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NATIONAL  
STOCK MARKET-TAKING  
SHAPE

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in Market Interest Rates  
Affect Bank Profits?

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## THE NATIONAL STOCK MARKET: TAKING SHAPE

*John J. Mulhern*

... Over the last five years, automation and reorganization have produced some basic changes in the U.S. stock market.

# BUSINESS REVIEW

**Federal Reserve Bank of Philadelphia**  
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Philadelphia, Pennsylvania 19106

## HOW DO CHANGES IN MARKET INTEREST RATES AFFECT BANK PROFITS?

*Mark J. Flannery*

... Banks use portfolio management techniques that shield them from the effects of swings in interest rates.

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# The National Stock Market: Taking Shape

*By John J. Mulhern\**

Five years ago, Congress passed a law—the Securities Acts Amendments of 1975—which directed the Securities and Exchange Commission, in part, “to facilitate the establishment of a national market system for securities.” The sense in which this market should be national was fairly clear: it should give market participants in one part of the country access to information about securities prices in any other part of the country and enable them to buy or sell at the best price available in any market. But what sort of system it should be was not spelled out in the law. Nor did the law indicate which part of the securities market—the market for equities, say, or for notes or bonds—should

be dealt with first. In the absence of detailed guidelines, most of the attention has focused on developing a nationwide system for that portion of the industry which deals in resale of corporate equity securities—the stock market.

The established markets, which include stock exchanges and networks of dealers, have responded by investing in equipment to make their operations more efficient and to improve intermarket communications. It seems clear now that the market will continue to evolve toward greater automation and less fragmentation—responding to changes in the financial environment and in available technology as well as to planning efforts in government and in the securities industry itself. But how much further it will go, and in what direction, may well depend heavily on how large the cost is and who is willing to pay it.

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## THE STOCK MARKET DEVELOPS

The stock market in the United States today actually is several markets. It includes traditional exchange trading floors in five leading cities, electronic trading networks, and broker-dealer firms that offer alternative facilities for stock trading.<sup>1</sup>

And it's a growing market. Since 1970, for example, yearly volume of shares traded on the New York Stock Exchange, which trades the lion's share of exchange-listed stocks, has grown from under three billion to over eight billion. (A listed stock is one for which an exchange has agreed to provide a marketplace.) Growth in trading volume of securities quoted on the National Association of Securities Dealers' automated quotation system (NASDAQ) also has risen sharply, about tripling since 1974 (see GROWTH IN OVER-THE-COUNTER MARKETS).

Another measure of growth is dollar volume of trading. In 1970, for example, the value of shares traded on the Big Board was a little more than \$100 billion; in 1979, that volume was up to nearly \$¼ trillion.

But growth brings challenges of its own. Larger aggregate volume can strain a market's ability to keep up with trading activity. In the late 1960s, for example, the market's inability to keep pace with a sharply higher number of trades produced a back-office paper glut. And recently one large brokerage firm has suffered a recurrence of this kind of backlogging. In a business where time is of the essence, a market's inability to process trades quickly and accurately can be devastating.

Aggregate volume growth is not the only source of strain. So is growth in the size of individual trades. Large blocks of stock may require special handling. Treating a large block as if it were a much smaller lot—

<sup>1</sup>In their brokerage role, firms handle public orders on an agency basis; as dealers, they buy and sell for their own accounts.

## GROWTH IN OVER-THE-COUNTER MARKETS

Trading off the organized exchanges has grown considerably in recent years. By the end of 1979, about 2,500 domestic common stocks were being quoted on the automated quotation system (NASDAQ) operated by the National Association of Securities Dealers, and NASDAQ share volume was up sharply from 2.8 billion in 1978 to 3.7 billion in 1979—or 45 percent as large as Big Board volume.\*

The large institutional investors, such as bank trust departments, mutual funds, and pension funds, began directing more of their orders to the OTC market in the late 1960s, partly because of the exchange brokers' fixed commission rates. Over-the-counter brokers offered their services for less. Many of the large institutions that now trade in OTC markets cannot be lured back by negotiated commission rates at the exchanges.

The NASD, which acts as self-regulator for the OTC marketplace, is approaching a membership level of 3,000 firms with nearly 7,000 branches. It grossed nearly \$34 million on a consolidated basis in 1979 and currently is engaged in a facilities upgrade which should help it handle a larger volume of orders at a higher speed, reduce unit cost, and compete more effectively for order flow.

\*National Association of Securities Dealers, Inc. 1979 Annual Report, p. 4.

advertising the whole block at something near the market offer price—may drive down the price of the stock, harming the financial positions of all holders. But breaking up the block into smaller lots may delay its sale. Thus the preferred course often is to find a buyer or buyers for the block without exposing its size and then to negotiate the price; but not every market has the depth to accommodate such large trades efficiently.

Further, as more shares are traded or

shares are traded in larger lots, demand for trading services attracts new people and new methods into the industry. The new markets that develop get a portion of customers' buy and sell orders in certain stocks, and, as a result, the flow of orders is fragmented—dispersed among market centers or networks. If the same stock were traded in its primary market—say the New York Stock Exchange—and on another exchange or over the counter, for example, some of the bids and offers would not come to the primary market (assuming no link of one market to the other) and so the efficiency of that market would be impaired. Buyers and sellers in either market might not be getting the price they would get if all orders were to come to the same market.

The exchanges and securities dealers, which have certain self-regulatory powers, have sought to deal with these growth-related difficulties by upgrading their hardware and procedures for handling share lots of different sizes and by exchanging price information. Evolution along these lines has been rapid. In fact, many initiatives might have been taken even without the 1975 Amendments, as market participants sought new ways to deal with changing conditions. But because of the public interest in the stock market, it is regulated also by government through the Securities and Exchange Commission, whose efforts have been devoted to encouraging interaction and competition among the several markets, in the hope that fragmentation will be reduced and that the industry will operate more cost-effectively on a national scale.

Most recently, for example, the Commission, which has the authority to override the rules of stock exchanges, issued its own Rule 19c-3, which sets aside exchange rules that kept member firms from trading certain listed stocks off board. The typical exchange has bound its members to trade listed stocks only on the exchange floor. If observed, a rule of this kind guarantees not only that the

listing exchange will provide a mostly unfragmented market for the listed stock, but also that the order flow will continue to generate economic opportunities for members and employees of the exchange. Under the new Rule, however, any stock not already being traded on an exchange as of April 26, 1979 can be traded off board by member firms as well as on the floor. The net effect of this Rule is to let member firms continue to trade newly listed stocks over the counter, if they wish, as well as on the exchange floor.

The SEC points out in its 19c-3 release that, "since the Rule will provide the securities industry with an opportunity to experience an environment involving competitive over-the-counter and exchange trading, it may be helpful in evaluating the effectiveness of current efforts to facilitate the development of a national market system." And it points especially to the steps toward automation that the industry already has taken and plans to take. Clearly, those steps are crucial to the development of a national market for stocks.

### LINKING THE MARKETS

Tying the several stock markets together into a national market is a matter of setting up mechanisms that will allow a participant in one market to gain access to the facilities of another market. Those facilities include order price and quantity information, order routing, execution, reporting, and clearing and settlement. The separate markets limit access to one another's facilities at present, but some links are in place, and more appear to be in the offing. And the feasibility of linking the markets increases as each becomes more completely automated internally.

**Consolidated Information.** The best known vehicle for providing market information probably is the NYSE ticker, which has provided showers of paper for so many lower Manhattan parades. But today's consolidated tape is a far cry from the old ticker. Just days after passage of the 1975 Amend-

ments, the Big Board inaugurated its full consolidated tape, which immediately prints all trades of its listed stocks on participating markets—these being the two exchanges in New York (Big Board and American) and the four regionals (Boston, Midwest, Pacific, and Philadelphia), along with the Cincinnati Stock Exchange, the National Association of Securities Dealers, and Instinet (Institutional Networks Corporation—a system tailored for institutional investors). Trades of stocks listed on other exchanges also are reported promptly and automatically, and over-the-counter transactions are reported through NASDAQ.

Information on the latest trade, however, is only one part of the picture. For trading purposes, the really vital information is in the quotes. The trader has to know at what prices a quantity of stock is being bid or offered. In the past, up-to-date bid and offer information would be available only from the local exchange specialist for listed stocks, and only for one exchange. In 1978, however, with the advent of the consolidated quotation service, bid and offer prices from the various registered exchanges were brought together for display on a single screen. The specialist or broker could look at this screen to see where the best price was to be had and, if the best price was in another market, he could communicate with that market. Since 1979, NASD over-the-counter quotes have been listed in the consolidated service along with the exchange quotes.

**Order Routing and Execution.** The reason for consolidating information is to make trading in other markets not only possible but as easy as possible. It's a way of reducing the information cost of getting the best trade. But some of that gain may be lost if market participants are not able to route their orders to the preferred market and get them executed efficiently.

At the exchanges, for example, incoming orders typically used to be routed from member firms' offices to their booths around

the trading floor, where floor brokers would pick them up and take them to trading posts to be matched. Maintaining several booths on the floor with personnel and equipment, as the larger firms did (and still do), was not cheap, however; and because of the cost to their members, exchanges have had to come up with more efficient routing systems.

At the New York Stock Exchange, the Designated Order Turnaround (DOT) system, inaugurated in 1976, allows a firm to transmit smaller routine orders directly to the specialist at his trading post on the floor, bypassing the floor booth (see MAKING MARKETS for the role of the specialist). Upon execution, the specialist sends confirmation of the trade back to the member firm office over the same data link that brought it in. DOT orders now participate in about 45 percent of all Big Board trades, and that percentage is expected to rise. At the American Stock Exchange, a similar but less comprehensive system—Post Execution Reporting (PER)—handles routing of market orders and odd lots (less than 100 shares). These routing systems represent a considerable saving in floor brokerage.

The NYSE and AMEX routing systems are just that—internal routing systems. The Philadelphia Stock Exchange and the Pacific Stock Exchange both use systems that not only route but also execute orders. The Philadelphia Automated Communication and Execution (PACE) system, which handles about 20 percent of Philadelphia's total equity share volume, automatically executes orders under 400 shares at the better of the prices available in Philadelphia and on the Big Board, and it does so without levying a floor brokerage fee or a specialist fee on any order. Although some market observers fear that regional automated execution systems may introduce a certain amount of fragmentation and keep some bids and offers from meeting, the users apparently find them to be highly cost-effective.

Just how attractive automated small-order

## MAKING MARKETS

A public shareholder would like to be sure that he can buy or sell shares whenever he wants to and at the best possible price. When no public buyer or seller appears on the other side, however, the market in a stock can evaporate, unless a market maker steps in to buy or sell for his own or his firm's account. At the exchanges, specialists and other registered market makers perform this function, as dealers do in over-the-counter markets; and some large brokerage houses have begun making their own markets in certain stocks.

At the NYSE, the specialist function is defined to include "effective execution of commission orders" and "maintenance, insofar as reasonably practicable, of a fair and orderly market on the Exchange" in assigned stocks (Rule 108). The market is considered fair if it is free of manipulative and deceptive practices and if it avoids giving any market participants undue advantages; it's considered orderly if trading prices are continuous (showing little or no change) from sale to sale and if large amounts of buying or selling interest can be accommodated without significant price changes.

In the course of going about his tasks, the specialist may act as an agent for other brokers or as a dealer for his own account; in fact, however, he acts as a dealer in only about a quarter of all trades. (There is some double counting here, since the specialist as dealer is handling the same stock twice—once as a buyer and once as a seller.) For the other three-quarters, the specialist is involved as an auctioneer—arranging bids and offers at the daily opening and otherwise bringing public orders together.

The specialist must meet the responsibilities and eligibility requirements outlined in the specialist job description (adopted by the Big Board in 1976) and must conform to a code of acceptable business practices. Based on the job description and the code, specialists are evaluated quarterly by the floor brokers they serve. The evaluation questionnaires provide the principal information used by the NYSE Allocation Committee, which assigns stocks to specialists and, when necessary, reassigns them.

There are now about 400 members performing the specialist function at the New York Stock Exchange.

routing and execution systems are to the providers of market services can be seen from the NASD's response to Rule 19c-3. The NASD supported adoption of the Rule, but it also embarked on an enhancement of its own trading facilities to make itself more competitive with exchanges as a market for 19c-3 securities. A new subsidiary, NASD Market Services, was formed to build a common message switch, which will link dealers with off-board market makers, as well as an order display capability and a mechanism for computer-assisted execution. Initial capitalization for this project has been set at \$2 million, according to the NASD's 1979 *Annual Report*.

For larger or more complex transactions,

however, human intervention still appears to be the order of the day.

**Intermarket Trades.** For the first several years after the 1975 Amendments were passed, the industry heard a great deal of discussion about what form the national market should take—whether it should build on then-current organizations or start over from scratch. But even while that discussion was going on, the exchanges were working at a trading system that would come on line in 1978 and help to reduce regional fragmentation. Extension of this system to NASDAQ subscribers and others now appears highly likely.

The Intermarket Trading System (ITS) provides brokers and market makers with an electronic link for transmitting buy or sell

orders from one exchange to another after seeing the bids and offers in all markets. So, for example, a floor broker at the NYSE who takes an order to a trading post can look at the ITS television monitor mounted over the post and see the last trade price, the local bid and offer spread, and the best prices available in all of the other markets. And if the price displayed on the Midwest or Pacific exchange, say, is better than the Big Board price, he can communicate across country and make a trade. Further, ITS trades require no extra clearing and settlement procedures. In short, ITS allows market centers to compete in certain stocks, regardless of location, by using a central computer to store bid and offer prices. Some centers are using ITS to improve their market share (see THE PHILADELPHIA EXCHANGE AND THE NATIONAL MARKET).

The value of ITS as a mechanism for increasing market share is recognized even by its arch rival, the Cincinnati Stock Exchange's National Securities Trading System. The NSTS is a prototype system designed to provide automated execution without fragmenting the market by exposing all quotes in the system to all market participants. Since 1978, it has permitted direct input from member firm offices as well as from exchange floors.

A few large brokerage firms in search of alternatives to maintaining costly exchange brokerage staffs, and several correspondent houses, have directed their order flow in certain issues to Cincinnati. But even with this support, the NSTS has not been able to capture very much of the business (about 200,000 shares a day compared to upwards of 40 million on the Big Board), mainly because it's so small and its offerings are so few. In an effort to beef up its volume in the short run, the NSTS is developing an automated link of its own to ITS. Whether this link will help the NSTS capture enough order flow eventually to replace ITS or whether it will lead to some as yet unthought

### THE PHILADELPHIA EXCHANGE AND THE NATIONAL MARKET

In April 1978, the Philadelphia Stock Exchange became the first of the regionals to link up with the Big Board via the Intermarket Trading System (ITS) for trading in certain NYSE-listed stocks. In the pilot phase, 11 stocks were eligible for ITS; by the end of 1979, nearly 700 were eligible.

Measured by prints on the consolidated tape, which includes all transactions in NYSE-listed stocks on participating markets, the Philadelphia Stock Exchange continued its strong showing in 1979, increasing its share to over 2 ¾ percent of total trades. Consolidated tape volume was up also—to over 160 million shares, or nearly 1 ¾ percent of shares traded. While the Philadelphia Automated Communication and Execution (PACE) system doubtless contributed to share volume growth (from about 130 million in 1978 to 173 million in 1979), ITS also surely played a part in this growth.

Expecting further increases in equity share volume as well as on its burgeoning options floor, which provides a primary market for contracts in energy options and selected other interests, the Philadelphia Stock Exchange is anticipating a move into new and larger quarters in 1981.

of accommodation, however, is a question that will be answered only in the longer term.

Thus the stock markets appear well on the way toward achieving the goal of providing access to best available execution nationwide, regardless of where the market participant happens to be. But that may be only the beginning of the development. And it is not easy to predict what will happen as the market reacts to Rule 19c-3. Will the effect of invoking the Rule in this new systems-oriented environment be a net benefit to all investors or just to some? What will be the effect on exchanges, or on brokerage firms?



Will the smaller members of the NASD be able to compete with the giant market making brokers?

So far, little research has been done to determine who will benefit and who will pay under the emerging national market scenario. But even without a lot of empirical research, it seems possible to identify where the benefits and costs are likely to be found, and perhaps to indicate how they should be related.

### WHAT ARE THE COSTS?

In stating that the securities markets are a national asset, the 1975 Amendments recognize that the benefits of these markets extend far beyond those who own stocks directly or are engaged directly in trading them. The costs of maintaining markets also spread beyond this circle. And these costs will be redistributed by changes in the market system. Although it may not be possible at this point to estimate the size of the cost changes under different national market scenarios, the first step in such an effort would be to identify where they might be found.

**Functional Costs.** The costs of handling trades are the most visible costs on a narrow view of the industry. These costs fall first on those who operate the markets as a business—the exchanges, the over-the-counter groups, and others who provide facilities for trading. But they are passed through to brokers and to the investors who use their services.

At a typical exchange, these costs include salaries and benefits, equipment for handling stock trades, professional services, depreciation of capital items, and a variety of other expenses. They are passed through in the form of commission charges and a range of fees for communications services, registration, application, membership, and the like. In 1979, such charges amounted to roughly one-half of the NYSE's total pretax revenue, or about \$53 million, according to its *Annual Report*. The NASD has a similar list of expenses and revenues.

Member firms and brokers who must pay these charges naturally want to be sure that they are getting their money's worth and that they could not do better at another exchange or with a different market structure. And they are under pressure from the ultimate consumers of their services—the public investors—who want to get the lowest price they can for trading services.

In order to keep overall costs down, the exchanges and the over-the-counter markets must control unit costs. Further automation and reorganization appear to offer ways of controlling these costs. But further automation and reorganization won't be cheap. The NYSE, for instance, is engaged right now in a multi-million-dollar facilities upgrade, roughly half of which is for automation or automation-related improvements. The pay-off is expected to be large—the ability to handle three times current daily volume without skipping a beat. But whether the order flow to the NYSE will reach this level will depend in part upon just how cost-effective the upgraded trading system turns out to be with respect to the alternatives.

**Less Obvious Costs.** Beyond trading costs lie the costs to U.S. industry and to the economy at large. These include the fees paid by listing corporations and other costs of maintaining a market for raising investment capital.

A company that wants to have its stock listed on the NYSE, for example, not only must meet certain standards for earning power, net tangible assets, and market value of publicly held shares, but also must pay a listing fee. In 1979, listing fees amounted to about \$35 million in cost to listing firms and in revenue to the New York Stock Exchange. Listing firms must ask themselves whether an exchange listing—which tends to increase institutional interest and aid capital raising in the primary market—is a cost-effective method of making their securities available for trading after the initial offering, again with respect to the alternatives. Rule 19c-3

could make listing less attractive to some corporate equity issuers, but that outcome is far from certain.

Changes in market organization could impose costs also upon industries and firms that provide support to the current markets or have close working relations with them—suppliers of goods and services, for example. Along with the exchanges and dealers, these associated industries and firms employ thousands of people and considerable assets of other kinds. Even where these assets are reemployable, the cost of adjustment could be important to decisionmakers.

And finally there is the public interest in maintaining healthy capital markets. The health of the capital markets is a prerequisite to productivity gains for U.S. industry and to growth for the economy at large; without infusions of capital, productivity gains will not be realized. The question for the public and for government, then, is what market arrangements will be most likely to keep capital flowing to its most efficient industrial users.

All in all, discussion of the national market system has featured comparatively little hard data on costs other than estimates of the capital costs for hardware and programming. But the costs to the investing community and to the economy at large also matter. And the SEC's 19c-3 monitoring program, which will measure the impact of competitive market making on market quality (width of bid-ask spreads, depth, and continuity), quality of execution, and market structure, should give some feel for how costs could be affected.<sup>2</sup>

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<sup>2</sup>The amount by which the bid price differs from the offer price is the quotation spread. NYSE spreads have narrowed over the last ten years: about a quarter of all spreads were of the minimum possible magnitude (¼ point or 12½¢) in 1979, roughly double the percentage at the beginning of the decade; about three-quarters had spreads of ¼ point or less. Some observers believe that increased competitive market making will narrow average spreads still further.

A market's depth is its ability to accommodate buying

and selling interest without significant price changes. Its continuity is its property of keeping prices relatively constant from trade to trade. Depth can be measured as price change per number of shares traded, continuity as price change per number of trades.

**Continued Growth.** Clearly, the registered exchanges and the NASD, along with the large broker-dealer firms that make their own markets, are behaving as if they believe that the equity business is a growth business. One sign of this belief is the amount they spend on servicing the automated components of the ITS through the Securities Industry Automation Corporation (SIAC)—a subsidiary of the NYSE and the AMEX. Since 1973, SIAC annual revenues have nearly doubled, finishing 1979 at about \$70 million, over half of which goes for exchange trading and clearing services.

The kind of growth that market participants expect and plan for is evolutionary. Each major group has a multi-year development plan which fits automation and organizational changes into financial and other operating constraints. The Big Board, for example, had SIAC develop a five-year automation plan for the period 1977-81. SIAC undertook a similar effort for the AMEX in 1978. The exchanges and the NASD would not be willing to plan and execute major automation efforts without the prospect of economic benefits to their members. Growth can be expected to continue only on lines

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and selling interest without significant price changes. Its continuity is its property of keeping prices relatively constant from trade to trade. Depth can be measured as price change per number of shares traded, continuity as price change per number of trades.

Execution quality is a matter of pricing: best execution is execution at the best price available in the market. The SEC plans to monitor execution by comparing prices at which agency orders are executed to the quoted market at the time of execution.

Market structure is determined by the number of competitors in a market and the distribution of volume among them.

which are perceived to promise economic benefits to those concerned.

Thus, because of the complexity and long-term nature of the industry decisionmaking process, and because of the way it institutionalizes cost considerations, further development of the national market system is almost certain to be consistent with developments to date. And the SEC can concur in that growth as long as the industry remains adequately competitive and provides the requisite services to its many publics.

### SHAPING UP

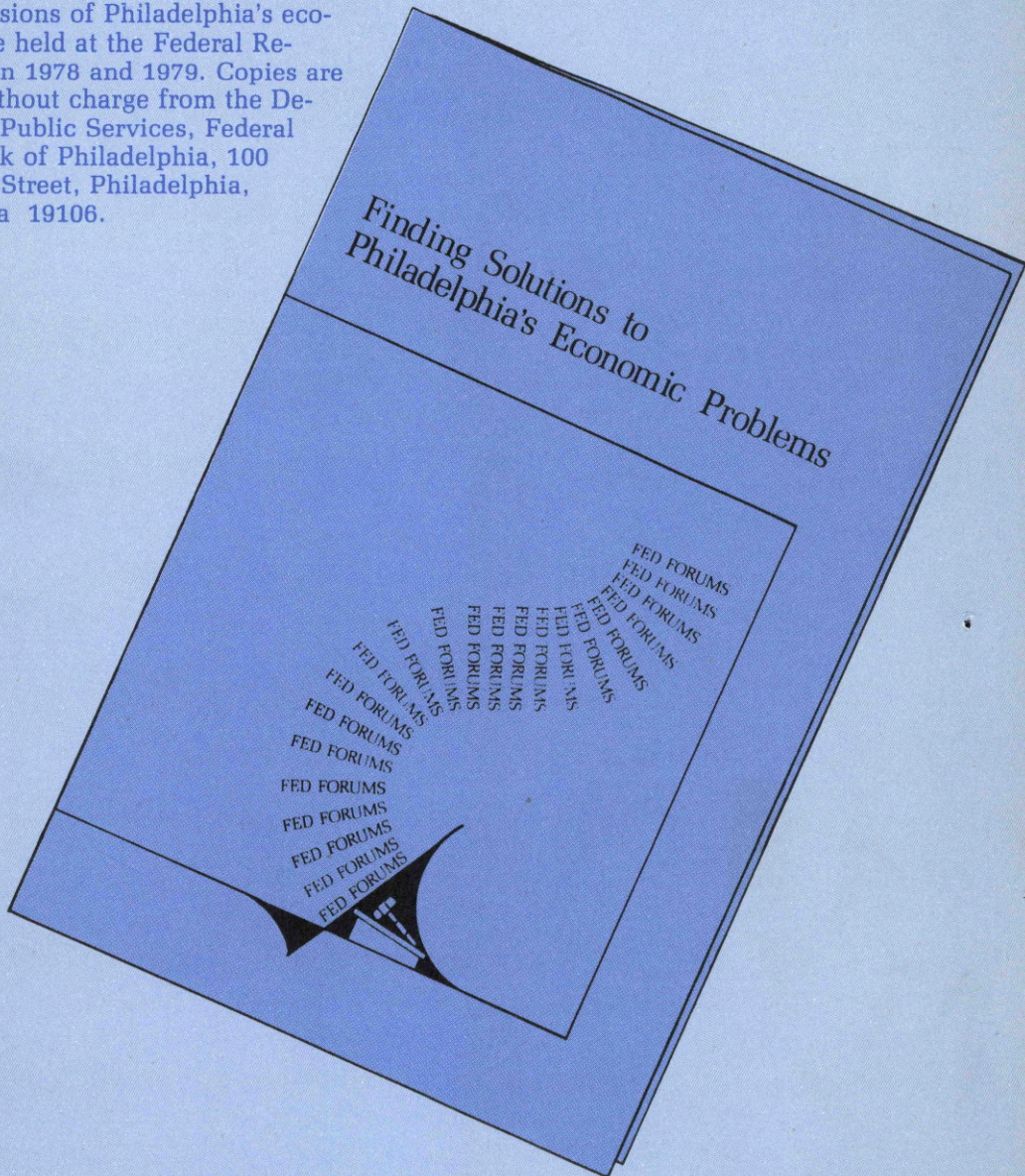
The years since the national market legislation have witnessed remarkable developments in the securities industry. In the stock market alone, the exchanges, dealers, and brokerage houses have moved decisively into a new era of information-driven restructuring—finding more cost-effective

methods for meeting the capital requirements of industry and the investing preferences of the public. The several market centers and networks are linked more closely than ever before, better able both to cooperate and to compete for portions of the trading business.

Has the national market system arrived? As yet, probably not. But the shape that it will take on, in the near term at least, is becoming clearer each day—a system that links established markets rather than an utterly new kind of market. Further technical and regulatory developments that will unbind stock trading from geographical and institutional restrictions appear to be just around the corner. All the players will have their eyes on the data produced by the SEC's 19c-3 monitoring efforts. But before they plan any new moves, they'll be taking a long look at their own cost and revenue projections.

# From the Philadelphia Fed . . .

This booklet contains summaries of four panel discussions of Philadelphia's economic future held at the Federal Reserve Bank in 1978 and 1979. Copies are available without charge from the Department of Public Services, Federal Reserve Bank of Philadelphia, 100 North Sixth Street, Philadelphia, Pennsylvania 19106.



# How Do Changes in Market Interest Rates Affect Bank Profits?

*By Mark J. Flannery\**

In the past year, interest rates in the United States have been both unusually high and unusually variable. The prime loan rate, for example, stood at 15 percent in early 1980, increased to a peak of 20 percent in April, then plummeted to 11 percent by August. Other short-term rates exhibited a similar pattern. As is often the case, however, bank loan rates have received more popular attention than other rates, and many people believe that the banking sector was making unreasonably high profits from these higher loan rates.

For many bankers and bank regulators, though, high and rising market rates do not necessarily imply record profits. These observers recognize that greater bank interest

revenues are at least partly offset by the higher interest costs banks must pay for their deposits and other liabilities. If market rates drive up bank costs more rapidly than loan revenues, bank profits will fall. In the extreme, widespread bank losses could destabilize the financial sector, or so the story goes.

With bank costs and revenues both responding to increases in market rates, the net effect on bank profits is hard to predict. A recent Philadelphia Fed study concludes, however, that most banks employ portfolio management techniques that insulate their earnings from the effects of high and volatile market rates. Banks do not reap windfalls, nor are they in danger of failing, when market rates change.

## **INTEREST RATES AND PROFITS: A DUAL IMPACT**

When interest rates rise, because of Fed policy actions or other forces, bank portfolio

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managers can expect changes on both the asset and liability sides of their balance sheets.<sup>1</sup> Bank revenues and costs will adjust to reflect the new level of market rates at different speeds, depending on each bank's collection of assets and liabilities. Rearranging the portfolio to make the most of new market circumstances also may take longer at one bank than at another.

**The Asset Side.** Market rates affect bank revenues in two distinct ways. First, an increase in market rates raises the amount of income a bank can earn on new assets it acquires. If a bank were 100-percent invested in overnight loans and securities, for example, its average revenues would change every day to reflect current market interest rates. Of course, no bank holds such an asset portfolio. Assets mature over time and are liquidated, with the proceeds only gradually being reinvested at the new higher interest rates. All earning assets eventually will roll over into securities bearing the new higher rate, but the time involved will vary across banks.

For each bank, the speed with which revenues adjust to new market conditions depends on how long it takes for the average asset's interest rate to adjust to current market rates. The adjustment may occur either when the asset matures (an old loan is repaid and a new one bearing the current market rate is issued) or when a variable-rate clause causes the contract rate to change.<sup>2</sup> Many bank loans, especially loans to business, carry an interest rate that can change before the loan must be fully repaid. Some banks

also issue variable-rate mortgages, for example. The mortgage loan may run 30 years before it is fully repaid, but the interest rate is adjusted, say, every six months to bring it more nearly into line with current market rates. For purposes of judging its impact on revenues, this mortgage should be considered a six-month asset.

The second way market rates affect bank revenues is through their impact on the bank's decisions about which loans and securities to purchase and how much to hold in cash reserves. Some loan customers may find it more difficult to borrow in the open market when rates are high. This difficulty might cause them to bid up bank loan rates even more than, say, the Treasury bill rate increases. If so, banks could earn more profit from making loans than from buying marketable securities, and revenues would fluctuate as the asset portfolio is reshuffled. Likewise, a bank's holdings of cash reserves and other nonearning assets should decrease when the return on earning assets rises. Total bank revenue therefore will rise more than in proportion to the market rate if nonearning assets come to occupy a smaller percentage of the portfolio.

Thus after a permanent increase in market rates, a bank's average return on assets rises. The extent of the adjustment and the time period involved depend on the portfolio's structure at the time and the behavior of loan customers in response to higher rates.

**The Liability Side.** In a similar way, the impact of market rate changes on bank costs depends on the average maturity and composition of the liability portfolio. Negotiable certificates of deposit, Federal funds borrowed, and subordinated debentures (long-term borrowings secured by a bank's general credit and subordinated to deposits) all have well defined interest costs and maturities. For other (primarily retail) deposit types, the picture is more complicated.

Some liability maturities are poorly defined. What is the maturity of a demand deposit

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<sup>1</sup>Exactly the same principles apply to rate decreases.

<sup>2</sup>Strictly speaking, the asset's maturity is an inappropriate measure since it ignores cash flows prior to the repayment of principal. G. O. Bierwag, "Immunization, Duration, and the Term Structure of Interest Rates," *Journal of Financial and Quantitative Analysis* 12 (1977), pp. 725-742, explains why duration is a better measure of a security's response to interest rate changes. Maturity is used here for simplicity.

(checking) account? Of a passbook savings account? Some would argue that these are very short-term liabilities: demand deposit balances can be withdrawn without notice, and savings account balances are de facto (if not de jure) payable on demand. But every banker is familiar with the notion of core deposits—balances that will remain with the bank for long periods of time almost irrespective of market conditions. Are demand and passbook balances zero-maturity or infinite-maturity liabilities? This issue is extremely important in assessing a bank's exposure to interest rate risk. (Account balances with ill defined maturities made up 59 percent of all insured commercial bank deposits and 45 percent of total assets in May 1980.)<sup>3</sup>

Another complication arises because a bank's true cost for some deposit types exceeds the explicit interest payments made to depositors. Federal bank regulators have prohibited the payment of any interest on demand deposits since 1933. In addition, Regulation Q limits the maximum rate payable on time and savings accounts,<sup>4</sup> and these rates have been below their competitive level for a number of years. This situation creates an incentive for banks and thrift institutions to compete with one another by offering implicit interest payments (free checking, for example, or toasters, or Snoopy dolls) to attract and keep deposits. Bankers also try to attract funds by making it cheaper for people to do business with them—building new branches, extending business hours, and paying bank-by-mail postage—so that it becomes easier to hold savings in the form of bank deposits than in other available in-

struments. When market rates rise, bankers heat up their implicit interest competition for these regulated accounts, incurring additional expenses in the process. The true cost of funding a bank's asset portfolio therefore includes both interest and noninterest expenses.<sup>5</sup>

Aside from these complications, the response of bank costs to a market rate change is analogous to developments on the asset side of the balance sheet. Liability costs eventually will follow market rates with the speed of adjustment depending on the bank's initial liability portfolio composition and the nature of its depositors.

**The Net Effect.** A stylized example can best describe the net effect of market rate changes on bank costs versus revenues. Suppose that the market rate of interest has been fixed at 9 percent for as long as anyone can remember, then suddenly and permanently rises to 10 percent.<sup>6</sup> Bank costs and revenues both begin to rise almost immediately, with their relative responses determining the impact on bank profits (Figure 1 overleaf). Whether profits go up or down depends largely on the average maturity of bank liabilities and assets.<sup>7</sup>

A perfectly balanced asset/liability position would leave the intermediary's profit

<sup>3</sup>Note that the effective maturity of demand or savings balances need not be constant across individual banks.

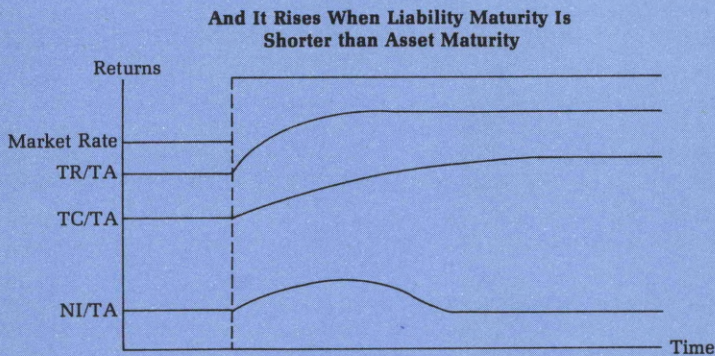
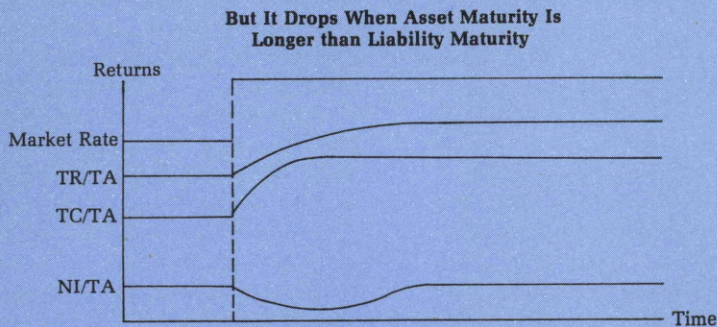
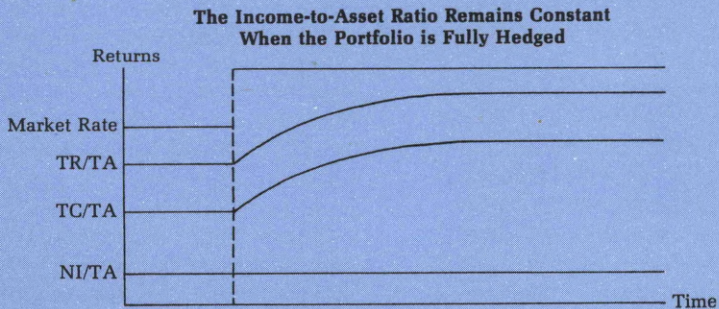
<sup>4</sup>The Monetary Control Act of 1980 requires that Regulation Q ceilings be phased out by 1986. As this occurs, bankers will most likely reduce their noninterest expenses and compensate depositors more directly via explicit interest.

<sup>5</sup>For more detailed discussion of this phenomenon as it has applied to Massachusetts and Connecticut, see Robert A. Taggart and Geoffrey Woglom, "Savings Bank Reactions to Rate Ceilings and Rising Market Rates," *New England Economic Review*, September/October 1978, pp. 17-31; and Michael A. Klein, "The Implicit Deposit Rate Concept: Issues and Applications," *Economic Review*, Federal Reserve Bank of Richmond, September/October 1978, pp. 3-12.

<sup>6</sup>It is unlikely, of course, that the market rate will remain unchanged for very long. One should think of this example as describing a permanent change in average rates: instead of fluctuating around an average level of 9 percent, they fluctuate around an average of 10 percent.

<sup>7</sup>Bankers sometimes refer to a funding gap, by which they mean the difference between average asset and liability maturities.

### FIGURE 1 THE EFFECT OF A MARKET INTEREST RATE INCREASE ON BANK PORTFOLIO PERFORMANCE DEPENDS ON THE ASSET/LIABILITY BALANCE\*



\*TR/TA is the ratio of total revenues to total assets; TC/TA is the ratio of total costs to total assets; NI/TA is the ratio of net income to total assets.



stream unaffected by market interest rate changes. This balance can be achieved only if each asset is financed by a liability of similar maturity. Market rate changes then affect revenues and costs equally promptly or slowly.

Whether a bank finds this so-called hedged position desirable depends on its expectations about future interest rate movements and the shareholders' willingness to accept risk. Suppose a bank portfolio manager expects interest rates to rise and wishes to profit to the fullest possible extent based on that development. Then the bank should issue liabilities with an average maturity exceeding its average asset maturity. If rates do rise, interest costs will rise more slowly than revenues (because liability rates are locked in) and the bank will earn a handsome profit until its cheap liabilities must be rolled over. Of course, if interest rates fall (contrary to expectation), asset returns would decline more promptly than liability costs and the bank would show poor earnings. This is the risk of an unbalanced asset/liability position. An unbalanced portfolio offers more opportunity for profit, but, like a wager, also offers the prospect of loss.

Many people (including many bank regulators) feel that the nature of banking in the real world requires these institutions to borrow short and lend long—to structure their portfolios so that the average maturity of their assets exceeds the average maturity of their liabilities. But such an asset/liability imbalance is most appropriate for a bank that expects market rates to *fall*. If banks cannot avoid holding this sort of unbalanced portfolio, a sharp market rate increase may threaten their viability.

Market rate changes, then, can have two separate effects on bank profits. The immediate or short-run effect reflects primarily the relative maturities of the asset and liability portfolios. After all assets and liabilities have matured, a second effect may emerge: the higher market rate may induce permanent

portfolio revisions that can raise or lower bank income.

### THE EMPIRICAL EVIDENCE

Some evidence on how banks have been structuring their asset and liability portfolios can be obtained by examining the past relation of bank profits to market rates. Individual banks regularly report their revenues, costs, and profits to the Federal banking agencies. Their records provide annual information on a sample of 75 United States banks (in six size categories) for the period 1961-78.

Interest rate data also are readily available, but accurately summarizing the historical pattern of market rates can be difficult. Consider the first half of 1980: the average Treasury bill rate was 11.5 percent for the period as a whole, but it varied from 11.7 percent in early January to 15.5 percent in late March, finally falling to 7.4 percent at the end of June. This was surely an unusual period for interest rates, but it serves to illustrate two distinct components of market rate behavior—the *average level* over a time period (for example, the six-month average for January through June 1980) and the *variability* of rates within each time period.<sup>8</sup> These two components cannot perfectly capture the full richness of each period's market rate environment, but they go a long way toward that goal.

Analyzing the historical experience of 75 banks yields several important conclusions. One may come as a surprise to many bankers and regulators: the variability of market interest rates within a year has virtually no impact on commercial bank profits. While the market rate's average *level* prominently influences bank revenues and costs, fluctuations around that average are unimportant.

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<sup>8</sup>Variability can be measured by the range of rates observed (highest minus lowest) or the standard deviation of weekly rates around the period's average.

**The Short Run: Are Banks Well Balanced?**

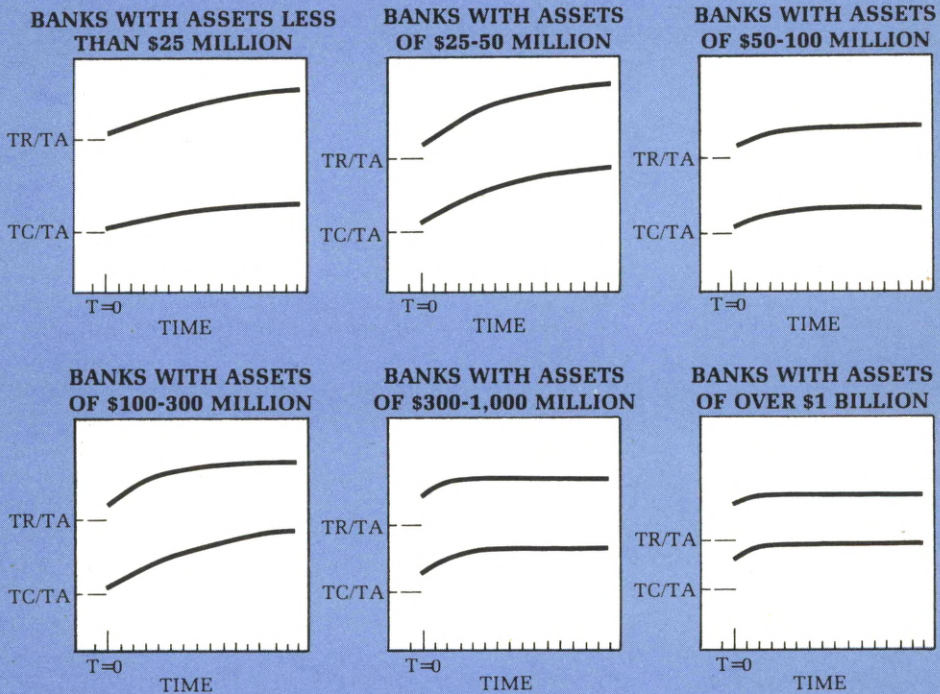
A market rate change endangers bank profitability only if asset and liability returns adjust at significantly different speeds. Then an interest rate change can cause sharp profit fluctuations and, if rates change contrary to the bank's expectations, perhaps even insolvency.

The historical relations between market interest rates and each bank's revenue, costs, and profits were determined statistically. Using these estimated relations, the impact

of a hypothetical permanent 100-basis-point increase in all market rates was calculated for each bank.<sup>9</sup> (A permanent rate change of this magnitude would be large by historical standards, though temporary interest rate fluctuations within a year routinely exceed 100 basis points.) Bank responses in each size class were then averaged (Figure 2). The

<sup>9</sup>A basis point is one-hundredth of a percentage point. Reactions to larger or smaller market rate changes would be proportional to those in Figures 2, 3, and 4.

**FIGURE 2**  
**AT MOST BANKS, ASSET RETURNS AND LIABILITY COSTS RESPOND ABOUT EQUALLY QUICKLY TO MARKET RATE CHANGES\***



\*Bank classification based on 1978 asset position.

evidence shows that different sized banks respond at different speeds to market rate changes. In particular, larger banks' revenue and costs adjust more quickly than smaller banks', because larger banks tend to deal with larger, more interest-sensitive customers.

Within each individual bank, of course, the relative adjustments of revenues and costs determine the net impact on profitability. Judging from the ratios of total revenues to total assets and total costs to total assets, asset returns respond more promptly than liability costs to market rate changes at smaller banks, suggesting that asset maturities are shorter on average than liability maturities. The same is true at larger banks, though the difference between average asset and liability maturities is not so great. Banks with assets above \$300 million appear to

have balanced their effective asset and liability maturities quite closely so that revenues and costs are about equally affected by a rate increase. The smaller banks (those below \$100 million) seem to enjoy significantly increased profitability following a market rate increase, while larger banks' revenues and costs adjust at approximately equal speed—leaving no great effect on profit even in the short run. At least over the first 15 years following a market rate increase, no class of banks is in danger of failing from adverse market effects.

**The Long Run: Are High Rates Good for Banks?** Figure 3 provides information on the cumulative effect of all these adjustments: what is the final impact on revenues, costs, and profits when the market rate of interest rises permanently by 100 basis points? From the first two columns of Figure 3 it is clear

**FIGURE 3**

**THE LONG-RUN IMPACT ON BANK REVENUES AND COSTS OF A ONE-PERCENTAGE-POINT INCREASE IN MARKET RATES IS GREATER AT SMALLER BANKS**

Bank Size Class (millions of dollars)	TR/TA	TC/TA	Difference
< 25	1.36	.558	.802
25 - 50	1.35	.812	.538
50 - 100	1.64	1.217	.423
100 - 300	1.26	1.229	.031
300 - 1,000	.938	1.013	-.075
> 1,000	.852	.900	-.048

that banks below \$300 million (approximately 97 percent of all banks in the United States, holding 33 percent of all bank assets) enjoy a permanent increase in their pretax interest income when market rates rise. Equally clearly, the magnitude of this effect is smaller the larger the bank: banks under \$25 million enjoy a .802-percentage point increase (1.36 - .558) in their net earnings margin while banks between \$100 million and \$300 million gain only .031 of a percentage point. For banks with assets above \$300 million, market rate increases induce a slight decline in operating margin because costs eventually rise by more than revenues. Differences in the largest three bank classes are small (in a

statistical sense), however, and should not be accorded great significance.

Figure 4 shows the change in net income associated with a permanent 100-basis-point increase in market rates. (Net income is revenues less costs, adjusted for taxes, capital gains or losses on securities sold, and other extraordinary income items.) As an example of how to read this Figure, consider the banks smaller than \$25 million. The permanent market rate increase ultimately raises net income as a percentage of total assets by a tenth of a percent. The size of this effect should be judged by comparing the tenth of a percent with the actual ratio of net income to total assets, which in this case is

**FIGURE 4**

**A ONE-PERCENTAGE-POINT INCREASE IN MARKET RATES  
SLIGHTLY RAISES LONG-RUN BANK PROFITS\***

Bank Size Class (millions of dollars)	1978 Value of NI/TA	Change in NI/TA
< 25	1.264	.1005
25 - 50	.983	.120
50 - 100	1.042	.0781
100 - 300	.972	.0238
300 - 1,000	.870	.0724
>1,000	.572	.0330

\*The change in NI/TA (the ratio of net income to total assets) indicated for each size class is the average value from a number of banks in the sample. For each individual bank a test can be performed to determine whether the indicated change in NI/TA is statistically important. Among the 75 sample banks, 24 showed significant (at the five-percent level) permanent changes in NI/TA when market rates changed. Of these 24 banks, only two manifest lower earnings at higher market rates. In the total sample of 75 commercial banks, therefore, only two have been shown to suffer significant declines in NI/TA when market rates increase.

1.264 percent. All six bank classes enjoy greater net income at higher market rates, though the increases are not particularly large.<sup>10</sup> Overall, the available evidence indicates that changes in market interest rates have a relatively small impact on the average bank's reported profits.<sup>11</sup>

The historical period covered by this study ended with 1978. Since then, retail banking has changed drastically on account of money market certificates, and even more regulatory changes are pending in the wake of the Monetary Control Act of 1980. Policy recommendations therefore follow from this study only if its historical results can be expected to persist into the future. Lacking a crystal ball, no definitive response can be given to this concern, but some evidence is available from evaluating the impact of a large previous change in banking practices.

Observers often argue that institutional changes in the early 1970s changed the nature of banking, at least among large money market institutions. In mid-1970, interest rate ceilings were eliminated for large certificates of deposit (\$100,000 or more) with a maturity less than 90 days. Shortly

after that, large money center banks introduced a floating prime rate tied to market interest rates. These two developments potentially set the stage for much quicker bank responses to market rate fluctuations than had occurred during the 1960s.

Statistical tests were conducted to determine if the 15 largest sample banks exhibited significantly different interest rate effects during the latter half of the period (1970-78) than they had during the former half (1961-69).<sup>12</sup> The answer is No. While market rate fluctuations were larger during the 1970s, large banks responded to rate changes with about the same speed as they had in the 1960s. Floating prime loans and unregulated deposit rates undoubtedly induced important portfolio adjustments at large banks, but these insured that bank profits remained relatively insensitive to market rate fluctuations. It can be expected that corresponding adjustments will occur in retail banking practices in response to the regulatory developments of the 1980s.

## CONCLUSION

The historical experience of 75 United States commercial banks indicates that, on the whole, bank profits are not very responsive to the level of market interest rates. When market rates change, the responses of bank revenues and costs approximately cancel one another, leaving the level of commercial bank profits only slightly sensitive to market rates in most cases. The popular conception that the banking industry reaps unreasonably large profits during tight money times thus is not supported by the evidence.

For identical reasons, the regulatory fear that sharp rate increases threaten the commercial banking system's viability also should

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<sup>10</sup>In the fourth quarter of 1979 and the first quarter of 1980, some large United States banks reported sharp profit increases, attributing them to the effects of high market rates on asset/liability balances. Upon closer inspection of balance sheets and income statements, however, the bank profit margins emerged as approximately unchanged from periods of lower interest rates. (Salomon Brothers' "Quarterly Banking Review" reports the average net interest margin for 37 large U.S. banks declined only 25 basis points—less than 10 percent—between the first quarter of 1979 and the first quarter of 1980.) The reported large changes in net profits derived more from overall asset growth than from changing profit margins.

<sup>11</sup>This evidence implies nothing categorical about the impact of higher market rates on the market value of bank stock. As a technical matter, however, bank stock prices *must decline* when rates rise *unless* net income also rises. The evidence in Figure 4 thus allows for the possibility that bank stock values rise, fall, or remain unchanged when market rates rise.

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<sup>12</sup>Specifically, a Chow test was performed for the revenue, cost, and income equations of each bank. Only one of the 15 banks manifested significant structural shifts between the two historical periods.

be questioned. Seriously unbalanced asset/liability portfolios are not a pandemic feature of commercial banking in the United States. Thus relatively large market rate fluctuations can be tolerated if these prove necessary to attaining monetary policy goals such as full employment and price stability. (Another way to say this is that the banks' ability to weather the past year's market gyrations reflects their well-hedged balance sheets.)

This conclusion does not imply that regulators should ignore individual bank exposure to interest rate risks. An excessively un-

balanced asset/liability portfolio threatens bank stability just as much as undue loan concentration, excessive reliance on bought money, or low capitalization. Individual banks certainly can choose asset/liability portfolios that leave them exposed to interest rate risks; several recent examples come readily to mind. But most banks can avoid such risks if they choose. While selected banks may be threatened by sharp market rate changes, the banking industry as a whole is not.

### SUGGESTED READINGS

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