and Schoar, 2003; Malmendier and Nagel, 2011; Malmendier, Tate, and Yan, 2011). In a similar vein, an entire age cohort may share common economic experiences such as an episode of persistent high inflation that subsequently colors their inflation expectations (Malmendier and Nagel, 2015).

Organizations, too, may be scarred by experience. For example, an unexpected adverse event could lead an institution to reassess its future payoff probabilities and modify its risk culture (Gennaioli, Shleifer, and Vishny, 2012). Anecdotally, the near-bust experience of the Nokia Corporation in the 1980s forced the conglomerate to focus on its mobile phone and network businesses, a transformation that enabled its global success in the 1990s. Similarly, Lou Gerstner attributes IBM's encounter with hard times in the early 1990s to its later success; the management team abandoned its internally focused process-driven approach in favor of a market-driven quality strategy (Gerstner, 2002).

While the scope for learning for individuals and institutions from their prior experiences is well documented, only one study to the best of our knowledge considers whether banks retain the lessons of financial crisis. Fahlenbrach, Prilmeier, and Stulz (2012) (henceforth FPS) offer two competing hypotheses. Under their *learning hypothesis*, banks internalize the lessons of the crisis experience, while under the *risk culture hypothesis*, persisting risk culture prevents banks from internalizing their experiences and within a few years they are back to their old ways. Using data on 280 banks listed on US exchanges, they test these hypotheses by considering whether a bank's performance in a previous financial crisis predicts its performance in a subsequent crisis.²

² The preceding crisis in their study is the 1998 crisis, which was triggered by Russia's default on foreign debt and the collapse of the hedge fund managed by Long-Term Capital Management (LTCM), which was heavily exposed to

They find is that a bank's poor stock return performance in the 1998 crisis is a strong predictor of poor performance and likelihood of failure in the 2008 crisis. Specifically, for each percentage point of loss in value of equity in 1998, a bank lost 66 basis points in the 2007–2008 crisis, suggesting an inflexible risk culture is the dominant determinant in bank business models. This finding is inconsistent with the learning hypothesis.

Our paper aims to provide evidence on the scope of bank learning from financial crises. For this purpose, we construct a European panel data set from 1994 to 2010, based on annual financial statements of individual banks. Following FPS (2012), we distinguish between the learning and risk culture hypotheses. We exploit the fact that three institutionally, economically, and socially similar Nordic countries – Finland, Norway and Sweden – experienced severe economic and systemic banking crises in the early 1990s (henceforth “the Nordic crisis”) that other European countries largely avoided. Indeed, the relative economic and social costs of the crisis to Finland, Norway, and Sweden were so large that Reinhart and Rogoff (2008) include the Nordic crisis among the five worst post-World War II banking crises in industrialized countries before the 2008 Great Recession.³

Consistent with the learning hypothesis, our main testable prediction is that the Nordic banks were less exposed to the 2008 financial crisis than banks in other European countries. Evidence in the favor of the Nordic banks' strong performance in the 2008 crisis implies that the Nordic banks took the lessons of the Nordic crisis to heart and adjusted their business models accordingly. However, if only minor performance differences are observed between the banks in the Nordic countries and other European countries during the 2008 financial crisis, we would

Russian debt. Their subsequent crisis is the recent Great Recession, which began with the collapse of Lehmann Brothers in September 2008.

³ We do not include the Nordic countries Iceland and Denmark here. Neither country experienced systemic financial crisis in the early 1990s.

ascribe this to a persistent risk culture or business model.

Our findings reveal significant performance differences between Nordic banks and other European banks preceding and during the 2008 financial crisis. Most notably, we find Nordic banks were more profitable and less exposed to financial distress than other European banks during the 2008 financial crisis. Thus, our findings support the view that the Nordic banks learned from the Nordic crisis and adjusted their business models.

Our descriptive analysis emphasizes capital cushions, management efficiency, and credit quality as learning indicators. Our main findings are robust to various estimation methods.

This work contributes the banking crisis literature in four ways. First, using novel European bank-level data, we present evidence on learning by Nordic banks from financial crisis experiences. Second, we analyze banks learning from a financial crisis using a comprehensive cross-section of banks (i.e. commercial, co-operative, and savings banks).⁴ Third, our panel data cover individual banks for a relatively long period (1994–2010), allowing us to utilize the fixed effects estimator to control for unobserved heterogeneity across banks. Fourth, our rich panel data set enables us to control for crucial bank and macroeconomic factors *between crises* in order to assess bank performance and the probability of distress.

The rest of paper is organized as follows. Section 2 provides a brief background regarding the Nordic crisis in the beginning of the 1990s. Section 3 reviews related studies. In Section 4, we discuss our data and empirical approach. Section 5 reports our key findings and presents some robustness checks. The final section concludes with directions for future research.

⁴ The number of listed Nordic and European banks is too small to provide a convincing empirical analysis. Adding stakeholder-oriented banks (e.g. cooperative and savings banks) into the sample is quite justified as these banks are major players in European banking.

2. A brief overview of the Nordic financial crisis of the early 1990s

The systemic banking and financial crises in the three Nordic countries in the early 1990s are well-documented.⁵ Drees and Pazarbaşıoğlu (1998) offer an early summary of the events leading up to, during, and after these crises. Stutts and Watts (2009) give an outside observer's perspective of the Finnish, Norwegian, and Swedish experiences. More recently, Honkapohja (2014) provides an excellent summary of the Nordic crisis. The Swedish and the Finnish crises are compared in Jonung et al. (2009). The Norwegian case is discussed in Steigum (2010). The Finnish crisis is examined in detail in Freystätter (2011), Gorodnichenko et al. (2012), and Gulan et al. (2014).

Several common themes emerge from these papers. There is general agreement that the underlying causes and the development of the crises were the same for all countries. Their origins trace back to the financial market liberalization of the late 1980s that opened the door for rapid expansion of bank lending and soaring housing and equity prices. When the boom ended, loan losses quickly reached record levels,⁶ GDP plunged, and unemployment skyrocketed. Finland's crisis was compounded by the simultaneous collapse of the USSR and a severe loss of trade.

The systemic financial crisis in these small Nordic countries was substantial. Governments had to intervene to rescue the operations of banks that were unable to raise sufficient private capital to cover their credit losses. For those running the banks, the crisis was a wake-up call. Bankers once praised for their aggressive lending practices found themselves being sued for negligence and complicity in fraud. Thus, if the learning hypothesis has any relevance

⁵ Laeven and Valencia (2008), who offer one of the more complete and detailed databases on the Nordic banking crisis, find that the banking crisis was systemic in Finland and Sweden for 1991–1995 and in Norway for 1991–1993.

⁶ Note that the growth of loan losses was not restricted to a specific ownership type of banks, although savings banks were the most severely hit in Finland.

for the behavior of Nordic banks, we would expect that the financial crisis of the early 1990s triggered fundamental changes in risk culture and business models of banks geared to reducing the chance of similar traumatic experiences in the future.

3. Related studies

Our study contributes to the growing literature on the scope for learning from experience. As mentioned, several studies find that prior experiences of executives and managers can strongly affect their subsequent behavior (e.g. Bertrand and Schoar, 2003; Malmendier and Nagel, 2011; Malmendier, Tate, and Yan, 2011). Malmendier and Nagel (2015) show how an entire age cohort sharing common inflation experiences can have different inflation expectations than other cohort groups. The theoretical paper by Gennaioli, Shleifer, and Vishny (2012) considers a model in which an unexpected adverse event forces an institution to reassess its future payoff probabilities, triggering a major change in its risk culture. Berger and Udell (2004) test an institutional memory hypothesis by considering how loan officer skills deteriorate over time following a loan bust. The trauma of the loan bust initially dominates the judgment of loan officers, but eventually credit standards ease. The empirical paper of FPS (2012), which is closest to this work, looks at the lessons of financial crisis absorbed by banks listed on US exchanges. They find that bank performance in a previous crisis is a good predictor of its performance in a subsequent crisis. The listed banks in their study for the most part failed to retain lessons from the initial crisis.

To the best of our knowledge, no studies yet examine the scope of learning from prior crises in the European banking sector, or consider the scope for learning using a comprehensive group of diverse ownership types of banks (i.e. not just exchange-listed banks). Moreover, we are unaware of any study that takes advantage of a rich set of panel data for individual banks over a relatively long period (1994–2010 here) to control for unobserved heterogeneity across banks, as

well as important bank and macroeconomic factors in the years *between* crises. This work addresses these gaps.

Our study also relates to research on the determinants of banking crises.⁷ Previous work in this area identifies several key, sometimes overlapping, macroeconomic determinants of banking crisis, including the asset price boom-bust cycle. For an overview of this literature, see e.g. Scherbina (2013). There are numerous discussions of specific macroeconomic determinants, including the credit boom-bust cycle (Claessens et al., 2012; Dell’Ariccia et al., 2014), currency collapses and sovereign debt (Frankel and Rose, 1996; Calvo et al., 2006), local economic conditions (Aubuchon and Wheelock, 2010), and weaknesses in regulation and supervision (Čihák et al., 2012). Other authors analyze the combination of bank-specific and macro factors as determinants of bank failures (e.g. Gonzalez-Hermosillo, 1999; Mare, 2015).

For a review of growing body of econometric studies on early warning indicators of banking crises since the late 1990s, see Kauko (2014). Early warning indicator studies broadly support the view that most banking crises are preceded by foreign credit-driven boom that inflates domestic asset prices and exacerbates external imbalances.

We contribute to this area of research in four ways. First, we consider whether financial crisis experiences trigger fundamental changes in bank risk culture/business models in ways that reduce the likelihood of a subsequent crisis. Second, we consider both bank-specific and macro factors as determinants of financial distress among European retail-oriented banks. Third, no studies to our knowledge have examined the likelihood of financial distress among the Nordic banks during the most recent crisis (2008–2010). Finally, we know of no empirical banking study

⁷ We recognize that it is may be impossible to differentiate between a banking and a currency crisis (i.e. twin crises).

that focuses on *financial distress*,⁸ a broader concept than bank failure, among retail-oriented European banks *and* accounts for the full range of bank ownership formats (i.e. commercial, cooperative, and savings banks). We hope to partly amend these research gaps.

4. Data and empirical approach

4.1 Data

Because they provide consumers with a relatively homogeneous set of financial products and services such as savings accounts and basic loans, payment intermediation and bank and credits cards to consumers and corporate customers, we restrict our analysis to the European retail-oriented banking sector. We exclude from our sample specialized commercial banks such as investment banks, which bear little resemblance to other banks. By focusing on a relatively homogenous group of banks, we hope to eliminate differences in bank performance that could arise from differences in the business models of specialized and retail-oriented banks.

Our empirical analysis is based on annual consolidated financial accounts and ownership information of Nordic3 and EU12 banks over the period 1994 to 2010.^{9,10} The original data are

⁸ FPS (2012) look at failures of individual banks, while we model financial distress. The main reason for doing so is that the frequency of outright bank failures in Europe was quite low/modest in 1994–2010. Our sample also includes cooperative and savings banks. These two bank groups often deal with their banks financial problems internally that may be unobservable to outsiders. One surprising discovery for us was the fact that there seems to be no single site collating public information source for European bank failures in the manner US bank failures are catalogued on the FDIC's website. As it would be a challenging, if not impossible, task to construct a similar record of individual bank failures for European banks, we find our broader concept more appropriate and leave the creation of such a site to others.

⁹ The three Nordic countries we look at are Finland (EU member/euro zone), Norway (non-EU member/non-euro zone) and Sweden (EU member/non-euro zone). These three countries experienced a systemic banking crisis in the early 1990s. We exclude other two Nordic countries, Denmark and Iceland, because Denmark avoided a systemic crisis and Iceland did not experience a financial crisis in the early 1990s.

¹⁰ EU12=Austria, Belgium, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal, Spain, United Kingdom. Except for the UK, all these countries are in the euro zone.

collected by Ferri, Kalmi and Kerola (2015) from the BankScope data provided by Bureau van Dijk.^{11,12} The sample construction is described in detail in the Appendix B.

4.2 Descriptive analysis

We investigate the disparity between the Nordic banks and other European banks by testing whether the sample means of selective key variables differ in the sub-periods 1994–2007 and 2008–2010. These sub-periods are selected for testing (i) whether the Nordic banks differ from other European banks in the period preceding the 2008 crises (1994–2007) and during the 2008 crisis (2008–2010). To examine potential learning mechanisms that might enable Nordic banks to alter their behavior after the crisis of the early 1990s, we separately examine the evolution of selected key financial variables from 1994 to 2010 for Nordic and other European banks.

Table 1 shows sample means and p -values for selected key variables.¹³ As is evident, the cost structure of banks and their efficiency levels are quite similar for Nordic banks and other European banks. We find no statistically significant difference for operating expenses to total costs or interest expenses to total costs. On the other hand, personnel expenses to total costs are significantly higher in European banks. In line with this finding, the cost-to-income ratio (CIR), a proxy for bank managerial efficiency, is significantly better for Nordic banks in both sub-periods. During the recent financial crisis in 2008–2010, the initial impact on costs followed a rather similar pattern in both groups of banks. The difference over the sub-period is mostly explained by

¹¹ We are grateful to them for providing the refined bank data.

¹² BankScope is the standard data set used in many previous cross-country banking studies (e.g. Altunbas and Chakravarty 1998; Iannotta, Nocera, and Sironi, 2007). The coverage of BankScope data is good for most banking sectors within the EU, perhaps Austria, Belgium and Luxembourg being the exceptions (e.g. Schure, Wagenvoort, and O'Brien 2004).

¹³ Based on the equality of sample means t tests.

a more rapid income recovery from the initial shock for the Nordic banks.

Traditional banking consists of attracting customer deposits in exchange for interest payments and lending the deposited funds to other customers at higher rates. Table 1 shows that the Nordic banks base their business more on customer loans than other European banks. This may partly depend on how residential investments are financed. In the Nordic countries, banks are the main suppliers of mortgage loans, while in other European countries special housing finance institutes are more common. For small and medium-sized firms, bank loans constitute the main source of external funding in the Nordic countries.

On the liability side of the bank balance sheet, customer deposits are significantly lower in the Nordic banks. The loan-to-deposit ratio (LDR), i.e. the average percentage of customer loans to customer deposits, is approximately 130 % in the Nordic countries, compared to around 90 % for banks elsewhere in Europe. This implies that the Nordic banks rely heavily on the availability of the interbank liquidity in funding their customer loans. The risk from this strategy became painfully evident during the 2008 financial crisis, when interbank rates surged and banks that relied on the continuous flow of interbank market liquidity in their funding were suddenly forced to pay much higher rates than before the crisis. Moving one row up in Table 1, however, we do not find a statistically significant difference between these two groups of banks for non-interest income.¹⁴

Table 1 also reports results from tests of differences in bank capital, credit quality, liquid assets and return on assets.¹⁵ While the capital ratio (equity-to-total assets ratio) is higher in the Nordic banks in 1994–2007, it is significant only at a 13 % level. However, we find a noticeable

¹⁴ Using non-interest income, we try to capture non-traditional banking activities (such as off-balance sheet business, fees, and service charges) that have become increasingly common among banks.

¹⁵ Return on assets (ROA) is the ratio of net income to total assets, calculated as return on average assets in BankScope.

difference in the capital ratio in favor of the Nordic banks during the recent financial crisis.

Customer credit quality (the ratio of loan loss provisions to total loans) also appears to be better for the Nordic banks.

A striking finding is that there is a major difference in the liquid assets ratio (LAR), i.e. cash and other assets that a bank can be expected to convert into cash quickly relative to total assets.¹⁶ The LAR is significantly higher for other European banks. The LAR decreased from 22.63 in 1994–2007 to 19.94 in 2007–2010 for European banks, while for the Nordic banks the LAR increased from 9.60 to 10.68. Profitability (ROA) was significantly higher in the Nordic banks, both in the 1994–2007 and 2008–2010 sub-periods.

Overall, the results in Table 1 strongly indicate that the Nordic banks performed better than other European banks. This holds for the period between crises and for the recent financial crisis.

Table 1. Sample means for selective key variables.

	1994-2007			2008-2010		
	(1) European banks	(2) Nordic banks	(3) Test on the equality of sample means (<i>p</i> -values)	(4) European banks	(5) Nordic banks	(6) Test on the equality of sample means (<i>p</i> -values)
<i>Costs and efficiency</i>						
Ratio of total operating expenses to total costs (%)	40.99	40.71	0.76	48.64	47.50	0.56
Ratio of interest expenses to total costs (%)	59.01	59.29	0.76	51.35	52.50	0.56
Ratio of personnel expenses to total costs (%)	20.14	18.85	0.01 ***	25.19	22.77	0.02 **
Cost-to-income ratio (CIR, %)	65.01	61.86	0.00 ***	68.64	62.53	0.02 **

¹⁶ Includes sovereign bonds, short-term claims on other banks, and own trading portfolio.

<i>Outputs</i>						
Ratio of total deposits to total assets (TA, %)	70.52	60.60	0.00 ***	70.14	59.86	0.00 ***
Ratio of total loans to TA (%)	58.51	76.48	0.00 ***	60.71	74.80	0.00 ***
Ratio of non-interest income to TA (%)	1.31	1.37	0.67	1.14	0.95	0.37
LDR (loan-to-deposit ratio, %)	90.69	133.41	0.00 ***	93.37	127.69	0.00 ***
Capital ratio (ratio of equity to TA, %)	7.27	7.60	0.13	6.76	8.08	0.01 ***
Credit quality (ratio of loan loss provisions to total loans, %)	0.52	0.21	0.00 ***	0.88	0.38	0.00 ***
LAR (ratio of liquid assets to TA, %)	22.63	9.60	0.00 ***	19.94	10.68	0.00 ***
ROA (return on average assets, %)	0.64	0.78	0.00 ***	0.28	0.56	0.00 ***

Sources: BankScope; authors' calculations.

We now turn to measures indicating whether Nordic banks retained the lessons of the 1990s crisis. Figure 1 shows the development from 1994 to 2010 of four key financial variables (capital ratio, CIR, credit quality, and ROA) for Nordic and other European banks. A striking finding is the Nordic banks have systematically strengthened their capital cushions after the early 1990s crisis. The *capital ratio* was mostly higher in the non-Nordic banks during 1994–2004, but thereafter markedly higher for the Nordic banks. During the 2008 crisis, there is a significant difference in the favor of the Nordic banks. The trend-line improvement of the capital ratio in the period for Nordic banks is consistent with the learning hypothesis.

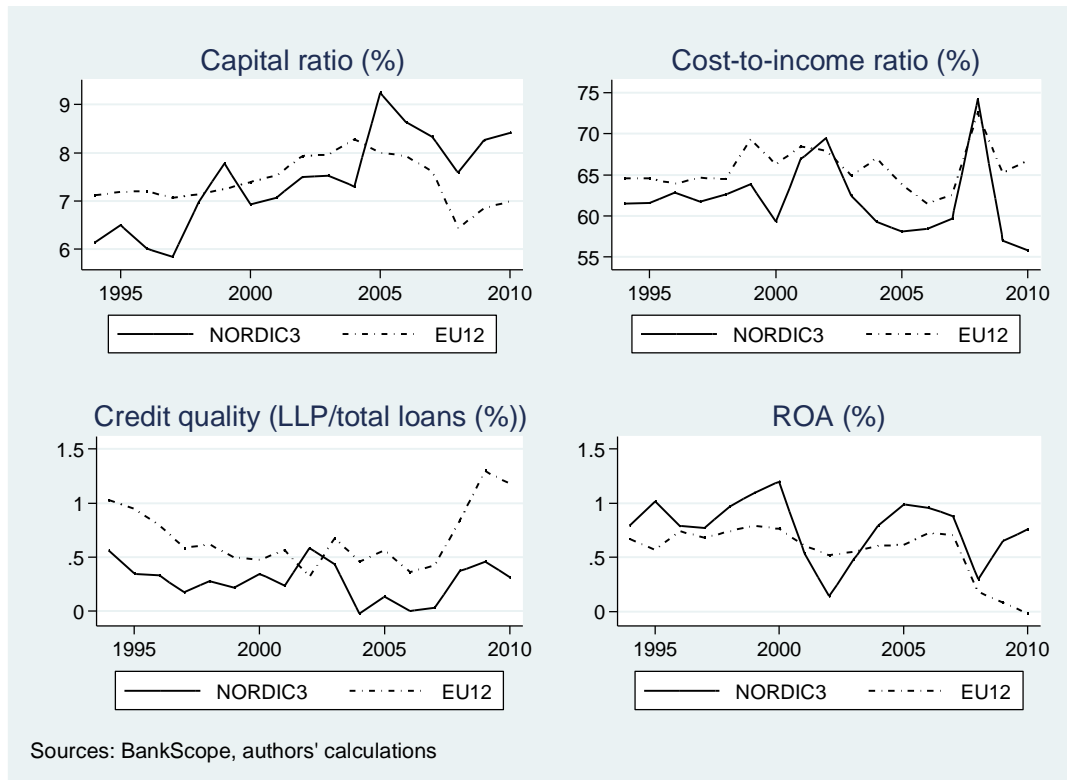
The remaining three series in Figure 1 show that the *CIR* (cost-to-income ratio), a proxy for bank managerial efficiency, is overall better in the Nordic banks in the period. The Nordic banks were able to improve their CIRs faster than other European banks in the years after the dot-

com bubble. More importantly, the Nordic banks have fared much better during the 2008 crisis than the non-Nordic banks.. Because costs followed a rather similar pattern in both groups of banks, the difference largely stems from the faster income recovery of the Nordic banks, suggesting swift and sound managerial reaction to the crises.

Credit quality is also better for the Nordic banks, even if both the Nordic and non-Nordic banks improved their credit quality in the 1994-2007 period. However, Figure 1 shows a significant decrease in credit quality in other European banks during the 2008 crisis. This difference reflects more prudent credit quality management in the case of the Nordic banks, which is consistent with the learning hypothesis.

Except for the dot-com bubble aftermath, *profitability* (ROA) appears to be higher in the Nordic banks for most of the 1994–2007 period. However, profitability increases for the Nordic banks and decreases for other European banks during the 2008 crisis, indicating the Nordic banks' business model was more resilient to the consequences of the 2008 crisis. Again, this finding is consistent with the learning hypothesis.

Figure 1. Capital ratio, CIR, credit quality and ROA.



4.3 Empirical approach

This section defines the main variables that we use in the empirical analysis and discusses our empirical approach. First we use linear panel data models to assess the determinants of bank returns. Thereafter, to quantify the average marginal effects of key explanatory variables on the probability of bank financial distress, we estimate a logit model. To facilitate a comparison between these two approaches, we use the same set of covariates throughout the models.

We measure bank profitability using ROA, the ratio of net income to total assets. To deal with potential outliers, we exclude observations in the first as well as the last percentile of the ROA distribution.

Related to bank profitability is the probability of financial distress. An interesting question from a risk management point of view is whether the Nordic banks differ from other

European banks in this respect. Unlike ROA that is a continuous dependent variable, our distress variable is a binary variable, taking a value of one in each year a distress event occurred, and zero otherwise. Because the realization of financial distress is often a complex and multifaceted phenomenon, we apply two definitions: (i) negative net operating profit¹⁷ (unusually high reported financial losses), defined as losses exceeding of 15 % of total capital (roughly the lowest 15 % of the net profit distribution in our sample); and (ii) ROA (unusually low profitability), defined as a reading of less than 0.2 (roughly the lowest 18 % of the ROA distribution in our sample).

We also use a broad set of control variables. Because market values are unavailable for cooperative, savings, and non-listed commercial banks, we pick our control variables from bank financial statements (internal factors) and macroeconomic indicators (external factors).¹⁸ Our internal factors include the capital ratio, the size of lending activity, exposure to interbank finance, and liquidity. To capture external factors, we use business cycle and inflation measures.¹⁹ We control for potential ownership differences with two dummy variables for stakeholder-oriented banks (i.e. savings banks and cooperative banks).²⁰ Control variable definitions are detailed in Appendix A. Table 2 represents summary statistics for our key variables over the full sample.

¹⁷ Net operating profit = total operating profit – total operating expenses

¹⁸ Using internal and external controls we aim to separate between bank specific and macroeconomic factors.

¹⁹ Our covariates roughly follow the CAMELS categories (see, e.g., Lopez 1999), for an overview) used by many bank regulators and supervisors to assess individual banks' soundness. CAMELS categories are capital adequacy, asset quality, management quality, earnings, liquidity, and sensitivity to market risk. Unfortunately, we cannot apply CAMELS here since we lack adequate measures for asset quality, management quality, and sensitivity to market risk.

²⁰ Commercial banks are the reference category.

Table 2. Summary statistics

Variable	Definition	Mean	Standard deviation	Min	Max
1. ROA	Return on assets (%)	.594	.641	-2.68	4.19
2. NPROFIT_15	=1 if negative net operating profit in excess of 15% of capital, 0 otherwise	.153	.36	0	1
3. ROA_02	=1 if return on assets less than 0.2%, 0 otherwise	.177	.381	0	1
4. Capital ratio	Ratio of equity to total assets (%)	7.23	4.83	-1.86	93.9
5. Size of lending activity	Ratio of total loans to total assets (%)	60.4	21.6	1.06	99.9
6. Exposure to interbank finance	LDR (loan-to-deposit ratio, %)	94.8	52.7	1.33	496
7. Liquidity	LAR (liquid assets-to-total assets ratio, %)	21.1	18.0	.010	96.5
8. Nordic	=1 if Nordic bank, 0 otherwise	.089	.285	0	1
9. Commercial bank	=1 if commercial bank, 0 otherwise	.48	.50	0	1
10. Savings bank	=1 if savings bank, 0 otherwise	.21	.408	0	1
11. Cooperative bank	=1 if cooperative bank, 0 otherwise	.31	.463	0	1
12. Business cycle	Harmonized unemployment rate (%)	7.98	3.24	1.90	20.1
13. Inflation pressures	Annual change of CPI (consumer price index, %)	2.12	1.03	-4.48	5.56

Sources: BankScope; OECD.

To investigate the difference in bank profitability between the Nordic and other European banks, we estimate:

$$(1) ROA_{it} = \beta_0 + \beta_1 CAP_{it} + \beta_2 LENDING_{it} + \beta_3 LDR_{it} + \beta_4 LAR_{it} + \beta_5 SAV_{it} + \beta_6 COOP_{it} + \beta_7 BUSINESS_{it} + \beta_8 INFLATION_{ct} + \beta_9 NORDIC_i + \beta_{10} YEAR_t + \beta_{11} NORDIC * YEAR2008_{it} + \beta_{12} NORDIC * YEAR2009_{it} + \beta_{13} NORDIC * YEAR2010_{it} + \varepsilon_{it},$$

where for bank i in year t , ROA_{it} is return on assets, CAP_{it} is ratio of capital to total assets, $LENDING_{it}$ is ratio of total loans to total assets, LDR_{it} is the loan-to-deposit ratio (a proxy for exposure to interbank finance), and LAR_{it} is the liquid assets-to-total assets ratio. For SAV_{it} , 1 if savings bank, 0 otherwise. For $COOP_{it}$, 1 if cooperative bank, 0 otherwise. $BUSINESS_{it}$ is harmonized unemployment rate (proxy for business cycle in a country of origin of bank), $INFLATION_{it}$ is annual change in the CPI (proxy for inflation pressure in the bank's home), and $YEAR_t$ is a year dummy. Our main interest lies in the coefficients of the interaction terms of $NORDIC * YEAR2008$, $NORDIC * YEAR2009$, and $NORDIC * YEAR2010$ (i.e. β_{11} , β_{12} and β_{13}).

To investigate the difference in financial distress between the Nordic and other European banks, we estimate the pooled logit model²¹:

$$(2) P(FD_{it} = 1) = F(\beta_0 + \beta_1 CAP_{RATIO_{it}} + \beta_2 LENDING_{ACTIVITY_{it}} + \beta_3 LDR_{it} + \beta_4 LAR_{it} + \beta_5 SAV_{it} + \beta_6 COOP_{it} + \beta_7 BUSINESS_{it} + \beta_8 INFLATION_{it} + \beta_9 NORDIC_i + \beta_{10} YEAR_t + \beta_{11} NORDIC * YEAR2008_{it} + \beta_{12} NORDIC * YEAR2009_{it} +$$

²¹ We do not prefer to estimate a random effects logit model because the unobserved effects are unlikely to be independent of the bank-level covariates (see footnote 22). However, as a robustness check we estimate the random effects logit model (not reported but available upon request). Our key findings for the Nordic banks during the 2008 financial crisis remain qualitatively intact.

$\beta_{13}NORDIC * YEAR2010_{it}$),

where for a bank i in year t , the dependent variable financial distress (FD_{it}) takes a value of one if the distress event occurred in that year, and zero otherwise. $F(.)$ is the cumulative standard logistic distribution function. All other explanatory variables are as in Eq. (1).

5. Results

5.1 Determinants of bank returns

For a finding that comports with the learning hypothesis, our initial expectation is that we should see differences in returns between the Nordic banks and European banks, i.e. that Nordic banks achieved higher levels of ROA (profitability) in the full sample period (1994–2010) than their counterparts elsewhere in Europe. Our second expectation, which involves specifically testing for retained learning, is that the Nordic banks should show higher levels of profits during the recent financial crisis in 2008–2010. This is tested by including the interaction terms between YEAR2008-YEAR2010 and NORDIC (1 if Nordic bank, 0 otherwise).

Table 3 shows our estimation results for the determinants of bank profitability. In columns (1) and (2), we use a pooled OLS estimator. Column (1) finds no significant difference in the levels of returns between the Nordic banks and other European banks in the period preceding the recent financial crisis (1994–2007), although the estimated coefficient for the Nordic banks is positive (.085 with a p -value of .20). In column (2), we add the crisis years 2008–2010. Using the full sample period (1994–2010), we find that the dummy variable NORDIC (0.11) is significant at 9 % level, implying about 11 % higher returns for the Nordic banks in 1994–2010. In contrast, the evidence for the performance during the financial crisis in 2008–2010 is mixed.

Consistent with the learning hypothesis, we find positively significant coefficients for the interaction terms NORDIC*2009 and NORDIC*2010 , whereas the coefficient of NORDIC*2008 is negatively significant. A possible explanation for the negatively significant NORDIC*2008 interaction term is that the onset of the recent financial crisis hit Nordic banks harder than other European banks. However, because Nordic banks had learned from their past crisis experiences in the early 1990s, they emerged from the crisis faster than other European banks. Alternatively, it could be that the recovery of other European banks was curtailed by their higher exposure to the eurozone crisis (e.g. due to higher share of various liquid assets in their balance sheet such as sovereign bonds issued by the crises countries) than Nordic banks. While our data do not allow teasing out these two potential explanations, both are consistent with the learning hypothesis.

To mitigate potential endogeneity concerns in column (2), in column (3) we re-estimate the pooled OLS model of column (2) using one-year lagged continuous explanatory variables (i.e. first four explanatory variables and two macro variables). Overall, the estimates are qualitatively similar to those of reported in column (2). In particular, we continue to find that the estimated coefficients of NORDIC*2009 and NORDIC*2010 are positively significant, which is consistent with the “faster recovery” interpretation for the Nordic banks discussed earlier. The important difference to column (3), however, is that now the interaction term NORDIC*2008 is insignificantly negative (p -value 0.15). This implies that there is no significant difference in the way the onset of the recent crisis hit the Nordic banks compared to other European banks.

As our sample includes observations for the same bank over time, in columns (4) and (5) we try to control for unobserved bank heterogeneity (or the omitted variables bias) using fixed effects (FE) and the random effects (RE) panel data estimators. In column (4) we use the FE

estimator and in column (5) the RE estimator.²² The fixed effects estimator is consistent when the unobserved bank effects are correlated with the error term, while the RE estimator is more efficient when the unobserved bank effects are uncorrelated with the error term.²³ We find in columns (4) and (5) that the estimated coefficients of NORDIC*2009 and NORDIC*2010 remain positively significant, which support the “faster recovery” interpretation as in columns (2) and (3). Similarly, we find that the interaction term NORDIC*2008 remains negative, but insignificant (*p*-values 0.13 in column (4) and 0.11 in column (5), respectively). As earlier, this implies the onset of the crisis hit the Nordic banks and other European banks in similar fashion.

Concerning other explanatory variables in Table 3, a short review of the main findings is the following. First, the capital ratio is significant and positively related to returns. The estimated coefficients are in the range of .040–.056. Thus a higher capital ratio does seem to imply higher bank returns. The impact of bank lending activity is positive (about .002–.005), but significant only in columns (1), (4), and (5). Traditional lending thus has at least a marginally favorable impact on bank returns. This indicates that banks managed to screen their loan customers to prevent excessive credit risks. The liquid assets ratio is consistently insignificant, as is exposure to interbank lending.

With respect to macro factors higher inflationary pressures imply significantly higher returns as seen in columns (1)–(3), where we use the pooled OLS estimator. However, after

²² While not reported here (but available on request), our Hausman test suggests that the individual-specific effects are correlated with the covariates, implying the RE estimator is inconsistent and the FE estimator is preferred. A shortcoming of the Hausman test, however, is that it requires the RE estimator to be efficient, which is an assumption that cannot be tested in the Hausman test. Given that we are primarily interested in the coefficients of the interaction terms NORDIC*2008, NORDIC*2009 and NORDIC*2010 in columns (4) and (5), we use an alternative to the Hausman test, single *t* tests, that ignore the other parameters. These tests (also not reported, but available on request) suggest there is no difference between the FE and the RE interaction parameters. We therefore report the estimates based on the RE estimator in column (5).

²³ By using the FE estimator, we cannot include time-constant variables such as dummy variables for bank ownership types and Nordic banks (NORDIC) in our model. However, we can still use the interaction terms between YEAR2008–YEAR2010 and NORDIC to test the learning hypothesis. By the same token, using the RE estimator allows us to include time-constant covariates in the model such as the NORDIC dummy variable.

controlling for unobserved bank heterogeneity in columns (4) and (5), the estimated coefficient is negatively insignificant.

As for differences in returns across different forms of incorporation, cooperative banks appear to be significantly less profitable than commercial banks. This finding is consistent with the view that cooperative banks try to maximize the benefits of their customer owners more broadly and not just returns. In contrast, we find no significant difference between savings banks and commercial banks.²⁴ One potential explanation for the difference between cooperative and savings banks is that the risk culture (or business model) of savings banks have evolved further from traditional stakeholder-oriented banking to riskier commercial banking, while cooperative banks have maintained their traditional deposit-taking and lending business model.

Table 3. Determinants of bank returns

	(1) Pooled OLS 1994-2007	(2) Pooled OLS 1994-2010	(3) Pooled OLS 1994-2010 (lagged $t-1$)	(4) FE 1994-2010	(5) RE 1994-2010
Capital ratio (equity-to-asset ratio)	0.052 *** (0.00)	0.054 *** (0.00)	0.056 *** (0.00) ⁺	0.040 *** (0.00)	0.044 *** (0.00)
Lending activity (loan-to-assets ratio)	0.004 ** (0.02)	0.002 (0.13)	0.002 (0.27) ⁺	0.004 ** (0.03)	0.004 ** (0.02)
Exposure to interbank lending (LDR)	-0.000 (0.62)	-0.000 (0.76)	0.000 (0.92) ⁺	-0.001 (0.17)	-0.000 (0.20)
Liquidity (LAR)	0.002 (0.38)	0.001 (0.46)	0.002 (0.25) ⁺	0.000 (0.92)	0.000 (0.79)

²⁴ This finding is consistent with Mäkinen and Jones (2015).

Nordic bank (0/1)	0.085 (0.20)	0.110 * (0.09)	0.129 * (0.06)	-	0.29 (0.39)
Savings bank (0/1)	0.006 (0.90)	0.016 (0.40)	0.033 (0.42)	-	0.002 (0.97)
Cooperative bank (0/1)	-0.146 *** (0.00)	-0.102 *** (0.00)	-0.084 ** (0.01)	-	-0.112 *** (0.00)
Business cycle (harmonized unemployment rate)	0.008 (0.11)	0.008 * (0.08)	0.010 ** (0.03) ⁺	-0.007 (0.24)	-0.003 (0.55)
Inflation pressures (CPI)	0.041 ** (0.03)	0.038 ** (0.02)	0.040 *** (0.01) ⁺	-0.013 (0.44)	-0.005 (0.77)
Nordic bank*2008	-	-0.213 ** (0.05)	-0.160 (0.15)	-0.160 (0.13)	-0.167 (0.11)
Nordic bank*2009	-	0.194 ** (0.03)	0.183 ** (0.03)	0.251 *** (0.01)	0.245 *** (0.01)
Nordic bank*2010	-	0.208 *** (0.00)	0.187 *** (0.01)	0.224 *** (0.01)	0.221 *** (0.00)
<i>p</i> -value testing exclusion of interaction terms NORDIC*2008, NORDIC*2009 and NORDIC*2010	-	0.00 ***	0.03 **	0.00 ***	0.00 ***
Number of banks	546	546	546	546	546
Number of observations	4,938	6,037	5,305	6,037	6,037
R ²	0.21	0.24	0.25	0.23 (within)	0.31 (between)

Sources: BankScope and OECD.

Notes: The dependent variable is ROA in all columns. Standard errors are adjusted for clustering at the bank level. *p*-values in parentheses. Significance levels: * 10 %; ** 5 %; *** 1 %, respectively. All models include a constant term and year dummies. ⁺ implies one-year lagged explanatory variable. We require that each bank has at least three consecutive observations.

5.2 Determinants of bank financial distress

If the learning hypothesis applies, the probability that a bank faces financial distress should be lower for the Nordic banks over the full sample period (1994–2010). Furthermore, we would expect that the Nordic banks faced a lower probability of distress during the recent financial crisis. As previously, we use the interaction terms between YEAR2008–YEAR2010 and NORDIC (1 if Nordic bank, 0 otherwise) to capture the difference between the Nordic banks and other European banks during the recent crisis.

Table 4 shows the estimation results for the determinants of financial distress. Since logit coefficients are difficult to interpret, we report the average marginal effects on the probability of distress. In column (1), we show *unusual high reported losses* (negative net operating profit exceeding 15 % of total capital, or NPROFIT_15).²⁵ Consistent with our expectation that the overall probability of financial distress was lower for Nordic banks for the full observation period 1994–2010, we find that the Nordic banks experienced a roughly six percentage point lower probability of distress than other European banks. This finding is statistically significant at the 5 % level (p -value 0.05). In contrast, the evidence on the lower risk of distress of the Nordic banks during the recent financial crisis is mixed. Consistent with the learning hypothesis, we find that in 2009 and 2010 the probability of distress was considerably lower for the Nordic banks (about 27 percentage points in 2009 and about 34 percentage points in 2010). The Nordic banks faced a significantly higher probability of distress in 2008 (about 13 percentage points). This suggests that the onset of the recent crisis hit Nordic banks harder than their other European counterparts.²⁶

²⁵ To deal with potential errors in the dependent variable, we exclude observations in the first and last percentile of the NPROFIT distribution.

²⁶ An alternative explanation might be in that the Nordic banks recognized their losses from the global crisis at an earlier stage, while their European competitors postponed declaring their loan losses.

In column (2), we use *unusual low profitability* (i.e. ROA less than 0.2) as a proxy for financial distress. Again, Nordic banks had a significantly lower probability of distress (5.9 percentage points) over the full sample period. We also find that the probability of distress for the Nordic banks was significantly lower in 2009 and 2010 (14 percentage points in 2009 and about 19 percentage points in 2010). Looking at the intensity of the onset of the recent crisis, we find that the estimated coefficient of the interaction term $NORDIC*2008$ is positively insignificant (.049 with p -value .28), suggesting an absence of differences in how hard the recent crisis did hit the Nordic banks as compared to other European banks.

For the other explanatory variables in Table 4, we note the following. First, consistent with our prior expectations, a higher capital ratio implies a significantly lower probability of financial distress (the estimated average marginal effect is around -.02). Second, our findings for bank lending activity differ for financial losses in column (1) and low returns in column (2). The average marginal effect is positively significant (.003) for high losses at the 1 % level and negatively significant (-.002) for low returns at the 5 % level. Third, higher inflationary pressures imply a significantly lower probability of distress. Finally, we do not find significant differences in the probability of distress between stakeholder-oriented savings and cooperative banks and shareholder-oriented commercial banks.

Table 4. Determinants of bank financial distress

	(1) NPROFIT < -15 % 1994-2010	(2) ROA < 0.2 1994-2010
Capital ratio (equity-to-assets ratio)	-0.017 *** (0.00)	-0.022 *** (0.00)
Lending activity (loan-to-assets ratio)	0.003 *** (0.00)	-0.002 ** (0.03)
Exposure to interbank lending (LDR)	-0.001 *** (0.00)	0.000 (0.30)
Liquidity (LAR)	-0.001 (0.44)	-0.00 (0.83)
Nordic bank (0/1)	-0.060 ** (0.05)	-0.059 * (0.06)
Savings bank (0/1)	-0.005 (0.85)	-0.014 (0.62)
Cooperative bank (0/1)	0.003 (0.90)	-0.030 (0.12)
Business cycle (harmonized unemployment rate)	-0.006 ** (0.05)	0.002 (0.41)
Inflation pressures (CPI)	-0.045 *** (0.00)	-0.025 *** (0.01)
Nordic bank*2008	0.132 *** (0.00)	0.049 (0.28)
Nordic bank*2009	-0.274 ** (0.02)	-0.138 * (0.08)
Nordic bank*2010	-0.318 *** (0.01)	-0.194 *** (0.01)
<i>p</i> -values testing exclusion of interaction terms NORDIC*2008, NORDIC*2009 and NORDIC*2010	0.00 ***	0.01 ***
Number of banks	544	546

Log pseudolikelihood	-2,207	-2,409
Number of observations	6,032	6,037
Pseudo R ²	0.13	0.14

Sources: BankScope and OECD.

Notes: Estimates are based on the pooled logit model for 1994–2010. The dependent dummy variable equals one if the bank experiences financial distress that year, and zero otherwise. We report the sample average of the marginal effects (AMEs) derived from the estimated logit model, where standard errors are adjusted for clustering at the bank-level. *p*-values in parentheses. Significance levels: * 10 %; ** 5 %; *** 1 %, respectively. The models include a constant term and year dummies. We require that each bank has at least three consecutive observations.

6. Conclusions and discussion

This paper considered how well banks retain and incorporate their experiences of a severe financial crisis. Our study focused on banks in three Nordic countries – Finland, Norway, and Sweden – which suffered simultaneous severe economic and systemic banking crises in the early 1990s, while other European countries did not. We examine a large novel panel data set of Nordic and European retail-oriented banks from 1994 to 2010 in light of two hypotheses originally put forth by Fahlenbrach, Prilmeier, and Stulz (FPS, 2012). If their *risk culture or business model hypothesis* is applicable, our data should show that Nordic banks were subject to an inflexible business model and unable to alter their risk exposure in the years after the crisis. As no learning was retained, we would expect this to show up as insignificant performance differences in the later crisis. Under the alternative *learning hypothesis*, we would expect the Nordic banks to show lesson learned from the initial crisis and evidence of permanent adjustment of their banking practices and corporate culture. We specifically expect if the learning hypothesis applies, the Nordic banks should show significantly higher profitability and greater efforts at reducing exposure to financial distress than other European banks during the peak years of the Great Recession (2008–2010).

We find that banks in the three Nordic countries outperformed other European banks not just during the Great Recession, but from 1994 onwards, i.e. throughout our entire observation period. Our descriptive analysis reveals that the Nordic banks have done a better job of steadily enhanced their capital ratios since 1994 than their European counterparts. Our results also reveal that the Nordic banks were hit harder by the 2008 financial crisis than other European banks, but recovered more quickly and more thoroughly than other European banks. Hence, our findings are in line with the view that the Nordic crisis of the 1990s have had a major impact on the behavior of the Nordic banks, and the Nordic banks today have taken to heart the lessons of a painful and traumatic crisis nearly two decades ago.

Our findings differ from those of FPS (2012), who find that listed US banks that performed poorly during the 1998 financial crisis (which in the US was initiated by the collapse of the LTCM hedge fund with heavy exposure to Russia's bond market) also performed poorly during the Great Recession of 2008. A potential explanation might be that the initial crisis needs to be systemic and sufficiently severe (as it most certainly was in the Nordic crisis of the early 1990s) for banks to see the point of altering their risk culture. When large financial losses are limited to a small number of investors as in the 1998 crisis in the US, it may not be a sufficient to trigger for a major re-evaluation of bank business models. Interestingly, the idea "severe enough" crisis requirement is consistent with illustrative evidence from Denmark and Iceland. Denmark, unlike Finland, Norway, and Sweden, did not face a large-scale systemic financial crisis in the early 1990s. While Danish banks were hit by financial challenges, only a few went bankrupt. During the 2008 crisis, the entire Danish banking sector was brought to its knees, mostly due to a real-estate collapse cycle fueled by excessive lending. As a result, several banks required extensive financial support from the Danish government to continue their business. In similar vein, Iceland was plunged into severe crisis in 2008, when all three of the country's major private

banks went bankrupt. Had banks in Denmark and Iceland been largely exposed to a systemic banking crisis in the early 1990s, more prudent lending behavior prior to the 2008 crisis, quite likely, would have resulted.

We recognize the potential limitations of this study. Even with rich panel data, differences in the findings between FPS (2012) and ours may reflect differences in the composition of the samples. We focus on the retail-oriented banking sector, a broader category of banks than the list banks examined by FPS (2012). The number of listed Nordic and European banks, however, is too small for convincing empirical analysis in our case. Adding stakeholder-oriented banks, i.e. cooperative and savings banks, into the sample is justified by the fact that these banks are major players in the European banking system. Because stakeholder banks and listed banks are likely to differ in many respects, including profitability, risk taking, corporate governance and managerial compensation patterns, this may affect our results, and should be kept in mind when comparing their findings to ours.

These findings could also be interpreted to show that it was not Nordic banks so much as the financial regulatory authorities in three Nordic countries that learned from the traumatic and costly experiences of the early 1990s. However, this is unlikely the *main* explanation for the performance difference we find between the Nordic and other European banks during the latest crisis. First, the implementation of major EU directives in the banking and financial service industry means that, since about 1993, all banks in the EU, irrespective of ownership structure, have operated within the same regulatory and competitive business environment. Second, financial deregulation has led to standardized procedures (e.g. acquisition of banking licenses), standardized capital requirements, and standardized supervision rules in the EU (Schure et al., 2004). Third, the European Commission in 2004 established the Committee of European Banking Supervisors. It is composed of senior representatives of bank supervisory authorities and central

banks of the European Union, and its mission is to promote cooperation and convergence of banking supervision practices across the European Union. Fourth, to the best of our knowledge, there is no anecdotal evidence that the Nordic Financial Supervisory Authorities have performed significantly better or worse than their European counterparts in the period of our study. Nevertheless, a detailed examination to determine the extent to which Nordic regulatory authorities explicitly have taken lessons of the 1990s Nordic crisis into account would undoubtedly provide valuable insights into forces that impact the development and enforcement of financial regulation.

References

- Altunbas, Yener, and Shanti P. Chakravarty (1998). "Efficiency measures and the banking structure in Europe." *Economic Letters*, 60, 205-208.
- Aubuchon, C.P., and D.C. Wheelock (2010). "The geographic distribution and characteristics of US bank failures, 2007–2010: Do bank failures still reflect local economic conditions?" *Federal Reserve Bank of St. Louis Review*, 92(5), 395-415.
- Berg, A., and C. Pattillo (1999). "Predicting currency crisis: The indicators approach and an alternative." *Journal of International Money Finance*, 18, 561-586.
- Berger, Allen, and Gregory F. Udell (2004). "The institutional memory hypothesis and the procyclicality of bank lending behavior." *Journal of Financial Intermediation*, 13(4), October 2004, 458-495.
- Berger, Allen, and Christa Bouwman (2013). "How Does Capital Affect Bank Performance During Financial Crises?" *Journal of Financial Economics*, 109, 146-176.
- Bertrand, Marianne, and Antoinette Schoar (2003). "Managing with style: The effect of managers on firm policies." *Quarterly Journal of Economics*, 118, 1169-1208.
- Calvo, G. A., A. Izquierdo, and R. Loo-Kung (2006). "Relative Price Volatility under Sudden Stops: The Relevance of Balance Sheet Effects." *Journal of International Economics*, 69(1), 231-254.
- Čihák, M., A. Demirgüç-Kunt, M. Soledad Martínez Pería, and A. Mohseni-Cheraghloo (2012). "Bank Regulation and Supervision around the World: A Crisis Update." World Bank Policy and Research Working Paper No. 6286.
- Claessens, S., G. Dell'Ariccia, D. Igan, and L. Laeven (2012). "A Cross-Country Perspective on the Causes of the Global Financial Crisis." In: *Handbooks in Financial Globalization: The Evidence and Impact of Financial Globalization*, pp. 737-752. Elsevier UK: Academic Press.
- Dell'Ariccia, Giovanni, and Robert Marquez (2006). "Lending Booms and Lending Standards." *Journal of Finance*, 61, 2511-2546.
- Dell'Ariccia, G., D. Igan, L. Laeven, and H. Tong (2014). "Policies for Macrofinancial Stability: Dealing with Credit Booms and Busts." In: S. Claessens, M. A. Kose, L. Laeven, and F. Valencia (eds.), *Financial Crises, Consequences, and Policy Responses*. International Monetary Fund, Washington D.C.
- Drees, Burkhard, and Ceyla Pazarbaşıoğlu. (1998). "The Nordic Banking Crises: Pitfalls in Financial Liberalization?" IMF Occasional Paper No. 161.
- Fahlenbrach, Rüdiger, Robert Prilmeier, and Réne M. Stulz (2012). "This Time is the Same: Using Bank Performance in 1998 to Explain Bank Performance During the Recent Financial Crisis." *Journal of Finance*, 67, 2139-2185.

- Ferri, Giovanni, Panu Kalmi, and Eeva Kerola (2015). "Organizational Structure and Performance in European Banks: A Reassessment." In: Antti Kauhanen (ed.), *Advances in the Economic Analysis of Participatory & Labor-Managed Firms*, vol. 16, pp.109-141. Emerald Group Publishing Limited.
- Frankel, J.A., and A.K. Rose (1996). "Currency crashes in emerging markets: An empirical treatment." *Journal of International Economics*, 41, 351-366.
- Freystätter, Hanna (2011). "Financial factors in the boom-bust episode in Finland in the late 1980s and early 1990s." Bank of Finland Discussion Paper No. 1.
- Gennaioli, Nicola, Andrei Shleifer, and Robert Vishny (2012). "Neglected risks, financial innovation, and financial fragility." *Journal of Financial Economics*, 104, 452-468.
- Gerstner, Louis V. Jr. (2002). *Who Says Elephants Can't Dance? Inside IBM's Historic Turnaround*. Collins, New York, New York.
- Gonzalez-Hermosillo, B. (1999). "Determinants of Ex-Ante Banking System Distress: A Macro-Micro Empirical Exploration of Some Recent Episodes." IMF Working Paper No. 337.
- Gorodnichenko, Yuriy, Enrique G. Mendoza, and Linda L. Tesar (2012). "The Finnish Great Depression: From Russia with Love." *American Economic Review*, 102(4), 1619-44.
- Gulan, Adam, Markus Haavio, and Juha Kilponen (2014). "Kiss me deadly: From Finnish great depression to great recession." Bank of Finland Discussion Paper No. 24.
- Honkapohja, Seppo (2014). "Financial crises: Lessons from the Nordic experience." *Journal of Financial Stability*, 13(20), 193-201.
- Iannotta, Giuliano, Giacomo Nocera, and Andrea Sironi (2007). "Ownership Structure, Risk and Performance in the European Banking Industry." *Journal of Banking and Finance*, 31, 3127-3148.
- Jensen, Michael C., and William H. Meckling (1976). "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure." *Journal of Financial Economics*, 3(4), 305-360.
- Jonung, Lars, Jaakko Kiander, and Pentti Vartia (eds.) (2009). *The Great Financial Crisis in Finland and Sweden: The Nordic Experience from Financial Liberalization*. Edward Elgar.
- Kauko, Karlo (2014). "How to foresee banking crises? A survey of the empirical literature." *Economic Systems*, 38, 289-308.
- Laeven, Luc, and Fabian Valencia (2008). "Systemic Banking Crises: A New Database." IMF Working Paper 8/224.
- Loutskina, Elena, and Philip E. Strahan (2011). "Informed and uninformed investment in housing: The downside of diversification." *Review of Financial Studies*, 24(5), 1447-1480.
- Malmendier, Ulrike, and Stefan Nagel (2011). "Depression babies: Do macroeconomic experiences affect risk taking?" *Quarterly Journal of Economics*, 126, 373-416.

Malmendier, Ulrike, and Stefan Nagel (2015). "Learning from Inflation Experiences." *Quarterly Journal of Economics*, 131, 53-87.

Malmendier, Ulrike, Geoffrey Tate, and Jonathan Yan (2011). "Overconfidence and early-life experiences: The effect of managerial traits on corporate financial policies." *Journal of Finance*, 66, 1687-1733.

Mare, Davide Salvatore (2015). "Contribution of macroeconomic factors to the prediction of small bank failures." *Journal of International Financial Markets, Institutions and Money*, 39, 25-39.

Mäkinen, Mikko, and Derek C, Jones (2015). "Comparative Efficiency Between Cooperative, Savings, and Commercial Banks in Europe Using the Frontier Approach." *Annals of Public and Cooperative Economics*, 86(3), 401-420.

Reinhart, Carmen M., and Kenneth S. Rogoff (2008). "Is the 2007 US Sub-Prime Financial Crisis So Different? An International Historical Comparison." *American Economic Review*, 98, 339-344.

Scherbina, Anna (2013). "Asset Price Bubbles: A Selective Survey." IMF Working Paper 13/45.

Schure, Paul, Rien Wagenvoort, and Dermot O'Brien (2004). "The efficiency and the conduct of European banks: Developments after 1992." *Review of Financial Economics*, 13, 371-396.

Steigum, Erling (2010). "The Norwegian Banking Crisis in the 1990s: Effects and Lessons." Working Paper, BI Norwegian School of Management, Department of Economics.

Stutts, William F., and Wesley C. Watts (2009). "Of Herring and Sausage: Nordic Responses to Banking Crises as Examples for the United States." *Texas International Law Journal*, 44, 577-627.

Appendix A. Description of control variables

Capital ratio. The ratio of total equity to total assets. Total assets is the sum of common equity, non-controlling interest, securities revaluation reserves, foreign exchange revaluation reserves and other revaluation reserves. Our assumption here is that higher capital reserves improve a bank's ability to tolerate financial losses. The capital ratio should thus be positively related to ROA and negatively related to the probability of financial distress.²⁷

Lending activity. This measures the importance of traditional lending businesses for the bank, and is captured by the ratio of total loans to total assets. ROA can be positively or negatively related to lending activity, depending on the quality of borrowers in the bank's loan portfolio. If lending activity is positively related to the probability of distress, a sizeable loan portfolio indicates higher exposure to losses. We assume this is the case when a sizeable loan portfolio is the result of aggressive lending using lax credit standards (see e.g. Dell'Ariccia and Marquez, 2006).

Exposure to wholesale market funding in lending. Customer deposits are a traditional source of funding for bank lending. However, deregulation, intensified competition, and financial innovations combined with relatively low interest rates has increased the dependence of banks on the wholesale market as a funding source. Although banks normally can raise funds from the wholesale market at low costs, wholesale market loans may become excessively expensive in a severe financial crisis. Availability may even dry up completely due to adverse selection. We assume such conditions aggravate financial distress and reduce profitability. A bank's exposure to the wholesale market funding in lending is captured using the loan-to-deposit ratio (LDR). An increase in the LDR implies increased exposure to wholesale market liquidity in lending.

Liquid assets includes cash and other assets that the bank expects to be able to convert into cash quickly; such as sovereign bonds, short-term claims on other banks, and trading portfolio. Liquid assets, which normally are rather safe assets for banks, can become risky during a severe

²⁷ A positive association may also exist between capital ratio and risk. For example, increased leverage (decreased capital) may reduce agency conflicts between bank managers and shareholders because leverage pressures managers to be more efficient (e.g. Jensen and Meckling 1976). Likewise, a positive relationship may occur if riskier banks are forced to raise capital, or if more capitalized banks have a greater risk absorption capacity and, because of this, are willing to take on more risk (e.g. Berger and Bouwman 2013).

financial crisis when e.g. sovereign bonds or claims on other banks caused by increased distress risk reflect issuer solvency problems. We measure the relative magnitude of liquid assets by the ratio of liquid assets to total assets (LAR).

Bank ownership type. The nature of the banking business may be related to the form of incorporation of the bank (commercial, savings, and cooperative bank formats). The form of incorporation can thus have important implications on profitability and the risk of distress. As a rule, commercial banks are more willing to take on high-risk/high-return business activities, while stakeholder-oriented cooperative and savings banks are likely to follow fairly conservative business practices. They prefer overall security over risk and emphasizes prudent long-run strategies. Unlike commercial banks, cooperative and savings banks do not focus on profit maximization exclusively, but also strive to serve the needs of their principals (usually a customer base close to the bank). In general, shareholders in commercial banks have more immediate interest in governance policies that safeguard bank value than stakeholders in cooperative and savings banks. To control for the form of incorporation, we add savings bank and cooperative bank dummy variables into the models (with commercial banks as the reference category).

Macroeconomic factors. We include two country-specific macroeconomic variables. We use changes in the *consumer price index* (CPI) as a proxy for inflationary pressure, and the *harmonized unemployment rate* as a proxy for the business cycle.

Appendix B. Sample construction

Our sample of European retail-oriented banks is constructed as follows. First, banks that were classified in BankScope as commercial banks, savings banks, cooperative banks, real estate/mortgage banks, bank holdings and holding companies, and specialized governmental credit institutions were retrieved. UK and Irish building societies are included as they provide a broad range of financial services. Other mortgage banks are excluded, however. Some large commercial banks are classified as “bank holdings and holding companies.” A “specialized governmental credit institution” is included if it is a savings bank. To remove potential outlier observations, we exclude the observations for a bank if the ratio of total loans to total assets for that bank is less than 1 %, the ratio of total deposits to total assets is less than 1 %, the ratio of total loans to total deposits (LDR) is more than 500 %, the ratio of total costs to total assets is more than 100 %, or the ratio of personnel expenses to total costs is less than 1 %. We require that each bank has at least three consecutive observations.

We have had to recode BankScope ownership type classifications in a few cases. Mostly this applies to savings banks. Many such banks have changed their mission and can no longer be reasonably be viewed as savings banks, even if they are still classified as such (e.g. Lloyds TSB and Swedbank). We also recode for certain Belgian and Italian banks where the non-profit foundation is no longer the dominant shareholder.²⁸ Likewise, the savings bank classification of French Caisse d’Epargne banks in BankScope is changed since their ownership structure has been cooperative since the late 1990s. Other cooperative banks are appropriately classified.

A challenge specific to cooperative banks is they may be included at different levels of aggregation. For instance, the French cooperative banks are represented by their regional banks, but also on the group level as well as by their subsidiaries. The same regional-level aggregation applies to German and Austrian cooperative banks. In contrast, for the Netherlands and Finland (countries that have large cooperative banks) only group-level data are available. In cases where regional data is available, Ferri, Kalmi, and Kerola (2015) include the regional level data to increase the comparability with savings banks that are also regionally defined (especially government-owned ones), otherwise group level data are used.

²⁸ Because savings banks may differ in their legal forms, it is difficult to give a uniform criterion for savings banks. Ferri, Kalmi, and Kerola (2015) use the following criterion: if a savings bank is majority controlled by a foundation and there are no other large owners, then it is classified as a savings bank even if incorporated as a joint-stock company.

Commercial banks fall into a relatively straightforward category, and no recoding of ownership type was required.²⁹ Table A1 shows the number of bank-year observations by ownership type in our sample.

Table A1. The number of bank-year observations by ownership type.

Ownership type	EU12	Nordic3	Total
Commercial banks	2,688	212	2,900
Savings banks	977	286	1,263
Cooperative banks	1,833	36	1,869
Total	5,498	543	6,032

Sources: BankScope, authors' calculations.

²⁹ For a more detailed description of data and refinements, see Ferri, Kalmi, and Kerola (2015).

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