Accounting Values versus Market Values and Earnings Management in Banks

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Abstract

Banks worldwide are subject to increasing regulation and, simultaneously, find themselves under the close scrutiny of market analysts and the screening of large institutional investors. Banks are required to maintain minimal equity relative to both total and risky assets. Market analysts expect banks to grow at a certain rate and to show reasonable returns on assets and on equity.

Capital requirements imposed by central banks on commercial banks follow the guidelines of the BIS (Bank for International Settlement). These requirements are calculated and expressed in accounting terms, and not in terms of market value. The accounting literature on the issue of earnings management is extensive, and there is substantial evidence that firms employ different methods to smooth reported earnings and to create hidden reserves that could be translated into equity at some point in the future.

The question arises as to what extent capital adequacy regulations on the one hand, and expectations concerning banks’ profits on the other, create incentives for banks to hide earnings in good times (by under-stating equity) and increase reported earnings in bad times. We develop a model, mapping the optimal behavior of a bank that operates in an uncertain environment and attempts to maintain capital requirements and to meet target growth rates, while building a reservoir of hidden earnings for capitalization in future bad periods. We show that if banks are penalized for downward deviations from targets, while not being symmetrically rewarded for over-achieving; there will be incentives to create hidden reserves.
I. Introduction

Over the past two decades we have witnessed a phenomenon of many banks expending their investments in real activities and real assets, including privately-held companies. We have also seen complex financial arrangements with high tech start-ups, in which the indirect objective of the lending bank is ownership of non-traded shares. Many banks have also made loans to real estate enterprises, for which the major collateral is the real estate (i.e. non recourse loans). The common feature shared by these investments is their limited liquidity and lack of market prices.

This phenomenon deserves some explanation, since in an efficient capital market there should be no clear economic reason for banks to acquire real assets, especially such that lack clearly evident market prices. Individual investors can diversify on their own and do not require the services of commercial banks for this purpose.

In this paper we examine this phenomenon and show that financial institutions can benefit from direct investment in real assets. The decision to undertake such investments, especially in assets lacking quoted market values, may be strongly motivated by considerations of earnings management. According to generally accepted accounting principles, real assets are usually reported on the balance sheet by their historical value, which differs significantly from market values. When the market value of an asset is significantly higher than its book value, there is a “hidden” store of value, which can be released to the income statement once the asset is sold.¹

Financial institutions are faced with the necessity to dynamically meet multiple, at times contradictory constraints, including capital adequacy requirements, investor expectations regarding return on capital and dividend policy, and internal managerial benchmarking. These requirements and measurements are expressed in accounting terms. Accordingly, banks have a major incentive to manage earnings to deal better with the demanding, dynamic environment in which they operate. Entities in the non-financial sector face similar constraints in cases where capital adequacy requirements

¹ It should be emphasized that due to FASB standards 121 and 144 as well as international accounting standard 36, fixed assets can no longer be carried at values above their recoverable amount, which serves as a proxy for their value. Note, however, that the reversal of an impairment is possible only according to IAS 36. Our paper can shed light on reversal strategy.
are replaced with loan covenants. However, these constraints are more binding and stringent in a regulated industry.

It should be noted that the most important constraint facing banks is the regulatory capital adequacy requirement. Failure of a bank to meet this requirement might simply drive it out of business. In some jurisdictions, delinquent banks are not allowed to create new loans. It is not surprising, therefore, that the capital adequacy requirement, by itself, generates incentives for earnings management. Research shows that banks that are close to the minimal capital requirements are actively engaged in earnings management (e.g. Moyer (1990), Scholes et al (1990), Collins et al (1995) and Beatty et al (1995)). Recent evidence demonstrates that banks and insurance companies respectively use loan loss provisions and claim loss reserves as major tools in managing their earnings.

In this paper, we claim that a dynamic stochastic optimization model under constraints should be developed to solve for the optimal behavior of a bank facing an environment of multiple constraints. Since there is no analytical solution to such a model, we illustrate the model with a two-period binomial example. We show that the dynamic timing of liquidation of real assets can be an effective earnings management tool. This is contrasted to the selective liquidation of financial assets or liabilities to satisfy constraints. Holding assets for earnings management purposes is not without cost. The model enables us to estimate the economic cost associated with holding of the real assets (part of it is the cost of regulation) and the related value of exercising the “accounting option” inherent in this activity. Our approach has implications for dividend policy.

We depart from the approach adopted by most of the literature on earnings management, by presenting an optimal policy in a multi-period stochastic model for the liquidation of real assets by financial institutions. We argue that strategically-timed investment and divestment of real assets enables banks to manage earnings in a multiple-constraint environment: to adhere to capital adequacy requirements, to meet other profitability objectives and to maintain dividend policy targets. We account explicitly for the need to meet both investor expectations (such as earnings growth and

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1 See Crouhy, Galai, and Mark 2000, ch. 2, on the regulatory requirements imposed on banks worldwide by the Bank for International Settlements (BIS).
return on equity) and regulatory requirements as incentives to the earnings management. While this model is tailored to the financial services industry, it can be applied to firms in other industries that face similar sets of constraints.

Our premise is that earnings management is conducted through purely legal actions based on the use of accounting standards to reflect real activities, as distinguished from some techniques that might be construed as fraudulent financial reporting. This paper does not deal with practices such as “income smoothing” or the manipulation of accounting standards.

Schipper (1989) terms the timing of the sale of assets as “real” earnings management, accomplished by timing investments or financial decisions to alter reported earnings or some subset of them. Bartov (1993) is among the few to discuss the timing of the liquidation of financial assets in a framework of earnings management. Empirical evidence on the timing of liquidation of assets is provided by Myers and Skinner (2002). Hand (1989) examines the “real” management of debt-equity swaps. We concern ourselves solely with transactions in real assets whose reported values are based on historical cost figures rather than market values. The practice of selectively timing real (or non-financial) asset liquidation has two foundations: a) historical cost is the principle upon which banks’ financial reporting systems are based, b) required minimal capital is denominated and measured in accounting rather than economic terms.

Generally Accepted Accounting Principles (GAAP) (with the exception of IAS 40 which allows for value appreciation in the case of investment property) require recognition, measurement and representation of most fixed assets (except some traded securities and derivatives) at their historical cost, which involves less depreciation and impairment charges than their market value or fair value when it exceeds the cost.  

3 In the last few years, the SEC has conducted a campaign against the practice of earnings management. According to the retired SEC chairman, Arthur Levitt, who initiated that campaign, “more than eighteen months ago, I came to NYU to speak about the state of financial reporting. I expressed my concern that corporate America’s motivation to meet Wall Street earnings expectations could be overriding common sense business practices. The zeal to project smoother earnings from year to year cast a pall over the quality of the underlying numbers…” (Arthur Levitt, 2000. See also the Appendix A and a paper by Turner and Goodwin (1999))

4 Barniv, Stephens and Sulganik (1994) observed that the “financial reporting function” exhibits major discontinuities, which stem partly from the fact that accounting rules are contingent on numerical reservation values. Hence, an entire financial report can be dramatically altered by the slightest diversion from one of the decision variables. These discontinuities create opportunities for earnings management and can lead to deviation from an economic optimum. We consider the timing of asset sales to be one technique by which regulatory inconsistencies are exploited.
The historical cost principle relates, amongst others, to real estate, liquid investments, and even privately traded securities and financial instruments (e.g. public deposits and loans). The value appreciation of these assets is reported only when they are sold, i.e. transaction based accounting. The principles of historical cost and transaction-based accounting enable the creation of “hidden reserves”. These “assets” represent the difference between historical costs and economic value that is realized only when the real asset is liquidated. Profits from these sales accrue to the banks’ equity. By selectively timing the acquisition and sale of assets with hidden values, banks are able to control reported earnings and equity by storing value in good years and releasing it (through the liquidation of real assets) in lean years.

Our model differs from models that view compensation as the major driver of asset liquidation. These models focus on incentives to expedite reported earnings to facilitate higher executive bonuses. We claim that bank management does not necessarily realize profits immediately and may prefer to defer reported earnings to future periods, as long as the current profitability is reasonable in terms of the multiple objectives and constraints that face the bank. Our model also predicts that in relatively bad times banks will opt to sell assets whose market value exceeds their book value, to generate profits rather than cash flow alone. Asset sale will be gradual, over time, rescinding as the situation worsens.

In Section II we review the literature on motivations for earnings management. In Section III a model for earnings management in a dynamic stochastic environment is outlined. A numerical example, for a three period, binomial distribution case is analyzed in Section IV. A summary, conclusions and implications for dividends are presented in Section V.

II. Motivations for Earnings Management by Banks and its Pattern

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5 Penman and Zhang (2002) analyze the empirical relationship between accounting conservatism, the quality of earnings and the stock price. They argue that lower reported earnings create “hidden reserves”. “Hidden reserves” can be increased (reduced) by reducing (increasing) earnings and investment. We look at “hidden reserves” that are created not by manipulating accounting rules, but rather by following them.

6 There may be a positive correlation between the values of both classes of assets. This correlation may change the quantitative results of the model but not the qualitative ones, and hence will not change our conclusions. One possible empirical implication of the model is that banks will select “hidden assets” with low correlation with the bank’s other activities.

7 See, for example, Bagnoli and Watts (2000) and Holthausen, Larcker and Sloan (1995)
An abundant body of literature, written by both academics and practitioners, documents and explains the phenomenon of earnings management. Schipper (1989) provides a conceptual framework for analyzing earnings management from an informational perspective (see also Holthausen and Leftwich (1983)). De Angelo (1988) refers to earnings management in buyout cases. Teoh, Welch and Wong (1998a, 1998b) find that firms manage earnings prior to seasoned equity offers and IPOs. Burgstahler and Eames (1998) conclude that firms manage earnings to meet forecasts of financial analysts. Watts and Zimmerman (1978) suggest that earnings management can be explained from a point of view of contracting (with managers and/or lenders), since it is costly for relevant decision makers to “see through” the earnings management. It should be emphasized that the literature discusses earnings management mostly in terms of income smoothing or directional earnings management techniques, and is primarily focused on accruals. Dye (1988), and Verrechia (1986) propose analytic models of earnings management.

In their comprehensive survey, Healy and Whalen (1999) summarize the major motivations to manage earnings as follows:

1. Public offerings: “Window dressing”, or enhancing financial reports prior to an IPO or secondary equity offering to attract better valuations;
2. Executive compensation: Increasing reported earnings to increase executive bonuses;
3. Financial liabilities: Fulfilling financial requirements in loan covenants;
4. Regulation: Reducing regulation costs or enhancing regulatory benefits.

Beneish (2001) suggests that insider trading can be added to this list of motives. Managers who are aware of a misstatement of profits can benefit by trading the securities. Stolowy and Breton (2000) suggest three broad objectives for earnings management: minimization of political costs; minimization of the cost of capital; and maximization of managers’ wealth.

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8 For a comprehensive review of literature on earnings management, see Healy and Whalen (1999), Beneish (2001) and Stolowy and Breton (2000).
These observed motivations can be applied easily to the banking industry. Moreover, the dialectic interplay between capital adequacy regulations and investor expectations creates a series of constraints that augment the incentives to adopt earnings management as an on-going strategy.

Banks operate in a multiple constraint environment. They are required to maintain minimum capital against risky positions. In most countries, banks are required to hold 8% equity against their consumer and corporate loan portfolios according to BIS guidelines. Banks can be penalized severely if they violate this requirement; they may even be required to curtail new lending activities. In many economies, the banks would not even be granted a “grace period” to reconcile capital deficiency problems. At the same time, banks traded on public markets are constantly monitored by financial analysts, the SEC, investors, other banking institutions (including foreign banks) and other stakeholders, including current and potential customers. Market expectations are formed with respect to key ratios, such as price/earning ratios (P/E), market to book value of equity (M/B), return on assets (ROA), return on equity (ROE) (or return on investment (ROI)), and earnings growth (EG). Missing key targets can adversely affect stock prices. Missing targets can also damage reputation and lead to a loss of business. In addition, dividend policy can be an issue. Banks often experience pressure to distribute dividends, especially in cases in which a bank has principal shareholders. The need to distribute and subsequently maintain dividends constitutes yet another limit on the bank’s financial performance. In our model, the various constraints are expressed as a series of thresholds. We draw on Degeorge et al. (1999), who claim that executives have a strong incentive to manage earnings since their performance is evaluated on the basis of reported earnings. They introduce behavioral thresholds for earnings management, based on empirical observations. Three important thresholds for earnings management are identified: report positive profits, sustain recent performance, and meet analysts’ expectations. The authors go on to outline tactical methods of earnings management: “Within generally accepted accounting principles (GAAP), executives have considerable flexibility in the choice of inventory methods, allowance for bad debt, expensing of research and development, recognition of sales not yet shipped,

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9 See Crouhy, Galai and Mark (2000) for a detailed discussion of capital adequacy requirements.
10 See e.g. Degeorge et al (1999) for a discussion of behavioral thresholds.
estimation of pension liabilities, capitalization of leases and marketing expenses, delay in maintenance expenditures, and so on”. In addition, their paper deals with strategic measures taken by management to affect the reported earnings figures by timing reported events to shift income between periods.

In our paper we adopt a similar approach, but examine the use of “hidden assets” and their impact on reported earnings and capital as the primary means by which banks manage earnings.

**III. Modeling Earnings Management in a Dynamic Stochastic Environment**

As is customary in the literature on earnings management, we assume asymmetry of information, and hence market imperfection. Management knows the true economic value of the non-traded, real asset, while the market has access only to its aggregate book value. Another assumption is that investors cannot distinguish between the components of income, i.e. between loan income and assets’ gains. They determine the value of the bank by the “bottom line” numbers only. The market demands, therefore, a certain return on equity as an approximation to the true economic value. We also assume that decisions regarding the activities of the bank are taken by the management rather than by the owners. The CEO, who makes the investment/liquidation decisions, faces a utility function that is affected by a reward-penalty function for attaining or missing certain targets.

Our model presents the optimal decision mechanism for bank management, given an accounting-based profitability function that is subject to the constraints of capital adequacy and financial performance expectations. Accordingly, we derive values for the optimal quantity of real assets held and/or liquidated in a bank’s asset portfolio for a given period. As in practice we assume that historic cost is used for financial reporting and that capital requirements are based on accounting rather than economic terms.

Let us assume that bank management aspires to maximize the bank’s market value subject to the regulatory constraints, i.e. the minimal required capital.

\[
\text{Max} (\text{Market Value})
\]

s.t. Minimal Required Capital
We assume that a bank’s market value (MV) is based on its economic value (EV), i.e. its discounted expected future net cashflow, and on the temporal effect of analyst expectations (AE), so that MV=EV+AE. Analysts’ expectations are usually based on projected earnings, the growth rate of earnings, the book-to-market ratio, the price-earnings ratio and other parameters. It can be assumed that, given EV, the AE has a zero mean over time.

The CEO, whose task is to maximize the bank’s market value, has an incentive to influence AE. The CEO may be penalized for missing targets set by analysts, and may be rewarded for outperforming analyst forecasts. The bank is assumed to possess a “hidden reserve” in the form of assets with market values that exceed their book values. These assets are available in limited quantities. Once such an asset is liquidated, it is withdrawn from the pool. Therefore, the CEO faces a multi-period optimization problem: whether, and how much, to liquidate at each point of time in order to create a balance between current and future rewards versus penalties:

$$\max E\left(\int_0^T \beta^{-t} V(RP) dt\right)$$

where $\beta^t$ is the risk-neutral discount rate, RP is the reward-penalty function to be specified below, and V is the utility function.\(^{11}\)

To illustrate and analyze the multi-period optimization problem facing bank management, and its complexities, we construct a simple, two-period binomial model. We assume that the bank has to meet the capital adequacy constraint, which we denote by MRC (minimal required capital). We assume that analyst expectations are based on the accounting rate of return on equity (RET).\(^{12}\)

Hence, the CEO must not only satisfy capital adequacy requirements, but faces penalty when undershooting RET targets as well. The CEO may be rewarded for surpassing selected targets and for maintaining a consistent dividend policy. Reward and penalty coefficients are not necessarily symmetrical.

In our model, the bank is assumed to hold two types of assets: A is risky, and B is riskless. All assets are financed by deposits and equity. In the binomial model, the risky asset of the bank (say its loan portfolio) appreciates at the end of each period.

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\(^{11}\) For the sake of simplicity, V is assumed to be defined over the reward-penalty space only.

\(^{12}\) In this paper we do not explicitly model the method by which analysts incorporate RET in corporate valuation.
either by a factor $U$ (e.g., 1.1) or by a factor $D$ (e.g., 1.02), where $U > D$. It is also assumed that the risk-free factor $R$ (e.g., 1.05) is such that $U > R > D$. Hence, if asset $A$ appreciates by $D$ only, it may miss both the regulatory (capital adequacy) requirement and the performance (return on equity) target. The reason for this is that at the end of each period, the bank is required to pay interest on deposits (at a rate which is assumed to be equal to the risk-free rate $R - 1$).

Asset $B$ is a riskless and divisible asset. It represents a “hidden asset”, for which book value is lower than its economic value. The CEO can time the sale of units of asset $B$ in order to capitalize its economic value. For simplicity of analysis, it is assumed that the proceeds from the liquidation of $B$ are distributed as interest payments or as dividends, or invested in asset $A$.

According to this model, in a good state (i.e., attainment of $U$) the bank can surpass both regulatory and performance thresholds and may be able to distribute dividends without liquidating units of $B$. In bad states (i.e., attainment of $D$), the bank may be forced to sell units of $B$ in order to satisfy MRC and/or RET. The CEO must adopt a strategy that considers both current and future rewards and penalties. By liquidating too many units of $B$ at time 1, he may face a greater shortage at time 2. It should be remembered that liquidation of units of $B$ at time 1 increases equity and hence raises the threshold of expected earnings at time 2.

It is assumed that the binomial process is an equilibrium process, hence $100$ invested today will yield either $100 \cdot U$ or $100 \cdot D$ in the following period. All riskless assets and liabilities yield a riskless rate of $R - 1$. We use this binomial process to express the present value of the stochastic, periodic penalties (and rewards) assigned to the CEO.

The linear penalty function that we assume for missing targets is steeper than the reward function for outperforming expectations.\textsuperscript{13} Due to its complexity and the disagreement over it in the literature, no explicit reward-penalty function is imposed on dividend policy.

\textbf{IV. A Numerical Example}

\textsuperscript{13} This assumption of differential levels above and below the threshold is consistent with Degeorge et al. (1999).
Since the problem presented involves many parameters, and a simple analytical solution is unavailable, we use a numerical analysis based on the binomial model for the risky asset. The numerical example is described in detail in Appendix B. This example helps us in understanding the relationship between the reward/penalty ratio and the incentive to liquidate the “hidden asset”. In addition, we show the interaction between the financial leverage, i.e. the amount of equity to debt, and the optimal liquidation policy.

The value of the reward-penalty function takes into account the achievements of the CEO relative to targets for both t=1 and t=2 across all states. The present value of the RP is based on the binomial process of asset A.

Figure 1 which is based on the parameters described in Appendix B, outlines the reward-penalty functions for ratios of reward to penalty, b1/b2, between 0.6 and 0.65. The net reward in present value terms, i.e. the reward minus penalty, is depicted as a function of the amount of “hidden assets”, INV, which is sold at time 1 in state D. As can be seen, the function is non-monotonic, with multiple local maximum points.

It can be observed that the optimal strategy is a function of the ratio b1/b2. For b1/b2=0.65, the optimal policy is to realize 3.587 units of INV at t=1, which is the minimal quantity required to achieve the minimal required capital MRC=8%. In this case, the CEO incurs a relatively small penalty in order to avoid a potentially high penalty at t=2, if D reoccurs.

It is interesting to note that by realizing 5.616 units of INV at t=1, the reward-penalty ratio is almost identical to the optimal policy. At 5.616 there is a local maximum reward. Obviously, for a reward-penalty ratio above 0.65, the optimal policy will be to realize the minimal quantity required to fulfill minimal capital adequacy requirements. The lower the relative reward is, the greater the incentive for early liquidation of the invisible asset. For a reward-penalty ratio of 0.62, the optimal policy is to realize 5.616 units of INV, achieving a net reward of 1.826. For such relative rewards the optimal solution is internal, not at the boundaries (see Figure 1).

14 The reward-penalty function is expressed in terms of present value, taking into consideration the basic binomial distribution and the specific reward-penalty at each node.
The conclusion so far is that even in a simple, 2-period binomial distribution, the optimal decision of the CEO is highly complex. The values are non-monotonic and contingent on the shape of the reward-penalty function. Obviously, the CEO can benefit from having a “hidden asset” at his disposal, whose value is understated by accepted accounting principles.

This last point is highlighted when inefficiency is introduced into the system. Let us assume that the “hidden asset” B yields less than the market rate of return for riskless assets. Figure 2 is similar to Figure 1, except that in calculating the reward-penalty and the optimal liquidation policy, the rate of return on INV is 4% per annum (while the economic riskless rate remains 5%). From Figure 2 it is evident that the CEO still has an incentive to hold INV and liquidate it incrementally on the basis of the RP function, even though this asset yields below the market rate. The value of this function is somewhat lower for each ratio of $b_1/b_2$ than for the case depicted in Figure 1. The realized rate of return on equity is adversely affected by the lower yield on the invisible asset, which is taken into account in the PR function. However, the ability to smooth earnings and avoid potentially sharp deviations from targets has a value to the CEO. This can be referred to as an “accounting option”, which allows the CEO to meet reporting targets by strategically exploiting the gap between the economic values and the book values of assets.

An interesting question in our framework is that of finding the relationship between the leverage of the bank and its propensity to liquidate the “hidden asset”. On one hand, by increasing the amount of equity relative to debt (for the same total book value of equity and debt), the bank is moving away from the capital adequacy requirement constraint. On the other hand, the bank may find it more costly to achieve the minimal required yield on equity. In this case the solution to the optimal capital structure problem is endogenous.

In Figure 3 we show the relationship between the equity (in book value terms) and the optimal liquidating policy of the “hidden asset”. If the bank starts with a low level of equity, it will have to liquidate a sufficient amount to achieve the minimal capital adequacy requirement. In our numerical example, by increasing the equity
between 9 and 11 (and thus reducing the leverage), the amount of “hidden asset” that will be liquidated at period 1 drops from 7 units to zero. The amount of liquidated “hidden asset” is almost a linear function of the equity. The driver for liquidation up to equity level of 11 is the capital adequacy requirement. For equity between 11 and 13, no units of the “hidden asset” need to be sold. When equity is over 13 (and debt therefore is at most 97), liquidation jumps to over 10 units and continues to grow at a very low pace. The trigger to liquidation in this range is the requirement of minimal return on equity (in period 2).

V. Summary and Conclusions

We have described a simple two-period binomial model of earnings management. With this model, we are able to derive an optimal policy of liquidating real assets whose economic value exceeds book value. Strategic liquidation of these assets enables banks to capitalize profits and to boost the book value of equity. Even with a simple reward-penalty function, the problem of optimal asset liquidation is both complex and dynamic. The CEO must consider the bank’s ability to meet obligations not only at the present, but also in the future, even in bad states of nature.

While we could not find specific data on asset sales by banks, supportive evidence of asset sales to manage earnings in found in Myers and Skinner (2002). They found that managers of earnings momentum firms tend to smooth income with the “special items” entry in the financial reports. Moreover, they find that in quarters of falling earnings from operations, firms tend to show gains from disposing of assets. They emphasize that "these gains are likely discretionary because the decision to sell assets is directly under management control, because the timing of the transaction is directly under management control, and because management knows ex-ante the amount by which earnings will benefit".

Anecdotal evidence on discretionary asset sales by banks can be found in the annual reports of CIBC. In 1996 CIBC bought 20% of Global Crossing stock, which at that time was a start-up. In a few years the market value of Global Crossing grew to
tens of billions of dollars. From 1998 CIBC started selling parts of its stock holding in Global Crossing. CIBC also reported in its annual reports their targets for return on equity, and growth rate of earnings. The strategic disposition of Global Crossing shares helped CIBC in meeting the targets.

Optimal policy is a complicated function of the amount of INV (compared to risky asset, VIS), the $b_1/b_2$ ratio, as well as of the risk of VIS (which also determines the present value of RP – the reward-penalty function).

When relative rewards on good performance are lower than penalties for missing targets, the penalties are critical both in state D at $t=1$ and in state DD at $t=2$. However, due to the present value function (which takes into account the risk-neutral probabilities of each state) penalties at D carry greater weight than at DD. This is illustrated in Figure 1B.

The problem of asset liquidation policy is one of resource management: determining optimal policy in an uncertain environment to manage a reservoir that can be depleted over time. The complexity of the problem results in non-monotonic and discontinuous functions that defy generalization. This is due to the introduction of discrete points at which targets are examined. This is true in reality, where banks and other financial institutions are examined on a periodic basis rather than being monitored continuously.

The optimal decision of how much of the “hidden asset” to liquidate at any point in time is extremely sensitive to the value of the parameters. Even a small change in the parameters’ values can affect dramatically the optimal amount to be sold. Moreover, in a turbulent environment, liquidation policy may change frequently and management may find it very difficult to fine-tune its policy. One result of our analysis is that immediate liquidation of a “hidden asset” in order to achieve short-term objectives is not always optimal. Liquidation policy, if it is to be effective, must be assessed in a multi-period framework.

We have also shown that the CEO may have an incentive to acquire (or keep) assets that yield inferior rates of return, if this enhances the capacity for strategic earnings management. This is a well-observed phenomenon in banks that own real assets, such as office buildings, even though from a purely economic point of view real estate investments may be inefficient. Banks sell these assets in bad times in order to boost equity and reported earnings. It is the hidden cost of regulation and
accounting procedures that deviates from fair value accounting. This cost constitutes the cost of the “accounting option”.

The “accounting option” may be important for regulated and/or public companies. A privately-held company, not subject to analysts’ expectations, may adopt different policies. Also, the separation of ownership and control can introduce additional incentives to manage earnings and hold non-optimal asset portfolios.

We also show the relationship between the leverage of the bank and its policy to liquidate the hidden reserve. Banks with greater reserves may opt to increase leverage and use less equity initially, knowing that equity can be generated over time by liquidating more units of the “hidden asset”.

Future research should also look at the issue of acquiring real assets in order to create a future “reservoir” of hidden values. In a complete model, both strategic acquisition and liquidation of assets must be considered.

Another important research option is to incorporate dividend policy into the optimization model, by extending the objective function to consider changes in the dividend payoff.

The model presented above can be used to analyze the relationship between earnings management and dividend policy. Due to legal constraints, dividends are routinely paid out of accounting earnings, i.e. the absence of accounting earnings may legally limit the amount of dividends paid, regardless of the firm’s cash flow. Many firms prefer to follow a constant dividend policy over time and to minimize the incidence of lowering dividends per share.\textsuperscript{15}

When a company accumulates too much equity (which necessitates higher profits to meet the RET targets), dividends can be distributed to reduce equity. However, distributing too many dividends can affect future equity reserves, which may be beneficial in bad times. In order to attain long-term goals management has to optimize dividend policy. The existence of assets (B) bearing lower book than market values can serve management well in executing its dividend policy. Units of B can be liquidated to supplement earnings from asset A. Once again, timing is critical and liquidating too many units of B may create a larger shortage at a later time.

\textsuperscript{15} It can be shown in our basic numerical example that at t=1 for state U, the bank cannot distribute more than $4.92 in dividends while maintaining the same dividend at t=2 in state D and meeting capital adequacy requirements, MRC2,D ≥ 8%.
While there is a huge body of research on dividend policy and on the tendency of firms to smooth dividends, there is no model that examines multi-period dividend paths that are subject to additional constraints, such as capital adequacy requirements and investor expectations. Our framework can be expanded to accommodate cash dividends. Potential impacts on the reward-penalty function must be adjusted to incorporate deviations from target dividend policy. In the expanded model, the CEO will be penalized for reducing the dividend per share from the previous period level, or from a “target level”, and will be rewarded for a permanent increase in the dividend per share.
References


Appendix A: Methods for Managing Earnings

The phenomenon of earnings management is attracting significant attention by both academics and regulators. Arthur Levitt, former Chairman of the SEC, called for action to limit this phenomenon, especially when its objective is to mislead investors. In a speech at NYU (later known as “The Numbers Game” Speech), Levitt criticized the practice of manipulating accounting principles in order to meet analysts’ expectations, and claimed it could be disastrous for the accounting profession. In his words:

“While the problem of earnings management is not new, it has risen in a market unforgiving of companies that miss Wall Street’s consensus estimates... Sales and income are overstated by recognizing revenues for partially shipped, unshipped or even back-ordered equipment. Fiscal years are extended beyond 365 days to record extra sales – and even sales that the company knows don’t conform to what a customer ordered...”

Levitt identified five common ways to manage earnings:

1. **Big Bath Charges**: Companies in the process of restructuring “hollow up” their balance sheets by writing-off assets and creating substantial liabilities and loss reserves. The rationale behind this practice is that the stock market ignores one-time substantial write-offs, and sometimes even regards it as a conservative policy. Exaggerated losses create a hidden pool for restating future profits, and narrow the capital base to enable the presentation of substantial growth rates in the future.

2. **Creative Acquisition Accounting**: When acquiring a company at a cost substantially above its book value, the acquirer must amortize the remaining unallocated gap (i.e. goodwill) over an extended period of time in the future. This may hurt future profits. To avoid this, companies
choose to classify part of the excess cost as “in process Research and Development”, and therefore claim, according to SFAS2 and FIN4, a one-time charge for these costs.

(3) **Cookie-Jar Reserves**: The idea is to overstate reserves (such as reserves for dubious debts, or bad debts, or reserves for product warranties, etc.) during periods of high profitability, when they are hardly noticeable. During bad times, the allocation to these reserves is greatly reduced, in order to improve the profit numbers.

(4) **Materiality**: This is an important accounting rule, which is considered to imply that items that are immaterial can be disregarded. Companies misuse this concept to include many “immaterial” revenue items that help them improve their profit numbers, so as to hit a threshold. It should be noted that the SEC responded to this practice by publication of SAB 99.

(5) **Revenue Recognition**: This is the most popular method for managing earnings, though it sometimes borders on outright manipulation and unlawful reporting. The method is to register revenues and profits prematurely. The SEC responded to this phenomenon by imposing SAB-101.

**Appendix B: Numerical Example**

We present a numerical example of our model to illustrate the results:

1. The risky asset A is binomially distributed with $U = 1.10$ and $D = 1.02$. Its value is denoted by VIS.

2. The "hidden", riskless asset B, has a constant return of 5% per period. The risk-free factor, therefore, is $R = 1.05$. The economic value of the asset B is denoted by INV and its book value by BVL.

3. The initial value of A is VIS = 100. The initial values of B are INV = 15 and BVL = 10.
4. The bank is financed by deposits, $\text{DEB} = 100$, and equity, $\text{EQT} = 10$. The interest rate on deposits is equal to the riskless rate, i.e. $5\%$ per period.

5. The capital adequacy requirement is $8\%$, i.e.,

$$\text{MRC}_t \equiv \frac{\text{EQT}_t}{(\text{EQT}_t + \text{DEB}_t)} \geq 8\%.$$

6. The minimal rate of return on equity is $10\%$, i.e.,

$$\text{RET}_t \equiv \frac{\text{PROF}_t}{\text{EQT}_t} > 10\%,$$

where PROF represents reported earnings.

7. The economic value of the bank is the sum of the economic values of the risky and riskless assets minus the interest payment on deposits:

$$\text{VIS}_t + \text{INV}_t - 0.05 \cdot \text{DEB}_{t-1}.$$

8. The reward-penalty function is assumed to take the following form:

$$\text{PR} = b_1 \text{Max(RET-10\%,0)} + b_2 \text{Min(RET-10\%,0)},$$

where $b_2 > b_1 > 0$.

To summarize the notations: VIS means the value of the visible asset; INV – the economic value of the invisible, or hidden, asset; BVL – the book value of the hidden asset; DEB – debt (deposits); MRC – minimal required capital; EQT – equity; RET – return on equity; PROF – reported earnings; and RP – the reward-penalty function. Superscripts U and D denote the state of nature at each time period.

Figure 1B illustrates the binomial tree. Block (1) denotes the initial state at $t=0$. At this state, the book value of the bank is 110 while its economic value is 115. Equity relative to book value is $9.1\%$, which is above the minimal required capital of $8\%$. Figure 1B.
Figure 1. Reward/penalty function (vertical axis) for different levels of realization of invisible asset at $t=1$ (horizontal axis), for different ratios of reward $b_1$ to penalty $b_2=10$, when riskless rate of return on invisible asset is 5%.
Figure 2. Reward/penalty function (vertical axis) for different levels of realization of invisible asset at $t=1$ (horizontal axis), for different ratios of reward $b_1$ to penalty $b_2=10$, when riskless rate of return on invisible asset is 4%.
Figure 3. The optimal liquidation at period one of invisible asset as a function of bank’s equity.
penalty b1*Max(ret-Eret,0)+b2*Min(ret-Eret,0)

### assumptions

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**Figure 1B**