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AND ITS APPLICATION TO THE FARA CREDIT SYSTEM**

**Fred Meltzer & Jeff Calvert**

**Proceedings of Regional Research Committee  
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ASSET/LIABILITY MANAGEMENT  
AND ITS APPLICATION TO THE FARM CREDIT SYSTEM

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BACKGROUND - WHY ASSET/LIABILITY MANAGEMENT?

Like many industries, financial services are experiencing significant change. Nowhere is this more evident than in the world of commercial banking. Such was not always the case, however. For decades following the Great Depression, banking in this country operated under a strict set of rules promulgated and enforced by a myriad of regulatory agencies. One of the many lessons of the Depression was the identification of the importance of the banking system to the general well being of society and the need to limit the degree of risk assumed by the commercial banks of this country.

In return for a highly constrained regulatory environment, banks operated relatively free of competition. They were encouraged to create assets through lending activities by the abundance of cheap deposit money. Banks, by law, were not allowed to pay interest on demand deposits. In addition, the Federal Reserve acted as a lender of last resort to member commercial banks who in turn left a fraction of their deposits as reserves in the nation's central bank.

In the 35 years following the depths of the Depression, interest rates remained relatively stable thus causing little variation in the market value of bank assets. This relatively attractive operating environment allowed commercial banks to recruit highly capable, if not highly motivated, individuals to the industry. In the early 1950's, for example, Gaylord Freeman, a former Chairman of the the First National Bank of Chicago, wrote the following description of bank personnel policies. "Banks offer an opportunity to an educated, personable, but uncourageous young man, for a pleasant, interesting, dignified life." Perhaps in a bit of foresight as to where the industry was headed, however, Freeman added. "One of our major jobs is to avoid the employment or advancement of such men."

Today the world of commercial banking is much different from the era of the 1950's and 60's. The banking business of today is significantly less regulated, fiercely competitive, and subject to sharp swings in interest rates.

As a result of this transformation, commercial bankers today are keenly aware of the sensitivity of their operating results to changes in the overall business environment. With regard to interest rate variability, for example, this concern is demonstrated in the insatiable appetite on the part of today's bankers for controlling interest rate exposure through active asset/liability management.

The Importance of Capital

Essential to the business of banking is the need for capital. Unlike bygone eras, however, the emphasis today is on financial capital and not on ornate bank structures. From a financial standpoint bank capital serves three basic functions.

- It protects creditors of the bank in case of bank failure.  
The degree of protection afforded bank creditors is an

important determinant in attracting borrowed funds at a reasonable cost.

- It permits a bank to withstand occasional losses.
- It enables banks to assume risk.

Banks, in fulfilling a social purpose, intermediate funds from savers to borrowers. In intermediating funds, banks do three things:

- They attract funds.
- They substitute their credit for that of the ultimate borrower (i.e., they make credit judgements and assume credit risks).
- They assume some degree of interest rate risk because intermediation often implies maturity transformation - using short-term deposits to fund longer-term loans.

The extent to which banks execute these functions efficiently, banks can expect to be rewarded in the form of bank profits.

At this point some distinctions need to be drawn between commercial banks and the activities of the Farm Credit System. Commercial banks conduct their business so as to assume both credit and interest rate risk. Credit risk is a necessary by-product of a loan portfolio while interest rate risk is a natural consequence of a maturity mismatch between assets and liabilities. The key distinction between commercial banks today and thirty years ago is that banks today manage both their credit and interest rate risk so as to maximize the return on bank capital.

#### The Nature of Banking Risks

Commercial banking today is a much riskier proposition than was the case just fifteen years ago. Most large commercial banks now operate with asset to equity ratios of 20:1 or a third again as high as in 1970. The attraction of running a more highly leveraged bank operation is the relatively high return on capital that can be achieved.

In addition to a more highly leveraged capital position, the loan portfolios of commercial banks today evidence a generally lower credit quality than was the case fifteen years ago. Banks today actively manage a mismatch in the average maturities of assets versus liabilities so as to earn profits from outguessing movements in interest rates.

The development of a more risk-oriented approach to the management of commercial banks has not occurred in a vacuum. The rating agencies, for example, have consistently viewed these developments as being detrimental to the repayment of debt service by commercial banks. As a result, commercial banks have been downgraded to the point where only one bank holding company, J.P. Morgan & Company, still retains an Aaa-rating. The lowering of the overall credit quality of the loan portfolio has been offset, to some extent, by the conscious effort on the part of bank management to develop non loan related business. Today the loan-to-asset ratio of all U.S. commercial banks



stands at 57 percent.

Lastly, commercial banks in their attempt to outguess interest rates have identified analytical tools to help manage the asset/liability mismatch. These tools collectively form the basis of modern asset/liability management.

#### The Nature of Farm Credit System Risks

Capital is no less important to the functioning of the Farm Credit System. In today's environment of increased competition it is critical that the FCS manage itself so as to maximize its return on capital. In considering this challenge, however, the management of the FCS necessarily operates in a slightly different environment from commercial banks.

The FCS is essentially a loan machine. The system exhibits a loan-to-asset ratio of 96 percent. In addition, these loans represent an exposure to one industry, agriculture. The inherent business of the FCS is therefore a risky one. The FCS carries a significantly higher degree of credit risk relative to commercial banks of equal size. The System has been long aware of this exposure and has managed itself in a manner consistent with this reality. The FCS has: (1) maintained a relatively unleveraged capital position and (2) attempted to keep its maturity mismatch of assets to liabilities at a minimum and (3) avoided supplying its creditors with liquidity by eschewing deposit-like liabilities. The objective of these operating rules has been to ensure the maintenance of a sufficient volume of capital so as to allow the FCS to pursue its social mission as a dependable source of borrowed capital to farmers and ranchers.

The willingness of commercial bank management to assume some exposure to interest rate risk within well defined limits is in part explained by the significant increase in interest rate volatility witnessed since the mid-1960s (Table 1).

Table 1  
Interest Rate Volatility

	<u>1946-1965</u>	<u>1966-1985</u>
Standard Deviation Interest Rate on 3-month Treasury Bills	1.08	2.92

Interest rate variability includes both positive and negative implications for commercial bank operations. It is both a source of additional profits (outguessing the market) and a threat to bank capital. The current attitude among commercial bankers is that some interest rate risk is desirable; too much can put you out of business.

The Farm Credit System by virtue of its heavy loan exposure has always tended to avoid interest rate risk. Adherence to prescribed debt maturity guidelines has formed the backbone of this approach. By limiting the maturity structure of its liabilities a Farm Credit bank has been implicitly assigning a relatively tight range of outcomes to the average life of its liabilities. A view of the average life of System liabilities across bank groups suggests however, that this approach has been more than simply mechanical. (Table 2)

Table 2  
Average Life of FCS Liabilities  
by Bank Group (in years)

	<u>1970</u>	<u>1977</u>	<u>1984</u>
Federal Land Banks	2.4	4.3	3.2
Federal Intermediate Credit Banks	.6	1.5	1.0
Banks for Cooperatives	.4	1.7	1.4

Within the FCS, the average life of bank liabilities tends to conform to some simple notions concerning bank assets. The Land Banks have the longest average life, while the Credit Banks have the shortest. Since 1970, the average life of the liabilities has varied for each bank group. In the absence of more information about the assets, it appears that the debt managers of the FCS have responded over the years to changes in the business environment.

Part of the reason for the relatively short average lives of FCS liabilities today compared to 1977 is the need to respond to borrower needs. System borrowers, when confronted with the relatively high interest rates of the last five years, have sought shorter-term loans. This is particularly true of the borrowers of the Banks for Cooperatives. While it appears that the debt maturity guidelines have permitted some response on the part of bank liabilities to this change in the environment, one cannot be sure that the guidelines do enough. The need to deliver a wider assortment of more complex loan products, for example, will likely test the flexibility of the current debt maturity guidelines. Complex repayment plans such as leveraged lease loans necessitate the additional employment of more sophisticated approaches to liability management if the dual needs of insulating bank capital from interest rate risk while minimizing interest expense are to be met.

## II. THE COST OF RUNNING A MISMATCH

The heightened degree of interest rate volatility demonstrated in the previous chapter has caused a significant transformation in the operating philosophies of commercial bank management. Back when interest rates were relatively stable the management of commercial banks generally adopted a passive approach with respect to the management of assets and liabilities. Commercial banks stood ready to accept low cost deposits and to make those loans required by its customers. A key objective in those days was to make the loans as nearly identical as possible. Commercial loans were made on a floating-rate basis tied to the prime rate. Consumer loans were usually made on a fixed-rate basis. As the economy grew both the assets and liabilities of the bank rose in tandem. Many large money center banks habitually borrowed funds in the money market on a day-to-day basis while most smaller banks lent excess funds or enlarged their portfolios of high grade investment securities.

Volatile interest rates had a jarring effect on this rather somnolent state of affairs. The passive approach to asset/liability management was challenged in two ways:

- The market value of any fixed-rate loan moves inversely with interest rates.
- As interest rates rose, deposits paying little or no interest began to leave the bank (disintermediation).

Bankers caught in these circumstances found themselves borrowing funds from the money market at significantly higher interest rates than the deposits they were replacing. Costly borrowed funds were needed to support an asset portfolio of declining market value. The inverse relationship between the market value of fixed-rate loans and interest rates and the positive relationship between interest rates and bank interest expense played havoc with the financial operating results of many financial intermediaries.

The "cost" of running a mismatch can perhaps best be illustrated by examining one particular financial intermediary, the Federal National Mortgage Association (Fannie Mae).

Fannie Mae is often referred to as the country's largest savings and loan association. Although it does not accept deposits, some 95 percent of its loanable funds come from the money and capital markets. On the asset side Fannie Mae holds a large portfolio of long-dated fixed-rate mortgage instruments. In the past few years Fannie Mae has paid dearly for its large exposure to long-dated fixed-rate assets supported by relatively short-dated liabilities. The end result has been a serious deterioration in Fannie Mae's net worth position illustrated by a record of negative earnings in three out of the last four years.

The recent history of Fannie Mae offers some interesting insights into the effect of mismatches on operating results. In the period 1975-1977, Fannie Mae ran a relatively small mismatch of 1.75 years in the average life of its assets (6.0 years) versus the average life of its liabilities (4.25 years). Subsequently, Fannie Mae added a large volume of mortgages and funded them with relatively short-term debt. As a result, the average life of the assets in 1981 stood at 14.6 years while that of the liabilities fell to 2.6 years.



The resulting mismatch of 12 years had serious consequences for Fannie Mae's operating results. In the 1975-1977 period, when interest rates were relatively low, Fannie Mae enjoyed a positive net interest margin of 51 basis points. With the subsequent increase in interest rates, Fannie Mae saw its net interest margin decline to a negative 157 basis points in 1981. In the 1975-1977 period Fannie Mae averaged \$2.32 in earnings per share each year. In 1981, Fannie Mae lost \$3.22 per share.

Although the results would have been much different if interest rates had fallen from 1978 through 1981 the fact remains that pursuing a large maturity mismatch between assets and liabilities holds the operating results of any financial institution hostage to changes in interest rates.



## III. EFFECTING ASSET/LIABILITY MANAGEMENT (PART I)

In a deregulated environment for financial services, liability managers need to concern themselves with the cost of funds rather than their availability. On the asset side, however, increased competition tends to limit the availability of those assets which will return an amount sufficient to cover costs and provide an adequate profit. Banks that find themselves in a more competitive environment soon learn that the availability of attractive assets drives the decision to add more liabilities.

The type of liability needed to support a given asset depends critically on the characteristics of that asset. An essential element in asset/liability management is the need to develop an understanding of the asset portfolio.

The most important single parameter of an asset in selecting an appropriate offsetting liability is the effective term to maturity. For fixed-rate assets the effective term to maturity coincides with the nominal term under the assumption that the borrower must compensate the bank for any foregone income in the case of prepayment.

For floating-rate assets the effective term to maturity refers to the time period between the loan repricing dates and not to the nominal term of the loan facility. A five-year loan repriced every six months according to a formula based on a specific market rate (e.g., the six-month LIBOR rate) has an effective term to maturity of six months. The appropriate offsetting liability to this asset would be a five-year floating-rate liability repriced every six months. Another funding alternative would be the rollover of a six-month instrument. A common feature of floating-rate instruments repriced at specific intervals is the borrower's right of prepayment on the repricing date. Offsetting five-year floating-rate facilities ensure that the initial spread to the bank is maintained throughout the life of the loan.

Unfortunately, the straightforward calculation of an effective term to maturity is inappropriate in the case of variable-rate loans priced off an average cost of funds. The validity of using the time interval between repricing dates as the effective term to maturity is predicated on the repricing being done on the basis of a market determined opportunity cost of funds. An average cost of funds does not reflect true opportunity cost. An average cost of funds is unique to a particular pool of liabilities and in all likelihood will not reflect the alternatives available in the marketplace. The ability to change an average cost based lending rate every day, therefore, is not relevant to determining the effective term to maturity.

The effective term to maturity for a floating-rate loan tied to an average cost of funds index is indeterminate. Many factors influence both the setting of a base lending rate by a bank and the decision to prepay on the part of a borrower. In dealing with loans based on the prime rate, for example, commercial banks have been forced to adopt ex post measures for identifying the effective term to maturity. Many commercial banks assume, for example, that prime-rate-based loans are outstanding for a period averaging three months. As a result, many banks fund their prime-based loan portfolio with three-month certificates of deposit.

The challenge facing a lender with a floating-rate loan portfolio priced off an average cost of funds is to identify the best means of funding without the

benefit of an explicit effective term to maturity. By constantly monitoring the rolloff experience of the asset portfolio, however, a lender can eventually identify systematic behavior which can be useful in the selection of an appropriate funding instrument.

#### IV. EFFECTING ASSET/LIABILITY MANAGEMENT (PART II)

There are four basic techniques through which asset/liability management is effected. These techniques include 1) match-funding, 2) average life, 3) gap management and 4) duration. Application of asset/liability management ranges from the time-honored method of matched-funding to methods employing duration. Utilization of these concepts does ensure that the objectives set forth by bank management are met. Appropriate judgements on the degree of risk-taking and the impact of competition are important in the decision-making process.

##### Match-funding

Match-funding assets effectively eliminates all interest rate exposure. Basically, an asset is funded with a liability that has similarly timed cash flows. The pricing of the asset includes a fixed spread over the cost of the liability. Therefore, once this spread is locked in, the intermediary can predict net interest income from the loan. Aside from the lack of interest rate risk, another advantage of match-funding is that the structure of the assets drives the choice of liability.

The primary difficulty with this "dedication" of cash flows arises from its inflexible nature. Match-funding often restricts the liability manager in his choice of funding instrument. The resulting limits to flexibility can prove costly in an environment highly solicitous of investor needs. A slight mismatch developed in the interest of satisfying investor preferences may well result in a somewhat larger operating spread.

##### Average Life

An alternative to match-funding would be to fund off the average life of the asset portfolio. This method would approximate the results of dollar-for-dollar match-funding if two conditions are met. The first is that the lending program is an ongoing concern. The second is that the liabilities and the assets have similar repricing dates and essentially float in tandem. Interest rate risk is held to acceptable levels particularly when the loans are of short maturity. The "pool" concept still implies that interest rate risk is transferred to the borrower.

##### Gap Management

The tools of gap management were developed to better assess the interest rate exposure on a group of assets or liabilities. All balance sheet items are categorized according to the degree of interest rate sensitivity implicit in each. Gap management is more useful for assets and liabilities which have a relatively short repricing period and a final maturity of one or two years. Gap management tools give bank management meaningful information about the nature of their business. Data on the composition of assets and the structure of liabilities is useful as a foundation to more sophisticated analytic techniques. Action based on gap management information allows for the systematic appraisal of the bank's financial results.



## Duration

Duration provides portfolio managers with a powerful approach to asset/liability management. Assets that are dollar-for-dollar "match-funded" with specific liabilities are perfectly immunized against interest rate risk. Each cash outflow has a corresponding cash inflow with a fixed spread to provide for operating costs and profit. Portfolio immunization can be accomplished using duration instead of a dollar-for-dollar "match" and for greater financial gain. Each series of cash flows which are received and paid by a bank are weighted by maturity and discounted at current levels of interest rates. The resulting single number for each series describes the average maturity of the cash flow pattern relative to the time value of money. The duration of the assets can either be matched with the duration of liabilities, or deliberately mis-matched for potential gain.

Duration can be viewed as the term to maturity of a zero coupon bond. A series of cash flows is simply a portfolio of zero coupons. An investor who has a choice between a 10-year coupon bond with a 6-year duration and a zero coupon bond with a final maturity of 6 years should be indifferent. This is called zero coupon equivalency. Both securities have the same degree of price risk, at least initially.

An application of duration to asset/liability management may be useful. An amortizing debt security was sold in late 1982 to fund the debt portion of a leveraged lease. The final maturity was 15 years with an average life of 10 years and a duration of 6 years. An alternative funding program could have been utilized using bullet maturity liabilities in order to achieve an offsetting duration of 6 years. At that time a 15-year bullet maturity with a duration of 7.5 years had recently been issued. A synthetic liability could have been constructed with 78 percent of the loan funded by the 15-year bullet maturity and the remainder with 6-month bonds. Benefits would have been realized through a lower spread on the mix of bullet maturities (25 b.p.) compared to the amortizing liabilities that were actually used (50 b.p.).

Funding with an amortizing debt security which more closely matches the cash flows of the asset is more appropriate for institutions which only infrequently fund assets with such longer maturities. Duration is more useful with active portfolios on both sides of the balance sheet.

Duration is the most accurate portfolio management tool because each cash flow is weighted with its maturity and discounted at the current level of interest rates. Like present values, durations can be summed across series of cash flows. The number that results from the extensive calculations can be directly compared with the durations of other cash flow series for estimating price risk and interest rate sensitivity. Once again, continuous monitoring of each portfolio's duration relative to expected changes in interest rates is the task of asset/liability management. When used in conjunction with gap management or other concepts of average life, the precision duration offers may make it the most important tool of asset/liability management. Moreover, the ability to more adequately assess risk should allow the bank to recoup additional revenues from the cash flow stream over and above the simple operating spread applied to the pricing of the assets.