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THE PRICING OF BANK SERVICES: A PROPOSAL FOR THE ELIMINATION OF COMPENSATING BALANCES

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PREFACE

This paper grew out of discussion and analysis of financial markets in the Seminar in Financial Economics at The University of Michigan Graduate School of Business Administration. The authors first brought the problem to the Seminar in the Fall of 1972 and submitted an earlier draft of certain concepts that year. The paper has been considerably elaborated this year and made definitive in places where earlier analysis was incomplete.

The thrust of the paper relates to the pricing practices traditionally followed by commercial banks, wherein the bank as supplier of credit to a borrower takes back part of the loan as a deposit by the borrower. To the uninitiated this may seem to be a curious process, but it should be remembered that, as some sage has wisely observed, the function of finance is to enlarge everyone's balance sheet! The use of such compensating balances is one of the traditions of American commercial banking, and as such possibly should be preserved in this iconoclastic generation. It does not, after all, involve any absorption of resources, does not produce a social cost, and it does not pollute. However, there are potential private benefits attainable by pricing loan credit directly as an interest charge and eliminating the use of compensating balances -- benefits which can be shared between lenders and borrowers.

We are confident that the subject is not yet exhausted and would welcome comments and suggestions.

Thomas G. Gies

ACKNOWLEDGEMENTS

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BACKGROUND

While numerous studies have been conducted on the topic of compensating balances, there has been very little analysis of incremental compensating balances and their effects upon both commercial banks and their corporate customers. This paper segregates incremental compensating balances and their effects from compensating balances. The approach which we use is theoretical; further studies should include an empirical validation of our results.

ABSTRACT

This paper addresses the controversial subject of compensating balances as a method of payment for credit provided by commercial banks to corporate customers. An analytical model is developed to quantify the lending relationship between a single bank and its corporate customer. This model indicates that there is an effective rate which the bank can charge the customer that will lower the effective cost to the customer and at the same time raise the effective yield to the bank for all levels of feedback. The assumption underlying this model (i.e., that the individual bank can loan additional amounts at a slightly lower effective rate) is appropriate for several reasons. First, the model does not consider demand for loanable funds; second, the model does not take into account the effects of such action at the macro level. For these reasons, several macro-economic theories are applied in order to evaluate the impact of the elimination of incremental compensating balances on the entire banking system.

The first economic approach involves the application of a Marshallian analysis to both the individual bank and to the banking system as a whole. In the former case, it is demonstrated that a competitive advantage will accrue to an individual bank which adopts fees if its competition maintains incremental compensating balance requirements. In the latter case, it is demonstrated that costs to the corporate borrowers can be lowered; however, profits to the banking system are also lowered.

The second economic approach involves the application of Keynesian analysis to the banking system. The result of this analysis is that, barring any actions by the Federal Reserve, the velocity of money increases, causing increased economic activity; further, the same amount of credit is available at a lower cost to the corporations but at a lower yield to the banking system as a whole.

The conclusion is that using only fees as compensation for loans will lower the costs of bank borrowing to the firm at the expense of profits to the entire banking system. Action to establish fees as compensation for loans by an individual bank could result in greater profits to the individual bank and lower costs to each of its corporate customers. However, certain characteristics of the individual bank's market and of its competitive environment must be evaluated in order to determine the long-run profitability of this tactic. The essence of this evaluation will focus upon the sophistication of the individual bank's competition and, in particular, upon the rapidity with which this competition will follow any price reduction.

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I. Introduction

There has been a long-established controversy centered around the United States' banking-communities' practice of requiring compensating balances for loans provided to corporate customers. The most common alternative suggested by corporate treasurers, academicians, and some bankers is to supplant the current practice with a system of fees. The research problem of this paper has been to evaluate the relative effects of these two methods of compensation upon individual banks, individual corporations, and the banking system as a whole in order to identify the merits of each pricing technique.

This research has been directed toward testing three hypotheses. First, replacing incremental compensating balances with fees will increase the profitability of the individual bank. Second, replacing incremental compensating balances with fees will reduce the firm's costs of borrowing from the bank. Finally, substituting fees for incremental compensating balances will have no impact on the banking system as a whole. Testing the three hypotheses was constrained by considering only the domestic operations of United States' banks with corporate customers. The analysis was performed within the existing United States' banking structure and regulations.

In researching the literature in this area, it is difficult to discover any quantitative investigation of the implications of fees as an alternative to compensating balances. This report hopes to fill that gap through the application of an analytical lending model that provides a means of examining the effects upon a bank's profitability and a firm's cost of bank debt.

Following the development of the model, in-depth interviews were held with one leading New York bank, six major Detroit banks, and three major manufacturers. The purpose of these interviews was to discover current practices in bank compensation and to elicit reaction to the aforementioned

model. The interviews supplied several criticisms to which the model could not respond; therefore, an economic analysis was conducted in order to appraise those factors which the analytical model could not assess.

Before proceeding, it is paramount that our definitions of an incremental compensating balance and a compensating balance be understood. As used in this paper, an incremental compensating balance is defined as an increment to a corporate-banking customer's normal-demand deposit balance (also termed net-transaction balance), which is required in order to compensate the bank for loans provided to the corporation. It is realized that banks typically look not at minimum net-transaction balances but at average balances in determining the incremental compensating-balance requirement; consequently, net-transaction balances as used in this paper will refer to the average of such balances for a corporation. The computation for this average is purposely left out of the model in order to simplify it. The incremental compensating balance may or may not be loaned by the bank; however, in all cases it is considered to be an amount of demand deposits which would not be held by the corporation if it were not required by the bank. These relationships may be expressed algebraically as follows:

$$ICB = \frac{L(cb) - NTB}{1 - cb}, \text{ where the ICB is borrowed}$$

and

$$ICB = cb(L) - NTB, \text{ where the ICB is not borrowed}$$

where

ICB = incremental compensating balance
L = the useable amount of the loan (apart from the incremental compensating balance) to the firm
NTB = net-transaction balance normally held by the firm as a demand deposit
cb = compensating-balance requirement based as a percentage of the loan

A compensating balance, on the other hand (as distinguished from an incremental compensating balance), is the total balance requirement necessary

to support a loan or line of credit. Algebraically this may be shown as follows:

CB = ICB + NTB,	whether the ICB is borrowed or not; CB = compensating balance;
CB = cb(L),	where the ICB is not borrowed; this occurs where the NTB $>$ CB;
and CB = (L + ICB)cb,	where the ICB is borrowed from the bank.

As a point of perspective, it should be noted that over the past decade important sources of bank-profit growth have largely disappeared. There has been a movement away from heavy liquidity and from 30 percent to 40 percent loan-to-deposit ratios to a greater emphasis on loans, resulting in loan-to-deposit ratios as high as 70 percent to 80 percent.[1/] As banks entered the 1960s, the average loan-to-deposit ratio was 46 percent; therefore, banks have had the ability to increase their higher-yielding loans faster than their other earning assets.[2/] At the end of the past decade, the banking system was generally considered to be "loaned up." Further, through the first part of the 1960s, there was a willingness on the part of the saver to accept penurious interest rates on savings no matter how market interest rates climbed. At the present time, however, the saver knows what his money is worth.[3/] Finally, the significant growth in loans was coupled with a change in the way banks were obtaining funds; while loans grew at an annual compounded rate in excess of 10 percent a year, gross-demand deposits grew at an annual rate of only 4.3 percent a year.[4/] With the banking system's traditional source of funds growing only half as fast as the demand for funds, the spread between the cost of funds and the

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1/ Paul S. Nadler, "Compensating Balances and the Prime at Twilight," Harvard Business Review (January - February, 1972), p. 116.

2/ Jon C. Poppen, "Banking -- 1980 Style," Address before Third General Session, 20th National Agricultural Credit Conference of the American Bankers Association, November 17, 1971, p. 1.

3/ Nadler, "Compensating Balances."

4/ Poppen, "Banking -- 1980 Style," p. 5.

price which banks receive for loanable funds has declined. In view of these factors, banks in the next decade face issues which will force management to generate other sources of income in lieu of the traditional sources.

In defense of incremental compensating balances, bankers cite several reasons for their use and value to the bank: (1) to increase deposits, (2) to increase net earnings, (3) to increase lending capacity, (4) to increase the effective rate of interest on a loan, (5) to act as an offset for loan security, and (6) to enable bankers to lend to a larger number of customers at the prime rate.[5/] Some bankers also cite the effect of increasing the total money supply by forcing demand deposits. However, the ability of the banking system as a whole to create deposits is limited by the Federal Reserve; this matter is discussed later in the paper.

Compensating balances are generally applied to lines of credit, to direct loans, and sometimes in lieu of service charges to nonborrowing customers who utilize other bank services. The lending bank may, however, not ask for an incremental compensating balance if the customer has voluntarily carried sufficient balances with the bank in the past or has given a strong promise for doing so in the future. [6/] This practice underscores the fact that compensating-balance requirements reflect an informal understanding between the bank and the firm to the effect that an exact amount is not included in a loan contract; further compensating-balance requirements are not

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[5/] Harold T. Shapiro and Nevins D. Baxter, "The Nature of Compensating Balance Requirements," Journal of Finance, XIX (September, 1964), p. 490.

[6/] Jack M. Guttentag and Richard G. Davis, "Compensating Balances," Monthly Review of the Federal Reserve Bank of New York, December, 1961, p. 205.

legally enforceable. In policing compensating balances, banks tend to vary in their attitudes, depending upon the negotiating strength of the borrower. However, the customer's failure to fulfill compensating-balance requirements is usually met with persuasion. If this method does not work, the bank may raise the interest rate on an outstanding loan, reduce lines of credit, terminate specific services, or even cancel a firm's borrowing privilege; the action and its severity depends upon the persistence of the deficiency, the customer's current and potential value to the bank, and the general state of credit conditions.

From the viewpoint of the bank, the compensating-balance requirement obliges the firm to hold its money balances at the bank rather than elsewhere. Incremental compensating-balance requirements can increase both deposits and loans and thereby swell the bank's interest revenues. These requirements, however, actually reduce the volume of loanable funds which the bank can make available to other borrowers because part of these incremental compensating balances are tied up as required reserves. Although revenues from the loan may increase with an incremental compensating balance, the yield to the bank will reflect the added cost of the reserve requirement. A bank which increases its own deposits by requiring incremental compensating balances reduces the deposits of other banks by the same amount. This is particularly true in the case where the borrower obtains the incremental compensating balance by withdrawing funds from another bank; it is also true when the incremental compensating balance is obtained directly from the bank making the loan, since the bank must hold reserves against the incremental compensating balance -- these reserves could be used to expand credit elsewhere in the system.

When compensating balances are supplied by funds which are needed for transaction purposes, there is a benefit to both the customer and the bank. There is, therefore, an economic justification in this situation but not in

the situation in which incremental compensating balance requirements are forced upon the firm when better use could be made of these funds elsewhere. The latter case results in economic waste.

II. Analytical Lending Model for Profit Optimization

In the area of profit optimization, we are working under the assumption that the interests of the bank are normally opposed to those of the firm. The logic behind this assumption is that the bank seeks to earn as much as possible from its loans, whereas the firm seeks to have its loans provided as inexpensively as possible. Therefore, in order to optimize the profits of both the firm and the bank, it is necessary to consider these profits in aggregate. In order to accomplish this profit optimization, a model has been formulated based on an individual bank's relationship with an individual corporate customer; its applicability to the banking system as a whole is not assumed. A macro-economic view will be discussed in detail in Section V.

Banks have traditionally charged for their loans using both an interest charge (based upon some rate of interest times the amount of the loan) and a compensating balance (usually equal to a percentage of the outstanding portion of the loan). Whether or not a portion or all of this compensating balance is an incremental compensating balance will depend upon the firm's net-transaction balances. The model considers only the incremental compensating-balance requirement. This method of pricing is presented below in a formulaic representation:

$$(L + ICB)i_p = IC \qquad (1)$$

where
- L = the usable amount of the loan (apart from the incremental compensating balance) to the firm
- ICB = the incremental compensating balance (i.e., the balance held in addition to the net-transaction balance)
- i_p = interest rate with compensating balance
- IC = interest charge in dollars to the firm

It should be noted that this formula applies only to those cases in which the incremental compensating-balance (ICB) requirement is loaned to the firm. It is possible, however, to develop a pricing mechanism in which the firm is loaned the same amount of usable money (L) as above and is charged the same amount (IC) for the loan. In this instance the bank need only charge a higher rate of interest. The interest charge (IC) to the firm will be the same (otherwise, the rational firm would always want to take the one with the lower interest charge). This case follows:

$$L \cdot i_{ef} = IC \tag{2}$$

where i_{ef} = effective interest rate without the incremental compensating balance

Because

$$IC = IC, \tag{3}$$

$$L \cdot i_{ef} = (L + ICB)i_p, \tag{4}$$

$$i_{ef} = \frac{(L + ICB)i_p}{L}, \tag{5}$$

$$i_{ef} = (1 + \frac{ICB}{L})i_p, \tag{6}$$

$$i_{ef} > i_p \tag{7}$$

The firm is indifferent in the choice between the two methods of compensation because its effective interest rate is i_{ef} in both cases. It should be noted that the above formulation implies that the cost of the incremental compensating balance to the firm is equal to i_p; this cost is only true when the firm borrows the compensating balance from the bank. There are other methods which the firm can use in order to satisfy the compensating-balance requirement. One of these methods will be presented in Section III. As will be shown, the actual numbers do change, but the concept remains the same.

Although the firm is indifferent as formulated, the bank is not indifferent, since it is required to maintain a reserve against deposit balances. In other words, the reserve requirement (R_{g+w}) represents a nonearning asset to the bank.

Therefore, when the bank charges an interest rate (i_p) for a loan (L) which requires an incremental compensating balance (ICB), its yield is less than in the case in which it loans an amount (L) at a higher interest rate (i_{ef}) even though the effective interest charge to the firm is the same in both cases:

$$\frac{(L + ICB)i_p}{L + (ICB)(R_{g+w})} = i_{eb} \qquad (8)$$

where R_{g+w} = reserve requirement (government and working)

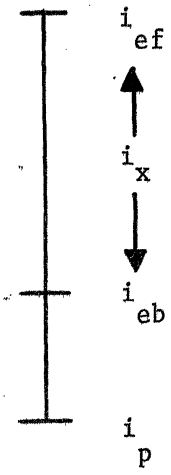
i_{eb} = effective yield to the bank from the loan, L, with an ICB at i_p

Once again the feedback is considered to be zero. An examination of the feedback question will be made in Section IV.

The $[(L + ICB)(R_{g+w})]$ in the above expression represents the actual amount of funds which the bank has tied up during this transaction. The effective yield (i_{eb}) to the bank on the loan with a compensating balance is less than the effective interest rate charged (i_{ef}) to the firm (the denominator in equation 8 is larger than the denominator in equation 5). Further, the actual interest rate charged on the loan with a compensating balance (i_p) is less than both the yield to the bank from the loan and the effective interest rate charge (i_{ef}) to the firm (note the relationship between i_{ef} and i_p in equation 5 and between i_{eb} and i_p in equation 8). These relationships are summarized below:

$$i_p < i_{eb} < i_{ef}$$

It can be reasoned intuitively that if the loan is made without an incremental compensating balance, there is an interest rate between i_{eb} and i_{ef} at which both the bank and the firm will be better off. This interest rate will be called i_x. The relationship is demonstrated schematically in Figure 1 below.



i_x is some point between i_{ef} and i_{eb} depending upon the strength of the bank and the firm.

Fig. 1. Interest-rate range.

While the bank will want to increase its effective yield by pushing i_x up to i_{ef}, the firm will attempt to reduce its costs as much as possible by pushing i_x down to i_{eb}. As long as the bank makes the loan without the incremental compensating balance and charges an interest rate greater than i_{eb} (its yield when making the loan with an incremental compensating balance) but less than i_{ef} (the effective interest-rate charge to the firm with an incremental compensating balance), both the bank and the firm will be better off. Where i_x is placed will depend upon the relative bargaining strengths of the bank and the firm. The bank could stop requiring compensating balances and charge i_{ef} for straight loans; however, both the bank and the firm would be in a better position if the rate were lower than i_{ef} but higher than i_{eb}. Banks which now do not use compensating balances should continue charging i_{ef} (where they are now) unless forced down by competition.

Taxes have no effect upon this model, whether or not the marginal tax rate of the bank is the same as that of the firm. This effect can be shown for the firm as follows:

$$(L + ICB)i_p(1 - T) = IC(1 - T)$$

$$L \cdot i_{ef}(1 - T) = IC(1 - T)$$

For the firm, both the effective interest rate and the interest charge are reduced by the amount of the tax rate, whether or not a compensating balance

is used. For the bank, the effective yield is reduced as is its interest revenue.

III. Application of the Lending Model

In Section II, a model was derived which illustrated that there existed an interest rate which could be charged for a loan without incremental compensating balances and which would improve the yield to the bank and lower the cost to the firm from the rate for the loan with incremental compensating balances. The following example will substantiate that model and examine the effects of some complicating factors. Let us assume that a firm has an investment project which will cost $1,000 and that it also has $50 in cash (the minimum level needed for transactions) and $150 in government securities. There are two cases or options which could describe the possible behavior of the firm. Case I is the option where the firm elects to borrow the entire amount of both the investment project and the incremental compensating balance, if required, from the bank. Within this option the firm can either be required to maintain a total compensating balance (20 percent) and be charged one rate (4 percent) (Suboption A), or it can be charged a higher rate (4.66 percent) without the compensating-balance requirement (Suboption B). Refer to the formulation of ICB (incremental compensating balances) on page 2. This option and the two suboptions (A and B) have the following effects upon the firm's balance sheet:

CASE I

Suboption A (Incremental Compensating Balances Required):

Assets		Liabilities	
Cash (ICB = $187.50)	$ 237.50	Loan	$1187.50
Govt. Securities	150.00	Other	200.00
Project	1000.00		
	$1387.50		$1387.50

IC (interest charge) = ($1000 + $187.50) x 4% = $47.50

i_{ef} (effective cost to the firm) = $\frac{\$\ 47.50}{\$1000}$ = 4.75%

i_{eb} (effective yield to the bank) = $\frac{\$47.50}{\$1000 + \$37.50}$ = 4.58%

let i_x = 4.66% (approximate midpoint between i_{ef} and i_{eb})

Suboption B (No Incremental Compensating-Balance Requirement):

Assets		Liabilities	
Cash	$ 50	Loan	$1000
Govt. Securities	150	Other	200
Project	1000		
	$1200		$1200

IC = ($1000) x 4.66% = $46.60, $i_{ef} = i_{eb} = 4.66\%$

In suboption A, assuming an interest rate of 4 percent, the interest charge to the firm would be $47.50, and the effective cost to the firm would be 4.75 percent; the effective yield to the bank would only be 4.58 percent because of the reserve requirement (working and legal reserves assumed to be equal to 20 percent) on the incremental compensating balance. In suboption B, if a rate of 4.66 percent is charged on the loan with no incremental compensating-balance requirement, the bank would have a higher yield (4.66 percent), and the firm would have a lower effective cost (4.66 percent) as well as a lower interest payment ($46.60 versus $47.50).

Case II, the second major option to the firm, is the option to liquidate enough government securities in order to meet the incremental compensating-balance requirement in suboption A or to reduce the amount of the loan in suboption B. The balance sheet for the firm appears as follows:

CASE II

Suboption A (Incremental Compensating Balances Required):

Assets		Liabilities	
Cash (ICB = $150)	$ 200	Loan	$1000
Govt. Securities	0	Other	200
Project	1000		$1200
	$1200		

IC = ($1000) x 4% = $40.00

$$i_{ef} = \frac{\$\ 40}{\$850} = 4.70\% \qquad i_{eb} = \frac{\$40}{\$850 + .20(\$150)} = 4.55\%$$

Total IC = ($1000) x 4% + ($150) x 3% = $44.50

Total $i_{ef} = \frac{\$44.50}{\$1000} = 4.45\%$

let $i_x = 4.62\%$ (approximate midpoint between i_{ef} and i_{eb})

Suboption B (No Incremental Compensating-Balance Requirement)

Assets		Liabilities	
Cash	$ 50	Loan	$ 850
Govt. Securities	0	Other	200
Project	1000		$1050
	$1050		

IC = ($850) x 4.62% = $39.27

$i_{ef} = 4.62\%$ $i_{eb} = 4.62\%$

Total IC = ($850) x 4.62% + ($150) x 3% = $43.77

Total $i_{ef} = 4.38\%$

In this case, as in Case I, our theoretical model has been verified. By eliminating the incremental compensating-balance requirement, the cost to the firm has been reduced from $40 to $39.27, and the effective interest cost has been reduced from 4.70% to 4.62%, while the yield to the bank has been increased from 4.55% to 4.62%. The total IC that has been calculated reflects the interest cost for financing the total project, including the interest foregone on the government securities (interest assumed equal to 3%).

Table 1 summarizes the interest charges, effective costs, and yields for the firm and the bank on the lending transaction. (See Table 1, page 13.)

Which of the cases the firms selects will depend on a number of factors--- monetary conditions, liquidity preference, financial mobility, yield on government securities, etc. Similar calculations can be made for the particular circumstances, and the decision could be made by the firm on a cost/risk basis. In either case, the cost to the firm is lower and the yield to the bank is higher under suboption B.

TABLE 1

Summary of Interest Charges

Case	Interest Charges	Effective Rate to the Firm	Effective Yield to the Bank
I-A	$47.50	4.75%	4.58%
I-B	46.60	4.66	4.66
II-A	40.00	4.70	4.55
II-B	39.27	4.62	4.62

IV. Introduction of Feedback to the Lending Model

In the formulation of the lending model in Section II, it was assumed that feedback on the usable part of the loan (L) was equal to zero, and that the feedback on the incremental compensating balances (ICB) was equal to one. Although feedback is difficult for an individual bank to determine, it does have an effect on the relationship among the effective cost to the firm (i_{ef}), the effective yield to the bank (i_{eb}), and the rate (i_x) which could be charged without incremental compensating balances and which would lower the cost to the firm and raise the yield to the bank.

For the purposes of this analysis, feedback is assumed to be the feedback occurring only at the first level after the loan has been made. Feedback resulting at lower levels will be associated with the loan immediately preceding rather than with the original loan.

Equations 6 and 8 were the formulary representations for i_{ef} and i_{eb}, respectively. Introducing feedback obviously has no effect on the effective cost to the firm, but it does affect the effective yield to the bank. The following equation is a reformulation of the effective yield to the bank with the introduction of feedback (f):

$$i_{eb} = \frac{(L + ICB)_{ip}}{L(1-f) + L(f)(R_{g+w}) + ICB(R_{g+w})}$$

The denominator of this equation represents the amount of funds required to provide the interest revenue represented in the numerator of the equation. If feedback equals zero, then the equation becomes simply equation 8 in Section II. If feedback equaled one, which is unlikely, the denominator would become $(L + ICB)R_{g+w}$. This denominator says that the only funds required are the reserve requirement on the loan and the incremental compensating balance.

When feedback was assumed to be zero, there existed a rate i_x which would raise the effective yield to the bank and lower the effective cost to the firm. Introducing feedback results in the following equation for i_x^* (i_x corrected for feedback):

$$i_x^* = \frac{Li_x}{L(1-f) + L(f)R_{g+w}}$$

In the case of zero feedback, i_x existed between i_{eb} and i_{ef}; however, when feedback is introduced, this relationship no longer applies since i_x^* and i_{eb} increase with feedback while i_{ef} remains the same. Figure 2 illustrates the relationship between i_x^*, i_{eb} and i_{ef} for various levels of feedback. The figure is based on the following assumptions:

$$cb = 20\%$$
$$L = \$1000$$
$$NTB = \$0$$
$$ICB = CB = \$250$$
$$i_p = 4\%$$

Therefore: $i_{ef} = 5\%$

As shown in the figure, higher levels of feedback increase the spread between i_x^* and i_{eb}. One conclusion that can be drawn is that by eliminating incremental compensating balances the bank is even better off than previously described. Whether this entire advantage should be passed on to the bank will again depend on the relative bargaining strengths of the bank and the firm.

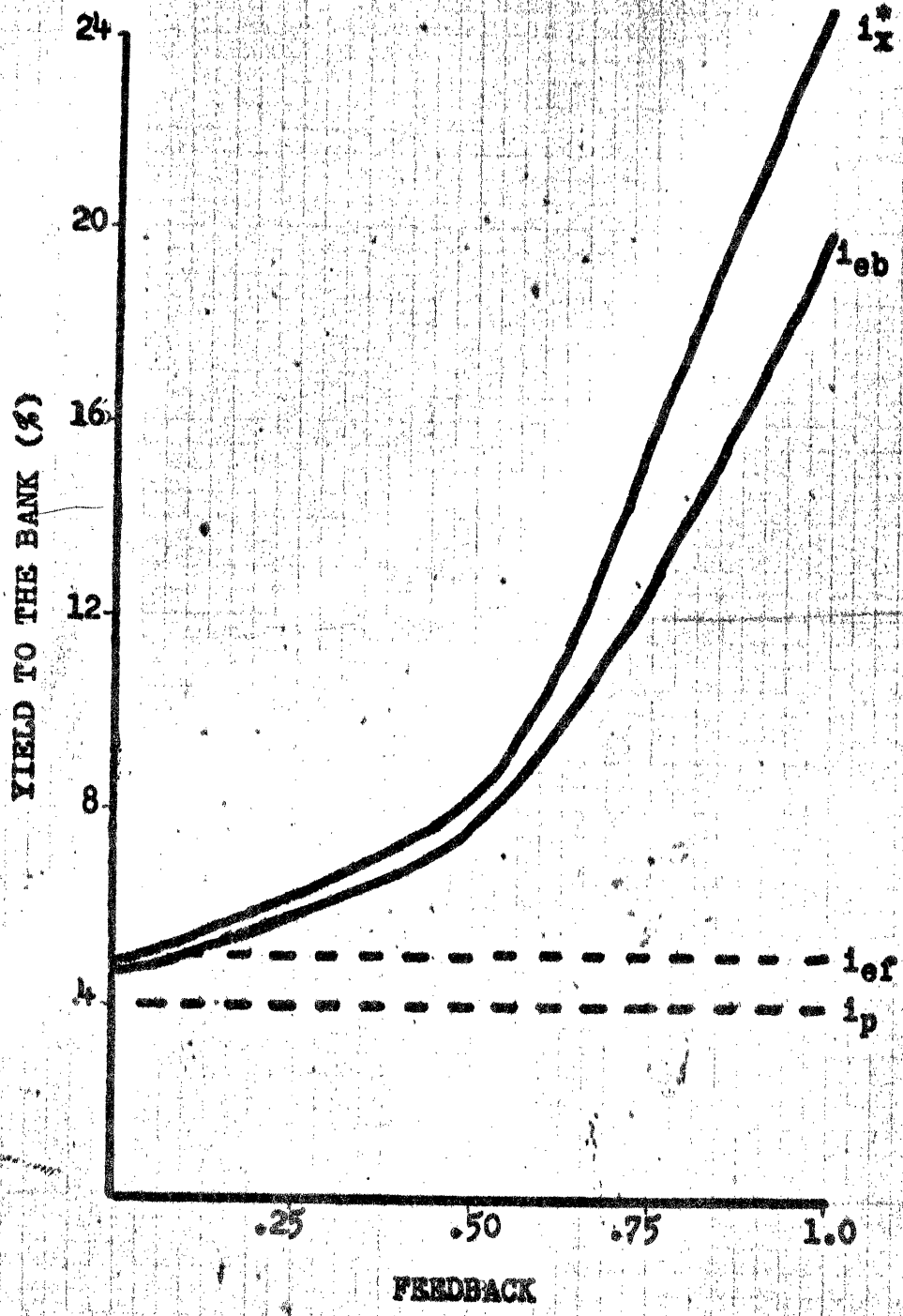


Fig. 2. Feedback Effects.

V. Micro- and Macro-Economic Analysis

The individual bank

The analytical lending model examines incremental compensating balances as they affect the loan relationship between the individual bank and the individual firm. This analysis can be further expanded by employing a marginal revenue-marginal cost analysis. Consider the individual bank which faces a downward sloping demand curve; that is, it can loan more funds if it charges a lower interest rate. This demand curve would not be perfectly straight because of the anticipated reactions of competing banks to price changes made by an individual bank. For instance, suppose a Detroit bank were to unilaterally raise its interest rates on corporate loans. Unless the higher rates were warranted by changing economic conditions, the remaining Detroit banks would not be expected to follow with similar rate increases. Therefore, the loans made by the individual bank could be expected to drop to a degree determined by the amount of the rate increase. However, if the individual bank reduced its interest rates on corporate loans, other banks in the same market might feel the need to meet the competition. The temporary competitive advantage that would accrue to the individual bank would quickly vanish as other banks retaliated, resulting in a smaller increase in funds loaned than would otherwise be expected. The result would be a kinked demand curve, illustrated as D-D in Figure 3 with the corresponding kinked marginal revenue curve (MR-MR). This kinked demand curve simply reflects the oligopolistic nature of regional banking markets. (Note that the axes used in Figure 3 are the effective interest rate on the loan and the net funds loaned, not including incremental compensating balances.)

The individual bank will originally operate where marginal revenue (MR-MR) intersects marginal cost (MC). At this point, a q_1 net quantity of funds would be loaned at an r_1 effective rate of interest.

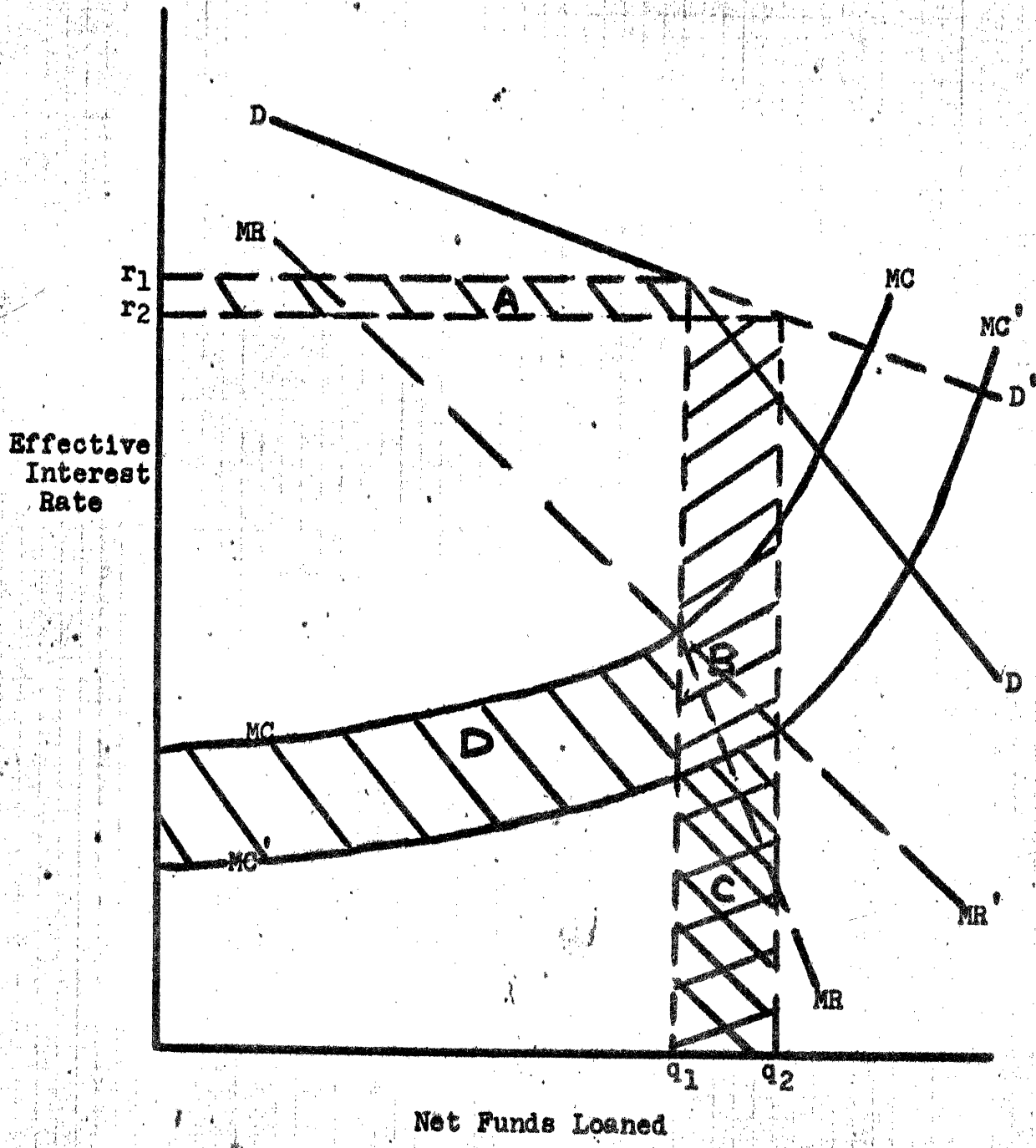


Fig. 3. Micro-analysis.

Suppose the individual bank eliminated incremental compensating balances. It can be seen that all available benefits from this move would accrue to the bank by continuing to charge the same effective interest rate (r_1) on its loans. Such an elimination of incremental compensating balances would allow the bank to loan funds previously frozen in the form of reserve requirements on incremental compensating balances. The result would be a drop in the marginal-cost curve from MC to MC^1, while the total amount of net funds demanded would remain constant at any given effective interest rate. If the bank continued to loan the same amount of funds, q_1, it would forego profits because the marginal revenue of the next loan would exceed the marginal cost. Therefore, a more likely approach would be for the bank to increase the quantity of funds loaned while at the same time eliminating the incremental compensating-balance requirements by lowering the effective interest rate (which is now the coupon rate) on its loans.

We have already mentioned that competing banks will tend to match a utilateral reduction in interest rates made by competitors. In this case, however, the reduction in the effective interest rate is disguised by the elimination of incremental compensating balances and the increase in the coupon rates. Many bankers tend not to understand the logic behind this move, as evidenced by the interviews conducted during our research. Therefore, retaliation will probably not come immediately as it would normally with outright price competition, but only after a considerable delay. Therefore, the relevant intersection for the individual bank is where the new marginal-cost curve (MC^1) intersects the straight marginal-revenue schedule (MR-MR^1), not the kinked marginal-revenue schedule. In the long run, after the competition has retaliated by eliminating compensating balances, there is no reason the individual bank should lose its new loan customers because

competitors could only profitably reduce their interest rates to r_2 (assuming similar cost structures). Hence, the pioneering bank will be left loaning more net funds, which will give it a larger share of the market.

The wisdom of eliminating incremental compensating balances for an individual bank will depend upon whether or not the increase in the quantity of funds loaned and the reduction in the effective cost to the bank of the funds loaned would be offset by the revenues foregone from lowering the effective interest rates. Graphically, the question is whether Area D plus Area B in Figure 3 exceeds Area A. Mathematically, the decision can be illustrated as follows:

$$\underset{(1)}{r_2(q_2-q_1)} + \underset{(2)}{\int_0^{q_1} (MC-MC^1)dq} - \underset{(3)}{\int_{q_1}^{q_2} MC^1 dq} \overset{?}{>} \underset{(4)}{(r_1-r_2)q_1}$$

where Term (1) is the equivalent of Areas B + C
Term (2) is the equivalent of Area D
Term (3) is the equivalent of Area C
Term (4) is the equivalent of Area A

If the left side of the equation exceeds the right side, the bank should consider eliminating incremental compensating balances.

There are three key competitive factors that affect this decision: (1) the elasticity of the demand schedule the individual bank faces, (2) the magnitude of the shift in the marginal cost curves, and (3) the time lag before competing banks retaliate. The first two factors determine the values of the expressions in the above equation. The above formula indicates the potential gains available from changing incremental compensating-balance policy. The third factor, the time lag, determines the degree to which the individual bank will capitalize on these potential gains. The importance of the time-lag factor is illustrated by the following Keynesian and Marshallian analyses, which consider the effects of eliminating incremental compensating balances on the economy and on the total banking system.

Keynesian analysis

The analysis to this point has provided an analytical framework for studying the behavior of an individual bank's profits and of its corporate customers' cost of bank debt, assuming that the individual bank eliminated incremental compensating balances and that the remainder of the banking system did not retaliate. By the elimination of incremental compensating balances, the individual bank would increase its market share and probably increase its profits. A Keynesian analysis expands the framework to allow the examination of the macro-effects upon the economy if the entire banking system eliminated incremental compensating balances.

Keynes postulated two types of demand for money. The first type, transactions demand (L_1), arises out of uncertainties associated with the receipt and disbursement of cash in the operations of a business. Transaction demand is a function of these uncertainties and of the firm's scale of operations; transaction demand is insensitive to the level of interest rates. The second type of demand is a speculative or asset demand (L_2). This demand arises from the portfolio preferences of economic units and is sensitive to interest rates, since these represent opportunity costs for holding speculative balances. As interest rates rise, the demand for speculative balances will decrease because of the relatively high opportunity cost.

In order to apply Keynesian analysis to the problem under investigation, the effect of incremental compensating balances on the firm's demand for money needs to be characterized by answering the following questions: What shape would this demand take? Is the magnitude of compensating balances greater during periods of high interest or low interest rates? In the bank interviews conducted during our research, it was confirmed that in times of high interest rates either the compensating-balance percentage is increased or the actual accounts are more carefully policed. This fact suggests that the demand for

compensating balances would be upward-sloping to the right. Even though compensating balance requirements are more strictly enforced at high interest rates, the demand for bank loans is lower during these periods and higher during periods of low interest rates. Bank borrowing is the base upon which compensating balances are determined, suggesting an opposite slope to that attributed solely to the stricter enforcement of compensating balances. These two factors tend to be offsetting, and in this analysis it will be assumed that compensating balances are interest inelastic. (In Figure 4 this demand is noted as ICB.)

The diagrams in Figure 4 illustrate the economy originally at a state of equilibrium with the interest rate at r_1, investment at I_1, savings at S_1, income at Y_1, and the money supply at M. If compensating balances were eliminated, the $L_1 + L_2$ + ICB curve would shift to the left, since the compensating-balance demand would no longer exist; it would become the $L_1 + L_2$ curve. Such a shift causes a disequilibrium in the economy, resulting in a readjustment process. In this process, the interest rates, investment, savings, and income will temporarily become r_2, I_2, S_2, and Y_2, respectively. However, these changes cause L_1 to shift to the right, giving an opposite movement to all of the above variables. The system will eventually reach a new equilibrium somewhere between r_1 and r_2, I_1 and I_2, S_1 and S_2, and Y_1 and Y_2, because the adjustment process is assumed to have a secondary effect on interest rates. It is unlikely that the new equilibrium will be at the old equilibrium; therefore, we see that elimination of incremental compensating balances results in lower interest rates and greater investment, savings, and income. This macro-analysis suggests that the corporation's cost of borrowing would be lowered; however, it would be lowered at the expense of the profitability of the banking system as a whole, as illustrated in the following analysis.

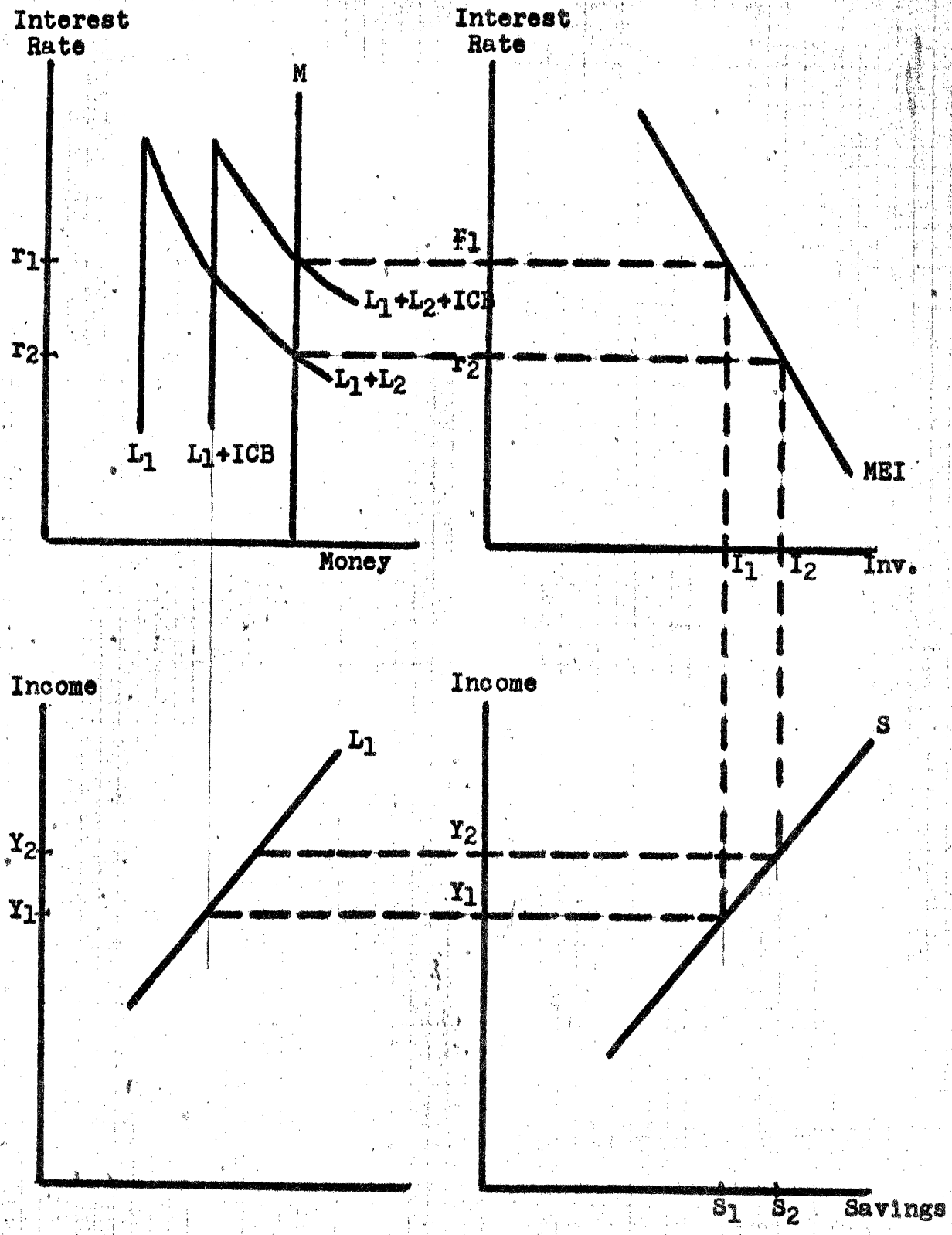


Fig. 4. Keynesian analysis.

Marshallian analysis

A Marshallian analysis is helpful in visualizing how the elimination of incremental compensating balances would affect the banking industry in the aggregate. Two different outcomes are possible, depicted by Cases 1 and 2 in Figure 5, depending upon the severity of the Federal Reserve's constraint on the money supply. The demand curves D-D represent the current demand for bank debt. The supply curves S-S are shown as becoming infinite at quantity q_1 because of the assumed limitation of the money supply imposed by the Federal Reserve (note: similar conclusions are reached if this assumption is relaxed). $\bar{S}$ is used in Figure 5 in order to dramatize the intersections which would occur had the Federal Reserve not constrained the money supply.

The quantity of loanable funds within the banking system and demanded by the public is denoted by q_1; these funds are loaned at an r_1 rate of interest prior to the shift of the demand curves. When the contrived demand for loanable funds (incremental compensating balances) is removed from the banking system, the demand schedules for loanable funds will shift downward. Greater policing of incremental compensating balances (before their elimination) during periods of high interest rates would tend to rotate the new demand curve clockwise with respect to the original demand curve. However, the demand for incremental compensating balances increased previously as the total quantity of loans demanded increased because of the fixed percentage relationship. Therefore, when incremental compensating balances are eliminated, this phenomenon will tend to offset the effect of varying degrees of policing. For illustration purposes, it is assumed that the two factors would be exactly offsetting, so the new demand curves D_1-D_1 are shown to be parallel to the original demand schedules. If the money supply is held constant by the Federal Reserve, these funds will be loaned at an r_2 rate of interest. If, as Case 1 represents, D_1-D_1 continues to intersect the supply curve in its vertical section, there

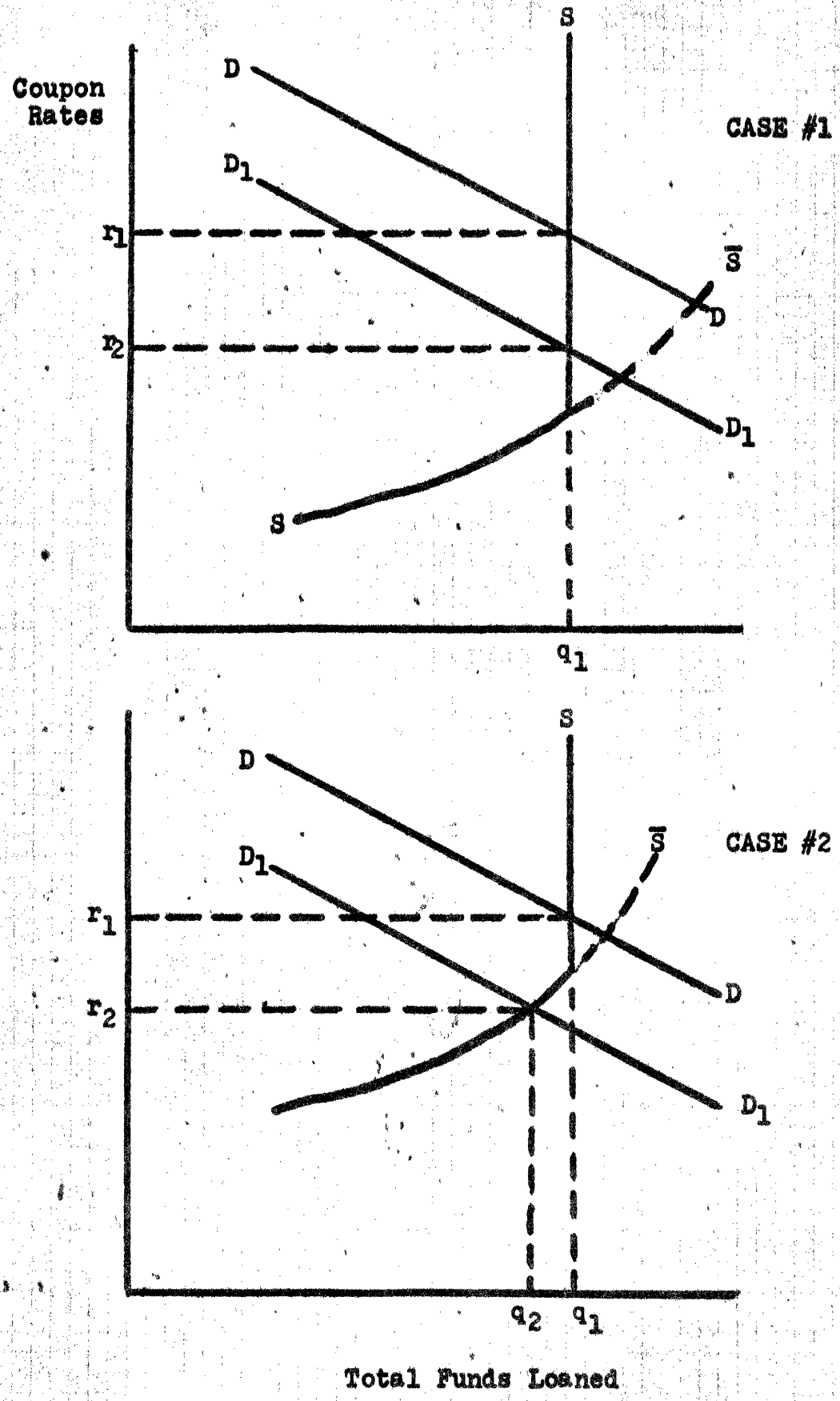


Fig. 5. Marshallian analysis.

will be no reduction in the quantity of loaned funds; it will remain at q_1. However, this quantity will be loaned at a lower rate of interest (r_2). On the other hand, if, as Case 2 represents, D_1-D_1 intersects the supply curve to the left of the vertical section, there will be a reduction in the quantity of loaned funds to q_2.

After the banking system abolishes incremental compensating balances, the demand curves D-D will, as previously stated, shift to D_1-D_1; r_1 will decline to r_2, and q_1 may or may not decline to q_2, depending upon which case occurs. In both cases r_2 is both the coupon rate and the effective interest rate of the loans because without the compensating-balance requirement the firms have the use of all q_2 in Case 2 and all of q_1 in Case 1; in other words, q_2=L in Case 2. Further, for Case 1, $r_2 . q_2 = IC_2$, and IC_2 is less than IC_1. It can be seen that the total revenues which the system as a whole will receive after the termination of incremental compensating balances will be less than it received when these balances were in effect.

It was pointed out in the Keynesian analysis that a reduction in r will cause increased investment, increased income, increased saving, and finally a secondary shift to the right of the transaction demand for money schedule (L_1) as the economy completes the cycle. This action will also result in a secondary shift to the right of the new demand schedule D_1-D_1 as more and more loanable funds are demanded from the banking system. As a result, in both of the above cases r_2 will rise; in Case 1 there will be no change in q_1; however, in Case 2, q_2 will increase, moving toward the old q_1. As when the demand schedule contracts, the magnitude of these shifts cannot be fully determined, since the magnitude of the shifts is a function of the use to which the firms put the incremental compensating balances after they are no longer required. If they are used to purchase time deposits (typically certificates of deposit), the supply schedule will shift upward slightly because of the increased cost of funds from this source to the banking system; in Case 2, such an occurence

will raise r_2 but decrease q_2 even further. Although r_2 would increase towards r_1, it would probably not reach r_1. This action will not alter the equilibrium in Case 1 as long as the relevant intersection is in the vertical portion of the supply curve; hence, the results of these counter shifts will depend upon which situation has occurred. In Case 1 there will be an equilibrium situation in which the banking system as a whole is loaning the same quantity of loanable funds (q_1) without incremental compensating balances as it was loaning when incremental compensating balances were required; further, it is loaning these funds at a lower coupon rate (and a lower effective interest rate to the firm) than it was when incremental compensating balances were required. In Case 2, there will be an equilibrium situation in which the banking system may be loaning a smaller quantity of loanable funds at a lower coupon rate (and a lower effective interest rate to the firm) than it was when incremental compensating balances were required. The net result is that the banking system will be loaning the available supply of loanable funds to more borrowers at a lower effective rate of interest than when incremental compensating balances were required. The yield to the banking system will be lowered because the funds are being loaned at a lower coupon rate as well as at a lower effective rate of interest.

The foregoing analysis assumes that the Federal Reserve will not change monetary policy in response to the elimination of incremental compensating balances; as a result, the supply of money will remain constant. These assumptions, however, may not hold if existing Federal Reserve objectives are thwarted by the downward pressure on interest rates. For example, if the economy were near or at full employment, lower interest rates would tend to generate undesirable expansionary pressures. The Federal Reserve might then be expected to reduce the supply of loanable funds by adjusting the money supply through open-market operations, which would reduce total bank loans

while increasing the interest rates. The reaction of the Federal Reserve would be similar if a reduction in the general interest-rate levels resulted in a greater flow of funds out of the country in order to seek higher returns. The reduction in loaned funds coupled with an increase in interest rates from the Federal Reserve's actions would further reduce total bank profits because the marginal revenue of the foregone loans would exceed their marginal cost. Therefore, the actions of the Federal Reserve are not likely to change the conclusions of the analysis.

VI. Conclusions and Recommendations

Our analytical model shows that in a corporate-loan agreement which includes a provision for incremental compensating balances, the interest cost to the firm as a percentage of usable funds obtained from the loan is greater than the yield to the bank on the total funds frozen by the loan; this spread is due to the reserve requirements on the incremental compensating balances held by the bank. The spread between the cost to the firm and the yield to the bank increases as the feedback on the loan increases. By eliminating the incremental compensating balance, a rate can be charged which lies between the effective yield to the bank and the effective cost to the firm; this rate will improve the present position of both the firm and the bank. The foregoing discussion remains valid as long as a single firm-bank relationship is under investigation. This micro-approach must be altered somewhat when a macro-view is taken.

If all banks eliminated the incremental compensating-balance provision from their loan agreements, the total demand for loans would decrease. A Keynesian interpretation says that the prevailing interest rates on corporate loans would also decrease. In addition, the cost of loanable funds for the banking system could increase if demand deposits previously held as incremental compensating balances are substituted in part with time deposits. The

decreasing revenues and increasing costs would result in lower aggregate profits for the banking system. With this in mind, one can be certain that the American Bankers Association will not voluntarily agree to end the practice of employing incremental compensating balances in its loan agreements.

An enterprising individual bank, however, might find the elimination of incremental compensating balances much to its advantage. This apparent contradiction results from the competitive advantage which would accrue to the single bank (i.e., the ability to loan at a lower effective rate vis-a-vis competing banks). This advantage would remain with the pioneering bank until such time as the competition follows with retaliatory policies, perhaps a lengthy period of time. By then, the pioneering bank should be able to expand its share of the market by vigorously promoting its new-product strategy.

The major obstacle the pioneering bank must overcome is the aversion which some corporations have to paying a coupon rate which is in excess of the prime. As our model shows, although the coupon rate would be higher, the effective interest rate to the firm would be lower, resulting in tangible cost savings. This argument should hopefully be sufficiently persuasive for any of the corporate treasurers, who have as a group become more sophisticated and cost conscious in recent years. The prime rate is undergoing its downfall anyway. The Wall Street Journal recently reported that "the concept of the prime rate, once the foundation for almost all business lending, has been so weakened and shaken by government pressure that it may never regain the full confidence of bankers and other lenders." 7/

If the bank can succeed in marketing its new pricing scheme, it will obtain a larger share of the corporate-loan market, and the market will probably shrink in total size if most banks follow with similar tactics.

7/ Edward P. Foldessy, "Death of the Prime?" The Wall Street Journal, Tuesday, March 20, 1973, p. 40.

The ultimate effect upon the pioneering bank is difficult to measure exactly because of the offsetting forces involved. The potential gains, however, seem large enough to merit further consideration.

Once again, relating this discussion in the area of loans to the hypotheses, the following conclusions can be reached:

HYPOTHESIS 1:

There is a strong possibility that action taken singly by an individual bank could increase its long-run profitability. The determination of this profitability would involve an analysis of the factors mentioned above. If action were taken by the entire system simultaneously, then the profitability for both the individual bank and the system as a whole would be reduced.

HYPOTHESIS 2:

The cost of bank borrowing to all firms in the system should decline after the elimination of incremental compensating balances. The effect upon a given firm will depend upon the relative bargaining positions of the firm and the bank before and after the elimination of incremental compensating balances.

HYPOTHESIS 3:

The profitability of lending operations for the entire banking system will decline when fees are substituted for incremental compensating balances as a means of compensation for loans.

RECOMMENDATION:

Individual banks should assess their current market environment in order to ascertain whether or not the elimination of incremental compensating balances would result in a more profitable long-range outlook for their bank.

VII. Areas for Further Investigation

More research needs to be done concerning the potential effects that the elimination of incremental compensating balances would have upon (1) Federal Reserve policy, (2) aggregate bank profits, and (3) the total-demand schedule for loans. Any bank would want a fair indication of how these factors would react before committing itself to the elimination of incremental compensating balances as a part of its loan agreements.

This study has restricted itself to the use of theoretical models and analysis; empirical research is needed in order to quantify the model and to suggest adoptions. In this regard, it would be beneficial to quantify and make estimates of the elasticity of demand for a typical bank in order to determine whether or not the elimination of incremental compensating-balance requirements offers sufficient potential to justify their termination.