Do Supervisory Rating Standards Change Over Time?*

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Supervisory BOPEC ratings were assigned to bank holding companies (BHCs) during the years 1987 to 2004 as a summary of their overall performance and level of supervisory concern. In this article, we examine the stability of the BOPEC ratings assigned over that period. We model supervisory ratings using balance sheet variables, and our analysis suggests that BOPEC rating standards varied over time. Supervisors seem to have applied more stringent rating standards from 1989 to 1992, a period marked by a recession and a large degree of distress in the banking sector. Rating standards then eased during the economic recovery from 1993 to 1998, before showing increasing signs of toughness again from 1999 through 2004. Based on our estimated model parameters, we find that, in some cases, up to 25 percent of the BHCs that were assigned a BOPEC rating in a "tough" year would have been given a better rating in an "easy" year. The reasons for the observed variation in supervisory standards could be changes in supervisory behavior, but they are also surely related to the substantial changes that occurred within the U.S. banking system over this 17-year period.

1. Introduction

Bank supervisors engage in extensive monitoring of banking organizations in order to conduct effective supervision, enforce regulations, and guard against systemic risk. In the United States, several financial regulatory agencies supervise commercial banks and related depository institutions, but the Federal Reserve System is the primary regulator of bank holding companies (BHCs) and, after the Gramm-Leach-Bliley Act of 1999, of financial holding companies. The supervisory monitoring of BHCs is primarily conducted using both on-site and off-site inspections. In particular, on-site supervisory visits produce a detailed picture of a BHC's financial condition and risk profile. The frequency of inspections is determined according to a BHC's size and its level of supervisory concern.[1]

From 1987 through 2004, BHCs received a numerical rating called a composite BOPEC rating at the end of these on-site visits.[2] The BOPEC acronym stands for five key areas of supervisory concern: the condition of the BHC's **B**ank subsidiaries, **O**ther nonbank subsidiaries, **P**arent company, **E**arnings, and **C**apital adequacy. BHCs with the best performance are assigned a BOPEC rating of one, while those with the worst performance are given a BOPEC rating of five. A rating of one or two indicates that the BHC is not considered to be of supervisory concern. Note that BOPEC ratings, as well as all other inspection materials, are highly confidential and are never made publicly available.

Like bond ratings given by the private rating agencies, BOPEC ratings are deemed absolute ratings and, thus, should be comparable over time. However, given the changes in the banking sector over the past several decades and the large changes in the competitive environment in which banks operate, it is natural to question whether the standards used to assign supervisory ratings have also changed. In an important study of corporate bond ratings, Blume, Lo, and MacKinlay

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1. For a detailed explanation of how inspection frequency is determined, see sections 5000.0.2-4 of the Bank Holding Supervision Manual issued by the Division of Banking Supervision and Regulation at the Board of Governors of the Federal Reserve System (www.federalreserve.gov/BoardDocs/SupManual).

2. Starting in 2005, the Federal Reserve's BHC supervisory rating system was changed from a method of historical analysis of BHC financial conditions to a forward-looking assessment of risk management and financial factors. The new rating system is known as the RFI/C(D) rating system. Each inspected BHC is assigned a "**C**" composite rating, which is based on an evaluation of its managerial and financial condition as well as the future potential risk of its subsidiary depository institutions. The other main components of the rating system are **R**isk management, **F**inancial condition, and potential **I**mpact of the parent company and nondepository subsidiaries on the subsidiary depository institutions.

(BLM, 1998) found that bond rating standards became more stringent over the period from 1978 to 1995. While subsequent studies, such as Jorion, Shi, and Zhang (2009), have raised some questions about this result, the general conclusion that rating standards move over time has been widely accepted. With regard to supervisory ratings, Berger, Kyle, and Scalise (BKS, 2001) directly address this question with respect to the CAMELS ratings assigned after bank examinations. They found that bank examiners were "tougher" in assigning ratings during the years 1989 through 1992 and less so from 1993 to 1998.

In this study, we examine the related question of whether the supervisory standards used to assign BOPEC ratings have changed over the period from 1987 to 2004. Using the econometric model proposed by BLM (1998), we look at whether a BHC that was assigned a given rating at a given point in time might have received a different rating at another point in time, holding constant the financial characteristics of the BHC. In this regard, we estimate an ordered logit model in which the dependent variable is the BOPEC rating. The regressors are supervisory variables that should have explanatory power in predicting BHC health; see Krainer and Lopez (2003, 2004, 2008) for further discussion. In addition, we include indicator variables for the year in which the BOPEC rating was assigned in order to track potential changes in supervisory standards over time. In this model, if rating standards change through time, the estimated intercepts should be statistically different from the benchmark year.

Our empirical results show that the yearly intercepts do vary significantly, suggesting that BOPEC rating standards did change over time. We find that supervisory standards were "tough" from 1989 to 1992, a period that corresponds with a recession and a "credit crunch," "easy" from 1993 to 1998, and "tough" again from 1999 through 2004. These results for BHCs align quite well with the bank-level results reported by BKS (2001). Our results are robust to including various cyclical measures of macroeconomic conditions, such as GDP growth and stock market returns, in the model.

We also find that the changes in rating standards had an impact on BOPEC rating assignments. As per BLM (1998), we use our estimated annual intercepts to gauge the magnitude of the differing standards by examining the degree to which ratings assigned in a given year would change if they had been assigned in another year. We find that about 15 percent of the BOPEC ratings assigned during the relatively "easy" years of 1993 to 1998 would have been given worse (i.e., higher) ratings in other years. Similarly, roughly 15 percent of BOPEC ratings assigned in the "tough" years of our sample would have received better (i.e., lower) BOPEC ratings during the "easy" years.

The underlying reasons for these changes range from possible examiner forbearance due to economic and political concerns, as is argued by Rosen (2003), to the significant changes in the banking system's structure and regulation, as detailed by Furlong and Kwan (2006). Our empirical results cannot directly address the underlying reasons for this pattern of supervisory behavior, but the size and timing of our implied changes in BOPEC rating standards can provide guidance for future research.

The paper is structured as follows. In Section 2, we provide a brief survey of the academic literature on supervisory rating standards. In Section 3, we discuss our data set and ordered logit model. In Section 4, we empirically analyze patterns in rating standards, and Section 5 concludes.

2. Literature Review

The stability of rating standards was first examined within an econometric framework by BLM (1998) for Standard and Poor's (S&P) corporate bonds. Using bond ratings over the period from 1978 through 1995, they estimated an ordered logit model that incorporated several control variables, such as total leverage and market value, as well as indicator variables (i.e., time dummies) for the ratings' assignment years. They found that the pattern of estimated coefficients on the indicator variables was downward sloping, indicating worsening ratings, in a statistically significant way. Their empirical results support the hypothesis that rating standards became more stringent over this period. The authors note that their results are conditional only on the firm characteristics included in their model. While they conducted a series of robustness tests to verify their results, it is possible that the changing intercept values were just compensating for an omitted variable or time variation in the coefficients on the explanatory variables.

In a follow-up study, Jorion et al. (2009) found much less support for this conclusion when they extended the analysis to the period from 1985 to 2002 and to encompass speculative-grade bonds. They found that these bonds did not exhibit the downward trend in their intercept variables. In addition to some further technical results, they argued that the omitted variable that could account for BLM's main result was the informativeness of accounting data. Based on indirect measures of the quality of accounting data for credit risk analysis and earnings management, they showed that the trend in the investment-grade intercept can be significantly reduced.

Turning to supervisory ratings, the most relevant study is BKS (2001), who examined changes in bank-level supervisory ratings, known as CAMELS ratings.[3] They also used an

3. As with BOPEC ratings, CAMELS ratings are assigned after bank examinations and are not made public. The CAMELS acronym refers to six key areas of supervisory concern: the bank's **C**apital adequacy, **A**sset quality, **M**anagement, **E**arnings, **L**iquidity, and **S**ensitivity to risk.

ordered logit model with time-varying intercepts for their analysis, but they allowed the intercepts to vary only across time periods. Their results suggest that supervisors assigned tougher ratings during the credit crunch period from 1989 to 1992 and easier ratings during the expansion period of 1993 to 1998. They also found that these changes in supervisory rating standards led to changes in bank lending patterns. However, they determined that the observed changes in bank lending can be only partially explained by changes in supervisory rating standards.[4] This latter result is consistent with Peek and Rosengren (1997) who found that tougher supervisory enforcement of capital requirements led to a sharp decline in bank lending in New England during the 1990–1991 recession, and with Curry, Fissel, and Ramirez (2006) who found that business lending at the state level was sensitive to CAMELS rating changes over the period from 1985 to 1993. Our study differs from the BKS study in two key ways: we use supervisory BOPEC ratings of bank holding companies instead of supervisory CAMELS ratings of banks, and we use annual indicator variables instead of regime indicators.

3. Sample, Model, and Estimation Results

3.1. The BOPEC Sample

The core database for our analysis is the supervisory BOPEC ratings assigned over the period from the first quarter of 1988 to the fourth quarter of 2004. We analyze only BOPEC ratings assigned after an on-site, full-scope inspection. This reflects the concern that limited and targeted inspections produce a less comprehensive supervisory information set than is produced in a full inspection. Our sample of BOPEC ratings is further refined to include only inspections of top-tier BHCs with identifiable lead banks, since they are typically the legal entity within the banking group that has the highest level of responsibility; for example, it is the top-tier entity that issues publicly traded equity. We also require each BHC to have at least four quarters of supervisory data and at least one prior BOPEC rating. This effectively removes de novo BHCs and new BHCs arising from mergers from the sample. Finally, four quarters of supervisory data are required to calculate certain explanatory variables for the model described later.

The assets of the BHCs inspected in our sample are summarized in Table 1. The full sample contains 7,045 BOPEC ratings for 2,077 different BHCs. There were slightly more inspections in the first half of the sample period than in the second half; this trend reflects both the gradual consolidation taking place over the period and the relatively benign environment for banks towards the end of the sample, which tends to slow down the frequency for each bank's periodic inspections. As shown in the table, an important difference between the private and publicly traded BHCs in our sample is size: Public BHCs are generally larger than private BHCs, with a greater percentage having total assets ranging between $1 billion and $100 billion. The table also shows that almost 70 percent of the total inspections in the sample are of relatively small institutions with less than $1 billion in total assets.

Table 1
Asset Size of BHCs in the BOPEC Sample

	1988–1995	1996–2004	1988–2004
Total inspections	4,119	2,926	7,045
Asset size:			
Assets < $1b	3,123	1,699	4,822
$1b < assets < $100b	981	1,177	2,158
Assets > $100b	15	50	65
Inspections of publicly traded BHCs	1,610	1,593	3,203
Asset size:			
Assets < $1b	690	535	1,225
$1b < assets < $100b	905	1,008	1,913
Assets > $100b	15	50	65

Note: A BHC is defined in our data set as a top-tier BHC with an identifiable lead bank and four quarters of available supervisory reporting data.

Table 2 presents the distribution of BOPEC ratings assigned in each year for all BHCs and for publicly traded BHCs. Note that there are very few BOPEC 5 ratings in the sample, since both supervisors and bankers take actions to try to prevent this outcome. Clearly, for each year and in total, the majority of the ratings fall in the upper two categories, which indicates that a BHC's financial condition and risk profile are of little supervisory concern. For the full 17-year period, the total percentage of ratings in these top two categories is 80 percent. Although the distribution fluctuates over the sample, the annual percentage of ratings in the top two categories for the full sample never falls below the 60 percent observed in 1991. From that point, the percentage of BOPEC assignments in the top two categories increases steadily, reaching 96 percent of assignments in 1998. From there through 2004, the percentage fluctuates between 87 and 93 percent.

Our sample contains 3,203 BOPEC rating assignments for publicly traded BHCs, which represents a little over 40 percent of the full sample. These ratings correspond to 660 unique institutions, which implies a slightly higher ratio of BOPEC ratings per BHC than for the full sample, i.e., 3.39

4. Bizer (1993) did a study similar to that of BKS, although smaller in scope. He found that supervisors were harder on banks during the credit crunch than on banks in one comparison quarter, 1988:Q4. Other previous studies are similar to the Bizer study in that they are smaller in scope or depth than the BKS study.

TABLE 2
BOPEC RATINGS IN SAMPLE

	BOPEC rating						Percent of total, according to BOPEC rating				
	1	2	3	4	5	Total	1	2	3	4	5
A. All BHCs											
1988	86	224	82	39	3	434	19.8	51.6	18.9	9.0	0.7
1989	91	256	116	51	6	520	17.5	49.2	22.3	9.8	1.2
1990	61	201	76	40	20	398	15.3	50.5	19.1	10.1	5.0
1991	75	251	132	70	16	544	13.8	46.1	24.3	12.9	2.9
1992	88	316	131	91	27	653	13.5	48.4	20.1	13.9	4.1
1993	137	317	92	51	8	605	22.6	52.4	15.2	8.4	1.3
1994	166	264	40	22	6	498	33.3	53.0	8.0	4.4	1.2
1995	178	241	30	16	2	467	38.1	51.6	6.4	3.4	0.4
1996	231	248	20	3	1	503	45.9	49.3	4.0	0.6	0.2
1997	214	210	15	1	0	440	48.6	47.7	3.4	0.2	0.0
1998	145	128	16	3	1	293	49.5	43.7	5.5	1.0	0.3
1999	116	150	20	4	0	290	40.0	51.7	6.9	1.4	0.0
2000	129	189	38	6	0	362	35.6	52.2	10.5	1.7	0.0
2001	89	209	36	6	2	342	26.0	61.1	10.5	1.8	0.6
2002	74	134	23	3	0	234	31.6	57.3	9.8	1.3	0.0
2003	60	143	14	3	0	220	27.3	65.0	6.4	1.4	0.0
2004	75	148	15	3	1	242	31.0	61.2	6.2	1.2	0.4
Total	2,015	3,629	896	412	93	7,045	28.6	51.5	12.7	5.8	1.3
B. Publicly traded BHCs											
1988	56	96	23	14	2	191	29.3	50.3	12.0	7.3	1.0
1989	43	102	24	8	2	179	24.0	57.0	13.4	4.5	1.1
1990	23	74	23	8	4	132	17.4	56.1	17.4	6.1	3.0
1991	28	86	54	27	5	200	14.0	43.0	27.0	13.5	2.5
1992	43	92	41	48	10	234	18.4	39.3	17.5	20.5	4.3
1993	57	112	37	24	2	232	24.6	48.3	15.9	10.3	0.9
1994	80	124	17	6	3	230	34.8	53.9	7.4	2.6	1.3
1995	76	118	14	3	1	212	35.8	55.7	6.6	1.4	0.5
1996	102	112	7	1	0	222	45.9	50.5	3.2	0.5	0.0
1997	90	92	1	1	0	184	48.9	50.0	0.5	0.5	0.0
1998	88	81	7	2	0	178	49.4	45.5	3.9	1.1	0.0
1999	77	91	7	2	0	177	43.5	51.4	4.0	1.1	0.0
2000	75	88	13	3	0	179	41.9	49.2	7.3	1.7	0.0
2001	60	109	15	3	0	187	32.1	58.3	8.0	1.6	0.0
2002	53	90	14	0	0	157	33.8	57.3	8.9	0.0	0.0
2003	41	105	8	0	0	154	26.6	68.2	5.2	0.0	0.0
2004	43	104	7	1	0	155	27.7	67.1	4.5	0.6	0.0
Total	1,035	1,676	312	151	29	3,203	32.3	52.3	9.7	4.7	0.9

for the full sample and 4.85 for the publicly traded sample. However, the ratings distribution for publicly traded BHCs is quite similar to that for the full sample.

Table 3 presents the patterns of changes in the BOPEC ratings in our sample. The most frequent outcome is no change in BOPEC rating, accounting for about 63 percent of the full sample and ranging from 39 percent to 79 percent of the annual totals. The ratio of BOPEC upgrades relative to downgrades fluctuates over the sample in a way that corresponds with our measure of time-varying standards. There are two periods of relative weakness for the banks. First, more downgrades occurred than upgrades in the period from 1988 through 1992, a period coinciding with a banking crisis and, later, an economy-wide recession. From 1993 through 1998, upgrades greatly outnumbered downgrades, and the percentage showing no change in BOPEC ratings rose from 58 percent to 75 percent. The second period of weakness occurred from 1999 through 2004, where downgrades again outnumbered upgrades, although by a lesser margin, and the percentage showing no change in BOPEC ratings remained

TABLE 3
BOPEC RATING CHANGES IN SAMPLE

	Change in BOPEC rating				Percent of total		
	Upgrade	No change	Downgrade	Total	Upgrade	No change	Downgrade
A. All BHCs							
1988	96	170	168	434	22.1	39.2	38.7
1989	84	301	135	520	16.2	57.9	26.0
1990	62	227	109	398	15.6	57.0	27.4
1991	70	295	179	544	12.9	54.2	32.9
1992	130	360	163	653	19.9	55.1	25.0
1993	187	349	69	605	30.9	57.7	11.4
1994	137	312	49	498	27.5	62.7	9.8
1995	139	285	43	467	29.8	61.0	9.2
1996	123	341	39	503	24.5	67.8	7.8
1997	101	299	40	440	23.0	68.0	9.1
1998	38	222	33	293	13.0	75.8	11.3
1999	25	226	39	290	8.6	77.9	13.4
2000	41	267	54	362	11.3	73.8	14.9
2001	30	241	71	342	8.8	70.5	20.8
2002	34	164	36	234	14.5	70.1	15.4
2003	21	174	25	220	9.5	79.1	11.4
2004	30	177	35	242	12.4	73.1	14.5
Total	1,348	4,410	1,287	7,045	19.1	62.6	18.3
B. Publicly traded BHCs							
1988	45	90	56	191	23.6	47.1	29.3
1989	25	127	27	179	14.0	70.9	15.1
1990	10	85	37	132	7.6	64.4	28.0
1991	19	113	68	200	9.5	56.5	34.0
1992	44	136	54	234	18.8	58.1	23.1
1993	68	141	23	232	29.3	60.8	9.9
1994	58	154	18	230	25.2	67.0	7.8
1995	53	136	23	212	25.0	64.2	10.8
1996	40	170	12	222	18.0	76.6	5.4
1997	32	137	15	184	17.4	74.5	8.2
1998	19	142	17	178	10.7	79.8	9.6
1999	14	139	24	177	7.9	78.5	13.6
2000	16	143	20	179	8.9	79.9	11.2
2001	12	153	22	187	6.4	81.8	11.8
2002	28	107	22	157	17.8	68.2	14.0
2003	10	130	14	154	6.5	84.4	9.1
2004	13	121	21	155	8.4	78.1	13.5
Total	506	2,224	473	3,203	15.8	69.4	14.8

at a high level, ranging from 70 percent to 79 percent. The data for publicly traded BHCs is similar with respect to the BOPEC no change category.

3.2. Model

Our previous work on modeling and forecasting BOPEC ratings has used a standard ordered logit model, as per the BLM and BKS studies. This model assumes that the BOPEC rating assigned to BHC *i* in quarter *t,* denoted BP_{it}^{*}, is an unobservable continuous variable based on supervisory variables available at the end of year *t*–1. The rating is modeled as

$$BP_{it}^{*} = \alpha + (\beta + \gamma I_{Eit-1})x_{it-2} + \varepsilon_{it},$$

where x_{it-2} is a $(k \times 1)$ vector of explanatory variables unique to BHC *i* from two quarters prior (i.e., the soonest possible as per Gunther and Moore (2000)) to the BOPEC assignment, and the indicator variable I_{Eit-1} identifies BHCs with publicly traded equity at year-end prior to the BOPEC assignment. The interaction terms allow us to control for possible differ-

ences between BHCs without public equity and those with public equity. The error term ε_{it} has a standard logistic distribution. While we do not have a panel structure to our data because inspections do not take place at a set frequency, we do have repeat observations of the same entity over time. To control for this possible dependence in the error term, we adjust the standard errors in the results sections by clustering on entity.

Since BP_{it}^* is unobserved, we can only model the observable BOPEC rating $BP_{it} \in \{1,2,3,4,5\}$. Thus, in addition to the parameter vector (α,β,γ) and the parameters in the variance-covariance matrix, we must also estimate four cutpoints, denoted n_j, such that

$$\begin{aligned} BP_{it} &= 1 \text{ if } BP_{it}^* \in (-\infty, n_1], \\ &= 2 \text{ if } BP_{it}^* \in (n_1, n_2], \\ &= 3 \text{ if } BP_{it}^* \in (n_2, n_3], \\ &= 4 \text{ if } BP_{it}^* \in (n_3, n_4], \\ &= 5 \text{ if } BP_{it}^* \in (n_4, \infty). \end{aligned}$$

The density function for an assigned BOPEC rating is constructed by defining Y_{ijt} as an indicator variable equal to one if rating j is assigned to BHC i at time t. Since the ratings are ordered, the probability that BHC i is assigned BOPEC rating j is calculated as the difference between the cumulative probability of receiving rating j and the cumulative probability of receiving rating j–1,

$$\Pr(Y_{ijt} = 1) = \Lambda[n_j - (BP_{it}^* - \varepsilon_{it})] - \Lambda[n_{j-1} - (BP_{it}^* - \varepsilon_{it})]$$

where $\Lambda(x)$ is the cumulative logistic function. In an estimation sample with N ratings, the likelihood function is

$$L(\theta) = \prod_{i=1}^{N} \prod_{j=1}^{5} \Pr(Y_{ijt} = 1)^{Y_{ijt}}.$$

We want to examine whether rating standards have changed over the sample period. As in BLM and BKS, we address this question by replacing the constant intercept term with a time-varying one, denoted as α_t, within our model:

$$BP_{it}^* = \alpha_t + (\beta + \gamma I_{Et-1}) x_{it-2} + \varepsilon_{it}.$$

Note that this specification implies that time-varying standards reflect time variation in supervisory ratings that we are not able to account for using our BHC-specific explanatory variables, x_{it}. As noted by BLM, this may be due to actual changes in BOPEC rating standards or to an omitted variable with dynamic characteristics that are proxied for by α_t.

The choice of which supervisory variables to include in x_{it-2} is challenging. No simple behavioral models exist of how supervisors assign BOPEC ratings. Based on prior work by Krainer and Lopez (2003, 2004, 2008), we select eight explanatory variables that are reasonable proxies for the five components of the BOPEC rating; see Table 4 for summary statistics.

The first variable is the natural log of total BHC assets, which is our control variable for firm size. The next three variables are used to capture the supervisory concerns regarding the BHC's bank subsidiaries, as summarized in the "B" component of the rating. The second variable is the ra-

TABLE 4
SUMMARY STATISTICS FOR EXPLANATORY VARIABLES

	Mean	Standard deviation	25th percentile	Median	75th percentile
A. All BHCs					
Assets (in billions)	$7.56	$40.10	$0.21	$0.46	$2.11
Nonperforming loans / assets (%)	1.81	1.80	0.82	1.34	2.23
Allowances for loan losses / assets (%)	1.05	0.68	0.72	0.91	1.18
Trading Assets / assets (%)	0.39	2.62	0.00	0.00	0.00
Double leverage (%)	82.02	32.81	58.66	87.28	99.82
Return on average assets (ROAA) (%)	0.82	1.18	0.63	0.98	1.24
Equity capital (%)	7.87	2.41	6.35	7.68	9.20
B. Publicly traded BHCs					
Assets (in billions)	$16.10	$58.30	$0.74	$2.29	$9.23
Nonperforming loans / assets (%)	1.75	1.82	0.83	1.29	2.03
Allowances for loan losses / assets (%)	1.13	0.61	0.78	0.97	1.27
Trading assets / assets (%)	0.78	3.74	0.00	0.00	0.00
Double leverage (%)	74.10	30.33	49.30	78.48	97.06
Return on average assets (ROAA) (%)	0.89	1.22	0.75	1.03	1.26
Equity capital (%)	7.96	1.97	6.71	7.79	9.04
Beta	0.4632	0.4524	0.1450	0.4248	0.7153
Asset volatility	0.0486	0.0515	0.0255	0.0391	0.0559

tio of the BHC's nonperforming loans to its total assets. This "problem loans" variable proxies for the health and performance of the BHC's loans that are not making their scheduled payments. The third variable is the ratio of the BHC's allowances (or provisions) for losses on loans and leases to its total loans, another proxy for the health and performance of the BHC's lending portfolio.

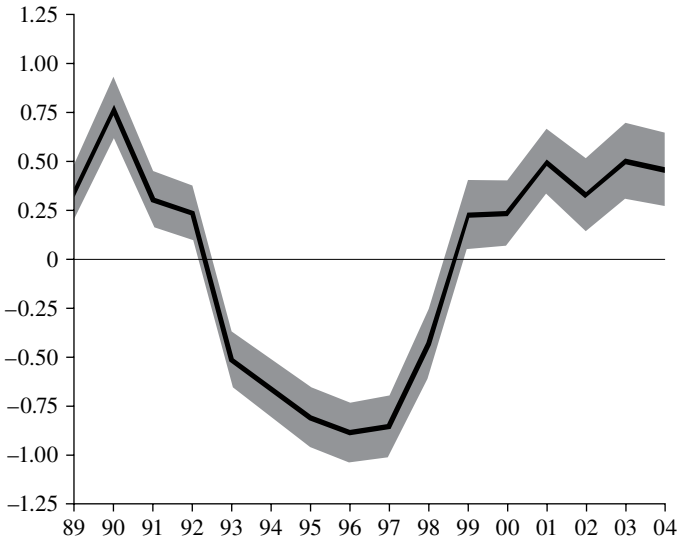
To proxy for the types of nonbank activities a BHC is engaged in—the "O" component of the BOPEC rating—we include as the fourth variable the ratio of a BHC's trading assets to its total assets. This includes nonbank activities which are conducted in banking or nonbanking subsidiaries.[5] The fifth variable is the so-called "double leverage" ratio between the BHC and its lead bank, which is the ratio of the lead bank's equity capital to that of the parent's equity capital. This variable provides a measure of the soundness of the parent BHC, indicating the extent to which the parent's equity capital can be used to buffer against damage to the lead bank's equity capital. We use this variable as a proxy for the condition of the parent BHC as summarized in the "P" component of the BOPEC rating. The sixth variable is the BHC's return on average assets (ROAA), defined as the ratio of the four-quarter average of the BHC's net income to the four-quarter average of its assets. This variable is used to proxy for the "E" component of the BOPEC rating.[6] The seventh variable is the BHC's ratio of equity capital to its total assets. This variable is used to proxy for the "C" component of the BOPEC rating. Finally, as a means to capture possible persistence in supervisory ratings, we include the lagged BOPEC rating as the eighth variable.

Given the model above, we made the model's β parameters constant through time, but we allow the intercept terms α_t to vary over time. We exclude the indicator variable for 1988, which means that each of the annual intercept estimates reflects how standards differ when compared to the 1988 base year. We then test for equality of estimated intercepts across different years, which translates to a test of equality of rating standards.

3.3. Empirical Results

In the first two columns of Table 5, we present the results of our base model estimation, where we make no distinction between publicly traded and private BHCs. The estimated coefficients on the control variables generally have the expected signs and tend to be statistically significant at the conventional levels. The coefficient on total assets is negative, suggesting that large banks tend to have better supervisory ratings. In general, more capital relative to assets and higher ROAA are associated with better ratings. Higher levels of nonperforming loan ratios and allowances for loan loss reserves are associated with worse ratings. The trading assets and double leverage variables fail to be statistically significant.

FIGURE 1
BOPEC RATING TRENDS COMPARED TO 1988



Note: Positive values indicate more stringent supervisory rating standards compared to 1988; negative values indicate more lenient supervisory rating standards compared to 1988. The gray band indicates standard error bands.

The main variables of interest here are the estimated coefficients on the time indicators, which are graphed in Figure 1 along with a standard error band. As we noted earlier, these coefficients are meant to reflect general supervisory concerns about BHCs that are not captured in the BHC-specific control variables. A positive coefficient on one of these time indicators implies that, relative to the base year of 1988, ratings were larger in magnitude (i.e., worse ratings) in that year. That is, controlling for observable variation, BHCs were rated more stringently in that year. In contrast, a negative coefficient implies that ratings were lower in magnitude (i.e., better ratings) and that BHCs were rated more leniently in that year.

The observed indicator pattern suggests that ratings were relatively stringent from 1989 through 1992. Starting in 1993 and through 1998, the estimated year coefficients are significantly negative. The coefficients return to positive values

5. Note that the trading assets variable as currently reported first became available in the first quarter of 1995. Before then, we proxy for BHC trading assets using the sum of the self-reported replacement cost of interest rate and foreign exchange derivative contracts.

6. A variety of capital measures have been used in previous studies, such as Evanoff and Wall (2000) and Estrella, Park, and Peristiani (2000). We choose a simple measure to facilitate comparison over the entire 17-year period.

TABLE 5
ORDERED LOGIT MODEL ESTIMATES

	Baseline regression: all BHCs		Indicator for public BHCs		Indicator for public BHCs with GDP growth	
	Coefficient	*p* value	Coefficient	*p* value	Coefficient	*p* value
Year dummies						
1989	0.34*	0.02	0.32*	0.02	0.33*	0.02
1990	0.78*	0.00	0.76*	0.00	0.78*	0.00
1991	0.31*	0.04	0.31*	0.05	0.35*	0.04
1992	0.24	0.12	0.25	0.10	0.25	0.10
1993	0.51*	0.00	–0.52*	0.00	–0.50*	0.00
1994	–0.67*	0.00	–0.68*	0.00	–0.69*	0.00
1995	–0.81*	0.00	–0.82*	0.00	–0.81*	0.00
1996	–0.89*	0.00	–0.92*	0.00	–0.92*	0.00
1997	–0.86*	0.00	–0.91*	0.00	–0.92*	0.00
1998	–0.43*	0.01	–0.52*	0.00	–0.52*	0.00
1999	0.23	0.16	0.15	0.37	0.15	0.38
2000	0.24	0.16	0.16	0.35	0.17	0.33
2001	0.50*	0.00	0.40*	0.01	0.43*	0.01
2002	0.33	0.08	0.21	0.28	0.22	0.25
2003	0.50*	0.00	0.36*	0.05	0.36*	0.05
2004	0.46*	0.02	0.22	0.28	0.23	0.27
ROAA	–98.27	0.00	–92.59	0.00	–92.62	0.00
Equity capital	–21.34	0.00	–25.89	0.00	–25.90	0.00
Allowance for losses	33.25	0.12	59.00	0.02	58.94	0.02
Assets	–0.13	0.00	–0.06	0.35	–0.06	0.35
Trading assets	0.94	0.50	2.91	0.21	2.92	0.21
Problem loans	53.00	0.00	57.20	0.00	57.21	0.00
Double leverage	–0.05	0.65	–0.03	0.85	–0.02	0.86
Publicly traded	—	—	–0.80	0.44	–0.80	0.44
Lag BOPEC	2.16	0.00	2.00	0.00	2.00	0.00
Interaction terms[a]						
ROAA	—	—	–27.37	0.22	–27.41	0.22
Equity capital	—	—	12.10	0.00	12.11	0.00
Allowance for losses	—	—	–68.52	0.02	–68.47	0.02
Assets	—	—	–0.01	0.94	0.00	0.94
Trading assets	—	—	–2.57	0.35	–2.59	0.34
Problem loans	—	—	–10.89	0.30	–10.91	0.30
Double leverage	—	—	0.06	0.76	0.06	0.77
Lag BOPEC	—	—	0.44	0.00	0.44	0.00
GDP growth	—	—	—	—	3.63	0.58
Number of observations	7,045		7,045		7,045	
Wald chi-squared statistics	$\chi^2(24) = 2334.14$		$\chi^2(33) = 2488.95$		$\chi^2(34) = 2491.21$	
p values	0.000		0.000		0.000	
Pseudo R^2	0.465		0.470		0.4702	

a. The interaction terms are the product of the indicator variable for public BHCs and the variables listed below.

*Statistically significant at the 5-percent level.

from 1999 through 2004. Note that changes in the estimates of the time indicators approximate changes in overall economic activity and the health of the banking sector.

We conduct a robustness test by examining whether this time pattern was due to different rating standards for public BHCs and report the results in the third and fourth columns of Table 5. We do so by interacting the control variables with an indicator for publicly traded BHCs. The BHC-specific variables all have the same signs and incidence of statistical significance as in the first estimation. In addition, few of the interaction terms are statistically significant. Thus, despite the differences between the typically larger public BHCs

and smaller private BHCs, our results suggest that supervisory ratings for both groups are determined in a similar manner. Most importantly for our analysis, the addition of the interaction terms has little impact on the observed indicator pattern.

As noted earlier, an alternative interpretation of the results could be that the pattern observed in our estimated intercept terms indicates the existence of some omitted variable that is having an effect on the determination of supervisory ratings. To address this concern, we augment our model by including macroeconomic variables in the specification. The variables we use include stock market variables such as the one-year change in S&P 500 index and a measure of the equity premium (the earnings–price ratio less the real 10-year Treasury yield), a measure of the speculative-grade bond spread, and average GDP growth rates leading up to the inspection. The last two columns in Table 5 present the results when the average GDP growth rate in the four quarters prior to the inspection is used as the macroeconomic variable. Note that the GDP coefficient is not statistically significant, and the other coefficient estimates barely change. The same result is seen with the other macroeconomic variables, except for the equity premium, as shown in Table 6. These results suggest that the changes in supervisory sentiment that our indicator variables capture occur at a lower frequency than the fluctuations in our proxies for macroeconomic conditions. The exception of the equity premium may be because of its slower-moving dynamics compared to the other variables.

Table 6
Macroeconomic Variables

Variable	Coefficient	*p* values
High-yield bond less 10-year Treasury	0.059	0.190
10-year Treasury less 3-month Treasury	0.002	0.974
S&P equity premium less 10-year Treasury	–0.101	0.033
One-quarter GDP growth	3.632	0.579
Four-quarter average GDP growth	22.111	0.228
S&P 500 Index yearly returns	0.302	0.396

Note: We obtain results by including each variable individually in the ordered logit model that created Table 5.

4. Implications of Our Findings

In this section, we discuss the implications of our observed indicator pattern. First, we gauge the economic impact of the estimated coefficients by conducting counterfactual exercises, as per BLM (1998). Second, we discuss possible explanations for the observed pattern in the indicator variables, ranging from supervisory forbearance to larger changes in the banking system over this period.

4.1. Counterfactual Exercise

To assess the magnitude of these empirical standard changes, we follow the methodology used by both BLM and BKS. In this approach, we use the parameter estimates from our BOPEC model to determine what the supervisory rating assigned in year t would have been using the supervisor rating standards for year $t+s$. In notational terms, for a given BOPEC rating assignment in, say, 1992, we determined the fitted value of its control variables with the estimated β and γ parameters; i.e., $\widehat{A} = (\widehat{\beta} + \widehat{\gamma} I_{Eit-1}) x_{it-2}$. However, instead of adding $\widehat{\alpha}_{1992}$ to that value to determine the model's fitted value for the BOPEC rating, we use the supervisory standard from, say, 1998 as summarized by $\widehat{\alpha}_{1998}$. The resulting sum of $\widehat{\alpha}_{1998} + \widehat{A}_{it}$ generates the model's counterfactual rating for BHC i if it were inspected in 1998 instead of 1992. In essence, we fix the BHC characteristics and vary the supervisory standards as measured by annual α_t parameters.

Table 7 presents these results. The column in the center of the table lists the base year for which we examine BOPEC ratings compared to rating standards from alternative years. The measure of comparison displayed in the other columns is the net percentage of assigned ratings that were changed, which is the sum of the percentage of BOPEC ratings upgraded (positive numbers) and downgraded (negative numbers). For example, for base year 1998, the value of +4.8 percent for three years earlier implies that 1998 BOPEC ratings would have been assigned better values, on net, using 1995 rating standards. In contrast, for base year 1995, the value of –10.9 percent for three years later suggests that 1995 BOPEC ratings would have been assigned worse values, on net, using 1998 rating standards.

As shown earlier in Figure 1, three distinct periods are suggested by our estimated indicator pattern: 1989 through 1992 was a period of relatively tougher supervisory rating standards; 1993 through 1998 exhibited looser rating standards; and 1998 through 2004 returned to relatively tighter standards. This pattern is mirrored in Table 6, particularly in the ratings assigned from 1993 to 1998. For the imputed ratings, both backward and forward from these years, the average of net changes in BOPEC ratings are relatively large negative numbers, on the order of 15 percent being downgraded. These suggested changes in BOPEC ratings correspond to about 70 additional downgrades per year during this period, which would more than double the number of downgrades observed. Similarly, BOPEC ratings assigned before and after this period would receive higher ratings using the looser standards of the middle time period, on the order of 15 percent being upgraded. In summary, the counterfactual exercise suggests that the changes in standards had a meaningful impact on supervisory outcomes.

TABLE 7
COUNTERFACTUAL ANALYSIS BASED ON THE BASELINE MODEL (PERCENT CHANGE)

–15 years	–10 years	–5 years	–3 years	**Base year**	+3 years	+5 years	+10 years	+15 years
				1989	3.3	18.1	3.3	0.6
				1990	22.1	24.9	13.3	
				1991	21.3	25.9	–3.1	
			–1.4	**1992**	20.4	21.0	–1.2	
			–23.5	**1993**	3.5	–3.0	–18.3	
		–16.5	–16.5	**1994**	–1.2	–14.9	–18.7	
		–28.7	–18.8	**1995**	–10.9	–18.8		
		–18.9	–13.3	**1996**	–17.5	–20.7		
		–15.2	–8.9	**1997**	–15.2	–16.1		
		1.0	4.8	**1998**	–6.8	–6.8		
	5.5	14.8	16.9	**1999**	5.5	2.8		
	–3.9	16.0	16.0	**2000**	3.6			
	9.1	24.0	18.7	**2001**	5.6			
	3.8	17.1	3.8	**2002**				
	14.5	13.2	5.0	**2003**				
3.7	15.7	5.0	1.7	**2004**				

Note: Potential percent change in base year BOPEC rating compared to other sample BOPEC ratings.

4.2. Possible Explanations

As mentioned earlier, the BLM methodology used here can detect changes in supervisory rating standards conditional on the explanatory variables used in the analysis. Thus, in addition to possible changes in supervisory behavior, we must consider other factors outside of our model that could be driving the observed indicator pattern.

Furlong and Kwan (2006) provide a useful survey of banking behavior over this period. In that paper, the authors detailed the substantial increase in bank charter values since the early 1990s. They showed that the median charter value (i.e., the ratio of market-based equity to book-value equity) for public BHCs from 1990 through 1998 for all BHC size categories rose sharply. From 1999 to 2003, these ratios declined for all public BHC categories, but in particular for the largest BHCs. Loosely speaking, their analysis matches our observed indicator pattern, and their discussion of the factors driving franchise value should inform our analysis of possible changes in supervisory standards. In particular, we discuss regulatory changes, consolidation mainly through mergers, state-level deregulation and increases in efficiency as argued by Jayaratne and Strahan (1996), and changes in the levels of bank equity capital.

Turning first to regulatory changes, the bank regulatory environment changed substantially over the period from 1988 through 2004, most importantly with the passage of the Federal Deposit Insurance Corporation Improvement Act (FDICIA) in 1991. The primary goals of the legislation were to assure the least-cost resolution of insured depository institutions that were sufficiently near insolvency and to improve bank supervision. FDICIA had two key features to ensure that these goals were reached: early closure of failing institutions and early supervisory intervention in undercapitalized banks, known as prompt corrective action (PCA), that became more stringent as bank capital declined. The change in legislation and in supervisory practices should provide some of the explanation for our observed indicator pattern with regard to supervisory BHC ratings. For example, Aggarwal and Jacques (2001) found, using data from 1992 through 1996, that FDICIA led to increased bank capital ratios without offsetting increases in credit risk. This outcome is consistent with better supervisory rating outcomes during that period.

Another important caveat to our hypothesized change in supervisory rating standards is presented by Peek and Rosengren (1997). They argued that the period just before the implementation of PCA was not more lenient in terms of supervisory actions. They found that formal regulatory actions during this period occurred well before banks became undercapitalized according to the PCA capital thresholds. They also found that supervisory restrictions on bank behavior, such as cease-and-desist orders and written agreements, tended to be more comprehensive than those required by PCA. The authors suggest that any improvement in supervisory intervention was more likely caused by the FDICIA requirements for more frequent examinations than by the PCA legislation and implementation. As shown in Tables 2 and 3, the number of BOPEC assignments increased in 1991 and 1992, but the relative frequency of BOPEC changes in those

years shifted only slightly towards more downgrades. Starting in 1994, the number of BOPEC assignments begins to decrease, but the more important shift was an increase in the percentage of BOPEC no-change assignments.

Rosen (2003) raised a different regulatory concern. He noted that a relatively large number of banks changed their charter and thus changed their primary supervisors during the 1990s. For example, in 1993, 124 banks (or just over 1 percent of all banks) changed their primary supervisors. The author's results suggest that banks were more likely to change their supervisory agency when they were also changing their portfolio composition. How these changes are related to our suggested changes in supervisory standards is not clear, but such changes could influence standards through competition among supervisory agencies or through actually different views on similar banks.

The U.S. banking system also experienced a significant amount of bank consolidation during this time period, owing both to failures and resolutions in the late 1980s and early 1990s and to mergers, especially starting in the mid-1990s. The increased consolidation could have led to changes in supervisory practices and standards, as the nature of the largest BHCs was changing. For example, supervisory practices shifted from emphazing the quality of the loan portfolio to the quality of bank risk management systems, as exhibited in the introduction of the "S" component of the CAMELS ratings in 1997.

Deregulation at the state level was a further driver of bank consolidation. In particular, the Riegle-Neal Interstate Banking and Branching Efficiency Act of 1994 permitted interstate bank mergers starting in 1997, but that process had started several years before (see Jayaratne and Strahan 1998). The improvements in bank performance and the demise of less-efficient banking organizations subsequent to interstate banking deregulation could have contributed to the observed indicator pattern as supervisory concerns shifted in response.

Finally, as described in Flannery and Rangan (2006), bank capital ratios increased during this period. Furlong and Kwan (2006) showed that, for their three size categories of public BHCs, book-value capital ratios began rising sharply in the early 1990s before stabilizing in the late 1990s. This increase was caused by several factors, such as increased regulatory emphasis on capital requirements arising from the 1988 Basel Accord. Furlong and Kwan (2006) attributed this increase partly to increased BHC charter values owing to the reasons we discussed earlier; see Furlong (1992) for some measures of this magnitude. As we have argued, the increased capital ratios may have altered supervisory standards, at least for awhile, and contributed to the "easier" standards from 1993 to 1998.

5. Conclusion

As part of their supervisory efforts, the U.S. banking supervisory agencies assign ratings to institutions at the end of an examination. In this paper, we examine the BOPEC ratings assigned by Federal Reserve examiners to bank holding companies from 1987 to 2004. In particular, we examine whether those standards fluctuated over time using the econometric framework proposed by Blume, Lo, and MacKinlay (1998).

Our analysis suggests that supervisory standards did change over this period. We find that supervisory standards were tough from 1989 to 1992, a period that corresponds with the credit crunch period; eased from 1993 to 1998; and were tough again from 1999 through 2004. These results align quite well with the bank-level results reported by Berger, Kyle, and Scalise (2001). We also find that the changes in rating standards had an impact on BOPEC rating assignments. That is, we find that about 15 percent of the BOPEC ratings assigned during the relatively easy years from 1993 to 1998 would have been given worse (i.e., higher) ratings in other years. Similarly, roughly 15 percent of BOPEC ratings assigned in the tough years of our sample would have received better (i.e., lower) BOPEC ratings during the easy years.

The underlying reasons for these changes range from examiner forbearance due to economic and political concerns, as argued by Rosen (2003), to the significant changes in the banking system's structure and regulation, as detailed by Furlong and Kwan (2006). Our empirical results cannot directly address the underlying reasons for this pattern or supervisory behavior, but the size and timing of our implied changes in BOPEC rating standards can help provide guidance for future research.

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