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The Seasonality of Interim Discretionary Accruals: The Case of Loan-Loss Provisions and Chargeoffs in the Banking Industry

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ABSTRACT

This paper examines the seasonal pattern of accruals for loan-loss provisions and chargeoffs chosen by bank managers. Using the existing literature on intra-year discretionary accruals, knowledge of the incentive systems used to evaluate bank managers' performance, and various regulatory characteristics, we predict that accruals for provisions and chargeoffs will cluster in the fourth quarter of each year. We examine quarterly data for 105 large bank holding companies from the first quarter of 1980 through the fourth quarter of 1990. Our results indicate that: (1) provisions and chargeoffs are clustered in the fourth quarter, (2) this clustering is not related to the level of business activity of the banks, (3) the proximity of a bank's actual capital to its regulatory capital requirement does not affect this clustering, and (4) current provisions are affected both by current chargeoffs and by expectations about future chargeoffs. To examine whether the systematic characteristics of these loan-loss provision and chargeoff decisions are understood by users, we also estimate a quarterly equity valuation model in which quarterly provisions should be differentially weighted to reflect their seasonal characteristics. We find strong evidence to indicate that equity prices behave as if the market participants take these seasonal properties into accouht.

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1. Introduction

Large commercial banks typically employ incentive schemes that link loan managers' compensation to their loan-portfolio earnings, net of chargeoffs.[1] These schemes have their intended effect, but they also appear to have side-effects. In this study we investigate how incentive schemes, in combination with annual external audits and certain regulatory restrictions, may result in significant distortions of banks' quarterly accounting reports. The structure of existing compensation schemes suggests that both chargeoffs and loan-loss provisions will be delayed until the fourth quarter, when impending external audits force their recognition. Such delaying tactics allow the maximum time for accrual of interest, and give portfolio managers additional time to turn around problem loans.

Our empirical tests demonstrate a significant fourth-quarter effect in both chargeoffs and provisions. This seasonal pattern defies any simple notion of inter-quarter smoothing. It is also inconsistent with the concept of interim reporting set forth in APB no. 28. This ruling directs firms to report interim activity as part of an integrated annual period, but without deferral of losses across quarters of the same year.

We next investigate whether the patterns in provisions and chargeoffs can be attributed to some underlying seasonality in the loan activity of commercial banks. We examine a number of measures of operating income before taxes and provisions, and find absolutely no evidence of seasonality. Thus, we find no evidence that the observed quarterly pattern in provisions and chargeoffs is related to fundamental factors. However, when we examine performance measures such as return on assets, which include the effects of provisions, a negative and significant fourth quarter effect is revealed. In other words, the seasonality in loan-loss provisions is not just statistically significant; it also is of sufficient magnitude to induce a seasonal pattern in the performance measures.

We also explore three related issues. First, we investigate the relative ability of historical data on provisions and chargeoffs to predict future loan losses. We find that the most powerful predictor of future chargeoffs is past chargeoffs. The results also indicate a significant, albeit smaller, predictive role for loss provisions, suggesting that provisions are, in fact, informative about future chargeoffs. Second, we investigate the possible effects of regulatory capital constraints. Recording provisions without chargeoffs can actually increase the level of regulatory capital. As a result, banks that are near the minimum permitted capital ratios might have an incentive to book provisions early in the year. However, our empirical tests find no evidence of such differential behavior according to capital adequacy. In fact, there is no evidence that regulatory capital constraints affect the seasonal pattern of either provisions or chargeoffs.

Third, and finally, we develop an equity valuation model derived from the Miller and Modigliani (1966) risk-class model, and similar to that used in Beaver, Eger, Ryan, and Wolfson (1989). The purpose of this model is to investigate whether equity investors take account of the seasonal pattern in provisions and chargeoffs in their pricing decisions. If we are correct and the true cause of the seasonals is managerial self-dealing, one might expect the seasonals to be fully discounted by equity-market participants. Our empirical tests suggest that this is indeed the case. Equity-market participants place highest weight on first-quarter loan-loss provisions and lowest weight on fourth-quarter provisions. These quarterly weights are exactly the opposite of the quarterly seasonality in the loan-loss provisions themselves, and they are of roughly the same magnitude. In sum, it appears that equity investors believe a "bogus seasonal" exists in bank accounting profits and set stock prices accordingly. It would be inappropriate to conclude from these findings that the distortion of the accounting data is harmless.

Previous research on discretionary accruals has focused principally on annual accrual decisions.[2] Our work is unique in that it focuses on a specific type of recurring accrual decision and how it is reflected in the interim reporting decisions.[3] We chose the banking industry for two major reasons: (1) the relative importance of a single category of discretionary accruals (those related to loan losses), and (2) readily available quarterly data on the results of these accrual decisions. We were also interested in how the regulatory process influences managerial decisions regarding these accruals.

The remainder of the paper continues as follows. Section 2 presents some background material and motivates our work. Section 3 discusses our sample selection criteria and provides summary statistics on our sample of banks. Section 4 presents the results of our tests for seasonal differences in provisions and chargeoffs. Section 5 presents the results of our market valuation tests. Section 6 concludes with a summary.

2. *Background and Motivation*

2.1 THE INCENTIVES OF BANK MANAGERS

Loan-loss provision and chargeoff decisions begin with bank managers, at least for commercial loans.[4] To understand these managers' performance incentives, we interviewed members of the large banks in our sample as well as a number of securities analysts who focus on this industry. Based on this information two facts emerge: (1) while certain characteristics of the performance evaluation system vary across banks, there is a great deal of homogeneity, and (2) there is considerable concern abut instituting change in this approach due to the effect that it has on the quality of information produced on loan losses. The homogeneity arises from the widespread use of net earnings, defined as accrued interest less chargeoffs, as a basis for evaluation over the last 10 to 15 years. Performance evaluation has typically been conducted annually. However, some banks indicated dissatisfaction with this approach and expressed concern about the effect this evaluation system was having on the timeliness of data regarding loan losses. In particular, some banks have recently changed their system from earnings-based measures to quality-of-loan measures, which they believe will increase the reliability of quarterly data on loan losses.

These observations support the proposition that over the time period of our sample the pre-eminent performance evaluation system was based on an earnings measure that included accrued interest from interest-earning assets in the loan portfolio, and reduced this only by actual chargeoffs. This measure is consistent with a focus on regulatory capital, since provisions for loan losses did not historically reduce regulatory capital, but chargeoffs did. In addition, our research suggests that the effects this incentive system has had on the information value of loan-loss data are viewed as a potential basis for change by members of the industry. This, in part, provides motivation for our desire to develop broad-based tests of the effects this system has had on loan-loss data.

2.1.1. The Effect of Banking Regulations. Banking regulations specify when a loan becomes past due, but they do not specify when a loan must be charged off. In addition, classifying a loan as past due does not automatically imply that the accrual of interest income must cease, since accrual of interest stops only when loans are classified as nonperforming. Under a variety of conditions, interest can be accrued on past-due loans under U.S. banking regulations. Once a loan has been charged off, however, there is no longer any possibility of continuing the accrual of interest. It is generally not possible to resurrect a charged-off loan as current if the customer becomes solvent and begins repayment, although nonperforming loans may be reinstated under certain circumstances. In effect, any recoveries that might occur after a loan is charged off are treated on a cash basis, with income recognized only as recoveries are made.[5] While the bank manager has little discretion regarding the classification from current to past due, he or she has a great deal of discretion regarding the accrual of interest on the loan and chargeoff decisions. Given the incentive structure that appears to be widely used in this industry, bank managers should prefer to delay the decision to charge off a loan, since the chargeoff decreases the net earnings of the portfolio. A chargeoff also makes it virtually impossible for the loan to be reclassified as performing because a chargeoff is viewed as a permanent impairment of the asset.

Managers in large banks, such as those studied here, often use models that predict default to help make decisions on accruals. A typical process for estimating the size of the provision incorporates an individual loan review for all loans over a preset size and a portfolio-level review for loans below that amount. Various statistical models might be used in support of an accrual decision.[6] After all the specific provision decisions for individual portfolios are made, a general reserve is created to "top it off." The more aggressive these individual analyses appear, the larger the general reserve is likely to be.[7] While the presence of this general reserve may serve to offset individual biases, it also presents a greater opportunity to manipulate the total reserve for loan losses for other reasons. Unlike the loan-loss provision decision, the chargeoff decision is always made on a loan-by-loan basis, with the possible assistance of statistical models.

2.1.2. The Effects of Audits. Three types of auditors limit the bank manager's decisions regarding the interest accrual on past-due loans and chargeoff decisions: (1) bank internal auditors, (2) bank examiners, and (3) third-party Certified Public Accountants. Internal auditors appear to be most concerned about the effectiveness of a bank's internal controls. If the bank has certain control procedures that bank managers are to follow in substantiating loss-provision and chargeoff decisions, internal auditors appear to be particularly concerned with the proper documentation of these matters. However, they do not appear to be as concerned about the potential for manipulating these amounts within the confines of the control system.

Regulatory audits are performed by bank examiners randomly throughout the year, and thus have no seasonal effect on loan-loss provisions and chargeoffs. But they will certainly affect provisions and chargeoffs at the time of the audit, since regulatory audits focus on the quality of the loan portfolio.

External CPAs provide on-site annual bank audits at the end of the fiscal year. They may review interim financial statements, but generally limit their efforts to an analytical review with a follow-up discussion between the auditor and bank management regarding any unusual patterns observed in the data. Since these audits occur at the same time each year and are anticipated by bank managers, any delay in recording provisions or chargeoffs must be "cleaned up" by then.

2.1.3. Hypotheses. Given their incentives, bank managers prefer to delay charging off a loan as long as possible to allow for accrual of interest income for the longest possible period of time and to provide maximum time to work with the customer to bring the loan back to current status. Given the structure of the audit and review process, we expect that the presence of the external audit at year's end will result in a clustering of chargeoffs in the fourth quarter. This is when bank managers' decisions will be reviewed by third-party auditors, whose own incentives make them more conservative when assessing the existence of bad debts in the portfolio.[8] This leads to the first hypothesis of our study:

H_{A1}: Loan chargeoffs will exhibit seasonality, with fourth-quarter chargeoffs systematically larger than those in earlier quarters.

Loan-loss provisions provide information about the manager's beliefs regarding future collection. If the bank manager wishes to delay recognizing chargeoffs, she or he may find it difficult to increase loan-loss provisions. This difficulty arises because increasing the provisions without increasing chargeoffs would result in a growth in the loan-loss reserve as a percentage of total loans. Managers know that this ratio is reviewed by both regulators and third-party auditors on an interim basis. Large fluctuations in it would attract attention.

Moyer (1990) suggests that annual chargeoffs and loan-loss provisions for banks are highly correlated within a given year. Such high contemporaneous correlation between provisions and chargeoffs may exist in other industries. However, this correlation is likely to be even more pronounced in the banking industry, since the time between booking a loan that eventually goes bad and writing it off is much longer than for other industries, due to the length of the allowable payment period. By the time that annual reports are issued in other industries, firms have fairly accurate information to help them predict which receivables will eventually become worthless. This timing implies that the bad-debt provisions that are reported for the fourth quarter can be based, to a large extent, on observations about which receivables become uncollectible after year end, but before the financial reports are issued. However, since it takes so long for a bank loan to be identified as uncollectible, post-balance-sheet-date information about loans does not give banks much help in deciding how much they should accrue for loan losses. Current-period provisions are thus driven to a greater extent by a need to maintain a general target level of reserves to loans. As a consequence, whenever chargeoffs are high provisions must also be increased simultaneously to maintain a target level of reserves.[9] These observations lead to our second hypothesis:

> H_{A2}: Bank loan-loss provisions will exhibit seasonality, with the fourth-quarter provision systematically larger than that in any other quarter.

If current provisions were driven exclusively by current chargeoffs, they would not be based on expectations about future chargeoffs. Nothing in our analysis suggests that current chargeoffs exclusively determine current provisions. However, it is still useful to test whether provisions are informative about chargeoffs, particularly relative to historical data on chargeoffs, because FAS 5 requires firms to make provisions for losses based on expected future chargeoffs. Consequently, we will also investigate the extent to which the historical pattern of provisions can provide information about future chargeoffs over and above that provided by the historical pattern of chargeoffs.

2.2 REGULATORY CAPITAL EFFECTS

Loan-loss provisions and chargeoffs affect bank regulatory capital. During the period we study, the definition of regulatory capital included the allowance for loan losses as well as the book value of equity. Consequently, the decision to record a provision for a loan loss reduced earnings, but not regulatory capital. Indeed, as Moyer (1990) and Scholes, Wilson, and Wolfson (1990) have noted, recording provisions in the absence of chargeoffs was actually likely to increase regulatory capital. That was so because the net-of-tax decrease in earnings was more than offset by the pre-tax addback to the allowance account. Obviously, regulatory capital is reduced when a loan is charged off. It follows that capital-constrained banks would have an incentive to increase excess provisions (that is, loan loss provisions—charge-offs). Moreover, the need to meet capital requirements is not just a year-end phenomenon. Bank examinations can occur at any time, and bank supervisors review the quarterly Call Reports. Consequently, capital-constrained banks might be expected to accelerate loan-loss provisions and delay chargeoffs.

Capital-maintenance incentives create additional motivation for delaying chargeoffs until the fourth quarter, but they have the opposite effect on the timing of loan-loss provisions. Therefore, we examine the effect of regulatory-capital restrictions on the seasonality in the loan-loss provisions and chargeoffs as a basis for determining whether this effect helps to explain the seasonality in the data.

3. Sample Selection

Our sample consists of 105 large bank holding companies for the period from the first quarter of 1980 though the fourth quarter of 1990 (44 quarters in total). In the following analysis, we delete the first two quarters of 1987 due to the effects of the foreign loan-loss provisions and chargeoffs that arose in that period. (These accruals were related to highly publicized events outside the scope of this paper. Other papers have focused specifically on these actions.[10]) Our truncated sample contained 4,218 observations. Table 1 shows the means and quartiles of several of the important variables used in this study.

The data reveal much more dispersion in both the ratio of provisions to assets and the ratio of chargeoffs to assets than there is in the ratio of excess provisions to assets. There is also substantial dispersion in the return on assets, the ratio of loans to total assets, and the ratio of bad-debt reserves to loans. Much of this dispersion represents persistent differences in portfolio strategy and assessment of loan-risk exposure across banks.

There is much less dispersion in capital/asset ratios and gross loan profitability. Dispersion in the capital/asset ratio is low because most banks want to be close to the minimum capital requirement. Dispersion in gross loan income to loans is low because of limits that regulators and banks themselves place on the riskiness of bank loans.

4. *Empirical Results*

4.1 RESULTS OF TESTS FOR SYSTEMATIC QUARTERLY DIFFERENCES

In order to test for significant differences in the provision and chargeoff decisions across quarters within a year, we estimated the following statistical models:

(1) $CRGOFF/TA_{i,t} = b_0 + b_1Q2_{i,t} + b_2Q3_{i,t} + b_3Q4_{i,t} + e_{i,t}$

(2) $LLP/TA_{i,t} = b_0 + b_1Q2_{i,t} + b_2Q3_{i,t} + b_3Q4_{i,t} + e_{i,t}$

where $CRGOFF/TA_{i,t}$ equals the chargeoffs for firm i in quarter t, divided by total assets for firm i in quarter t, and $LLP/TA_{i,t}$ equals the loan loss provision for firm i in quarter t, divided by total assets for firm i in quarter t. Q2, Q3, and Q4 are dummy variables for the second, third, and fourth quarters of the year.

There are two reasons for believing that the residuals in Models 1 and 2 are not independent, as would be necessary if we were to estimate those equations with ordinary least squares (OLS). First, banks have persistent differences in their portfolios which would be expected to lead to persistent differences in their provision and chargeoff rates. Second, banks are affected by aggregate shocks that would cause correlation among the provision and chargeoff rates across banks within any particular time period. These two types of correlation have led us to assume that the error structure for both Models 1 and 2 can be represented as $e_{i,t} = \eta_i + \delta_t + \nu_{i,t}$, where η_i is the difference between bank i's average provision or chargeoff rate and the mean provision or chargeoff rate for all banks, δ_t is the aggregate shock to provisions or chargeoffs in period t, and $\nu_{i,t}$ is the idiosyncratic component in bank i's provisions or chargeoffs in period t. By assumption, the realizations of η_i, δ_t, and $\nu_{i,t}$ are draws from three different constant-variance distributions that are independent from each other and from the regressors used in Models 1 and 2. We adjusted the standard errors in all of the estimates reported in Section 4 to take account of this error structure, as described in Appendix A.

Results of the estimation of Models 1 and 2 are presented in Table 2. The model of chargeoffs is presented in Panel A, which indicates that the average level of chargeoffs for the first quarter is 0.093 percent of the outstanding loan balance. The rate of chargeoffs as a percentage of the loan balance increases steadily over the year to 0.106 percent, 0.117 percent, and 0.158 percent for the second, third, and fourth quarters, respectively. This rate of change indicates an increase of approximately 70 percent in the rate of chargeoffs from the first quarter to the fourth. There is no statistically significant difference in the chargeoff rate over the first three quarters. A test of the restriction that these coefficients are equal for the first three quarters fails to reject the null hypothesis. However, the chargeoff rate for the fourth quarter is statistically different from that of the prior three quarters.

Figure 1 shows the quarterly pattern of mean chargeoffs from the first quarter of 1980 to the fourth quarter of 1990. The seasonality of chargeoffs is quite striking. The average chargeoff in the fourth quarter is higher than that in any other quarter for all years except 1988, and in that year the average chargeoff in the fourth quarter is barely below that for the third quarter. This finding demonstrates that the seasonality in chargeoffs is persistent, rather than the result of a few years of large fourth-quarter chargeoffs.

Given our conjecture that the decision about quarterly provisions will closely follow the chargeoff decision, we would expect the same basic pattern in the provision series by quarter as the one we observed in the chargeoffs. This conjecture is confirmed by the estimates of Model 2 presented in Panel B. The average loan-loss provision as a percentage of outstanding loans is 0.106 percent in the first quarter and rises to 0.125 percent, 0.137 percent, and 0.176 percent in the second, third, and fourth quarters, respectively. The change in the provision rate from the first to the fourth quarter is 66 percent, which is slightly less than the change in the chargeoff rate. Statistical tests for equality of these coefficients over the first three quarters fail to reject the null hypothesis, but an additional test demonstrates provisions are significantly higher in the fourth quarter than they are in the first three. Although we do not show a graph of the average provision rate for the entire sample, the pattern is similar to that shown in Figure 1 for chargeoffs, except for the large provisions for foreign loans made in the first half of 1987.

Provision rates are, on average, higher than the contemporaneous chargeoff rate, indicating that the excess provisions are positive. It is reasonable to expect provisions to be larger than chargeoffs if the bank's loan base is growing, since provisions should lead chargeoffs even if the frequency of bad debts is not increasing.

To further investigate the importance of differential growth in the provision and chargeoff rates, we also examined the difference between provisions and chargeoffs and the ratio of the reserves for loan losses to gross loans, by quarter. These results are presented in Table 3. The pattern of excess provisions indicates that provisions are larger than chargeoffs in every quarter, but the difference is slightly smaller in the fourth quarter than it is in the other three quarters. The difference is never significant for any quarter. These results suggest a very strong contemporaneous correlation in quarterly provisions and chargeoffs.[11]

Consistent with the lack of significant differences in excess provisions, we also find no evidence that the ratio of the loan-loss reserve to total loans changes systematically over quarters. This result is consistent with our speculation that loan-loss provisions are largely driven by contemporaneous chargeoffs, and that these chargeoffs are delayed as long as possible. On average, a bank's loss-reserve position at the end of any quarter looks the same as it does for any other quarter in the year.[12]

Although the decision to accrue loan-loss provisions appears to be largely driven by contemporaneous chargeoff decisions, we have not yet tested whether loan-loss provisions are also affected by expectations about future chargeoffs. One way to examine whether provisions are informative about future chargeoffs is to see whether provisions provide additional information about future chargeoffs beyond that contained in the history of chargeoffs themselves. A Granger-Sims causality test allows us to examine that possibility.[13]

Suppose we examined the provision- and chargeoff-rate time series for a single bank. If provisions are informative about future chargeoffs, then, in a regression of the chargeoff rate on lags of itself and of provisions, the coefficients on past provisions, jointly, should be significantly different from zero.[14]

If we reject the hypothesis of noncausality, we are not literally saying that provisions "cause" chargeoffs. Rather, we are saying that provisions help predict future chargeoffs, which would seem to be exactly what the Financial Accounting Standards Board's Statement Number 5 on contingencies requires: accrue a liability when it is probable and capable of reasonable estimation.

Testing for Granger-Sims causality in panel data is much more difficult than in time series because of persistent bank-specific differences in provision and chargeoff rates. These issues are discussed by Holtz-Eakin, Newey, and Rosen (1988) and Keane and Runkle (1992). We explain these tests in Appendix B.

We conducted a panel-data Granger-Sims causality test to see whether a bank's provision rate helped to predict its future chargeoff rate. We found that if we regressed the chargeoff rate on four lags of itself and the provision rate, the test statistic for the hypothesis that all of the coefficients on past provisions were zero was 11.39. Since this test statistic should be distributed asymptotically as a χ_4^2 random variable, we can reject at the 5-percent level the hypothesis that provisions do not cause future chargeoffs in the Granger-Sims sense. Thus, provisions are not entirely determined by contemporaneous chargeoffs, and they do provide information about future chargeoffs, as required by FAS 5.[15]

4.2 INTERIM PATTERNS IN OPERATING CHARACTERISTICS

The pattern of chargeoffs and provisions cannot be interpreted as management manipulation without showing how this pattern would appear without manipulation. Prior research on annual accruals in other industries has adopted several means of specifying the level of "manipulated accruals." Healy (1985) identified all differences between cash flows from operations and net income for a year as manipulated accruals. McNichols and Wilson (1988) take issue with that approach and use *ex post* data on chargeoffs to model *ex ante* annual bad-debt provision accruals in several industries.[16] We examine whether seasonality in banks' loan portfolios or loan income might cause the seasonality we observed in chargeoff and provision decisions. For example, there could be a large increase in loan demand every fourth quarter to finance Christmas purchases. The large increase in fourth-quarter provisions and chargeoffs could occur if the banks in our sample experienced significant changes in their asset mix over the year. If loan demand increased, the generation of new loans could be due to less stringent loan review, thereby leading to greater losses. We examined the ratio of loans to total assets in order to determine whether any shifts in asset mix appear to be correlated with provision and chargeoff decisions.[17]

Another indication of increased portfolio riskiness is the ratio of gross loan income to outstanding loans. Even if a bank were not increasing its loan portfolio as a fraction of total assets, loan losses might increase if the riskiness of the portfolio were changing. Greater risk should be reflected in higher gross returns. We examine this measure of performance over quarters to determine whether seasonality in gross returns could explain the seasonality in chargeoffs and provisions. We also examine the quarterly pattern of gross pre-tax operating income, excluding loan-loss provisions, to incorporate the potential effects of other nonloan income factors, which, if seasonal, might systematically affect accrual decisions.

These results are presented in Table 4. Model 1 examines the seasonality of gross operating profits before taxes and before the provision for loan losses. The results indicate that, for the sample period, this measure was statistically different from zero (the intercept is significant) but that there was no seasonality present in the series. Similar results are documented for Model 2, which focuses on gross loan income, Model 3, which employs the fraction of loans in the asset mix of the bank, and Model 4, which employs the allowance for bad debts. None of these series shows any significant seasonality. From this we conclude that the seasonality in the provision and chargeoff series is not caused by underlying seasonality in the operating characteristics of the banks we examined.

4.3 THE IMPORTANCE OF SEASONALITY IN CHARGEOFFS AND PROVISIONS

It is possible that the seasonality of chargeoffs and provisions is not economically material to overall bank performance, even though it is significant in a statistical sense. If the seasonality were not material, the importance of our statistical results would be questionable. To rule out this possibility, we examined the seasonal properties of several performance measures affected by loan-loss provisions. These include gross pre-tax operating earnings, return on assets, and the loan-loss provision as a percentage of gross loan income.

Table 5 presents results of these tests. In every case, the pattern is the same. There is no statistically significant difference across the first three quarters, but the fourth quarter is consistently lower due to the higher level of provisions booked in that quarter. These results suggest that the effect of the systematically higher fourth-quarter provisions stands out even in the presence of the variability of other elements of quarterly income. Further, the marginal difference between the first- and fourth-quarter levels of gross pre-tax operating income and ROA is about 20 percent (the coefficient on the fourth-quarter effect is approximately one-fifth the size of the intercept). The effect on the ratio of the provision to gross loan income is even more dramatic. There is a 62 percent increase from the first to the fourth quarter. From these results we conclude that the seasonality we document is not only statistically significant, but economically significant as well.

4.4 THE EFFECT OF REGULATORY CAPITAL LIMITATION

According to our discussion of the effects of bank regulation, capital-constrained banks have a special reason to provide for loan losses early rather than late. By the same logic, they have even more incentive than other banks to defer chargeoffs until the fourth quarter. To test these predictions, we estimated regulatory capital as the ratio of shareholders' equity plus loan-loss reserves to total assets. We also computed the difference between the first- and fourth-quarter provision (or chargeoff) as a percent of total assets at the beginning of that quarter. Figure 2 shows a scatterplot of the seasonal difference in loan-loss provisions against regulatory capital during the fourth quarter; a similar pattern emerges for chargeoffs, although not shown. In essence, there is no evidence of association between the two variables. In sum, there is no evidence that the extent of seasonality in loan-loss provisions or in chargeoffs depends on the adequacy of regulatory capital.

Why is there no apparent relation between regulatory capital and seasonality in provisions and chargeoffs? During most of the sample period, large bank holding companies needed to have shareholders' equity plus bad-debt reserves of at least 6 percent of total assets. Figure 2 shows that most banks exceeded that target. However, if a bank holding company fell below that limit for one or two quarters, the regulators would not impose a capital plan on the bank. In fact, before 1984, regulators had little effective power to enforce capital standards, because banks could appeal any regulatory order.

4.5 CONCLUSIONS ABOUT THE MANIPULATION OF PROVISIONS AND CHARGEOFFS

The evidence presented thus far supports our hypothesis that bank managers systematically delay accruing chargeoffs (H_{A1}) and loan-loss provisions (H_{A2}) until the last quarter of the year, consistent with their incentives. Furthermore, this seasonality is not significantly different for banks that are close to their minimum regulatory capital requirements.

One final indication that bank mangers' incentives are responsible for the seasonality in chargeoffs and provisions for most banks can be seen in the experience of Norwest Bank, when it changed its method of evaluating portfolio performance. Prior to 1985, Norwest based its performance evaluation only on annual net earnings and annual portfolio growth. Consistent with that incentive scheme, both provisions and chargeoffs showed strong fourth-quarter increases, for the reasons we have discussed throughout this paper. However, in 1985, Norwest changed from annual performance evaluation to quarterly performance evaluation. It also added asset quality to the performance measure, and made it the most important factor in the evaluation. Since these new performance measures were implemented, there has been no discernable seasonality in Norwest's provisions or chargeoffs.

5. How Equity Markets Interpret Provisions and Chargeoffs

A major question still left unanswered is whether the seasonality of the provision and chargeoff decisions affects the way that users interpret financial statements. If users are aware of the seasonality in provisions and chargeoffs, it may have little effect on their ability to interpret the data properly. To gain some perspective on this issue, we examined the effect that chargeoffs and provisions have on the price of publicly traded bank stocks.

We conjectured that the systematic quarterly patterns in provisions and chargeoffs could be predicted by market participants. Assuming that provisions and chargeoffs are important in determining the value of bank equity, the relative weight assigned to the level of provisions or chargeoffs reported in early quarters should be greater than that assigned to those levels in later quarters, since the early quarter provisions and chargeoffs are understated relative to later amounts. In particular, we suspected that the weight of the fourth-quarter provisions and chargeoffs in determining stock values would be significantly smaller than that for the first quarter.[18]

5.1 DEVELOPMENT OF AN EQUITY VALUATION MODEL

Testing the effect of seasonality in provisions and chargeoffs on stock prices requires a valuation model wherein equity value is a function of accounting variables. We used a derivative of the risk-class model developed by Miller and Modigliani (1966). This risk-class model seems appropriate for our sample, since the sample is made up only of large bank holding companies operating in essentially the same industry with similar opportunity sets.[19] The model is characterized as follows:

V = f (Gross Loan Income, Provisions for Loan Losses, Other Income and Expense Items, and Loan Income Growth)

where

Reported Net Income = Gross Loan Income − Provision for Loan Losses + Other Income and Expense Items.

In this formulation, variables such as gross loan income, other income and expense, and loan income growth act as control variables for the relationship of interest, which is the mapping of provisions into equity value. Since we want to find out how this mapping differs across quarters, we used the following model, which pools observations both cross-sectionally and intertemporally:

$$V_{i,t} = A_1 LLP_{i,t}Q1 + A_2 LLP_{i,t}Q2 + A_3 LLP_{i,t}Q3 + A_4 LLP_{i,t}Q4 + B_1 LI_{i,t} + C_1 OIE_{i,t} + D_1 LIG_{i,t} + e_{i,t} \quad (3)$$

where

$V_{i,t}$ = the market value of equity for bank i one month after the end of quarter t (divided by the book value of equity for bank i at the beginning of quarter t)[20]

$LI_{i,t}$ = gross loan income for bank i in quarter t (divided by the book value of equity for bank i at the beginning of quarter t)

$LLP_{i,t}$ = the loan loss provision for bank i in quarter t (divided by the book value of equity for bank i at the beginning of quarter t)

$OIE_{i,t}$ = other income and expense for bank i in quarter t (divided by the book value of equity for bank i at the beginning of quarter t)

$LIG_{i,t}$ = net (pre-tax) loan income growth for bank i in quarter t (divided by the book value of equity for bank i at the beginning of quarter t)

$$Q = \begin{cases} 1 \text{ if t is from the } i^{th} \text{ quarter} \\ 0 \text{ otherwise} \end{cases}.$$

A test of the hypothesis that the market appropriately interprets the seasonal properties of the provision series would examine the relative magnitude of the coefficient on the first-quarter loan-loss provision (A_1) and the coefficient on the fourth-quarter loan-loss provision (A_4).

We view our prediction that A_4 is smaller in absolute value than A_1 as indicating that the market differentiates the information contained in the loan-loss accrual in a manner consistent with its seasonal characteristics. The other variables in the model act as controls for other value-relevant factors. If these other variables were orthogonal to the loan-loss provision, a test of our proposition could be performed without incorporating them and still be unbiased, but it would be inefficient. The other control variables serve to increase the power of our tests as well as control for the effects of correlated omitted variables.[21] Because the aggregate shock to market value for all banks in a given quarter may be correlated with aggregate shocks to the values of the regressors, we use a slightly different estimator for the models in this section than we did for the models in Section 4. We describe that estimator in Appendix C.

5.2 EMPIRICAL RESULTS OF THE EQUITY VALUATION MODEL

Table 6 presents the results of estimating equation (3) above. It also presents results of an estimated version of equation (3), which breaks down the provision variable into two separate components: (1) the chargeoffs for the quarter, and (2) the excess provisions for the quarter. Overall, the model performs fairly well, since the coefficients conform to their predicted signs and their magnitudes seem reasonable. All coefficients in both variants of the model have the expected sign. In addition, the coefficients on loan income and other income and expense are of approximately the same magnitude (between 3.5 and 4.0).

Examining the results on loan-loss provisions first, we found that the coefficient on Q1 loan-loss reserves is the largest of that for any quarter. The coefficient on Q4 loss provisions is less than half that on Q1, and the difference is statistically significant at the one percent level. The pattern of loan-loss coefficients across quarters is a mirror image of the seasonal patterns we found in the raw loan-loss data. The pattern of valuation coefficients reveals progressively declining weights across quarters during the year, a finding which supports our interpretation that the seasonal pattern in the provisions data is interpreted as a bias that is corrected in the pricing process.

When the valuation model is estimated by decomposing the provision into chargeoffs and excess provisions, the same pattern emerges. The coefficient on Q1 chargeoffs and excess provisions is larger (in absolute value) than the Q4 coefficient by a factor of almost three, with the difference in excess provisions somewhat more pronounced. In both cases, these differences are significant at the one-percent level. Unlike the results for loan-loss provisions, there is no monotonic decline across quarters for the chargeoff and excess-provision coefficients.

It may seem somewhat strange that market weights placed on excess provisions are significantly different from zero, given our previous finding that excess provisions themselves are not significantly different from zero. However, the results of our causality tests showed that provisions provide additional information about future chargeoffs beyond that contained in the history of chargeoffs themselves. Since market participants are trying to ascertain the true future value of bank assets, they will logically place a nonzero value on excess provisions because these reveal information about future asset values.

Overall, the valuation model provides consistently strong evidence that fourth-quarter provisions and chargeoffs are interpreted as biased upward compared to other quarters, particularly the first. These findings provide further support for the hypothesis that chargeoffs and loan-loss provisions are seasonally distorted.

6. Conclusion

We began by developing hypotheses about how the incentives facing bank managers and the effects of regulatory requirements might affect the seasonality of loan-loss provisions and chargeoffs. We hypothesized that these features of the banking industry would result in a significant inter-quarter delay in recording both provisions and chargeoffs. We also hypothesized that the presence of a third-party audit at year's end would act to prevent such delays between fiscal years, at least to the extent that inter-year delays are smaller than inter-quarter delays. Consequently, we predicted that the fourth-quarter provisions and chargeoffs would be systematically higher than those for any other quarter. Our results support these hypotheses. They also show that provisions are not driven exclusively by contemporaneous chargeoffs, in that provisions help predict future chargeoffs.

Regulatory capital limitations do not appear to have any role in explaining cross-sectional differences across banks in the timing of provisions and chargeoffs. We find no relationship between a bank's capital adequacy and the timing of its intra-year provisions and chargeoffs. This finding suggests that, while regulatory capital limitations may influence annual levels of chargeoffs and provisions, the distribution of these annual accruals across quarters is not importantly affected.

Finally, we found that seasonality in provisions and chargeoffs appears to be understood by equity market participants, at least partially. We found evidence that first-quarter provisions and chargeoffs are given more weight in valuation than fourth-quarter accruals, consistent with the seasonality in these accruals.

The seasonality in provisions and chargeoffs is not explained by rational managerial responses to loan-market conditions or by regulatory capital constraints. The most likely explanation, therefore, lies in internal incentive structures facing loan-portfolio managers. These individuals have good reason to delay chargeoffs as long as possible to allow for accrual of interest income and the greatest chance to get loans back to current status. External audit at year's end imposes constraints on such delaying tactics, resulting in a cluster of year-end chargeoffs. If this explanation is correct, loan-loss provisions will follow a pattern similar to chargeoffs, since sharp divergence between chargeoffs and provisions is likely to attract unwanted attention.

Such a seasonal pattern is surely not in the spirit of APB No. 28 and, in addition, introduces significant and unnecessary bias into quarterly earnings reports. Such behavior may result in significant costs to bank shareholders or others, although it appears that equity market participants correctly discount the seasonal pattern in provisions and chargeoffs, at least on average. However, we do not know the amount of prediction error that remains in earnings after market adjustment, and this is likely to vary from bank to bank and over time. Moreover, if the seasonality in the accounting data is changed (for example, in response to banks' altering managerial compensation schemes, as discussed earlier), market participants must revise their own seasonal weights. This change in seasonality will surely result in increased prediction errors, at least for a time, and increased information costs to bank equity investors. In line with this observation, there is a growing literature indicating that agency problems between owners and managers are particularly severe in large banking firms. (See Gorton and Rosen 1991 and Srinivasan et al. 1993). Our findings are consistent with that conclusion and, perhaps, are symptomatic of such agency problems.

A panel-data Granger-Sims causality test provides evidence that loan-loss provisions give additional information about future chargeoffs beyond that contained in the history of chargeoffs themselves. This indicates that firms implement, to some extent, the intent of FAS 5, which requires them to accrue provisions when future chargeoffs are probable and capable of reasonable estimation. To the best of our knowledge, this is the first use of a panel-data Granger-Sims causality test in the accounting literature. Such tests may be useful in discovering the informativeness of other accounting estimates.

Notes

[1]This common arrangement was identified through numerous interviews with commercial bankers and securities analysts.

[2]See Healy (1985), McNichols and Wilson (1988), and Moyer (1990).

[3]See Elliott and Shaw (1988) and Mendenhall and Nichols (1988).

[4]Consumer loan portfolios are not evaluated on an individual-loan basis; thus accruals for loan losses in this portfolio are typically determined by bank policy via a specific formula.

[5]Recoveries on nonperforming loans are accounted for on a cost-recovery basis until full principal recovery is assured. Then these loans are restored to full-accrual basis.

[6]For a discussion of this assessment process, see O'Connor and Rollauer (1988).

[7]For a discussion of the general and specific reserve issue, see Walter (1991).

[8]This assertion is similar to that of Mendenhall and Nichols (1988), who argue that managers are likely to take a more aggressive position on accruals in interim periods because they lack a counterbalance arising from the third-party audit of these statements.

[9]McNichols and Wilson (1988) acknowledge this possibility in slightly different terms when they state, "We would expect that as accounts receivable turnover declines (for example, in banking), mechanical rules (for controlling chargeoff decisions) are more difficult to specify, leaving room from discretion over write-offs" (p. 20). In our terms, the inability to apply mechanical rules for the chargeoff decision results in a focus on maintaining certain balance-sheet relationships deemed reasonable based on history.

[10]For example, see Madura and McDaniel (1989), Grammatikos and Saunders (1990), Musumeci and Sinkey (1990a, 1990b). In support of our assertion that these accruals were generally not discretionary, see "Big Banks' Boost in Loss Reserves Was Not Voluntary," *Savings Institutions*, July 1987.

[11]In addition, the fact that the excess provision is never statistically significant suggests that, on average, the banks we sampled were not using the excess provision to increase regulatory capital across quarters, since the excess provision itself is not significantly different from zero for any quarter. Note that this finding does not imply that the excess provisions were not used as a means of increasing regulatory capital across years.

[12]For brevity statistical tests are not presented.

[13]See Granger (1969) and Sims (1972).

[14]This is Sims's version of the test.

[15]Following Holtz-Eakin, Newey, and Rosen (1988) and Keane and Runkle (1992), we conduct the causality tests by first differencing each of the variables, then instrumenting the regression by omitting the first first-difference of each variable, since it would be correlated with the error term. We used only the subsample of banks for which we had complete observations.

[16]We believe that our use of Granger-Sims causality tests in the previous section addresses exactly this issue, but in a way that has a deeper statistical justification.

[17]However, this explanation seems a bit far-fetched, since it usually takes at least one and one-half years for a loan to go bad.

[18]We focus on the difference between first- and fourth-quarter valuation since we focussed on the difference between the first- and fourth-quarter provision and chargeoff rate.

[19]This approach is identical to that of Litzenberger and Rao (1971) if the definition of a risk class implies equal firm betas. The Litzenberger and Rao formulation has been used in a variety of studies in accounting, including Bowen (1981), Daley (1984), and Beaver et al. (1989) in their examination of the information content of supplemental disclosures in the banking industry.

[20]We selected market value one month after the end of the quarter because the call reports filed with the Office of the Comptroller of the Currency are publicly available and required to be

filed shortly after the end of the quarter. Using market value one month after the end of the quarter provides time for this information to be incorporated into prices.

All variables were scaled by total assets to correct for heteroskedasticity in the data. Total assets was used for this purpose in previous studies relating information variables to share prices in the banking industry (for example, Beaver et al. 1989).

[21]This is the same spirit in which similar tests were applied by Beaver et al. (1989).

APPENDIX A

Panel Data Tests for Seasonality

Consider the model

(A1) $\quad Y_{i,t} = X_{i,t}\beta + e_{i,t}, \quad i = 1, \ldots, N, \quad t = 1, \ldots, T, \quad E(e_{i,t}) = 0, \quad E(X_{i,t} \cdot e_{i,t}) = 0$

where

$$e_{i,t} = \eta_i + \delta_t + \nu_{i,t}$$

$$E(\eta_i \cdot \eta_j) = \begin{cases} \sigma_\eta^2 & \text{if } i = j \\ 0 & \text{otherwise} \end{cases}$$

$$E(\delta_t \cdot \delta_s) = \begin{cases} \sigma_\delta^2 & \text{if } t = s \\ 0 & \text{otherwise} \end{cases}$$

$$E(\nu_{i,t} \cdot \nu_{j,s}) = \begin{cases} \sigma_\nu^2 & \text{if } i = j \text{ and } t = s \\ 0 & \text{otherwise} \end{cases}.$$

If we arrange the observations in (A1) in the order $Y_{1,1}, Y_{1,2}, \ldots, Y_{1,t}, Y_{2,1}, \ldots, Y_{2,t}, \ldots, Y_{n,t}$ and estimate the parameter in the regression $Y = X\beta + \epsilon$ using OLS, then $E(\epsilon\epsilon') = \Omega$, where

$$\Omega = \begin{bmatrix} A & B & \ldots & B \\ B & A & & \vdots \\ \vdots & & \ddots & B \\ B & \ldots & B & A \end{bmatrix}$$

$$\underset{T\times T}{A} = \begin{bmatrix} \sigma_\eta^2+\sigma_\delta^2+\sigma_\nu^2 & \sigma_\eta^2 & \ldots & \sigma_\eta^2 \\ \sigma_\eta^2 & \sigma_\eta^2+\sigma_\delta^2+\sigma_\nu^2 & \ldots & \vdots \\ \vdots & & \ddots & \sigma_\eta^2 \\ \sigma_\eta^2 & \ldots & \sigma_\eta^2 & \sigma_\eta^2+\sigma_\delta^2+\sigma_\nu^2 \end{bmatrix} \quad \underset{T\times T}{B} = \begin{bmatrix} \sigma_\delta^2 & 0 & \ldots & 0 \\ 0 & \sigma_\delta^2 & & \vdots \\ \vdots & & \ddots & 0 \\ 0 & \ldots & 0 & \sigma_\delta^2 \end{bmatrix}.$$

Since there are missing observations in the versions of (A1) estimated in the paper, generalized least squares (GLS) estimates cannot be used. However, a consistent estimate of the OLS covariance matrix is $(X'X)^{-1}X'\hat{\Omega}X(X'X)^{-1}$. This is the covariance matrix estimator we use for the results presented in Tables 2–5.

We can estimate the elements of A and B as follows

$$\hat{\sigma}_\eta^2 + \hat{\sigma}_\delta^2 + \hat{\sigma}_\nu^2 = \frac{1}{NT} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{u}_{i,t}^2$$

$$\hat{\sigma}_\eta^2 = \frac{1}{NT(T-1)} \sum_{i=1}^{N} \sum_{t=1}^{T} \sum_{\substack{s=1 \\ s \neq t}}^{T} \hat{u}_{i,t}\hat{u}_{i,s}$$

$$\hat{\sigma}_\delta^2 = \frac{1}{N(N-1)T} \sum_{i=1}^{N} \sum_{\substack{j=1 \\ j \neq i}}^{N} \sum_{t=1}^{T} \hat{u}_{i,t}\hat{u}_{j,t}$$

where $\hat{u}_{i,t} = Y_{i,t} - X_{i,t}\hat{\beta}_{OLS}$.

APPENDIX B

Panel Data Tests of Granger Causality

Suppose we want to test, in panel data, whether $X_{i,t}$ causes, in the Granger-Sims sense, $Y_{i,t}$. We might suppose that we could run the regression

$$\text{(A2)} \quad Y_{i,t} = \alpha_0 + \sum_{\ell=1}^{L} \beta_\ell Y_{i,t-\ell} + \sum_{\ell=1}^{L} \gamma_\ell X_{i,t-\ell} + e_{i,t}, \quad E(e_{i,t}) = 0$$

using OLS and test the joint restriction $\gamma_1 = \gamma_2 = \ldots = \gamma_\ell = 0$. However, in the panel data case, $e_{i,t}$ certainly contains an individual effect. For example, in this paper, the individual effect in a bank's chargeoff or provision rate arises from its persistent portfolio decisions. If such a persistent individual effect exists, $e_{i,t}$ will be correlated with the lags of $Y_{i,t}$. As a consequence, OLS would yield inconsistent parameter estimates. Holtz-Eakin, Newey, and Rosen (1988) show how to consistently estimate the parameters in (A2). First, first difference all the variables. If we denote, for any variable, $Z_{i,t} - Z_{i,t-1}$ as $\Delta Z_{i,t}$, we can write the first-differenced system as

$$\text{(A3)} \quad \Delta Y_{i,t} = \sum_{\ell=1}^{L} \beta_\ell \Delta Y_{i,t-\ell} + \sum_{\ell=1}^{L} \gamma_\ell \Delta X_{i,t-\ell} + \Delta e_{i,t}.$$

Since $\Delta e_{i,t}$ would be an MA(1) error if $e_{i,t}$ were serially uncorrelated except for the individual effect, $\Delta e_{i,t}$ would be correlated with $\Delta Y_{i,t-1}$. Therefore the parameters in (A3) could not be estimated consistently using OLS. They could be estimated consistently, however, using an instrumental variables estimator, with $\Delta X_{i,t-2}, \ldots, \Delta X_{i,t-\ell-1}, \Delta Y_{i,t-2}, \ldots, \Delta Y_{i,t-\ell-1}$ as instruments. Even in this case, the standard errors would need to be corrected for the MA(1) error structure. GLS estimates of (A3) would not be consistent because instruments are merely predetermined instead of being strictly exogenous, as discussed by Holtz-Eakin, Newey, and Rosen (1988) and Keane and Runkle (1992). In addition, the presence of missing observations prevents the use of GLS.

APPENDIX C

Econometric Methods for the Valuation Model

In the valuation models that we present in Section 5, we cannot assume that the estimator we used in Section 4 will yield consistent estimates of the coefficients. To see why, note that the error term from that model is $e_{i,t} = \eta_i + \delta_t + \nu_{i,t}$. If there is an aggregate shock to the market that is correlated with an aggregate shock to one of the regressors, as would happen if interest rates changed, then the error term would be correlated with the regressors. That correlation would imply that the estimator used in Section 4 would yield inconsistent parameter estimates. However, if we include a set of time dummies in the regression, we will get rid of the correlation between the error and the regressors by eliminating all aggregate shocks. In this case, our model would be

(A4) $\quad Y_{i,t} - \bar{Y}_t = (X_{i,t} - \bar{X}_t)\beta + e_{i,t} - \bar{e}_t$

where for any variable Z, $\bar{Z}_t$ is the average value of that variable in time t. If we denote, for any variable, Z, $\tilde{Z}_{i,t} = Z_{i,t} - \bar{Z}_t$, this equation can be rewritten as

(A5) $\quad \tilde{Y}_{i,t} = \tilde{X}_{i,t}\beta + \tilde{e}_{i,t}, \quad E(\tilde{e}_{i,t}) = 0, \quad E(\tilde{X}_{i,t} \cdot \tilde{e}_{i,t}) = 0.$

Note first that $\tilde{X}_{i,t}$ may not contain a constant, since, under the $\tilde{}$ operator, a constant would become identically zero. Note, second, that the error in the transformed system $\tilde{e}_{i,t} = \tilde{\eta}_i + \tilde{\nu}_{i,t}$, since $\bar{\delta} = \delta_t$ in each period, and has thus vanished from the regression. As a consequence, if we arrange the observation for equation (A5) in the order

$$\tilde{Y}_{1,1}, \tilde{Y}_{1,2}, \ldots, \tilde{Y}_{i,t}, \tilde{Y}_{21}, \ldots, \tilde{Y}_{2,t}, \ldots, \tilde{Y}_{\eta,1}, \ldots, \tilde{Y}_{\eta,t}$$

then for the model $\tilde{Y} = \tilde{X}\beta + \tilde{\epsilon}$, $E(\tilde{\epsilon}\tilde{\epsilon}') = \Omega$, where

$$\Omega = \begin{bmatrix} A & 0 & \dots & 0 \\ 0 & A & & \vdots \\ \vdots & & \ddots & 0 \\ 0 & \dots & 0 & A \end{bmatrix}$$

and

$$\underset{T\times T}{A} = \begin{bmatrix} \sigma^2_{\tilde{\eta}} + \sigma^2_{\tilde{\nu}} & \sigma^2_{\tilde{\eta}} & \dots & \sigma^2_{\tilde{\eta}} \\ \sigma^2_{\tilde{\eta}} & \sigma^2_{\tilde{\eta}} + \sigma^2_{\tilde{\nu}} & \dots & \vdots \\ \vdots & & \ddots & \vdots \\ \sigma^2_{\tilde{\eta}} & \dots & \dots & \sigma^2_{\tilde{\eta}} + \sigma^2_{\tilde{\nu}} \end{bmatrix}.$$

We can consistently estimate the elements of A by first estimating β using OLS. Then the residuals of the equation $\hat{u}_{i,t}$ can be used to estimate

$$\sigma^2_{\tilde{\eta}} + \sigma^2_{\tilde{\nu}} = \frac{1}{NT} \sum_{i=1}^{N} \sum_{t=1}^{T} \hat{u}^2_{i,t}$$

$$\sigma^2_{\tilde{\eta}} = \frac{1}{NT(T-1)} \sum_{i=1}^{N} \sum_{t=1}^{T} \sum_{\substack{s=1 \\ s\neq t}}^{T} \hat{u}_{i,t}\hat{u}_{i,s}$$

and the standard errors for $\hat{\beta}_{OLS}$ can be estimated as $V(\hat{\beta}_{OLS}) = (X'X)^{-1}X'\hat{\Omega}X(X'X)^{-1}$. Once again, we cannot use GLS because the regressors are not strictly exogenous.

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TABLE 1

Summary Statistics for Quarterly Data on
*A Sample of Bank Holding Companies**

	25th Percentile	Median	75th Percentile	Mean
Return on Assets	.15%	.21%	.26%	.18%
Loan-Loss Provisions/Assets	.06	.09	.15	.14
Chargeoffs/Assets	.04	.08	.14	.12
Loans/Assets	51.41	58.35	64.18	57.53
Capital/Assets	6.09	6.88	7.68	6.92
Bad-Debt Reserves/Loans	.63	1.35	1.72	1.67
Gross Loan Income/Loans	2.73	2.96	3.31	3.09
Excess Provisions/Loans	.00	.02	.04	.03

*These numbers are not annualized. For example, return on assets = net income for the quarter/ending assets for the quarter.

TABLE 2

Regression of Loan-Loss Provision and Chargeoffs by Quarters

1980–90 (Excluding Q1 and Q2 of 1987)

(t-statistics in parentheses)

Panel A: Loan Chargeoffs

Model: $CRGPOFF/TA_{i,t} = b_0 + b_1 Q2_{t,i} + b_2 Q3_{t,i} + b_3 Q4_{t,i} + e_{t,i}$

where

$$Q2 = \begin{cases} 1 \text{ if t is from the second quarter} \\ 0 \text{ otherwise} \end{cases}$$

$$Q3 = \begin{cases} 1 \text{ if t is from the third quarter} \\ 0 \text{ otherwise} \end{cases}$$

$$Q4 = \begin{cases} 1 \text{ if t is from the fourth quarter} \\ 0 \text{ otherwise} \end{cases}$$

Coefficient	b_0	b_1	b_2	b_3
	.0009305 (5.737)**	.0001332 (.629)	.0002386 (1.155)	.0006460 (3.127)**

Panel B: Loan-Loss Provisions

Model: $LLP/TA_{i,t} = b_0 + b_1 Q2_{t,i} + b_2 Q3_{t,i} + b_3 Q4_{t,i} + e_{t,i}$

where

$$Q2 = \begin{cases} 1 \text{ if t is from the second quarter} \\ 0 \text{ otherwise} \end{cases}$$

$$Q3 = \begin{cases} 1 \text{ if t is from the third quarter} \\ 0 \text{ otherwise} \end{cases}$$

$$Q4 = \begin{cases} 1 \text{ if t is from the fourth quarter} \\ 0 \text{ otherwise} \end{cases}$$

Coefficient	b_0	b_1	b_2	b_3
	.0010583 (5.080)**	.0001969 (.701)	.0003130 (1.140)	.0007013 (2.556)**

**Significant at .01 or higher.
*Significant at .05 or higher.

TABLE 3

Regression of Excess Loan-Loss Provisions by Quarters

1980–90 (Excluding Q1 and Q2 of 1987)

(t-statistics in parentheses)

Model: $EXCSLLP/TA_{i,t} = b_0 + b_1 Q2_{t,i} + b_2 Q3_{t,i} + b_3 Q4_{t,i} + e_{t,i}$

where

$$EXCSLLP = \begin{cases} \text{Excess Loan-Loss Provisions} \\ LLP - CRGOFF \end{cases}$$

$$Q2 = \begin{cases} 1 \text{ if t is from the second quarter} \\ 0 \text{ otherwise} \end{cases}$$

$$Q3 = \begin{cases} 1 \text{ if t is from the third quarter} \\ 0 \text{ otherwise} \end{cases}$$

$$Q4 = \begin{cases} 1 \text{ if t is from the fourth quarter} \\ 0 \text{ otherwise} \end{cases}$$

Coefficient	b_0	b_1	b_2	b_3
	.0001752	.0000838	.0001291	−.0001119
	(1.558)	(.558)	(0.880)	(−.768)

TABLE 4

Regression of Measures of Performance Excluding Loan-Loss Provisions on Quarters 1980–90 (Excluding Q1 and Q2 of 1987)

(t-statistics in parentheses)

Model: $DPNT_{i,t} = b_0 + b_1 Q2_{t,i} + b_2 Q3_{t,i} + b_3 Q4_{t,i} + e_{t,i}$

where DPNT = one of the following dependent variables:

Model 1: [Gross Pre-tax Operating Income + Loan Loss Provisions]/Total Assets

Model 2: Gross Loan Income/Total Assets

Model 3: Loans/Total Assets

Model 4: Allowance for Bad Debts/Loans

and

$$Q2 = \begin{cases} 1 \text{ if t is from the second quarter} \\ 0 \text{ otherwise} \end{cases}$$

$$Q3 = \begin{cases} 1 \text{ if t is from the third quarter} \\ 0 \text{ otherwise} \end{cases}$$

$$Q4 = \begin{cases} 1 \text{ if t is from the fourth quarter} \\ 0 \text{ otherwise} \end{cases}$$

Coefficient	b_0	b_1	b_2	b_3
Model 1	.0035833	.0000806	.0001278	.0001145
	(24.979)**	(.464)	(.753)	(.675)
Model 2	.0310714	.0001885	−.0005519	−.0009332
	(26.200)**	(.114)	(−.343)	(−.579)
Model 3	.5721992	.0013560	.0063430	−.0003052
	(44.800)**	(.092)	(.442)	(−.021)
Model 4	.0158775	.0001284	.0010748	.0012235
	(9.865)**	(.060)	(.510)	(.581)

**Significant at .01 or higher.

TABLE 5

Regression of Measures of Performance Including Loan-Loss Provisions on Quarters 1980–90 (Excluding Q1 and Q2 of 1987)

(t-statistics in parentheses)

Model: $DPNT_{i,t} = b_0 + b_1Q2_{t,i} + b_2Q3_{t,i} + b_3Q4_{t,i} + e_{t,i}$

where DPNT = one of the following dependent variables:

Model 1: Gross Pre-tax Operating Income/Total Assets

Model 2: Return on Assets

Model 3: Loan-Loss Provision/Gross Loan Income

and

$$Q2 = \begin{cases} 1 \text{ if } t \text{ is from the second quarter} \\ 0 \text{ otherwise} \end{cases}$$

$$Q3 = \begin{cases} 1 \text{ if } t \text{ is from the third quarter} \\ 0 \text{ otherwise} \end{cases}$$

$$Q4 = \begin{cases} 1 \text{ if } t \text{ is from the fourth quarter} \\ 0 \text{ otherwise} \end{cases}$$

Coefficient	b_0	b_1	b_2	b_3
Model 1	.0025220	−.0001140	−.0001845	−.0005827
	(13.321)**	(−.514)	(−.852)	(−2.689)**
Model 2	.0020278	−.0001024	−.0001701	−.0005033
	(11.421)**	(−.468)	(−.797)	(−2.357)*
Model 3	.0599732	.0125368	.0204795	.0368900
	(5.187)**	(.800)	(1.338)	(2.405)*

**Significant at .01 or higher.

*Significant at .05 or higher.

TABLE 6

Results of Valuation Model Tests

(t-statistics in parentheses)**

Variable	Model with Loan-Loss Provisions	Model with Chargeoffs and Excess Provisions
Loan-Loss Provisions		
Q1	−2.1163 (−4.2139)**	n/a
Q2	−1.7968 (−5.3676)**	n/a
Q3	−1.4405 (−5.3256)**	n/a
Q4	−1.2784 (−4.8931)**	n/a
Chargeoffs		
Q1	n/a	−2.7637 (−4.9125)**
Q2	n/a	−1.6991 (−3.9780)**
Q3	n/a	−1.1001 (−3.5318)**
Q4	n/a	−1.6830 (−5.1971)**
Excess Provisions		
Q1	n/a	−1.7466 (−2.7285)**
Q2	n/a	−1.3720 (−3.2391)**
Q3	n/a	−1.5180 (−4.4331)**
Q4	n/a	−.9060 (−3.0022)**
Loan Income Before Provisions	3.3974 (17.4613)**	3.3400 (15.5873)**
Other Income	3.9852 (18.9289)**	3.8927 (16.8096)**
Loan Income Growth	9.3822 (19.3790)**	10.5467 (19.6143)**

**Significant at .01 or higher.

Figure 1
Mean Chargeoff as a Percent of Assets

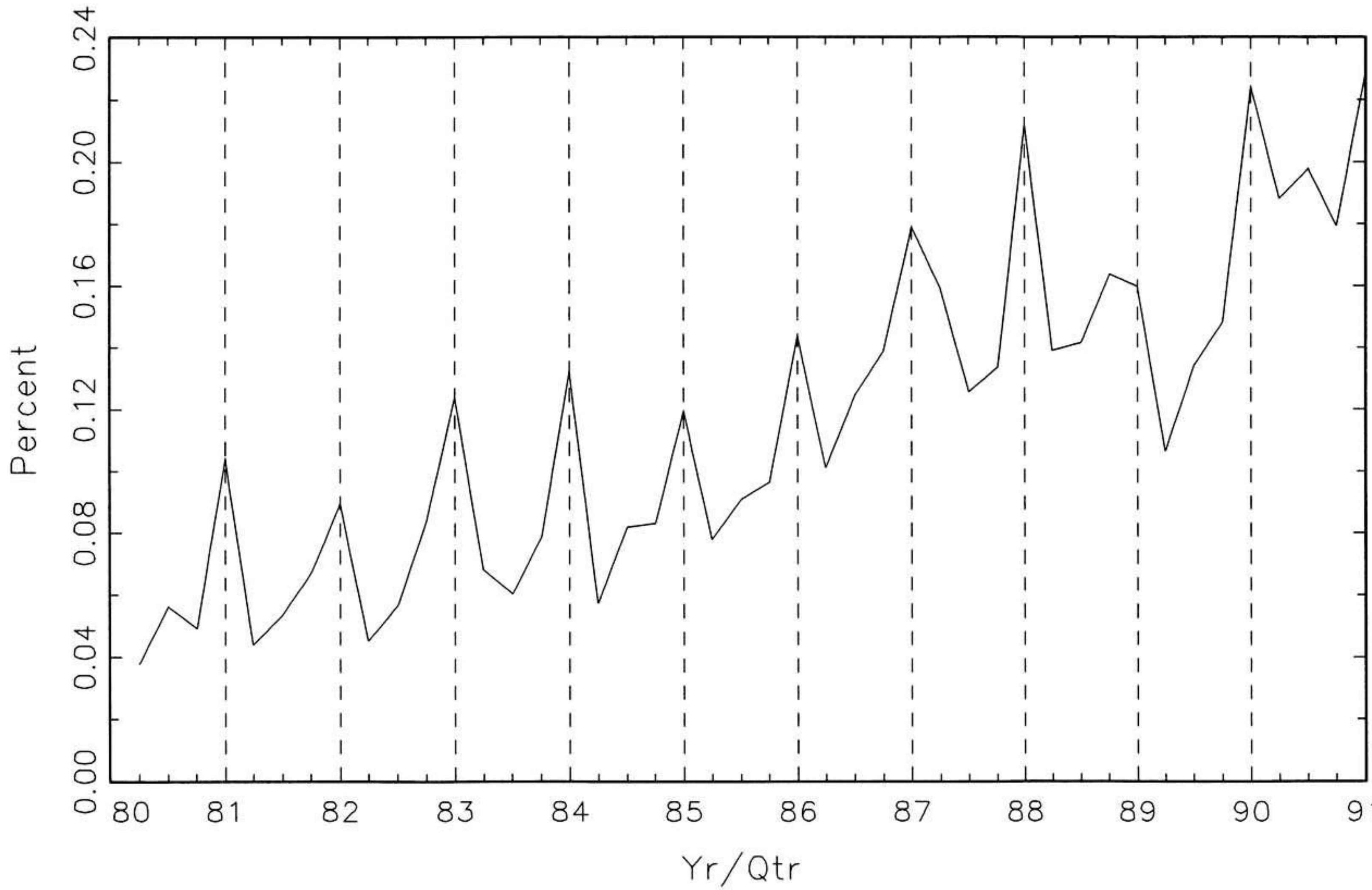

Figure 2

Capital Ratio vs. Loan-Loss Provision Seasonality