

Institutional Intervention as a Substitute for Learning by Teaching: Evidence using Bank Risk Forecasting Capabilities

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Abstract

This paper examines how institutional intervention can replace learning by teaching effects in the context of mergers and acquisitions. In doing so, we posit that performance differences between parent and target firms in bank mergers are associated with learning effects within the parent firm. Using U.S. banking industry data, we conducted a quasi-natural experiment to show that the implementation of the 2004 Basel Accord substitutes learning by teaching effects. Our findings show that parent firms with higher financial performance levels compared to acquired firms achieved timelier loan loss provisioning after a corporate merger. Further, we found this forward-looking accounting capability can be replicated by lower performing parent firms provided they follow the Basel Accord guidelines. This paper highlights pragmatic considerations for firm managers involved in training new employees and sheds light on a potential learning-by-teaching mechanism for organizational management researchers to further investigate.

Key words: learning by teaching, loss recognition model, mergers and acquisitions, risk forecasting capabilities

1. Introduction

Organizational learning theory has extended our understanding of the growth and development of a firm's knowledge and capability set through the lens of three distinct learning mechanisms. As in Argote & Epple (1990), the traditional learning curve illustrates how accumulation of experiences lead to greater efficiency gains. Much scholarly research in the field of strategic management has concentrated on this learning mechanism called learning-by-doing. Work in this domain investigates the reduced unit costs in relation to the increased number of output (Wright, 1936; Argote & Epple, 1990). Another stream of research focuses on the acquisition of knowledge or capabilities via others' experiences. This learning mechanism called vicarious learning refers to observing other's trial and error processes and imitating successful routines (Levitt & March, 1988; Greve, 1996; Denrell, 2003). Finally, firms can acquire an entity who possess advanced knowledge or capabilities. Technology acquisitions has long been at the center of interest of management scholars. Just like vicarious learning, technology acquisitions provide the acquirer with advanced knowledge or capabilities without costing them uncertain experiments (Dierickx & Cool, 1989; Puranam & Srikanth, 2007).

Few studies, however, have looked beyond such traditional learning mechanisms to determine what factors improve the effectiveness of organizational activities during the integration process. To address this research gap, this paper examines the effect of parent and target firm's pre-acquisition performance differences on post-merger bank loan risk management capabilities. We postulate that parent firms improve in terms of the timeliness of loan loss recognition as they teach necessary accounting practices to their new affiliate firm. We explore the consequences of organizational training opportunities that allow firm managers to reflect upon their current professional knowledge and reconfigure operational processes or systems into superior models.

This paper proposes that learning-by-teaching is the essential mechanism that leads to increased risk management capabilities of superior parent firms. Knowledge transfer in M&As requires one entity to teach vital information and practices to the other entity during the integration process. In general, the organization with higher performance outcomes is presumed to possess superior professional knowledge and capabilities.

Parent firms with higher performance levels are thus likely to engage in teaching or training activities to transfer their superior knowledge, practices, and capabilities to acquired firms to improve operational outcomes.

Traditional performance measures used in prior studies can be vulnerable to macro-economic environments and might be noisy to capture the learning effects in organizational routines and processes. To overcome this problem, this paper focuses on the improvement of a particular task in a bank's internal operations, which reflects managerial actions to achieve long-term organizational goals?

Loan loss recognition method is an organizational choice of the quality of accounting practice in terms of timeliness. Timeliness in loan loss provisioning refers to how fast bank managers incorporate future loan losses into their current provisioning practices. This timeliness is important as it closely relates to a bank's financial risk. Since earnings variability is a key determinant of bank risk, firms could mitigate the risk and protect banks from failure by incorporating future expected loan loss earlier. After the financial crises of 2001 and 2007–2009, the Basel Accord was adopted in the U.S. which promotes banks to utilize forward-looking provisioning instead of the incurred loss approach.

This paper's empirical analysis utilizes available data both prior to and after the implementation of the Basel Accord. Introduction of Basel Accord allows researchers to examine differences between banks that had strong loan loss recognition policies in place prior to the BCBS and banks that were forced by the BCBS to change their pre-crisis loan loss practices. Parent firms which are superior to their acquired firms, and which learn from teaching opportunities, likely already have strong risk management policies in place. This includes an emphasis on the timeliness of loan loss provisioning. For acquiring banks without a history of learning-by-teaching, the imposition of federal regulations can force them to incorporate needed new knowledge and practices into their daily operations. In effect, such regulations serve as a substitute for learning-by-teaching for these parent banks.

2. Theory & Hypotheses

2.1 Learning by Teaching in Corporate Context

This paper departs from the aforementioned learning mechanisms and sheds light on the value created when firms engage in teaching or training activities. In order to distinguish learning-by-teaching effects from learning-by-doing effects, this paper focuses on the parent firm's preparation for post-merger teaching rather than its actual engagement with the target firm. The core mechanism of learning-by-teaching is the teacher's reflection on their existing knowledge. Numerous theories have been advanced to explain the importance of this reflection-based learning. For example, Boud, Keogh, and Walker (1985) state that reflection is "an important human activity in which people recapture their experience, think about it, mull it over and evaluate it," a cognitive process that affects the degree of learning derived from a particular experience. When teaching other individuals, instructors often reflect upon their own knowledge (Galbraith and Winterbottom, 2011; Hoogerheide, Deijkers, Loyens, Heijltkes, and van Gog, 2016; Allen & Feldman, 1973; Cohen, Kulik, & Kulik, 1982; Bargh & Schul, 1980; Roscoe & Chi, 2007; Fiorella & Mayer, 2014). This can result in the transformation of complex and challenging information into more efficient forms of new knowledge that teachers can put to beneficial use themselves. This paper examines the consequences of reflection at the organizational level, where training opportunities prompt firm managers to revisit and reflect upon their current workplace beliefs and practices. This process can lead to the construction of new and improved operational strategies and systems. A formal training activity provides this learning opportunity as the teacher must devote considerable time and effort to prepare instructional materials. Organization-approved training preparation activities provide the reflective time needed to revisit current relationships across fractions of knowledge and to draw new inferences.

In a bank, teaching serves several purposes. Teaching occurs when the bank needs to (1) train new employees, including those joining a parent firm from an acquired firm, about daily operations; (2) allocate new responsibilities and roles to current employees or executives; (3) improve systems, standards, or structures as part of strategic organizational reform; or (4) integrate and modify operational procedures and capabilities following a corporate merger. During the integration process, managers at the acquiring bank who are responsible for training are afforded the opportunity to reflect upon their current knowledge base and to seek better ways of loan risk management. This paper argues that acquiring a target firm would yield a positive learning-by-teaching benefit for the parent firm who actively engages in integration-related training.

2.2 Risk Management in Banking

A primary concern of commercial banks is improving standards and operations to better respond to current and future environmental uncertainty.

The banking system as a whole regularly discusses such unforeseeable hazards and creates safeguards to prevent bank failures. Because a bank's financial performance largely depends on how well it avoids lasting risk-related damage, minimizing institutional risk is one of the most important daily objectives of every bank manager with supervisory authority. In doing so, managers rely on accounting policies to have a better understanding on and monitor potential risks.

Concerns about timeliness in forecasting loan losses arose after the financial crises in 2001 and 2007-2009. Prior to these economic disruptions, most banks used the incurred loss model that was strongly linked to increased financial risk for banks. Researchers and regulators argue that the prevalent use of an incurred loss model unnecessarily exposes banks to pro-cyclical effects. Because a bank's financial performance largely relates to how well it avoids lasting risk-related damage, reducing institutional risk is one of the most important objectives of every bank. In this context, the adoption of forward-looking provisioning mitigates institutional risk and pro-cyclicality by reducing earnings variability (Beaver, Kettler and Scholes, 1970).

Based on the theoretical framework of learning-by-teaching, it is reasonable to expect that parent banks will more likely switch to a timelier accounting model to reduce earnings volatility as a result of training new employees from a merger. When integrating loan management systems and personnel, the parent bank is likely to broadly reevaluate their current financial operations and make necessary updates to meet current industry standards. This behavior may be motivated in part by a desire to avoid criticism from the newly acquired employees about ineffective or outdated operational procedures. This is especially true when organizational conflict and resistance is anticipated during the merger process. In terms of loan loss provisioning, we anticipate that learning-by-teaching during an M&A will result in new knowledge and increased operational effectiveness for the parent firm. Specifically, we predict:

Hypothesis 1: Acquiring comparatively poorer performing firms is associated with greater benefits from learning-by-teaching to the parent firm in terms of improving timeliness of loan loss provisioning.

2.3 Institutional Intervention as a Substitute for Learning by Teaching

The Basel Accord

The availability of at least 5 years' worth of bank financial data both prior to and following the initial 2004 Basel Accord allows researchers to more accurately examine differences in firm practices and performance. Because the Basel Committee on Banking Supervision (BCBS) focused on concerns raised from the incurred loss approach, the Basel Accord guidelines promoted a forward-looking analysis of bank portfolios. Some banks were already utilizing this loan loss risk assessment process prior to the passage of this advisory measure, while other banks only adopted these guidelines after the Accord appeared in 2004.

The Basel II Accord was also published in 2004 by the BCBS. The aim was to curtail regulatory arbitrage and encourage better risk management throughout the commercial banking industry (Barr & Miller, 2006; Kane, 2006; Pattison, 2006). Basel II provided capital adequacy standards for internationally active banks. The BCBS has remained a strong advocate for swift, full, and consistent implementation of its standards to make the banking system more operationally transparent and resilient to economic shocks. Banks were encouraged to adopt more comprehensive and realistic risk analysis methods, including forward-looking provisioning, when distributing loan funds. When operating within this framework, banks incorporated expected loan losses into their regulatory capital requirement. Managers were to remain consistently forward looking when making financial decisions and creating safeguards to protect institutional stability in the case of adverse economic or stock market events. This would be accomplished by maintaining sufficient available capital at all times.

Promoting forward-looking provisioning, the BCBS has supported changing accounting standards to a transparent expected loss approach that increases the usefulness of financial reports to stakeholders and regulators. The BCBS argues that forward-looking provisioning is less procyclical with expected losses calculated into loan making decisions. An observation period for the Basel III Accord began in 2011 and the full implementation was expected to end by 2018; this was later extended to March 2019.

The Basel Accord provides a useful framework for revising knowledge and capabilities that could otherwise be improved during the new employee training phase of a corporate merger. As a result, we argue:

Hypothesis 2: The Basel Accord recommendations provide firms with important learning opportunities that are likely dependent on a teaching process. Hence, the learning-by-teaching effect in superior parents from H1 will disappear after the introduction of the Basel Accord.

3. Methodology

3.1 Data

We used an extensive data set from the U.S. banking industry covering the years 1998–2013. This provides a unique opportunity to analyze data prior to and after the promotion of forward-looking loan loss provisioning by the BCBS in 2004. This allowed us to capture the deviation of firm's ability to forecast with and without the learning-by-teaching effect.

We use the FDIC Call reports and merge the data set with the Income Statements and Balance Sheet data collected from the WRDS database. Because banks are assigned a unique identification number by the FDIC, it is convenient to match these different data sets and create an extensive panel that allows access to the financial performance, loan portfolio, and acquisition information of individual banks. The panel provides a total of 12,129 banks and 4,665 acquisition cases over the years of 1998-2013. We used the bank as the unit of analysis instead of the holding company because we wished to capture the immediate learning effect prior to the merger process measured as timeliness in loan loss provisioning. Because this particular data set is constructed at a quarterly level, we could examine changes by bank managers in their loan loss provisioning standards. The quarterly data breakdown also allows us to measure capital at the beginning of quarter, which affects the motivations of bank managers to manipulate provisions for smoothing earnings purposes.

3.2 Model Specification

Loan risk parameters are established by each bank and its corresponding states in each quarter year. We adopted a forecasting model from accounting research to examine managers' capability in timely and accurate loan loss provisioning (Beatty and Liao, 2011; Bushman and Williams, 2015). This Delayed Expected Loss Recognition model departs from the incurred loss model in terms of the inclusion of future forecasts in its calculation of current provisions. The incurred loss model was required by the Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB). It was later criticized by the Financial Stability Forum (FSF) (2009) because procyclicality emerges due to the backwards-looking nature of the model (Beatty and Liao, 2011; Bushman and Williams, 2015). IASB also published the complete version of IFRS 9 'Financial Instruments' in 2014, which contains a forward-looking approach to recognize expected losses. There were concerns that bank managers might take advantage of calculations in the incurred loss model to opportunistically delay incorporating anticipated losses into current term provisions. When managers delay recognition of losses from current term provisions, the true risk level of the bank's loan portfolio can be obscured (Bushman and Williams, 2015). The Delayed Expected Loss Recognition model mitigates such concerns. By including the future term of expected loss into the equation of current term provisioning, timelier loan loss provisioning practices are recognized via the increased adjusted R-square compared to that of the base model that omits the future forecasting term. The two models are described below:

$$LLP_t = \beta_0 + \beta_1 \Delta NPL_{t-1} + \beta_2 \Delta NPL_t + \text{controls} + \varepsilon \quad (1)$$

$$LLP_t = \beta_0 + \beta_1 \Delta NPL_{t-1} + \beta_2 \Delta NPL_t + \beta_3 \Delta NPL_{t+1} + \text{controls} + \varepsilon \quad (2)$$

where,

LLP_t : loan loss provisions (change in allowance) at time t

ΔNPL_{t-1} : change in non-performing loans at time t-1

ΔNPL_t : change in non-performing loans at time t

ΔNPL_{t+1} : change in non-performing loans at time t+1

In the models above, the increased adjusted R-square is derived by deducting the adjusted R-square of model (1) from that of model (2) indicates greater timeliness in forecasting loan losses. Also, the Delayed Expected Loss Recognition model compares the strengths of coefficients across different time periods. The timelier a manager's forecast, the greater correlation between recent and future data and a firm's current term provisioning.

We tested the hypotheses by examining the timeliness of provisioning as a function of (1) historic data of non-performing loans, (2) data on predicted non-performing future loans, and (3) the exposure to poor performing affiliates through acquisitions. To capture the learning-by-teaching effect following a merger, we interacted the incremental non-performing loans at each term t+2, t+3, and t+4 with a dummy indicating an acquisition made by a superior bank relative to the target bank. This argument assumes that acquiring firms that are superior to the target firm are exposed to greater amount of teaching, which entails transferring knowledge rather than learning new capabilities from the target firm. The reason t+3 was used as the baseline period is to capture learning that initiated in the preparation stage of teaching (t-1) while allowing time for the learning to reflect in firm behavior (typically a 1-year time lag). We used the following baseline model:

$LLP_{t+3} = \beta_0 + \beta_1 \Delta NPL_{t+2} + \beta_2 \Delta NPL_{t+3} + \beta_3 \Delta NPL_{t+4} + \beta_4 \Delta NPL_{t+2} * \text{sup_acquisition} + \beta_5 \Delta NPL_{t+3} * \text{sup_acquisition} + \beta_6 \Delta NPL_{t+4} * \text{sup_acquisition} + \text{controls} + \varepsilon$ (3) where,

LLP_{t+3} : loan loss provisions (change in allowance) at time t+3

ΔNPL_{t+2} : change in non-performing loans at time t+2

ΔNPL_{t+3} : change in non-performing loans at time t+3

ΔNPL_{t+4} : change in non-performing loans at time t+4

sup_acquisition: acquisition flag in time t made by superior parents, 1 if a superior bank acquired a relatively low performing target bank in time t and 0 otherwise

Following the work of Beatty & Liao (2011) and Bushman and Williams (2015), LLP represents the loan loss provision divided by lagged term total loans and ΔNPL is the change in non-performing loans divided by lagged term total loans. This model assumes that bank managers usually accurately anticipate future losses according to the patterns of current loan payments and that managers have the discretion to include forward-looking judgments into their quarterly loan loss provisions. Based on these assumptions, the actual future non-performing loans can be used as a measure of timely forecasting.

3.3 Variables

Dependent variable In order to capture the performance improvement in loan loss forecasting, we take the loan loss provisions scaled by lagged total loans as the dependent variable at time t+3.

Independent variables Because the forecasting capabilities are anticipated to improve after a teaching experience during post-merger integrations and because the effect of learning-by-teaching is argued to be greater when the acquiring firm performs better than the acquired firm, superior parent acquisitions is interacted with the change in non-performing loans at time t+2, t+3, and t+4 in consecutive terms. The superior parent acquisition variable is a binary dummy where 1 indicates a merger made by a bank whose performance is relatively superior to the target bank's and 0 indicates otherwise. The parent's performance superiority is measured in terms of the difference in return on assets (ROA) between the two firms.

Control variables Total assets are included to control for size effects of each bank as size can affect the degree of engagement in acquisitions as well as learning capabilities. The typical state controls such as quarterly state personal income, state Herfindahl index, number of parent level banks, and number of competitor banks are included into the analysis. Because of the unavailability of GDP data in quarter terms, we use state personal income to control for and economic microenvironment factors. In order to control for any diversification effects by acquiring a target bank with distant loan portfolios, we include a proximity measure, which is an angular separation measure using the loan composition and calculates the cosine value between the parent and target bank's loan portfolios. The greater the proximity measure (maximum value=1) the closer the two loan portfolios, which implies similar capabilities between the two merged banks. Also, to control for any geographical expansion effects, we include a neighbor state dummy where 1 indicates an acquisition between banks from adjacent states. Because loan loss provisioning is exposed to a bank manager's discretion, there is a possibility that the bank manager intends to delay loan loss recognition or to purposefully include future losses into the current term provisioning. In order to control for any opportunistic behavior by bank managers such as smoothing earnings, we include the tier 1 capital level, and beginning quarter earnings before loan loss provisions of the bank (Bushman & Williams, 2015). All the models include year and quarter dummies to control for any annual or quarterly industry specific effects.

4. Results

The summary statistics and correlation matrix for our explanatory variables and controls are shown in Tables I-III. Due to concerns on the collinearity between the lagged terms and interactions, we orthogonalize the measures of concern that include the consecutive terms of incremental non-performing loans and its interactions.

The results for the fixed effects regression using the Delayed Expected Loss Recognition model prior to the introduction of the Basel II Accord are shown in Table IV and are largely congruent with the theoretical arguments. The main effects of the incremental non-performing loans suggest a prevalent use of incurred loss provisioning where the main variable of delta non-performing loans at t+2 and t+3 show a positive and significant impact on the provisioning in t+3 while the loan losses in t+4 show no effect. When the main variables are interacted with acquisitions by superior parents, however, the magnitude of the incremental non-performing loan in t+4 becomes larger with a positive impact on current number of provisioning.

Table V provides evidence that the behavior in loan risk management differs across parent banks depending on whether they acquire a high performer or low performer as the target in a merger. Again, this subsample analysis is conducted on banks prior to the introduction of Basel guidelines.

The positive and significant effect of delta non-performing loans in t+4 indicate that a superior parent relative to the target is engaged in forward looking provisioning compared to inferior parents. The results imply that superior parents who try to improve the target's performance, engage more in a teaching activity and learn how to be more prudent in terms of loan risk management while inferior parents lack the opportunity to learn by teaching. The significant and negative coefficients of the change in non-performing loans at t+4 variable for the inferior parents suggest that many banks who lack a learning-by-teaching opportunity engaged in smoothing earnings rather than being cautious and careful in terms of their loan loss management. The t-test scores came back at 0.06 suggesting significant difference between the two parent groups at a 0.1 level.

Table VI shows the results for post-Basel Accord bank risk management. The results indicate much less magnitude in the interaction terms between delta non-performing loans at t+4 and parent superiority. To get a better idea of the behavioral difference between superior parents and inferior parents, we conducted a subsample test of which results are depicted in Table VII

The results show a significant loss in magnitude of the inferior parents engaging in smoothing earnings. In order to overcome the power issue that can be raised in the previous subsample analyses, we conducted a differences-in-difference test to investigate the impact of Basel guidelines by restricting the data to only firms that acquired another bank throughout the sample period.

We include the time viable where time=1 for post-Basel years while 0 in pre-Basel years. The dummy variable for treatment effect indicates 1 if the parent bank was relatively inferior to the target bank it acquired and 0 otherwise. The reasons we assigned the treatment variable in this fashion is because the Basel Accord is hypothesized to have impact on the behavior of inferior banks who were not following a forward-looking provisioning standard due to the lack of learning-by-teaching. Results suggest that the inferior parents improved in terms of their timeliness in loan loss provisioning after the introduction and enforcement of the Basel II Accord, which is congruent with the theoretical arguments in this paper.

In order to check the relationship between a bank's ROA and the propensity to adopt a forward-looking provisioning model, we ran a regression between subsamples of firms above the mean ROA of 0.0065916 and those below. Table IX shows the behavior of superior firms generally taking on greater risks rather than using a careful provisioning model. Inferior firms on the other hand solidly use an incurred loss model in calculating their allowances. The correlation between firm ROA and the extent to which a bank would select to acquire a poor performing bank was 0.0048. Table X uses the median ROA of 0.0059 as the criteria to divide the data sample and shows similar results as when we used the mean ROA value. Also, the scatter plot in Figure 1 suggests that the superiority in performance does not affect the degree to which a bank would engage in acquiring a poor or strong performer.

5. Discussion

The empirical findings in this study support the theoretical arguments about learning-by-teaching, particularly at banks who acquire new affiliates. Results are consistent with the argument that bank managers become timelier in terms of recognizing current and future term loan losses after acquiring another bank whose performance level is lower than the acquiring bank. The robust checks using a differences-in-difference model also indicate that superior parent banks were associated with timelier loan loss forecasting. This salience, however, disappeared post-Basel. Results suggest that the theoretical arguments of the learning-by-teaching effect hold.

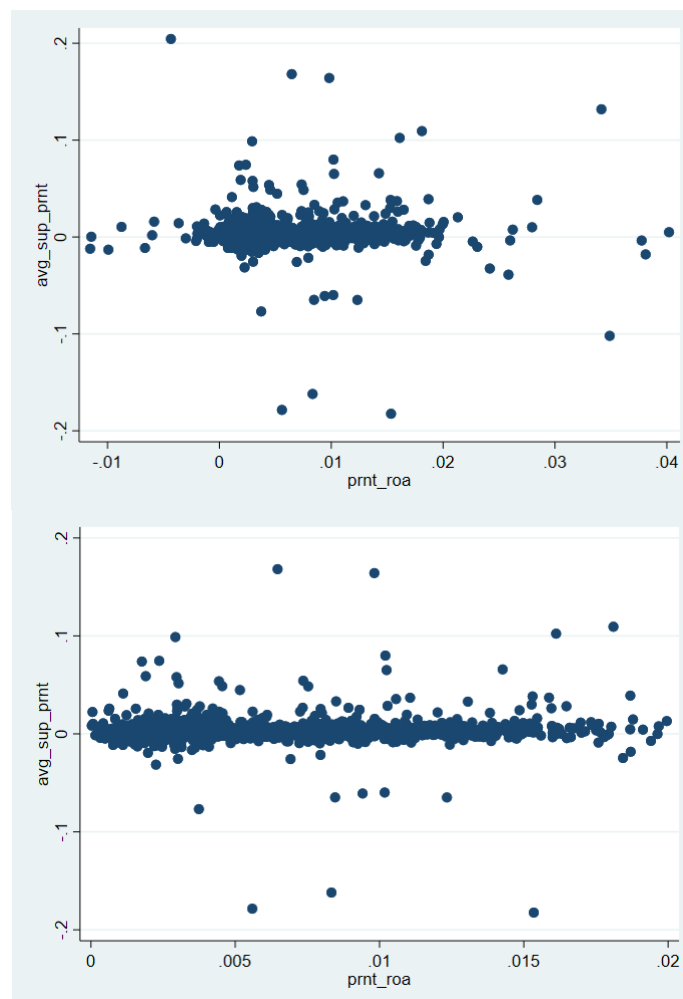
This study has implications for theory, research, and practice in several ways. First, our paper contributes to the M&A and organizational learning literature by empirically testing the effect of a novel learning mechanism—learning-by-teaching—in bank mergers. Our paper sheds light on this novel learning mechanism and test the efficacy of learning-by-teaching at the organizational level. Second, our findings have implications for the measurement of organizational learning. Using the loan loss recognition model enables us to investigate the direct impact of firm learning on risk management improvements. Because timeliness in decision makings, unlike other performance measures, is less prone to the effect of luck or macroeconomic factors, this paper benefits from its measurement and model with respect to ruling out noisy factors that may impact the efficacy of learning. Finally, our findings also have pragmatic implications for bank managers and financial regulators. With the full spectrum of organizational learning mechanisms—from learning-by-doing and learning-from-others'-experience to learning-by-teaching—taking place, bank managers can consciously look after the benefits they can rake from an integration process or other activities that

involve employee trainings (e.g. auditing, annual executive trainings, etc.). The results from this study also provide implications to the financial regulators. The empirical test in this study shows direct effect of public policies. The behavioral change in banks' loan loss provisioning provides us with an idea of how the Basel Accord had actually promoted forward-looking provisioning in order to protect banks against systemic failure. By theorizing and documenting the pattern in organizations' actions, regulators can find validity and legitimacy in the regulations that they endorse.

The present study, yet, awaits refinement in future work. While we try to control for bank managers' opportunistic behavior by using the tier 1 capital and beginning quarter earnings data, there are more factors that would affect the motivations of bank managers to smooth earnings. Although this paper does not suffer much from such concerns due to the industry wide convergence towards forward-looking accounting practices after the Basel Accords, a more thorough set of controls would benefit work in this domain. Also, researchers may find further opportunities by looking at different levels of analysis in order to identify the diffusion of learning-by-teaching. For instance, one could empirically test a bridging hypothesis between task level individual bank learning and the change in the higher-level organizational behavior using the bank holding company data. This would allow the researcher to document the constituent bank's behavioral change, which results from a learning experience, as well as the parent level learning by investigating other existing constituent banks' behavioral change. Finally, as the theoretical perspective on learning-by-teaching at the organizational level is relatively new to the literature, we believe various intriguing issues await future research.

Figures and Tables

[Figure 1] Scatter Plot of relationship between firm performance and different choice of target firm



[Table 1] Summary statistics: Explanatory variables

Variable	Obs	Mean	Std. Dev.	Min	Max
ΔNPLt+2	205,575	0.0005148	0.6545797	-153.6851	247.5346
ΔNPLt+3	203,353	0.0004889	0.6581559	-153.6851	247.5346
ΔNPLt+4	201,194	0.0004821	0.6617104	-153.6851	247.5346
Superior Parent Flag	1,532	0.6605744	0.473669	0	1

[Table 2] Summary statistics: Control variables

Variable	Obs	Mean	Std. Dev.	Min	Max
totasset	212,156	736860.1	1.02E+07	781	6.62E+08
stpincome	212,156	2.62E+08	2.41E+08	1.22E+07	1.27E+09
stherf	212,156	0.1196327	0.0997295	0.0114157	0.8506912
stnumbanks	212,156	336.8105	223.1089	4	843
loan proximity	212,156	0.0068617	0.0808369	0	1
nghbr dummy	212,156	0.9990646	0.0303242	0	1
# prior acq	212,156	0.0954628	1.210897	0	65
tier1cap	212,156	57815.33	689847.9	-40164	4.37E+07
boqcap	212,156	55142.59	658572.6	-563	4.19E+07

[Table 3] Pairwise correlation of independent variables

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
ΔNPLt+2	1															
ΔNPLt+3	-0.5081	1														
ΔNPLt+4	0.1043	-0.5414	1													
Superior Parent Flag	-0.0446	-0.0359	0.0522	1												
ΔNPLt+2*Sup	-0.0011	0.2349	-0.1995	0.0576	1											
ΔNPLt+3*Sup	0.1179	-0.0007	0.1477	-0.0219	-0.5135	1										
ΔNPLt+4*Sup	-0.169	0.1089	0	-0.0409	0.092	-0.5003	1									
totasset	-0.0147	0.0092	0.0105	-0.0098	0.0066	0.0072	-0.0094	1								
stpincome	-0.0279	0.0029	0.0313	0.0361	0.0142	-0.002	-0.0268	0.0696	1							
stherf	-0.0429	0.0345	-0.0519	0.0331	0.0423	-0.0666	0.0567	0.1958	0.0354	1						
stnumbanks	-0.0178	0.0297	0.0159	0.0318	-0.0109	0.0299	-0.0332	-0.076	0.3544	-0.3108	1					
loan proximity	0.0049	0.0137	-0.0608	0.0458	-0.0172	0.0163	-0.0046	-0.1131	0.0286	-0.0194	0.0437	1				
nghbr dummy	0.0266	-0.0236	0.0144	-0.0001	-0.0426	0.0622	-0.05	-0.3504	0.0185	-0.2144	0.1578	0.1354	1			
# prior acq	-0.0237	0.0123	0.0089	-0.0176	0.0073	0.0112	-0.016	0.2407	-0.0597	0.0534	-0.1162	0.0086	-0.3269	1		
tier1cap	-0.0394	0.008	0.0057	0.013	-0.0112	-0.028	0.0913	-0.1038	-0.022	0.05	-0.0386	-0.0821	-0.0181	-0.1033	1	
boqcap	-0.0486	-0.0383	0.0531	0.1198	-0.0145	-0.0381	0.089	-0.0619	-0.0318	0.0615	-0.0547	-0.1775	-0.0376	-0.036	0.6176	1

[Table 4] Fixed effects model regression: Prior to Basel accord

	1	2	3	4	5	6										
ΔNPLt+2	0.169***	0.176***	0.178***	0.179***	0.190***	0.155***		nghbr dummy	0.161	0.158	0.157	0.15	0.159	0.129		
	0.046	0.048	0.048	0.048	0.048	0.044			0.099	0.099	0.099	0.099	0.099	0.09		
ΔNPLt+3	0.279***	0.303***	0.305***	0.286***	0.288***	0.186***		# prior acq	0.178	0.165	0.145	0.125	0.104	0.010		
	0.041	0.057	0.057	0.059	0.059	0.055			0.517	0.518	0.516	0.516	0.516	0.472		
ΔNPLt+4		0.019	0.018	0.02	0.038	0.044		tier1cap	-20.435***	-20.485***	-20.311***	-20.072***	-20.367***	-15.561***		
		0.03	0.03	0.03	0.033	0.03			2.966	2.972	2.963	2.968	2.974	2.761		
Superior Parent Flag			0.109**	0.108**	0.114**	0.107**		boqcap	-2.737	-2.653	-2.891	-2.769	-2.857	-3.328*		
			0.052	0.052	0.052	0.047			2.029	2.035	2.031	2.033	2.032	1.858		
ΔNPLt+2*Sup				0.047	0.016	0.155***		Year/Quarter Dummies Included	Yes	Yes	Yes	Yes	Yes	Yes		
				0.039	0.045	0.043		Constant	0.183	0.102	0.025***	0.023***	0.023***	0.026***		
ΔNPLt+3*Sup					-0.064	0.169***			0.153	0.077	0.006	0.006	0.006	0.006		
					0.047	0.049		Observations	203102	200910	1475	1475	1475	1475		
ΔNPLt+4*Sup						0.325***		R-squared	0.0006	0.0052	0.341	0.3428	0.3453	0.4539		
						0.033										
Total assets	0.268**	0.267**	0.280**	0.292**	0.289**	0.240*										
	0.135	0.135	0.135	0.135	0.135	0.124										
stpincome	-0.176*	-0.178*	-0.176*	-0.170*	-0.166*	-0.194**										
	0.097	0.098	0.097	0.097	0.097	0.089										
stherf	-0.429	-0.415	-0.439	-0.421	-0.428	-0.706*										
	0.442	0.443	0.442	0.442	0.442	0.405										
stnumbanks	-81.861	-83.793	-86.251	-56.41	-51.999	-137.246										
	111.452	111.648	111.268	113.992	113.938	104.518										
loan proximity	0.574***	0.580***	0.554***	0.552***	0.547***	0.288*										
	0.184	0.185	0.185	0.185	0.184	0.171										

* p<0.10, ** p<0.05, *** p<0.01

[Table 5]Subsample regression: Superior parents vs inferior parents, prior to Basel

	Superior	Inferior			
ΔNPLt+2	37.754***	24.151*	nghbr dummy	-0.213*	-0.923***
	9.283	14.388		0.122	0.187
ΔNPLt+3	22.976**	24.689*	# prior acq	-0.790	-0.963
	9.359	13.487		0.483	0.685
ΔNPLt+4	46.370***	-100.378***	tier1cap	-8.298***	-0.786
	9.62	10.328		1.993	1.517
Total assets	0.319***	-0.067	boqcap	9.173***	8.461***
	0.085	0.122		1.93	2.202
stpincome	-0.020*	-0.003	Year/Quarter Dummies Included		Yes Yes
	0.012	0.019	Constant		0.385 1.139***
stherf	0.33	0.43			0.369 0.394
	0.315	0.499			
stnumbanks	-6.461	14.437	Observations		976 499
	16.581	24.569	R-squared		0.0938 0.4111
loan proximity	0.138	-0.679**			
	0.331	0.301			

* p<0.10, ** p<0.05, *** p<0.01

[Table 6]Fixed effects model regression: Post Basel accord

	1	2	3	4	5	6								
ΔNPLt+2	-0.011	-0.014	-0.013	-0.025	-0.019	-0.016	nghbr dummy	-0.171	-0.169	-0.175	-0.185	-0.192	-0.199	
	0.059	0.062	0.062	0.064	0.064	0.064		0.152	0.153	0.153	0.154	0.153	0.153	
ΔNPLt+3	0.004	0	0.003	-0.003	-0.014	-0.014	# prior acq	4.470**	4.480**	4.620***	4.556**	3.917**	3.822**	
	0.075	0.08	0.08	0.08	0.08	0.08		1.770	1.780	1.782	1.785	1.811	1.815	
ΔNPLt+4		-0.008	-0.011	-0.015	-0.031	-0.043	tier1cap	15.887**	15.939**	17.401**	17.184**	17.216**	17.247**	
		0.05	0.05	0.05	0.051	0.053		6.683	6.728	6.821	6.829	6.802	6.805	
Superior Parent Flag			0.113	0.109	0.101	0.09	boqcap	4.011	3.996	3.495	3.443	3.502	3.437	
			0.09	0.09	0.09	0.091		3.365	3.378	3.398	3.4	3.386	3.388	
ΔNPLt+2*Sup				0.048	0.064	0.061	Year/Quarter Dummies Included		Yes	Yes	Yes	Yes	Yes	Yes
				0.057	0.058	0.058	Constant		-3.512***	-3.542***	-3.700***	-3.629***	-3.490***	-3.383***
ΔNPLt+3*Sup					0.124*	0.133*			1.224	1.241	1.246	1.25	1.247	1.254
					0.067	0.068								
ΔNPLt+4*Sup						0.046								
						0.052								
Total assets	0.326***	0.333***	0.341***	0.368***	0.420***	0.424***								
	0.102	0.112	0.112	0.117	0.12	0.12								
stpincome	0.049	0.048	0.059	0.056	0.064	0.063								
	0.116	0.117	0.117	0.117	0.116	0.117								
stherf	-0.121	-0.132	-0.194	-0.239	-0.454	-0.444								
	0.626	0.632	0.634	0.636	0.644	0.645								
stnumbanks	747.658**	753.863**	749.322**	756.946**	717.706**	685.435**								
	325.604	329.229	328.928	329.217	328.571	330.8								
loan proximity	-0.29	-0.287	-0.293	-0.349	-0.338	-0.328								
	0.329	0.331	0.331	0.337	0.336	0.337								

* p<0.10, ** p<0.05, *** p<0.01

[Table 7]Subsample regression: Superior parents vs inferior parents, Post Basel

	Superior	Inferior			
Δ NPLt+2	3.909	18.158	nghbr dummy	-0.614***	-0.778***
	9.906	13.326		0.125	0.168
Δ NPLt+3	9.354	11.262	# prior acq	-0.179	0.321
	10.363	14.906		0.435	0.644
Δ NPLt+4	25.328**	24.626**	tier1cap	-6.640***	5.029*
	10.511	12.103		1.802	3.026
Total assets	0.076**	-0.018	boqcap	1.002	4.359**
	0.034	0.031		1.582	2.011
stpincome	-0.001	0.007	Year/Quarter Dummies Included		Yes
	0.01	0.012			Yes
stherf	1.270***	0.415	Constant	0.806**	0.764*
	0.273	0.352		0.356	0.399
stnumbanks	38.083**	-29.807	Observations	797	307
	19.133	24.834	R-squared	0.2502	0.3352
loan proximity	0.142	-0.591**	* p<0.10, ** p<0.05, *** p<0.01		
	0.321	0.257			

[Table 8] Differences-in-difference analysis

(Delayed Expected Loss Recognition Model: Time=1 if Post Basel II Accord, 0 otherwise; Treatment=1 if Acquisition made by Superior Parents, 0 if Acquisition made by Inferior Parents)

	1	2	3	4	5	6	7	8
Δ NPLt+2	14.353*	14.569*	14.569*	34.276***	34.387***	61.635***	81.944***	94.469***
	7.89	8.112	8.112	10.05	10.051	13.175	14.508	15.832
Δ NPLt+3	44.475***	42.756***	42.756***	58.921***	59.015***	100.482***	120.359***	100.612***
	6.871	8.294	8.294	10.266	10.268	12.765	15.886	17.865
Δ NPLt+4		-2.573	-2.573	0.656	0.767	11.343	81.818***	100.009***
		5.636	5.636	6.329	6.331	7.58	10.682	11.562
time			2.012***	1.806***	1.823***	1.862***	1.860***	1.884***
			0.198	0.214	0.215	0.212	0.203	0.202
treat				-0.074	-0.041	-0.047	-0.035	-0.044
				0.049	0.061	0.06	0.057	0.057
did					-0.087	-0.066	0.002	-0.012
					0.098	0.097	0.093	0.092
Δ NPLt+2*time						-55.321***	-48.476***	-67.815***
						19.158	18.636	21.332
Δ NPLt+3*time						-107.777***	-97.840***	-59.982**
						18.512	18.74	23.343
Δ NPLt+4*time						-0.892	-41.204***	-80.447***
						14.136	14.282	17.181
Δ NPLt+2*treat							-78.869***	-107.626***
							18.447	24.998

ΔNPLt+3*treat							-98.801***	-82.900***
							18.242	24.114
ΔNPLt+4*treat							-131.049***	-154.425***
							13.332	15.973
ΔNPLt+2*did								42.493
								38.428
ΔNPLt+3*did								-56.705
								36.628
ΔNPLt+4*did								100.370***
								30.584
Total assets	0.070**	0.072**	0.072**	0.055	0.056	0.084**	0.092**	0.092**
	0.032	0.033	0.033	0.038	0.038	0.039	0.037	0.038
stpincome	-0.001	-0.002	-0.002	0.005	0.006	0.002	-0.006	-0.013
	0.026	0.027	0.027	0.03	0.03	0.03	0.028	0.028
stherf	0.328	0.329	0.329	0.539*	0.530*	0.520*	0.474	0.479
	0.271	0.274	0.274	0.316	0.316	0.311	0.297	0.294
stnumbanks	138.869**	141.865**	141.865**	136.191	140.897	147.792*	157.273*	164.540**
	68.472	68.9	68.9	85.547	85.722	84.576	81.363	80.774
loan proximity	-0.015	-0.013	-0.013	0.387**	0.388**	0.301*	0.109	0.06
	0.052	0.052	0.052	0.172	0.172	0.17	0.163	0.162
nghbr dummy	-0.079	-0.074	-0.074	-0.034	-0.035	-0.068	-0.107	-0.091
	0.07	0.07	0.07	0.089	0.089	0.087	0.084	0.083
# prior acq	0.361	0.353	0.353	0.013	0.005	0.174	-0.077	-0.048
	0.397	0.399	0.399	0.481	0.481	0.474	0.454	0.450
tier1cap	0.79	0.851	0.851	3.875	3.922	2.956	3.803*	3.398
	1.779	1.804	1.804	2.387	2.388	2.359	2.256	2.255
boqcap	0.304	0.279	0.279	-2.16	-2.21	-1.816	-1.546	-1.486
	1.088	1.094	1.094	1.548	1.549	1.524	1.458	1.444
Year/Quarter Dummies Included	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	-0.058	-0.074	-0.074	-0.619	-0.644	-0.488	-0.387	-0.334
	0.297	0.3	0.3	0.412	0.413	0.408	0.39	0.387
Observations	3320	3283	3283	2579	2579	2579	2579	2579
R-squared	0.3021	0.2997	0.2997	0.325	0.3255	0.3507	0.4091	0.4232

* p<0.10, ** p<0.05, *** p<0.01

[Table 9] Subsample regression: Superior banks vs inferior banks, Prior to Basel

(Delayed Expected Loss Recognition Model, using mean=0.0066)

	Superior	Inferior			
ΔNPLt+2	-33.421***	21.932***	nghbr dummy	0.05	-1.408
	0.441	3.821		5.865	10.469
ΔNPLt+3	-56.937***	13.744***	# prior acq	-6.93	5.55
	1.506	3.846		13.95	27.59
ΔNPLt+4	-166.922***	-0.009	tier1cap	26.903***	10.368
	1.459	0.362		6.86	22.931
Total assets	-0.277	-1.173	boqcap	-14.384***	-9.301
	1.783	2.866		5.286	22.399
stpincome	-0.164*	-0.339***	Year/Quarter Dummies Included	Yes	Yes
	0.091	0.125	Constant	0.099	2.343
stherf	5.528***	-0.41		5.92	10.521
	1.931	2.858	Observations	89672	111238
stnumbanks	-444.769***	101.093	R-squared	0.1524	0.0005
	98.465	135.826			
loan proximity	-0.819	0.009			
	2.275	3.603			

* p<0.10, ** p<0.05, *** p<0.01

[Table 10] Subsample regression2: Superior banks vs inferior banks, Prior to Basel
(Delayed Expected Loss Recognition Model, using median=0.0059)

	Superior	Inferior			
ΔNPLt+2	-32.878***	20.445***	nghbr dummy	0.073	-1.535
	0.419	4.017		5.396	11.481
ΔNPLt+3	-54.194***	10.293**	# prior acq	-63197.131	72940.69
	1.43	4.048		124346.41	325517.709
ΔNPLt+4	-164.126***	-0.06	tier1cap	27.344***	10.655
	1.386	0.38		6.423	24.561
Total assets	-0.211	-1.507	boqcap	-14.358***	-9.852
	1.563	3.321		5.015	23.991
stpincome	-0.157*	-0.364***	Year/Quarter Dummies Included		
	0.081	0.137	Constant	-0.069	2.567
stherf	5.141***	-0.588		5.445	11.539
	1.741	3.155	Observations	100346	100564
stnumbanks	-406.265***	118.647	R-squared	0.148	0.0005
	88.358	149.617	* p<0.10, ** p<0.05, *** p<0.01		
loan proximity	-0.741	0.016			
	2.031	4.057			

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