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Abstract: Expanded public availability of U.S. banking data has prompted a need to re-examine end-of-quarter window dressing. We find substantial heterogeneity in the pattern of window dressing across banks and products, not all of which can be explained as customer-initiated, and some of which is consistent with theoretical predictions in the absence of publicly available data. These findings call into question the efficacy of financial disclosure in constraining banks' behavior, and raise new issues for further research.

Keywords: banks, window dressing, trend growth, disclosure, market discipline

JEL codes: G2, G21, G28

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Bank Window Dressing: A Re-Assessment and a Puzzle

1. Introduction

It is widely recognized that banks, perhaps more than other firms, have both an opportunity and an incentive to undertake various temporary transactions to make their end-of-quarter balance sheets look more favorable than is representative of their operations throughout the quarter. Such strategic transactions are termed “window dressing.” As an example, a bank may temporarily borrow through the fed funds market and invest the borrowings in liquid securities, increasing the bank’s total assets and enhancing the appearance of size and growth. If the total cost of borrowing approximates the low yield earned on liquid securities, such actions do not enhance the profitability or fundamental value of the bank. Conversely, an undercapitalized bank may artificially increase its ratio of equity to assets by temporarily selling securities and correspondingly reducing its liabilities. If the assets sold are default-free U.S. Treasury securities, those actions fail to reduce the bank’s overall credit risk or solvency risk and, by potentially worsening the bank’s static gap, may actually increase its interest rate risk.

Potential conflicts of interest among bank managers, shareholders, and regulators motivate an interest in understanding the scale and direction of such window dressing. The importance of accurate financial data on banks is underscored by the key role of mandatory disclosure as one of the three pillars of the Basel II regulatory framework, and further reinforced by the apparent shortcomings of existing financial reporting in providing timely identification of the risks underlying the post-2006 financial crisis. Nevertheless, very few prior studies have explored window dressing in banks. Allen and Saunders (1992) report evidence of upward window dressing by a majority of larger banks. Kotomin and Winters

(2006) present evidence that some of those changes may have been prompted by patterns of customer demand.

An additional issue, not raised in prior studies, is the impact of financial disclosure on window dressing. Quarterly average figures for selected assets and liabilities have long been collected by bank regulators and can be compared against end-of-quarter figures to detect window dressing; indeed, this is the method used by Allen and Saunders (1992). Assuming reasonable regulatory vigilance, any observed window dressing therefore could not have been aimed at regulators but must instead have been directed toward the general public, which during the sample period of Allen and Saunders could obtain the quarterly average data only at a high cost through one or two vendors.¹ However, beginning in mid-1998, the Federal Reserve Bank of Chicago began making these reports freely available to the public on their web site, www.chicagofed.org. While many investors and interested depositors may have become aware of this change only after a few months or years, it is reasonable to postulate a decline after the end of the 1990s in banks' ability to mislead the public via end-of-quarter window dressing.² Therefore, to gain a better understanding of the impact of financial disclosure on banks' behavior, it is important to explore banks' window dressing using a sample period limited to the 21st century. This study is the first to do so.³

¹ In those years, bank-level Call Report data could be purchased for around \$1000 per quarter from either Sheshunoff in Texas or the National Technical Information Service in Virginia. Schedule RC-K of this report contains quarterly average figures for selected assets and liabilities.

² The large size of the Call Report files and their obscure labeling of variables may still deter some stakeholders from making full use of that information.

³ Kotomin and Winters (2006) report some differences between banks' end-of-quarter behavior during 1978-1986 versus 1994-2002. However, the Basel capital requirements adopted after 1986 may have contributed to this change by mitigating banks' incentive for upward window dressing, and the 1994-2002 period falls mostly prior to the free public availability of quarterly average data. Moreover, Kotomin and Winters use data from a small group of weekly reporting banks rather than quarterly Call Report data; for those banks, the public's ability to detect window dressing did not change after 1998.

Our study further contributes to the sparse literature on banks' window dressing in three other ways as well. First, we introduce a method of correcting for intra-quarter trend growth, permitting a more robust measurement of window dressing. Second, our sample includes banks of all sizes rather than omitting the smallest banks as in both Allen and Saunders (1992) and Kotomin and Winters (2006), thus permitting a better test of whether window dressing varies across bank sizes as suggested by Johnson (1969). Third, we consider in more detail the potential interactions of exogenous and endogenous transactions and their implications for appropriately interpreting the observed patterns.

In accordance with theoretical predictions, we find substantial heterogeneity of window dressing patterns across banks and across asset categories. An overwhelming majority of banks exhibit systematic upward window dressing in total deposits and "other loans" (including consumer loans, agricultural loans, and foreign loans) but downward window dressing in commercial loans and total loans in domestic offices. In contrast to the findings of previous studies, but consistent with theory, larger banks are more likely to exhibit upward window dressing in total assets and its major components – total securities and total loans in domestic offices – as well as in fed funds purchased, but downward window dressing in deposits and "other loans." Better-capitalized banks are more likely to exhibit upward window dressing in deposits and securities but downward window dressing in total loans in domestic offices. Importantly, not all of the observed patterns can be explained by customer-initiated transactions. Therefore, these findings suggest either that financial disclosure is not adequate to constrain banks' behavior, or else that window-dressing banks are pursuing other objectives besides misleading the public. Available data cannot distinguish between these two possibilities.

The remainder of the paper is organized as follows. Section 2 reviews the sparse literature, discusses some possible incentives banks face to undertake window dressing, and proposes testable hypotheses. Section 3 describes our sample and empirical framework. Section 4 reports and interprets the results, both for the overall pattern of window dressing and for its association with bank size and capitalization. Section 5 concludes.

2. Prior Studies, Conceptual Background, and Hypotheses

A very early analysis of banks' window dressing is provided by Johnson (1969), who defines the practice as temporary rearrangement of the balance sheet in order to improve the appearance of good condition or performance. He notes that window dressing may be used to address multiple objectives, such as increased size on the one hand or improved liquidity on the other; and further, that banks of different sizes may face differing incentives to use window dressing. He provides no empirical evidence of actual window dressing and, like later studies, implicitly assumes that stakeholders lack data on quarterly average figures and so are unable to detect window dressing when it occurs.

In the first systematic empirical study of U.S. banks' window dressing, Allen and Saunders (1992) explore data from 1978 to 1986 for a sample of larger banks.⁴ Their primary measure of window dressing is the short-run deviation of end-of-quarter figures from monthly or quarterly averages. They find evidence of significant upward window dressing by most banks in total assets and in several subcategories of assets and liabilities. Further,

⁴ In a nearly unrelated literature, numerous empirical studies focus on calendar-specific behavior of aggregate financial markets, especially in pricing. Furfine (2004) provides evidence that end-of-year spikes in interbank loan rates may be influenced by window-dressing incentives at foreign banks. Musto (1997) proposes a risk-shifting explanation of aggregate year-end patterns in commercial paper rates, but Griffiths and Winters (2005) – while extending their empirical analysis to other financial market aggregates including aggregate demand deposits – reject risk shifting as an explanation, concluding instead that the evidence supports Ogden's (1987) notion of a preferred habitat for end-of-period liquidity. Dutta and Gigler (2002) provide a theory of strategic earnings management, which focuses on neither the balance sheet nor the banking industry.

they interpret this window dressing as primarily active (bank-initiated) rather than passive (customer-initiated) because the changes were concentrated in those types of assets most under the banks' control and funded by types of liabilities most under the banks' control. Within their sample, they find no systematic association between window dressing and bank size. They also find that, consistent with theoretical predictions, highly capitalized banks are more likely to exhibit upward window dressing.

Kotomin and Winters (2006) challenge the findings of Allen and Saunders by noting that, for large weekly reporting banks, end-of-quarter increases of assets and liabilities persist longer than a strategic window-dressing explanation might predict.⁵ In addition, patterns of deposit balances suggest that the overall changes are driven by customer demand (a year-end preferred habitat for liquidity) rather than by banks' initiative. They report some differences between banks' behavior during 1978-1986 versus 1994-2002 but, as discussed in footnote 3 above, those differences cannot be attributed to disclosure changes and might be influenced by the post-1986 Basel capital requirements.

In addition to the limited incentives to window dress discussed by Johnson (1968), banks often have a variety of other incentives, again assuming that stakeholders cannot or do not monitor quarter average figures. The incentive to appear larger can arise from the typical association between a firm's size and the pecuniary and nonpecuniary benefits accruing to the firm's management. An agency conflict can then arise between a bank's owners and managers, to the extent that the owners may face incentives to window dress downward as discussed below. Because agency problems are more likely for large banks with widely

⁵ However, this interpretation overlooks the fact that rapidly unwinding a temporary position may often be counterproductive by forcing adverse market reactions such as fire-sale losses, especially for very large banks, so that a gradual unwinding over a period of days or weeks would likely be the norm.

dispersed ownership than for small, closely held banks, we might expect that upward window dressing is relatively more common among larger banks.

Another potential benefit of appearing larger is that new customers are sometimes attracted to larger firms (Allen and Saunders, 1992). We note that this incentive is plausible even in the face of available data on quarterly averages, given any transaction cost or opportunity cost of accessing and interpreting the data; the consumer's problem then resembles a search problem with endogenous search costs as a function of the precision of information, and some consumers may choose to rely on the obvious, low-cost, but potentially less accurate signal of end-of-quarter figures.⁶

Improving a bank's apparent liquidity can provide an incentive for either upward or downward window dressing, depending on the measure of liquidity. A bank could reduce its ratio of loans to deposits by buying more securities, window dressing upward to appear more liquid. However, if those purchases are funded by short-term borrowing, alternate measures of liquidity such as net non-core funding dependence would fail to indicate any improvement. Alternatively, a bank may reduce its apparent dependence on purchased funds and borrowings by repaying borrowings shortly before the end of a quarter, selling investment securities or reducing its cash reserves to finance the repayment (downward window dressing).

Downward window dressing may be motivated by several considerations besides liability-side measures of liquidity. Artificially reducing the size of the balance sheet on the reporting date can increase a bank's reported ratio of equity capital to assets, not only

⁶ Allen and Saunders further indicate that banks may appear larger to gain the regulatory benefits resulting from too-big-to-fail status, but in practice this would be a potential consideration only for those few banks near the threshold of any recognized too-big-to-fail category.

fostering compliance with regulatory capital standards but also potentially decreasing the risk premium demanded by uninsured depositors and other creditors of the bank. Downward window dressing can also inflate a bank's reported return on assets, as a given profit figure is compared against a smaller asset total. Or a bank may employ this strategy selectively during periods of abnormally low profits as a way to reduce the intertemporal volatility of its return on assets, which is interpreted by investors as a measure of financial risk. To the extent that a bank is able to reduce its total domestic deposits around the relevant reporting dates, it can also economize on deposit insurance premia.⁷

Given these diverse incentives for window dressing, which clearly vary according to each bank's circumstances, mechanisms by which a bank may respond to those incentives likewise vary. Some assets and liabilities are primarily under the bank's control in the short run, including investment securities, excess reserves, fed funds purchased or sold, and borrowing from the Federal Reserve or from a Federal Home Loan Bank. Changes in these items have been generally interpreted as "active" or strategic in nature. Conversely, changes in core deposits primarily reflect patterns of customer preferences and have been interpreted as "passive" or largely exogenous to the bank.

Changes in loan balances may reflect some combination of bank preferences and borrower preferences. A bank that wishes to expand its lending at the end of a quarter may encourage some borrowers to schedule loan closings or commitment takedowns at those times. It may also encourage large business customers to borrow temporarily instead of issuing commercial paper. Interbank deposits may adjust in response to the wishes of both

⁷ Allen and Saunders (1992) list reduced reserve requirements as another motive for downward window dressing, but reservable deposits are tracked every two weeks via a separate process and so would not provide a specific incentive for end-of-quarter window dressing.

the correspondent and respondent banks. Net loan balances respond inversely to loan loss provisions, which a bank may adjust in the short run to manage the timing of those expenses as well as because of any impact on net loan balances.

With these considerations in mind, and recalling that these incentives mostly depend on the absence of financial disclosure capable of revealing window dressing, we therefore propose and test the following hypotheses:

H1. The size and direction of window dressing varies across asset categories and across banks.

H2. Larger banks are more likely than smaller banks to exhibit upward window dressing.

H3. Downward window dressing is more likely for banks with smaller ratios of equity to assets.

We should note that the evidence concerning possible patterns of window dressing is available only for limited subsets of the balance sheet. It is therefore possible that strategic end-of-quarter manipulations may sometimes be undertaken at finer levels of disaggregation than we can measure. On the other hand, for such unobservable window dressing to meet any of the banks' strategic objectives identified above, it would be necessary for the results to show up in the broader measures that we use.

The following section describes our sample and the empirical framework by which we test these hypotheses.

3. Sample and Empirical Framework

We look for evidence of window dressing in eight components of the balance sheet over the period from March 2001 to June 2006: fed funds purchased and securities sold

under agreements to repurchase, total securities, total loans in domestic offices, loans secured by real estate in domestic offices, commercial and industrial loans in domestic offices, other loans, deposits, and total assets. The sample period is chosen to begin several years after the full Call Reports became freely available to the public, to allow the public time to learn of the available data; and to end prior to the current financial crisis that might skew observed behavior. Data are from the regulatory Call Reports as available at www.chicagofed.org. We also explore empirical associations between window dressing and bank size or capital ratios.

Banks are excluded from the sample if they lack data for any quarter in the sample period or if they report any of the following characteristics: negative values for any of the eight variables under study; total domestic loans that are nonpositive or less than “other loans;” the sum of loans plus securities greater than total assets or less than 70 percent of assets; real estate loans larger than total loans; and foreign-owned or special-purpose banks. The final sample includes 3,610 banks and 79,420 observations.

Table 1 presents summary statistics for the variables. A major pattern evident in this table is a large degree of heterogeneity across banks and across asset categories regarding possible window dressing activity. The mean deviation between the calculated and reported quarterly averages ranges from 0.6 percent of the mean quarterly average for total assets to 78 percent of the mean quarterly average for other loans. However, in each row, the standard deviation in the last column is much larger than the corresponding mean deviation in the adjacent column (more than a hundred times larger for total securities and total assets), indicating that the mean deviations mask substantial variation across banks. The following section will address this heterogeneity in more detail.

Allen and Saunders (1992) measured window dressing as the relative difference between end-of-quarter figures and reported quarterly average figures. If a bank is growing, as is usually the case, the quarterly average will be less than the end-of-quarter figure, erroneously suggesting upward window dressing. Conversely, if a bank sold a substantial amount of loans or securities during the quarter for reasons unrelated to window dressing, the end-of-quarter figure could be below the reported quarterly average, erroneously suggesting downward window dressing. In recognition of this problem, Allen and Saunders also looked at an alternate measure in which the raw data were detrended using the Bureau of the Census X-11 Adjustment Program, as well as alternate benchmarks based on a four-quarter or two-quarter average. Their overall pattern of findings remained evident in the alternate measures.

However, the X-11 algorithm suffers several shortcomings in this application. Most importantly, its trend adjustment is based on a three-year trend, which not only misses actual bank-specific behavior within a given quarter but also shrinks the sample by reserving 12 quarters of data for detrending.⁸ The four-quarter and two-quarter benchmarks have similar, though less severe, problems, as window dressing by definition involves end-of-quarter deviations from intraquarter (not interquarter) levels. Here we use a better method of adjusting for trend growth that is both more efficient in its use of data and more appropriate to detecting any actual window dressing at the end of a given quarter. We next explain our algorithm with regard to total assets, though the same algorithm applies as well to every other component of the balance sheet.

If a bank is growing linearly and not window dressing, its quarterly average assets will equal the arithmetic mean of its end-of-quarter and end-of-prior-quarter assets. Then,

⁸ Allen and Saunders were left with only 196 quarterly observations for 1978-1983 and 296 quarterly observations for 1984-1986 in their detrended sample; see their footnote 21.

conditional on a linear growth path, any window dressing would show up as a deviation between the reported quarterly average figure and the arithmetic mean of the two adjacent end-of-quarter figures. In the same way, if a bank is growing at a constant exponential rate and not window dressing, its quarterly average assets will equal the geometric mean of its end-of-quarter and end-of-prior-quarter assets. Then, conditional on an exponential growth path, any window dressing would show up as a deviation between the reported quarterly average figure and the geometric mean of the two adjacent end-of-quarter figures.

Upward window dressing would make the respective means exceed the reported quarterly average, as balances from the end of the prior quarter are reduced during the quarter.⁹ Conversely, downward window dressing would drive the mean below the reported quarterly average, as balances reduced at the end of the prior quarter are restored to their normal levels during the quarter. Thus, this measure implicitly reflects the temporary nature of the end-of-quarter transactions that is considered one of the defining characteristics of true window dressing (Allen and Saunders, 1992; Kotomin and Winters, 2006), and removes the need to test separately for reversal of the transactions. Our measure is also intrinsically conservative in that it indicates weaker evidence of window dressing unless end-of-quarter adjustments appeared in consecutive quarters. Thus, it has the desirable feature that it reflects both the magnitude of window dressing within a quarter and the persistence of window dressing across consecutive quarters.

In practice, a bank's actual growth rate is unlikely to be exactly constant during any quarter, introducing noise into these measures. However, if short-term variations in trend growth rates are random, the distortions thereby introduced into the proposed measures of

⁹ Unlike Kotomin and Winters (2006), however, we do not claim that such reductions should occur immediately, as explained in footnote 3 above.

window dressing will tend to cancel out because any above-average growth within some part of the quarter must be offset by some below-average growth in other parts of the quarter.¹⁰ Such noise will not bias the measures of window dressing.

The geometric mean of any two numbers greater than unity (as in our sample) is always less than the arithmetic mean. Therefore, the geometric mean provides a more conservative measure of positive window dressing while the arithmetic mean provides a more conservative test of negative window dressing. For example, a bank exhibiting constant linear growth will have a geometric mean of quarter-end figures that is less than its reported quarterly average (actual daily average over the quarter), so the geometric mean would create a false impression of downward window dressing. Conversely, a bank exhibiting constant geometric growth would have an arithmetic mean that exceeds its reported quarterly average, creating a false impression of upward window dressing. Reported quarterly averages that lie between the arithmetic and geometric means of end-of-quarter figures cannot be robustly regarded as either upward or downward window dressing unless we have independent knowledge of the shape of the bank's overall growth path. We apply both measures for robustness but, for brevity, discuss primarily the conservative variants.

4. Empirical Results

4.1 Patterns of Window Dressing

For each bank in the sample and each of the balance sheet components specified above, we calculated a t-test of the null hypothesis that, over the sample period, the reported quarterly average equals the calculated average implied by the endpoints of the quarter according to the arithmetic or geometric means as described above. A rejection of the null

¹⁰ This property is a mechanical consequence of the construction of the mean growth rate over the quarter.

hypothesis indicates that the bank demonstrated a consistent pattern of end-of-quarter changes in the specified variable during the 2001-2006 sample period.

Table 2 reports the results of these paired t-tests. Using the more conservative measures as explained above, we focus on the geometric mean as a test of upward window dressing and the arithmetic mean as a test of downward window dressing.¹¹ In discussing these results, we shall refer to all systematic end-of-quarter changes as “window dressing” for brevity, while recognizing that not all such adjustments reflect endogenous strategic choices of the banks. A separate subsection will discuss this distinction in more detail.

The table reveals substantial heterogeneity of window dressing across banks and across balance sheet items. For total deposits and other loans, more than 95 percent of banks in the sample exhibited upward window dressing at the 0.01 significance level by this test. By contrast, fewer than five percent of the banks exhibited significant upward window dressing in fed funds purchased, commercial loans, or total loans in domestic offices. Upward window dressing was significant at the 0.01 level for fewer than 23 percent of the banks for securities and total assets.

Significant downward window dressing appeared in commercial loans for 90 percent of banks and in total loans in domestic offices for 70 percent of banks. Very few banks exhibited downward window dressing in securities, other loans, deposits, or fed funds purchased. Downward window dressing was found for 13 percent of banks in total assets and just over 10 percent of banks in real estate loans.

Our findings for total assets, securities and fed funds purchased are broadly consistent with the findings of Kotomin and Winters (2006) but contrast sharply with the earlier

¹¹ We also performed these tests for the alternate measures, available from the authors. The results were similar to those in the table but indicated somewhat stronger patterns of window dressing, consistent with the less conservative nature of the alternate measures.

findings of Allen and Saunders (1992), who report significant upward window dressing in these three items. Also in contrast to our findings, Allen and Saunders reported no systematic window dressing in total domestic loans. Possible reasons for these contrasts include our correction for intra-quarter growth, the inclusion of all sizes of banks in our sample, and our more recent sample period. However, our findings are consistent with those of Allen and Saunders for total deposits (see their page 601), agricultural loans, and consumer loans (major components of our “other loans”).

Another notable feature of these results is that the widespread upsurge in end-of-quarter deposits, which seems likely to be driven largely by customers’ preferences and thus exogenous to the banks (Kotomin and Winters, 2006), is not generally offset by endogenous downward end-of-quarter adjustments in fed funds purchased, despite the prevalence of downward end-of-quarter changes in commercial loans and total loans in domestic offices. Rather, the upsurge in end-of-quarter funding was accompanied by upward shifts in securities and total assets for nearly one-quarter of the banks, which for those banks could be consistent with either a desire to appear larger at the end of the quarter or else some constraint in their response to exogenous funding patterns.

Another 30 percent of banks exhibited end-of-quarter increases in real estate loans, which might be somewhat endogenous to the extent that banks were able to impose closing dates on mortgage loans just before the end of each quarter, as suggested by Allen and Saunders (1992). However, the interpretation suggested by the combination of outcomes here is somewhat different: if the end-of-quarter increase in funding was largely exogenous to the banks, then even an endogenous increase in end-of-quarter real estate loans may have represented largely a means of managing the balance sheet in response to the pattern and

timing of depositors' preferences rather than an isolated strategic manipulation by banks. The remainder of the incremental end-of-quarter funding appears to have used for "other loans," which includes mainly consumer loans, agricultural loans, and foreign loans.

Our measures indicate that about two-thirds of the banking industry did not exhibit systematic window dressing in either direction for total assets. This finding does not preclude the possibility that some of those banks may have undertaken window dressing in opposite directions at different times during the sample period as their individual situations changed. More than 13 percent of banks exhibited downward window dressing in total assets, which might result from a desire to increase their ratio of equity to assets or their rate of return on assets; while nearly 23 percent exhibited upward window dressing in assets, consistent with a desire to appear large. Overall, these findings confirm our first hypothesis of substantial heterogeneity in patterns of window dressing across asset categories and across banks. We turn next to an examination of how bank size and capitalization were associated with these patterns.

4.2 Window Dressing, Size, and Capitalization

The goal of this section is to compare the observed patterns of outcomes with the theoretical predictions based on various financial incentives. Here we measure outcomes by each bank's t-statistic of the difference of means between its calculated and reported quarterly averages of each balance sheet item, basing the calculated figures on the geometric mean of the quarter's endpoints as explained above.¹² We regressed these outcomes on the average size of each bank over the sample period, measured as the natural log of assets, and each bank's average capitalization over the sample period, measured as its ratio of equity to

¹² We also performed these estimates based on arithmetic means, with similar results.

assets. The sign and significance of the coefficient on each regressor indicates its empirical association with the sign and significance of window dressing across the U.S. banking industry.¹³

Table 3 reports the results. We find a significantly positive association between size and upward window dressing in fed funds purchased, total assets, total loans in domestic offices, commercial loans, and securities. That is, larger banks are more likely to window dress these items upward, while smaller banks are more likely to window dress these items downward. Conversely, we find a significantly negative association between size and upward window dressing in deposits and other loans. That is, larger banks are more likely to window dress these items downward, while smaller banks are more likely to window dress these items upward. These findings are robust to the inclusion or exclusion of capitalization in the regression.

With respect to total assets and its major components (securities and total loans in domestic offices), as well as for fed funds purchased, these findings support our second hypothesis that larger banks are more likely than smaller banks to exhibit upward window dressing. These effects are large enough to more than offset the contrary patterns found for deposits and other loans. Our association between bank size and upward window dressing in total assets contrasts with Allen and Saunders (1992), who found no association. Again, possible reasons for the contrast would include our form of correction for intra-quarter growth, our inclusion of all sizes of banks, and our more recent sample.

¹³ In addition to these regressions on the bank-level t-statistics of window dressing, we also estimated regressions in which the dependent variable for each balance sheet component was the bank's deviation between its calculated and reported quarterly averages, divided by its reported quarterly average. Those results, not reported here for brevity, were qualitatively similar for fed funds purchased, total domestic loans, commercial loans, and total assets. Here we focus on the regressions using the t-statistics as being more representative of systematic patterns of window dressing.

In conjunction with the coefficients shown in Table 3, the corresponding estimated intercepts (not reported in the table for brevity) indicated that the sign of predicted window dressing was reversed at specific scales of operation for three components of the balance sheet. Upward (downward) window dressing was the norm for banks with total assets greater (less) than the indicated threshold in each instance, where the threshold was estimated at \$63 million for total assets, \$21 billion for commercial loans, and \$220 billion for fed funds purchased. Statistically significant reversals of window dressing were not predicted for other balance sheet components within the range of scales spanned by our sample.

Whether or not size is included in the regression, we find a significantly positive association between capitalization and upward window dressing in deposits and securities. That is, better-capitalized banks are more likely to exhibit end-of-quarter increases in these items, while lower-capitalized banks are more likely to show end-of-quarter decreases in these items. These patterns are consistent with our third hypothesis and with previous findings by Allen and Saunders (1992) for total assets, especially since securities are endogenous to the bank and can be adjusted to reflect the bank's preferences.

Whether controlling for bank size or not, we do not find any systematic tendency for lower-capitalized banks to window dress downward in total assets, contrary to our third hypothesis and to the findings of Allen and Saunders (1992). Indeed, when capitalization is the only regressor, we find a significantly negative association between capitalization and upward window dressing in total assets, total loans in domestic offices, and commercial loans. For total assets, this pattern is likely driven by size-related incentives, as it disappears

when controlling for bank size.¹⁴ Since loans include components that are largely exogenous to the bank, the findings for total domestic loans and commercial loans may largely reflect borrowers' preferences rather than banks' strategic behavior, and in any case the pattern for commercial loans also vanishes when controlling for bank size.

Considering both the coefficients reported in Table 3 and the intercepts estimated for the corresponding regressions (not shown in the table for brevity), we found reversals of the sign of window dressing predicted for only two balance sheet components. Upward window dressing was predicted for securities by banks with equity / asset ratios above 0.0506, and for total assets by banks with equity / asset ratios below 0.1668. For all other balance sheet components, reversals were either not predicted, or were predicted to occur outside the range of sample values, or were not statistically significant.

4.3 Discussion and Interpretation

To interpret these findings further, we must recall the incentives that banks face, as well as the possibility that some end-of-quarter changes are initiated by a bank's customers (Kotomin and Winters, 2002). Here we extend that line of thought by identifying a more comprehensive taxonomy of possible combinations of bank-initiated and customer-initiated transactions, drawing more precise implications for a proper interpretation of observed outcomes. First, a bank that faces no end-of-quarter shifts in its customers' demand for loans or deposits would need to initiate matching changes on both sides of the balance sheet to achieve either upward or downward window dressing; this could entail, for example, increasing (respectively, decreasing) both fed funds purchased and investment securities

¹⁴ It is well known that smaller banks tend to maintain higher ratios of equity to assets, a pattern encouraged by regulators. The correlation coefficient between bank size and the ratio of equity to assets is approximately -0.25 in our sample, which is significantly different from zero.

simultaneously. The clue to such behavior would be changes in the same direction for categories of assets and liabilities that are endogenous to the bank.

Two other possibilities arise when a bank faces exogenous end-of-quarter shifts in demand from its customers. In one case, such demand could tend to create balanced increases or decreases on both sides of the balance sheet, involving items that are largely exogenous to the bank such as core deposits and most loans.¹⁵ The bank would exogenously grow or shrink at the end of the quarter and would need to take specific actions if it wished to either counteract or reinforce those changes. If the bank takes no action to counteract these changes, we might conclude either that the bank desires the observed outcome (which is equivalent to window dressing) or that it finds counteraction too costly to undertake; available data cannot distinguish between these two situations.

The other possibility is that exogenous end-of-quarter changes initiated by a bank's customers could be focused mainly on one side of the balance sheet. A bank then has a choice of whether to accommodate or to offset the impact of this change in demand on the size of the bank's total balance sheet, and the observed choice can shed light on the bank's preferences with regard to window dressing. Consider a temporary influx of core deposits. A bank can either invest the excess funds in securities (increasing an endogenous asset) or reduce its borrowing or purchased funds (reducing an endogenous liability). Although the relative cost and profitability of each action will influence the bank's choice, the former response – *ceteris paribus* – might suggest that the bank desired to window dress upward and

¹⁵ As noted above, previous literature has argued that banks may try to persuade some borrowers to initiate borrowing near the end of a quarter, but clearly such efforts could have only limited influence on a bank's overall loan balances. Many categories of loans are immune to such pressures, including consumer credit card loans and agricultural loans, among others. Similarly, a bank that wishes to window dress downward might try to schedule certain types of loan repayments near the end of a quarter, but again there is only limited scope for the overall impact of such strategies.

finds that outcome facilitated by its depositors' actions. The latter response might suggest that the bank does not desire to window dress upward. Of course, a bank that has little or no borrowing or purchased funds during the quarter would have only limited ability to respond by reducing those liabilities, regardless of its preferences. Larger banks, at least, are not typically constrained in this manner.

As another example, suppose borrowers temporarily draw down their lines of credit, increasing the bank's total loan balances outstanding. The bank can fund the drawdown in the short run either by borrowing (so total assets and liabilities grow) or by liquidating securities (so total assets and liabilities remain unchanged). While the bank's chosen combination of these two actions will generally be influenced by their relative cost and profitability, the former response could also achieve upward window dressing that is facilitated by customer demand. Both examples can of course be reversed to consider the potential for customers to facilitate downward window dressing via actions on either side of the balance sheet.

Two main conclusions are suggested by such considerations. First, changes in balance sheet components that are exogenous to the bank cannot by themselves shed definitive light on the presence or absence of the bank's intent to window dress. Rather, we always need to look at the endogenous balance sheet components as well. Second, strategic window dressing by a bank can be suggested by any end-of-quarter change in the bank's total assets, given the availability of endogenous means of offsetting unwelcome changes in customer demand. In that respect, one need not look at the exogenous components at all.

With this in mind, our findings suggest that nearly one-quarter of the banks in our sample, and particularly the larger banks, exhibited strategic upward window dressing in total

assets consistently during 2001-2006. Much of this pattern was facilitated by presumably exogenous upward shifts in deposits and “other loans,” especially at smaller banks. Reinforcing this upward window dressing, a similar number of banks – and especially the larger banks – increased their investment securities just before the quarter’s end. Larger banks also tended to increase their fed funds purchased, helping fund the upward window dressing. While commercial loans and total domestic loans tended to decline at quarter-ends for most banks, that decline was less severe for larger banks. End-of-quarter purchases of securities were concentrated among better-capitalized banks, as measured by the simple leverage ratio, suggesting that less-capitalized banks tended to be more concerned about their leverage ratio than about risk-based capital requirements. Less-capitalized banks tended to experience sharper end-of-quarter increases in loan balances but less pronounced end-of-quarter deposit increases, compared to better-capitalized banks. The former pattern likely reflects exogenous borrower demand, as it runs counter to those banks’ incentives, while the latter could facilitate downward window dressing if desired.

As noted above, banks’ incentives for strategic window dressing rely on the inability of stakeholders to detect such behavior, contrary to the free availability of quarterly average data to the public after 1998 and to the regulators even before then. The persistence of apparent window dressing among many banks in the 21st century then raises the question, “who are they fooling?” Although this puzzle cannot be resolved using available data, some conjectures may be proposed.

For example, assuming that transaction costs impose an effective upper limit on the relative scale of window dressing, such transactions cannot skew the long-term trends or growth path for a given bank, but will only distort the levels in a given quarter. In that case,

investors may not care whether a bank uses window dressing or not, and may therefore have little or no incentive to monitor it. However, this raises the question of what incentive remains for window dressing.

One possible answer is that, if window dressing is used to reduce intertemporal volatility in some ratios such as the return on assets or equity/assets, investors may actually welcome such strategies and reward banks that use them. However, such a smoothing strategy would be expected to entail upward window dressing in some quarters but downward window dressing in others, contrary to the consistently upward pattern or consistently downward pattern observed for many banks in our sample. Therefore, while smoothing might explain the behavior of some banks, it cannot explain the behavior of all banks in our sample.

Alternatively, if window dressing harms investors but only by small amounts, the value to investors of monitoring window dressing may be less than the startup cost of learning the required Call Report formats. Similarly, investors and depositors may be heterogeneous with regard to their willingness to monitor for window dressing, and continued strategic window dressing may be aimed primarily at the segment of stakeholders willing to forego monitoring. In either case, the free public disclosure of quarterly average data appears inadequate to eliminate strategic window dressing for all banks, a conclusion that would caution against relying too heavily on mandatory disclosure requirements and market discipline as a regulatory strategy. Such considerations motivate continued future study of window dressing, pending the availability of additional requisite data.

5. Conclusion

Motivated by regulators' emphasis on financial disclosure and by improved

availability of financial data to the public, this study has re-examined patterns of end-of-quarter window dressing of U.S. banks' balance sheets. We utilize a broader and more recent sample than previously analyzed, as well as introducing a correction for intra-quarter growth and a more detailed consideration of the interactions among exogenous and endogenous actions to identify window dressing more precisely.

We find substantial heterogeneity of window dressing patterns across banks and across asset categories, consistent with some theoretical predictions. Most banks exhibit upward window dressing in total deposits and “other loans” (including consumer loans, agricultural loans, and foreign loans) but downward window dressing in commercial loans and total loans in domestic offices. Unlike previous studies, we find that larger banks are more likely to exhibit upward window dressing in total assets and its major components – total securities and total loans in domestic offices – as well as in fed funds purchased, but downward window dressing in deposits and “other loans.” Stronger capitalization is associated with a tendency toward upward window dressing in deposits and securities but downward window dressing in total loans in domestic offices.

Because the same data used to identify window dressing here and throughout the literature were freely available to the public throughout our sample period, unlike the samples of prior studies, these new findings identify a puzzle: Since this form of window dressing can be observed by depositors, investors, regulators, and any other potential stakeholders, what are the banks' motives for the observed patterns? Our analysis argued against purely customer-initiated transactions as an explanation, but suggested other potential explanations that would require additional data to test. These issues may be important to explore in the future as regulatory policy toward financial disclosure continues to evolve.

Table 1: Summary Statistics for Selected Balance Sheet Components*Thousands of Dollars*

<i>Variable</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Mean</i>	<i>Standard Deviation</i>	<i>Mean</i>	<i>Standard Deviation</i>
	Quarterly Averages:		End-of-Quarter Values:		Deviation between Calculated and Reported Quarterly Averages:	
Fed funds purchased	45,771.48	597,006.45	44,980.44	595,456.31	-1,420.19	89,552.93
Total securities	151,420.75	1,746,007.03	154,374.12	1,782,129.4	1,168.81	119,790.45
Total loans in domestic offices	421,236.47	4,265,671.34	439,732.1	4,585,229.25	12,074.68	393,670.52
Real estate loans	263,727.92	2,489,163.09	271,876.41	2,551,019.25	3,161.03	155,957.86
Commercial loans	97,631.13	1,187,525.14	85,982.63	1,133,139.86	-12,642.1	134,459.87
Other loans	47,886.69	545,922.72	85,598.12	1,053,556.45	37,371.14	521,964.35
Deposits	412,151.20	4,237,515.48	493,405.05	5,204,819.38	75,091.35	969,045.09
Total assets	677,583.64	7,586,230.86	691,354.09	7,760,746.16	3,821.36	450,158.16

Table 2: Patterns of Window Dressing

<i>Balance sheet item</i>	<i>Percentage of banks with upward window dressing significant at the 0.01 level based on geometric mean</i>	<i>Percentage of banks with downward window dressing significant at the 0.01 level based on arithmetic mean</i>
Fed funds purchased	3.97%	7.65%
Securities	22.23%	4.94%
Total loans in domestic offices	4.90%	69.61%
Real estate loans	30.34%	10.83%
Commercial loans	2.15%	89.65%
Other loans	95.37%	1.36%
Deposits	98.89%	0.08%
Total assets	22.74%	13.21%

Note: As explained in the text, the geometric mean provides a more conservative measure of upward window dressing while the arithmetic mean provides a more conservative measure of downward window dressing.

Table 3: Window Dressing, Size, and Capitalization

	Coefficient on log (assets)		Coefficient on equity / assets	
	alone	controlling for equity / assets	alone	controlling for log (assets)
Fed funds purchased	0.1585 (5.97)*	0.1628 (5.93)*	-1.1090 (-0.94)	0.7404 (0.61)
Securities	0.0952 (2.44)**	0.2030 (5.13)*	15.4667 (10.23)*	17.3992 (11.21)*
Total loans in domestic offices	0.0716 (2.87)*	0.1602 (2.17)**	-8.8899 (-3.17)*	-7.3645 (-2.55)**
Real estate loans	0.0097 (0.15)	0.0198 (0.29)	1.4452 (0.55)	1.6340 (0.61)
Commercial loans	3.6303 (16.42)*	3.6737 (16.10)*	-28.6975 (-3.19)*	6.9130 (0.77)
Other loans	-1.3591 (-6.25)*	-1.4853 (-6.63)*	-6.2355 (-0.73)	-20.3808 (-2.32)**
Deposits	-1.3777 (-8.87)*	-1.1312 (-7.11)*	6.0974 (8.30)*	39.8238 (6.38)*
Total assets	0.6822 (18.29)*	0.6769 (17.60)*	-7.2920 (-4.78)*	-0.8451 (0.56)

Dependent variable is the t-statistic on the hypothesis that the mean reported quarterly average equals the mean calculated quarterly average (no window dressing), as described in the text and characterized in Table 2. Heteroscedastic-consistent (White) t-statistics are in parentheses, significant at the *0.01 or **0.05 level.

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