THE FED'S MANDATE: HELP OR HINDRANCE?

Address by

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It's a genuine pleasure to be with you today. to discuss a few of the major problems that are confronting us at present in, the conduct of monetary policy. I'm well aware that a discussion of a contentious topic like monetary policy may be somewhat out of keeping with the rather idyllic setting of this convention. At the same time, this secluded spot, well removed from the hectic pace of everyday business life, may well be an appropriate setting for a brief consideration of some of the broader, longer run issues with which we're grappling at the Fed, as distinct from the immediate problems that receive so much attention in the press. While I plan to mention some of our present difficulties in passing, I want to focus more specifically on some of these broader issues this morning.

The Present Setting

On the surface, I suppose one could argue that the immediate economic picture is pretty bright. After all, we are presently in the sixth quarter of a vigorous economic recovery. The early stages of the upswing were powered by strong increases in both residential construction and consumer spending. These sectors are still reasonably buoyant, and they are now being supplemented by increased business spending on new plant and equipment and on inventories. The main drag on the recovery to date has been the record deficit in our merchandise trade balance, but even with this deficit real growth in the economy has proceeded at an average annual rate of 6.7 percent since the recession bottomed out in late 1982: Further, and probably best of all, during the last two years we've enjoyed the lowest sustained rate of, inflation since the early 1970s. Indeed, my instincts tell me that this apparent progress on the inflation front is one of the reasons the recovery in business activity has been so much stronger than almost anyone expected it to be a year or so ago.

Despite this rather favorable scenario, I'm sure I don't have to tell you or any other knowledgeable observers that all is not well. Since the beginning of this year, there has been a growing uneasiness in the business and financial communities. Especially in recent weeks, expectations appear to have taken a distinct turn for the worse. There are a number of contributing factors. The discouraging failure of Congress to come to grips with the problem of the Federal deficit is a key element in the backdrop. Against that backdrop the very strength of the economic advance itself becomes something of a problem, generating as it does large increases in private credit demands and fears of a collision between private, and government, demands that could put sharp upward pressure on interest rates. The potential implications of such a collision for the international debt situation, for the stability of the banking industry and the international financial system, and for the beleaguered domestic thrift industry have become a matter of increasing concern to the financial community in recent weeks.

But most serious of all, I think, is an apparent escalation of inflationary expectations with all its adverse effects on financial markets. Such an expectations pattern tells us that public confidence in our ability to cope with our problems without causing a resurgence of inflation is at a low ebb. Sophisticated observers of financial markets know, as we in the Fed know, that inflation is not a solution. Indeed it can be a source of only more vexing, more serious problems that could cripple our financial markets. Nevertheless, there appears to exist an undercurrent of fear that political and other pressures generated in this election year climate will be too strong for the Fed to resist.

This troubles me greatly. After all, Chairman Volcker and others of us in the System have said repeatedly that the Fed attaches an extremely high priority to sustaining and extending the recent progress in reducing inflation. And I think I'm correct in my impression that most observers, despite critical comments, believe that our intentions are firm and honest. But despite our much heralded "independence," many market professionals and others believe it will be impossible for the Fed to resist strong election year pressures to ease policy even at the risk of reigniting inflation.

Public skepticism on this point can, perhaps, find some support in past history, but I don't think it captures the essence of the problem we at the Fed face in trying to design and implement an effective anti-inflationary program. The real problem, as I see it, is not the limitations of the System's ability to withstand partisan pressure or the ability of any of its high officials to withstand such pressures. None of us who choose central banking as a career expect to win popularity contests. Rather the difficulty is the nature of the mandate that has been given to the Fed by the public through its elected representatives. I have great respect for the collective wisdom of the American people, but I have to acknowledge that I do not believe the public has acted particularly wisely or carefully in setting objectives for the Fed. I'd like to spend the remainder of my time embellishing this theme just a little bit. And in doing so I want to emphasize that all of these views are my own personal judgments. They do not necessarily reflect the views of anyone else in the System.

What is the Fed's Mandate?

Suppose I were to ask you: What is the Fed's mandate in the area of monetary policy? That is, exactly what is it that the public expects the Fed to do with monetary policy? I'll bet that if I went around this room and put that question to each of you individually, I would get a wide variety of answers. Some would probably say our principal task is to hold inflation down. But others would say it is to keep the level of real business activity and employment high, or to prevent interest rates from rising too much, or to keep the dollar from becoming either too weak or too strong in the foreign exchange markets, and so forth. Who would be right? Well, in a sense, all of you would be right because our mandate, in its present form, essentially embraces all of these objectives. Section 2A of the Federal Reserve Act, as amended, requires the Fed "to promote effectively the goals of maximum employment, stable prices, and moderate long-term interest rates." Moreover, in carrying out monetary policy, we are to "[take] account of past and prospective developments in employment, unemployment, production, investment, real income, productivity, international trade and payments, and prices."

You don't have to be a genius to know that we at the Fed do not possess the means to achieve all of these objectives simultaneously and singlehandedly. In other words, the Fed's present mandate is unrealistically general and sweeping, particularly if viewed as a set of objectives to be achieved in the short run. In practice, this has forced the Fed to choose among competing objectives, or at least to make choices regarding the weight to give any particular objective in formulating monetary policy in the short run. At first glance, this ability to choose among objectives and to vary these choices over time might seem to increase the Fed's flexibility and hence its independence and its power. In my judgment, however, it does just the opposite: it subjects the Fed to a relentless barrage of pressure from competing interest groups trying to badger the Fed into giving greater weight to their respective points of view in setting monetary policy. Since many of these groups can argue with some justification that the Fed is mandated to achieve their favored objectives, such pressures can, in our type of political system, paralyze any effort of the Fed to set an attainable longer run objective and stick to it.

I cannot emphasize this point too strongly. Far from enhancing the Fed's independence and insulating it from partisan pressures, it seems to me that the lack of specificity in the Fed's current mandate serves to intensify these pressures, to reduce our real independence, and to prevent us from achieving any particular objective as effectively and consistently as we otherwise might. In particular, the flexibility we are thought to possess almost inevitably leads us to give substantial weight to current economic and financial conditions in deciding on current policy actions. Certainly the System should be aware of the current state of the economy and take account of any special prob-

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lems in financial markets in setting policy. But an excessive preoccupation with current conditions can lead to policy actions that destabilize the economy rather than stabilize it because of the long and unpredictable lags between the time policy actions are taken and the point at which they affect particular economic variables.

A Price Stability Mandate

If you're willing to buy my argument that the all-inclusive character of the Fed's present mandate is a problem, the obvious solution to the problem is for the public to specify the objective of monetary policy more narrowly and more precisely. That would mean making a choice among competing objectives, and obviously that choice would have to be made by the public through the legislative process. If it's not too presumptuous, however, I would like to tell you what by choice of an objective would be if the choice were mine. My choice would be price stability, and what I really have in mind here is a permanent return to a very low rate of inflation. Indeed, I would go so far as to set a goal of no inflation, after making allowance for the effect of quality change and the like on measured inflation. Once the inflation genie gets out of the bottle, it is very difficult to get it back in again.

You may reasonably ask why I would choose price stability as the major objective of monetary policy rather than some other desirable objective such. as high employment or low interest rates. There are several reasons. At one level, I would choose price stability because I believe that inflation and the forces that have created it are directly or indirectly responsible for much of the deterioration in our nation's economic performance over the last 20 years or so. Inflation disrupts the. functioning of our financial markets and discourages saving and investment. It introduces noise into market price signals. Its volatility increases the risk associated with particular business decisions and makes planning difficult. It distorts incentives and leads to serious inefficiencies in the allocation of resources. These distortions and inefficiencies prevent us from achieving the advancement in living standards we would otherwise be able to attain.

But these points alone are not sufficient to warrant choosing price stability as the prime objective of monetary policy. Someone else could always argue, with perhaps equal conviction, that high rates of unemployment are even worse than high rates of inflation, and that if it came to a choice between the two, the Fed should give greater weight to reducing unemployment. It would be very difficult-if not impossible-to resolve this kind of debate. With this in mind, I have a more fundamental reason for choosing price stability as the principal and maybe even the exclusive objective of monteary policy: namely, that price stability is the only feasible objective for monetary policy.

"... price stability is really the only objective that it is feasible for the Fed to try to achieve with monetary policy."

This last point-that price stability is the only feasible objective for Fed policy-is extremely important in my opinion, so let me just flesh it out very briefly. There was a time not very long ago when economists and others believed it was possible to manage economic conditions very closely through monetary and fiscal policy. The intellectual basis for this belief was the famous Phillips Curve, which suggested that there was a trade-off between inflation and unemployment that could be exploited profitably by policymakers. In essence, it was thought that policymakers could choose any particular combination of inflation and unemployment along the Phillips Curve. If they were willing to accept a little more inflation, they could get a little less unemployment and vice-versa. This approach to policy and the confidence in the manipulative power of monetary and fiscal policy it presupposed have come to be known as "fine-tuning."

Over the course of the last 20 years or so, this view of policy and the Phillips Curve doctrine that underlies it have been subjected to an intensely critical examination by a number of leading monetary economists. In the course of this examination, several important ideas have been developed that seriously challenge the validity of the fine-tuning approach. Let me just mention a couple of these ideas very quickly. Like all really powerful ideas in economics, their essence can be readily grasped by anyone.

The first is the so-called natural rate hypothesis. What this says is that if there is in fact any trade-off between inflation and unemployment, it is not between actual inflation and unemployment but between that part of inflation that is *unanticipated* by the public and unemployment. As long as inflation is fully anticipated, the unemployment rate will fluctuate around its natural rate as determined by such basic economic factors as the characteristics of the labor force and the state of technology. For example, if an effort is made to stimulate employment through policies that are likely to increase inflation, and if the public in general and workers in particular foresee this increase in inflation, workers will demand an increase in wages to compensate for the expected increase in inflation, and the policies won't cause any permanent increase in employment. The implication of the natural rate hypothesis for policy, then, is that employment can be systematically fine-tuned through monetary and fiscal policy only if the public systematically and persistently misestimates the effects of these policies on the rate of inflation.

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The second idea is what is known as the rational *expectations hypothesis*. In the present context, this hypothesis holds that the public, as a whole, is intelligent and perceptive and does not systematically misestimate the inflationary impact of monetary and fiscal policies. In short, the natural rate idea says that you can fine-tune the economy through fiscal and monetary policy only if you can fool most of the people most of the time, and the rational expectations idea says you can't do that.

The implications of these ideas for 'monetary policy are both obvious and profound. In essence, they say that the Fed cannot influence real economic conditions like employment and production and real rates of interest in any predictable way over time. This leaves price stability as the only feasible objective for monetary policy. I should point out that even though the set of ideas I've just outlined and their implications for policy are not yet universally accepted, they are embraced by a large and growing number of economists, and I personally find them very persuasive. I might also note that they are not really entirely new ideas but, like so many seemingly new concepts, have roots in the classical economics that is the foundation of our free market system.

The Matter of Implementation

I need to touch just briefly on one final point, and that's the matter of implementation. If one is willing to embrace price stability as the main objective of Fed monetary policy, what's the best way to achieve it? In principle there are several ways that we might go about it. For example, there have been suggestions recently that the Fed might set explicit numerical targets for the price level and then react in some fairly mechanical way to deviations of actual price movements from these targets. There might be some advantages to this kind of procedure, but I doubt seriously that it's the best approach given the very long and variable lags in the effect of Fed policy on the price level.

More fundamentally, it is not at all clear to me that some kind of reactive mechanism is necessary. We all know that *the* one sure way for the Federal Reserve to promote price stability is to reduce, slowly but surely, the rate of growth of the nation's money supply to a steady noninflationary rate and keep it there. With this in mind, my own feeling is that the most effective way we could attain a price stability objective would be to rededicate ourselves to the monetary targeting procedure we already have in place and to take some steps to strengthen that procedure. In particular, I think there's much to be said for the idea of setting targets not only for the current year but for several years into the future. Multi-year targeting would permit the Fed to put forward an explicit longer run strategy for achieving price stability, and it would eliminate the technical problem known as "base drift" that is an important defect of the current one-year targeting procedure. (This problem arises because we always base each new year's target on where we ended the preceding year, even if we missed the preceding year's target by a substantial amount.)

Further, I think we need to focus specifically on controlling over the long run the measure of the money supply known as M1 and reduce the attention we give to broader measures of money such as M2 and M3 and aggregate measures of credit. I am well aware of the debate that is going on among tech-, nically oriented monetary specialists over whether or not financial innovations like money market funds and the ensuing deregulation in banking markets have affected the demand for the various components of M1 in an unpredictable way and therefore reduced its usefulness as a target for monetary policy. The evidence I've seen suggests to me that for now M1 is still the best target among the various alternatives available. I don't think there is any serious reason to doubt that a policy of gradually reducing M1 growth to a noninflationary rate would allow us to achieve price stability without any excessive risk to the real economy. Having said this, let me also say that if it becomes evident in the future that some monetary measure other than M1 would be a better target for policy, I wouldn't hesitate to change. My preference for the use of M1 as a target is entirely practical rather than doctrinal.

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Concluding Comments

I realize that I've covered a fair amount of ground this morning, so let me just review very summarily the main points I've tried to make. First, a case can be made that the Fed's mandate, as it is, presently structured, is so broad and general that its value as a practical guide to monetary policy is limited and at times may actually prevent policy from contributing as much to our economic welfare as it otherwise might. Second, if the public should decide to narrow the Fed's mandate and make it more specific, the best choice of a more limited objective for Fed policy in my view would be price stability. Indeed, there are very solid reasons to believe that price stability is really the only objective that it is feasible for the Fed to try to achieve with monetary policy. I might add as a footnote here that restricting our mandate to price stability should go some distance toward satisfying those of our critics who complain that the Fed cannot be held accountable for its actions, since it would not be unreasonable to hold the Fed accountable, for the behavior of the price level over a period of, several years. Nor should we in the Fed fear such accountability since our assignment would be both feasible and unambiguous. Third and last, if price stability were our goal, my own feeling is that we could best achieve it by slowly but surely reducing the growth of M1 to a noninflationary. rate under present circumstances, but I'm enough of a pragmatist to have absolutely no objection to switching to some other monetary handle if it is ever demonstrated that something else has become superior to M1.

I hope you will find these comments useful as food for thought. You in the banking industry are closer to monetary policy than. people in most other industries, and we depend on you to consider these kinds of questions carefully and critically and let us know your views. I don't claim that the changes I've outlined would solve all of our nation's economic and financial problems. Far from it. Some of these problems have very deep roots, and they Will not be resolved easily or quickly. Nonetheless, I am convinced that the changes I have recommended would increase our ability at the Fed to contribute to the strength and stability of the economy. In a democracy like ours, public institutions are guided ultimately by the marching orders they receive from the electorate. If we are to do our job well, it is essential that these instructions be as clear and unambiguous as possible.

THE TAX EFFECT, AND THE RECENT BEHAVIOUR OF THE AFTER-TAX REAL RATE: IS IT TOO HIGH?

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I.
INTRODUCTION

Recent years have witnessed very high and volatile interest rates. This has stirred a debate among analysts as to whether observed interest rates are high by historical standards. Some analysts, focusing on the before-tax real rate, argue that if the observed nominal interest rate is corrected for the effect of expected (or actual) inflation, the ex ante (or ex post) real rate has been very high in recent years. Other analysts, however, note that it is also important to consider the effect of taxes on the behaviour of the nominal interest rate. Since real spending decisions in the economy are based on the after-tax real rate, it is more appropriate to focus on the behaviour of this latter real rate. Proponents of this view argue that the after-tax real interest rate observed since 1980 does not appear to be too high.[1]

At the center of the debate is an empirical issue of whether tax effects are fully recognized by investors. If the nominal interest rate does fully adjust to reflect the presence of an effective marginal tax rate on interest income, then it is more appropriate to look at the behaviour of the after-tax real interest rate. The theoretical proposition that nominal interest rates adjust to reflect the presence of taxes on interest income is intuitively appealing. As put by Michael R. Darby (1975), Martin Feldstein (1976) and Vito Tanzi (1976), the proposition states that, ceteris paribus, nominal interest rates will rise during an inflation by an amount which exceeds expected inflation enough to compensate lenders both for their expected loss of capital and for the taxation of interest income. Though this proposition is plausible, early empirical work failed to provide any firm empirical support for it. More recently, however, Joe Peek (1982) and Robert Ayanin (1983) were. able to produce empirical evidence supporting the presence of the tax effect on the nominal interest rate.

Despite recent empirical work implying that investors tend to adjust nominal interest rates for the presence of taxes on interest income, the question of whether nominal interest rates rise sufficiently to fully insulate expected real rates from the presence of an effective marginal tax rate on interest income has not been adequately investigated. This is an important issue because if nominal interest rates do not fully adjust, then the existence of the income tax on interest income will be another important source of variations in the after-tax real rates of interest.

This paper has two objectives. The first is to provide some further evidence supporting the existence of the tax effect on the nominal interest rate. In particular, the issue regarding whether nominal interest rates need to be fully adjusted for the presence of the effective marginal tax rate on the interest income is investigated. More specifically, the paper develops and applies a simple procedure to test this issue. The second objective is to focus on the behaviour of the after-tax expected short-term real rate. If one were to fully adjust the short-term nominal interest rate for effects of taxes and expected inflation, would the level and range of the real rate observed in recent years be high relative to the level and range observed during the period 1952-1979? This question is answered by deriving an after-tax expected real rate series over the period June 1952 to June 1983. In addition, to explain movements in the level of this short-term real rate over time, an empirical model of interest rate determination is presented and estimated.

The remainder of this paper is organized as follows: Section II reviews the early empirical work that investigated the presence of the tax effect and led to the inference that people have not considered the taxation of interest in determining the nominal

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[1] See "Rates Through Contrarian Eyes" in New York Times, October 9, 1983, page F29.

interest rate. It is argued that the conclusion regarding investor's ignorance of taxes could have been due to faulty interpretation of the econometric evidence. Section II also contains a discussion of the test procedure used by economists to infer the presence of the tax effect. Section III contains a discussion of the specific interest rate model that underlies the empirical work reported in this paper. Section IV presents and discusses various empirical estimates that underlie various conclusions. Section V contains main conclusions. Finally, the Appendix reviews and illustrates the J-test of non-nested regression models -a statistical procedure used in the previous work to test the presence of the tax effect on the nominal interest rate.

II.

BACKGROUND

The Fisher Equation and the Tax Effect

Since the studies of Darby (1975), Feldstein. (1976) and Tanzi (1976), economists have modified the standard Fisher relationship to incorporate the effects of taxation of' interest income. The standard formulation of the Fisher equation is

$$i = r + \pi, \qquad (1)$$

where i is the nominal interest rate, r is the real rate, and π the expected rate of inflation. This equation postulates that given r, an increase in the expected rate of inflation leads to an equivalent increase in the nominal interest rate. However, since interest is taxed, in order to leave the after-tax real interest rate unchanged we must have

$$i\,(1-T) = r^* + \pi, \qquad (2a)$$

or

$$i = r + (1/(1-T))\,\pi, \qquad (2b)$$

where r* is the after-tax real rate and T is the marginal tax rate on the interest income. Equation (2b) tells us that the size of the theoretical coefficient on the expected inflation rate is (1/(1-T)), and it exceeds unity for a nonzero tax rate. That is, in the presence of taxes on interest income, the nominal interest rate should rise during an inflation by an amount which, exceeds expected inflation sufficiently to compensate lenders both for their loss of capital and for the taxation of interest income.

It was this implication of equation (2b) that formed the basis of the early empirical work looking for the existence of the tax effect in the form of a greater-than-unitary coefficient in front of the expected inflation variable.[2] Moreover, in order to test whether nominal interest rates rise enough to fully insulate real rates from the effects of expected inflation and taxes, economists expected to find the estimated coefficient to equal the value implied by (1/(1-T)); if the marginal tax rate on the interest income equaled 32 percent, it implied a coefficient of approximately 1.47, i.e., (1/(1-.32)).

However, more often than not the estimated coefficient on the expected inflation variable was found to be close to or less than one. Initially, these empirical findings, were interpreted as providing little or no firm empirical support for the proposition that people have considered the taxation of interest in determining the nominal interest rate. For example, Vito Tanzi interpreted his estimated coefficient on expected inflation to be evidence that individuals ". . . have failed to see through the fiscal veil and thus have suffered from fiscal illusion" (p. 20). But the recent contributions of Levi and Makin (1978), Melvin (1982), and Makin, and Tanzi (1983) imply that a unitary or less-than-unitary response of the nominal interest rate to the expected inflation rate is not inconsistent with the presence of the tax effect. The basic point is that the Fisher equation is a reduced form relation. If we derive the Fisher equation from an explicitly specified structural macro model, the coefficient' in front of the expected inflation variable is a function of several structural parameters, and it Gill be equal to (1/(1-T)) only under specific restrictions on those parameters. In the absence of such restrictions, the response of the nominal interest rate to expected inflation is expected to be less than (1/(1-T)). (Section III demonstrates this in the context of a specific macro model that underlies the empircial work reported here.)

In fact, a more general analysis of the channels through, which expected inflation may influence the nominal interest rate suggests that it is very difficult to infer the presence of the tax effect by 'looking at the size of the estimated coefficient on the expected inflation variable in the interset rate equation based on equation (2b). The coefficient in front of the expected inflation variable may reflect, among other things, the influence of all or some of the following: (i) the Fisher effect, whereby the nominal interest rate rises by the full amount of a rise in expected inflation; (ii) the tax effect, whereby the nominal

[2] See Cargill (1977), and Tanzi (1980).

interest rate must rise by more than the rise in expected inflation to maintain a constant expected after-tax real return; (iii) the portfolio effect, whereby a rise in expected inflation, by raising the opportunity cost of holding money, causes people to shift from money to interest-bearing financial assets thereby restricting the rise in the nominal rate; and (iv) the Feldstein-Summers effect, whereby a rise in anticipated inflation depresses the expected after-tax profits and causes investment to fall. This latter effect, like the portfolio effect, tends to depress the real rate. In sum, tax-effects move the coefficient in front of expected inflation above unity, while the portfolio effect and the Feldstein-Summers effect both push it below unity. The net impact of all these on the coefficient in front of expected inflation is uncertain.[3] Hence the size of the estimated coefficient in front of the expected inflation proxy variable can not be used to reveal the presence or the degree of "fiscal illusion."

The Fisher Equation and the Magnitude of the Tax-Adjustment

Even if one focuses on the simple Fisher equation as formulated in equation (2b) and assumes the existence of the full Fisher effect, a general analysis of the tax effect on nominal interest rates suggests that there is no reason the market will always adjust the nominal interest rate for effects of expected inflation and income taxes by the full amount given by (1/(1-T)). Milton J. Ezrati (1982) points out that the tax effect on interest rates depends upon the tax status of market participants and the tax burden imposed on alternative uses of funds. The tax-adjusted inflation premium for nominal interest rates will equal (1/(1-T)) as suggested in equation (2b) only in the special case where the tax rate on alternative uses of funds equals zero and the tax rate on interest income is greater than zero.

In order to explain these results, let us explicitly discuss the alternative investment available to market participants. This alternative investment option pays some rate of return that can be compared with the interest rate. Markets are in equilibrium when the after-tax expected real returns are equal on these investment alternatives.[4] When these returns are not equal, wealth-maximizing investors will reallocate funds among these investment alternatives until the expected real returns are equalized on the after-tax basis. These considerations imply that in equilibrium, expected real returns must satisfy the following relationship :

$$i - (1/1-T))\,\pi = ia - (1/(1-Ta))\,\pi, \quad (3a)$$

where i, π, and T are defined as before and ia = nominal dollar rate of return on the alternative use of funds; Ta = marginal tax rate on income from the alternative use of funds. We can also express equation (3a) in the following way :

$$(i - ia) = ((T-Ta)/(1-T)(1-Ta))\,\pi. \quad (3b)$$

The equations (3a) and (3b) imply that even though after-tax expected real returns are equalized on the alternative uses of funds, nominal returns differ due to the interaction of differential tax rates and the inflation premium. If we augment the basic Fisher equation (1) with this "tax-differential" term, we get the following equation :

$$i = r + \pi + [(T-Ta)/(1-T)(1-Ta)]\,\pi, \quad (4a)$$

or

$$i = r + (1+c)\,\pi, \quad (4b)$$

where 1 in (4b) can be viewed as the inflation premium coefficient without tax considerations and c = the tax-differential adjustment = ((T-Ta)/(1-T)(1-Ta)).

From equation (4a), it is clear that if the two tax rates are equal (T=Ta), or if holders of funds are entirely tax exempt (T = Ta = 0), then the tax differential term is zero, and there is no tax effect in response of the nominal interest rate to expected inflation. This tax-differential term becomes positive when returns on the alternative uses of funds are taxed at a lower rate than returns on financial securities. We will get the tax-adjusted basic Fisher equation (2b) in the case where Ta equals zero, and T is greater than zero; in this special case, the tax-adjusted inflation premium equals (1/(1-T)).

In general, not all market participants in securities markets are tax exempt. There are taxless options open to individuals in "consumption" and to many investors in the purchase of tax-free securities ; in these cases, the tax rate on alternative investments falls short of the rate applied to interest income. Investment in real plant and equipment also offers relative tax breaks accorded by accelerated depreciation schedules, investment tax credits, etc. In view of these considerations, the estimated coefficient in front of the expected inflation variable even in the

[3] See Makin and Tanzi (1983).

[4] To be realistic, these perceived returns should be adjusted for risk.

simple Fisher equation (2b) may turn out to be smaller than (l/(1--T)). But that result in itself will not be indicative of the presence of “fiscal illusion”.

An Alternative Test of the Presence of the Tax Effect

In view of the discussion in the previous two sections, it is clear that the test based on the magnitude of the estimated coefficient in front of the expected inflation variable could not be relied upon to reveal the presence of the tax effect on the nominal interest rate. Aware of this difficulty, Peek (1982) and Ayanin (1983) used tests not contingent on the magnitude of the estimated coefficient in front of the expected inflation variable. Peek finds evidence for the tax effect by showing that the forecasting performance of the nominal interest rate equation estimated to allow the full adjustment of the nominal interest rate for the presence of taxes is better than that of the same equation estimated ignoring the presence of taxes. Moreover, he also uses the non-nested J-test to reveal the presence of the tax effect (see Appendix for details).

In order to explain these tests as well as to motivate the empirical work reported in this paper, the Fisher equation could be written as

$$i\,(1-kT) = r^* + b\pi,\ 0 \leqq k \leqq 1, \tag{5a}$$

or

$$i = (1/(1-kT)\ [r^* + b\pi] + u_t \tag{5b}$$

where i, T, r* and π are defined as before and b = the inflation premium coefficient not necessarily equal to one ; u = the random error term; k = the tax-adjustment parameter. The procedure used in the early empirical work to test the presence of the tax effect could then be characterized as follows: estimate equation (5b) setting the parameter k to zero and then examine whether or not the estimated coefficient on the expected inflation variable is greater than one. Moreover, under the assumption that the population parameter b equals one, examine whether or not the value of this estimated coefficient exactly equals the value given by (1/(1-T)), where T is the average marginal tax rate on interest income. As observed before, more often than not the estimated coefficient on the expected inflation variable was found to be less than one.

In his empirical investigation of the tax effect, Peek argues the crucial question is really whether the estimation of the interest rate equation (5b) should proceed by dividing all the explanatory variables by (1-T) or not. Equivalently, should, the estimation of equation (5b) be carried out by setting k to zero or k to one? He shows that the forecasting performance of the tax-adjusted Fisher equation (equation (5b) estimated setting k to one) is better than that of the standard Fisher equation (equation (5b) estimated setting k to zero).[5]

However, the general analysis of the tax effect presented in the previous section implies that the nominal interest rate may only partially adjust for the presence of the effective marginal tax rate on interest income. In order. to investigate this possibility, the empirical work in this paper treats the tax-adjustment parameter k as an unknown parameter and estimates it along with other parameters. Since the parameter k is hypothesized to take values ranging from zero (no tax-adjustment) to one (complete tax-adjustment), the empirical procedure employed is to search for that value of k that minimizes the standard error of the regression. An estimated value of k which is less than one but greater than zero, could be interpreted to imply an incomplete adjustment of the nominal rate to the presence of taxes.

III.

THE MODEL OF INTEREST RATE DETERMINATION

As observed before, the Fisher equation (5b) should be viewed as a reduced form relation. In order to estimate it, we need a model to help identify the important determinants of the expected real rate and the expected inflation rate. Therefore, this section presents a simple IS-LM-Aggregate Supply model[6] which can be seen as providing the basis for the nominal interest rate equation (5b) estimated in this paper.

The linearized version of this model could be expressed as

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[5] The procedure used by Ayanin (1983) is entirely different; he does not estimate the Fisher equation. Instead, through regression technique, he examines the yield spread between taxable and tax-exempt bonds. He finds that the nominal yield on taxable bonds has risen sufficiently to compensate the lenders for the presence of an effective marginal tax rate on the interest income; his results imply an effective average marginal tax rate in the neighborhood of 40 percent.

[6] This macro model is in essence similar to the ones given in Peek (1982), Wilcox (1983), and Peek and Wilcox (1983).

$$\text{IS:}\quad i(1-T) - \pi = \alpha_0 + \alpha_1 (X - Y^n) - \alpha_2 (Y - Y^n) - \alpha_3 SS + \alpha_4 Z_t, \quad \alpha_1, \alpha_2, \alpha_3, \alpha_4 > 0 \tag{6}$$

$$\text{LM:}\quad i(1-T) = \frac{b_0}{b_2} + \frac{b_1}{b_2}(Y - Y^n) + \frac{1}{b_2}(P - M + Y^n)^7, \; b_1, b_2, > 0, \tag{7}$$

$$\text{AS:}\quad P = c_0 + P^e + c_1(Y - Y^n) + c_2\, SS, \quad c_1, c_2 > 0, \tag{8}$$

where all the variables except i and Z are in natural logs and where Y is actual real output, Y^n is the natural real output, X is the exogenous component of real demand, M is the nominal money stock, P is the price level, P^e is the expected price level, i is the nominal interest rate, π is the expected inflation rate, SS is a supply shock variable measuring things like oil price disturbances, Z is the percentage change in the real output lagged one period, and T is the average marginal tax rate on interest income.

Figure 1 presents graphs of IS, LM, and aggregate supply (AS) equations. Equation (6) is the equation of the IS curve showing an inverse relationship between the after-tax nominal rate i(1-T) and real output[8] (Y-Y") ; its position depends upon the exogenous component of the real demand X, the expected inflation rate π, the lagged growth in real income Z, and the supply shock variable SS. Equation (7) is the equation of the LM curve showing a positive relationship between the after-tax nominal rate i(1-T) and real output $(Y-Y^n)$; its position depends upon the price level P and the nominal money stock M. Equation (8) is the equation of the aggregate supply curve implying a positive relationship between the price level and real ouput; its position depends upon the expected price level P^e and the supply shock variable SS. The model as formulated above enables one to consider the short-run behaviour of the nominal interest rate as the economy deviates from its natural real output level.

Equation (6) through (8) can be combined to yield the following nominal interest rate equation:

$$i = (1/(1-T))[A_0 + A_1\pi + A_2 X + A_3 SS + A_4 M^1 + A_5 Z] \tag{9}$$

where M^1 is $(M - P^e - Y^n)$,[9] and where A_1, A_2, A_3, A_4 and A_5 are the reduced form parameters. It can be easily shown that the latter are related to the structural equation parameters as follows:

$$A_1 = (b_1 + c_1)/d, \tag{10.1}$$

$$A_2 = (\alpha_1 b_1 + \alpha_1 c_1)/d, \tag{10.2}$$

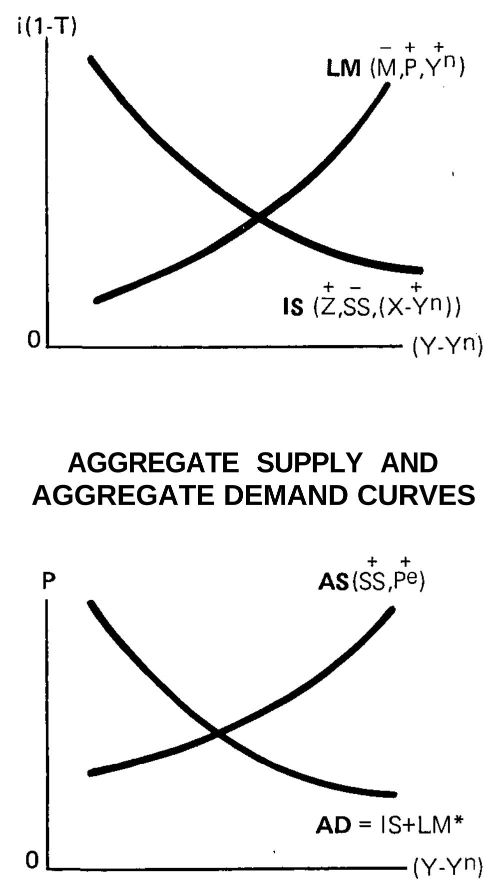
$$A_3 = (c_2\alpha_2 - \alpha_3 b_1 - \alpha_3 c_1)/d, \tag{10.3}$$

$$A_4 = (-\alpha_2)/d, \tag{10.4}$$

$$A_5 = (\alpha_4 b_1 + \alpha_4 c_1)/d, \tag{10.5}$$

Figure 1

IS AND LM CURVES



*Aggregate demand curve (**AD**) is derived by combining the **IS** and **LM** curves.

[7] The demand equation for real money balances underlying the LM curve is assumed to be $(M-P-Y^n)d = b_0 + b_1(Y - Y^n) - b_2\, i\,(1-T)$. Assuming that the money supply equals the money demand, we can solve the equilibrium expression for the after-tax nominal interest rate to get equation (7) of the text.

[8] Actual real output is measured relative to its natural level.

[9] In the empirical section of the paper, M1 is proxied by the variable LIQ; the latter is defined as the current growth rate of the nominal money stock relative to its most recent trend growth rate. See Wilcox (1983).

where $d \equiv (b_1+c_1+b_2\alpha_2)$. In this model, the nominal interest rate responds positively to an increase in expected inflation ($A_1 > 0$), exogenous components of real demand ($A_2 > 0$), and real income ($A_5 > 0$). All of these variables lead to an upward shift in the IS curve and therefore to a rise in the nominal interest rate. The supply shock variable has a priori an uncertain effect. on the nominal interest rate ($A_3 \gtreqless 0$). An adverse supply shock, such as a rise in the relative price of energy, is assumed, at least in the short run, to reduce the demand for capital because capital and energy are complements in the production process. This reduction in the demand for capital implies reduction in investment which effect, by itself, tends to cause a decline in the nominal interest rate (see eq. (6)). However, an adverse supply shock at the same time tends to raise input costs and in so doing shifts upward the aggregate supply curve (see eq. (8)): This shift raises the price level, reduces the real money supply and thereby causes a rise in the nominal interest rate. The net impact of an adverse supply shock on the nominal interest rate, therefore, depends upon the relative importance of the investment effect and the input cost effect.[10] The coefficient in front of the monetary variable is expected to be negative ($A4 < 0$).

The interest rate equation (9) yields two interesting implications. First, the presence of taxes on the interest income ($T \neq 0$) in general affects not only the parameter in front of the expected inflation variable but also other parameters in the interest rate equation. Hence important changes in the tax policy can bring about changes in the response of the nominal interest rate to the determinants of the real rate and the expected inflation rate. Second, as mentioned above the coefficient in front of the expected inflation rate will equal (1/(1-T)) only under some special assumptions about the structure. This parameter, given in equation (10.1), can be expressed as

$$A_1 = (1/(1-T)) \; [b_1 + c_1)/(b_1 + c_1 + b_2\alpha_2)].$$

In the context of this simple structural model, this coefficient will equal (1/1-T)) only if either b_2 or α_2 is zero (the LM curve is vertical or the IS curve is horizontal). In general, this coefficient will be less than (1/(1-T)). Therefore, the presence of the tax effect is not inconsistent with the findings of a smaller-than-unitary coefficient in front of the expected inflation variable.

[10] For details, see Wilcox (1983).

IV.

EMPIRICAL RESULTS

This section reports the evidence on the existence and the magnitude of the tax effect. The procedure employed here is to search for that value of the tax-adjustment parameter k that, produces the lowest standard error of the estimated interest rate equation. For different values of k between zero and one, the nominal interest rate equation (9) is estimated multiplying all the right hand side explanatory variables by (1/(1-kT)), where T is replaced by the actual values of the average marginal tax rate on interest income.

Table I reports the standard errors of the estimated interest rate equation for the full period 1952-1979 and for two subperiods. 1952-1970 and 1971-1979. It is clear that the nominal interest rate equation estimated under the assumption of the full tax-adjustment (assumed by setting k equal one in (1/(1-kT))) yields the lowest standard error of the regression (compare the standard errors of the

Table I

EVIDENCE ON THE MAGNITUDE OF THE TAX-ADJUSTMENT IN THE INTEREST RATE EQUATION

semiannual data

Tax-Adjustment Factor k in (1/(1−kT))	Standard Errors of the Regression 1952-1979 (1)	1952-1970 (2)	1971-1979 (3)
k = 0	.7339	.6272	.6164
k = .1	.7311	.6252	.6141
k = .2	.7280	.6232	.6117
k = .3	.7249	.6211	.6093
k = .4	.7216	.6189	.6067
k = .5	.7183	.6169	.6039
k = .6	.7147	.6145	.6012
k = .7	.7111	.6122	.5983
k = .8	.7074	.6098	.5952
k = .9	.7036	.6075	.5921
k = 1.0	.6996	.6052	.5889

Note: The entries in column (1) through (3) above list standard errors of the regression of the nominal interest rate equation estimated for different, sample periods under various hypothesized values about the magnitude of the tax-adjustment factor k (see note in Table II for a description of the interest rate equation estimated).

estimated interest rate equation in Table I).[11] This empirical result can be interpreted to imply that the nominal interest rate fully adjusts for the presence of an effective marginal tax rate on interest income. These findings support the assumption of complete tax-adjustment made by Peek (1982).

Table II presents estimates of the nominal interest rate equation (9). Row 1 presents estimates obtained ignoring the presence of income taxes on interest income (k=0), and row 2 presents estimates obtained assuming the full tax-adjustment (k=1). The estimates presented in rows 1 and 2 imply that all the explanatory variables have the expected influence on the behaviour of the nominal interest rate. That is, rises in expected inflation, exogenous components of aggregate demand, and lagged real income growth raise interest rates while positive supply shocks and accelerations in money growth lower them (see coefficients on PE12, X, SS, LIQ, and Z in Table II).

Given the above empirical results, Chart 1A graphs the behaviour of the after-tax short-term real rate for the period June 1952 to June 1983. The solid line displays the actual ex ante real rate and is computed as $\hat{i}\,(1-T)-PE12$. The dotted line displays the behaviour of the after-tax real rate predicted by the nominal interest rate equation. For the period June 1952 to December 1979, it is computed as $\hat{i}\,(1-T)-PE12$, where $\hat{i}$ is the predicted value of the nominal interest rate equation estimated over the period 1952-1979. For the period June 1980 through June 1983, the predicted values are the simulated values from the interest rate equation estimated over the period 1952-1979.

This chart suggests some interesting inferences. The after-tax real rate that was positive in the '50s and '60s turned negative in the '70s. The level of the after-tax real rate observed during the period June 1981 to June 1983 is again positive but it is within the range observed in the '50s and the '60s. Therefore, when judged against that range, it cannot be considered unusually high. However, the real rate does appear high relative to the negative levels observed in the '70s.

[11] This result about the existence of complete tax-adjustment seems fairly robust with respect to the measure of inflation used and the estimation procedure employed. If some right hand side explanatory variables in the interest rate equation (9) are not strictly exogenous, then the ordinary least squares estimation procedure will provide inconsistent estimates of the parameters including k. Therefore, the nominal interest rate equation was also estimated by the instrumental variable estimation procedure treating both Z and LIQ as right hand side endogenous variables. Even here, the nominal interest rate equation estimated by setting k equal one in (1/(1-kT)) yielded the lowest standard error of the regression. Similarly, considering the possibility that the Livingston survey measure of inflationary expectations (PE12) may contain measurement errors and thereby produce biased estimates of the regression parameters, a two-step procedure as outlined in Lahiri (1976) was employed to estimate the nominal interest rate equation (9). Again, this estimation procedure yielded the same conclusion about the presence of the complete tax-adjustment. These results are available upon request from the author.

Table II

REDUCED FORM ESTIMATES FOR THE INTEREST RATE EQUATION

semiannual data, 1952-1979

	Coefficient on						
	PE12	X	SS	LIQ	Z	SER	$\bar{R}^2$
1. Non-tax-adjustment k = 0	.81 (20.4)	7.70 (3.2)	- 2.84 (-4.5)	- 17.1 (-2.9)	14.9 (2.5)	.7339	.891
2. Full tax-adjustment k = 1	.55 (20.7)	5.81 (3.6)	- 2.52 (- 5.9)	- 11.9 (- 2.9)	10.2 (2.5)	.6996	.981

Note: The nominal interest rate equation estimated and reported above is from the text (equation 9) and can be expressed, using proxy variables, as

$$i = (1/(1-kT))\,[A_0 + A_1\,PE12 + A_2\,X + A_3\,SS + A_4\,LIQ + A_5\,Z],\ 0 \leqq k \leqq 1,$$

where i is the average market yield on a one-year Treasury bill, X is the normalized value of real exports and real government expenditure, SS is the ratio of the deflator for imports and deflator for GNP adjusted for changes in the exchange rate, PE12 is the Livingston survey forecast for inflation over the 12-month horizon, LIQ is the annualized growth rate of the nominal money stock (M1B) over the last six months minus its annualized growth rate over the last three years, T is the series on the average marginal tax rate prepared by Joe Peek (1982), and Z is the lagged value of the rate of growth of the real GNP. The time series on the average marginal tax rate was kindly provided by Peek, and the one on PE12 by the Federal Reserve Bank of Philadelphia. The interest rate equation is estimated using semiannual observations corresponding to the Livingston survey data collected each June and December. SER is the standard error of the regression, and $\bar{R}^2$ is R^2 adjusted for degrees of freedom. The equations are estimated by the ordinary least squares estimation procedure.

Chart 1A

REAL AFTER-TAX INTEREST RATES ACTUAL AND PREDICTED

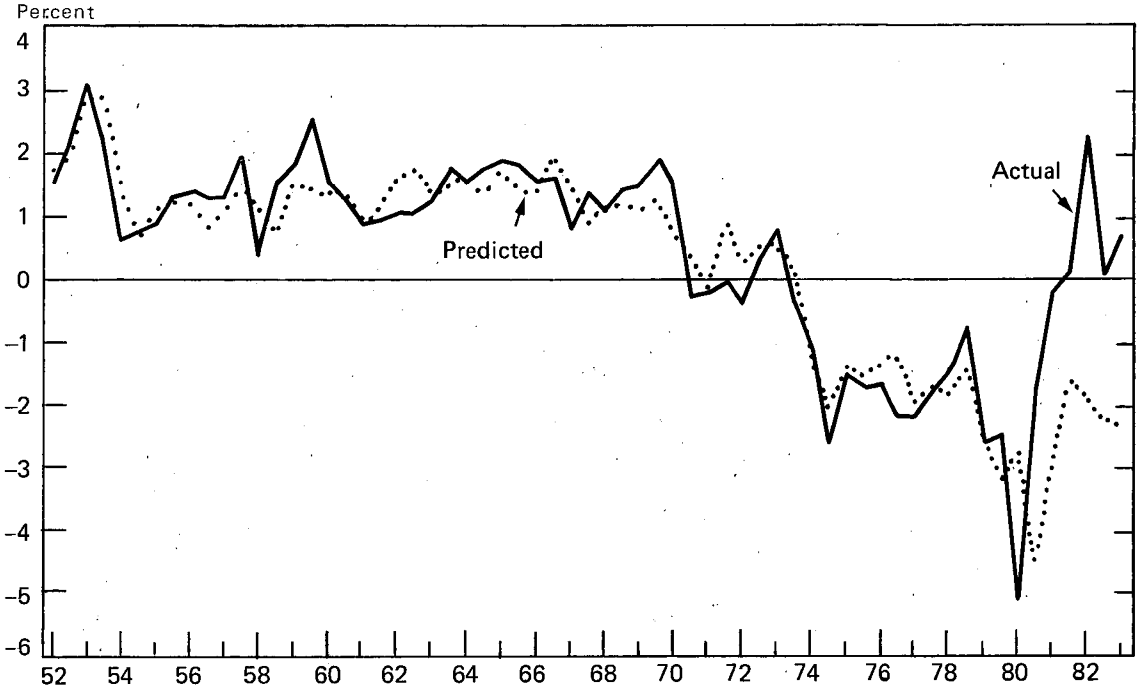
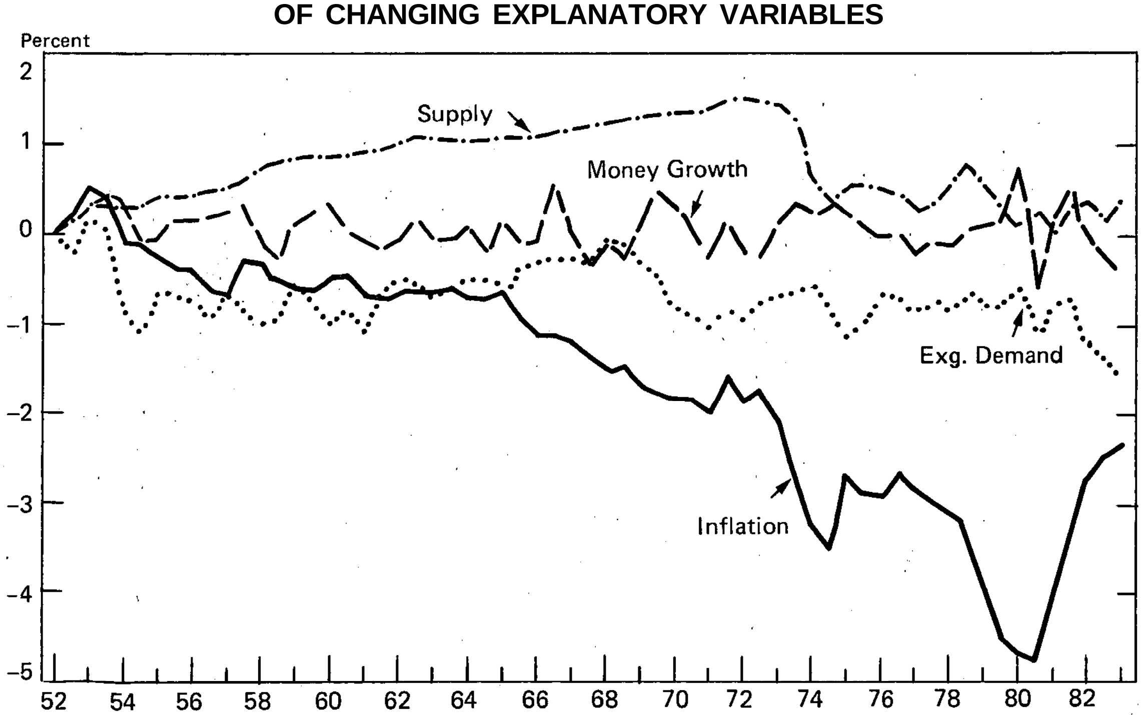


Chart 1B

EFFECT ON THE AFTER-TAX REAL RATE OF CHANGING EXPLANATORY VARIABLES



These observations on the level of the after-tax short-term real rate raise one important question. Why did the after-tax real rate turn negative in the 1970s? In order to suggest an answer to this question, Chart 1B displays the effect on the after-tax real rate of changing explanatory variables like the expected inflation rate (PE12), predetermined components of aggregate demand (X and Z), supply conditions (SS), and money growth rate (LIQ). Each plotted series traces the impact of an explanatory variable on the after-tax real rate and is calculated as the product of the variable and its estimated coefficient from row 2 (in Table II), less the value of that product for the first observation of the sample. Thus, each measure's movement of the after-tax expected real rate is due to that explanatory variable from the June 1952 base. Consider the solid line depicting the effect on the real rate of changing expected inflation (PE12). The solid line shows that the effect of expected inflation has been to depress the real rate, and the magnitude of this depressing influence has been changing over time. Thus, the steadily rising expected inflation drove down the real rate by almost 2 percentage points from the early '50s until the end of the '60s. The magnitude of this depressing influence increased as the expected inflation rate accelerated in the late '70s; it reduced the real rate by almost 5 percentage points by the end of the '70s. In the early '80s, the reduction in the expected inflation rate did decrease the magnitude of this depressing influence. Other lines in Chart 1B can be similarly interpreted.

Overall, Chart 1B shows the rising expected inflation rate to be the most important factor that contributed to depress the real rate in the 1970s. The adverse supply shocks of the 1970s were another factor contributing to low real rates in this period (Wilcox (1983)). Both of these factors were responsible for producing excessively low real rates of interest in the 1970s.

Even though the interest rate model estimated here reasonably explains the behaviour of the after-tax real rate during the period 1952-1979, it does not explain very well the behaviour of the after-tax real rate in the post-1979 period. The recent drastic reduction in the level of inflationary expectations and the recent stability in oil prices were among the important factors contributing to the recent increase in the after-tax real rate; however, they alone cannot explain all of the recent rise in real rates (see Chart 1A). This suggests that an important change might have occurred in the response of nominal and real rates to various explanatory variables in the post-1979 period.

V.

SUMMARY REMARKS

One of the important issues arising as a result of the recent appearance of high and volatile real interest rates concerns the existence of the tax effect on the response of the nominal interest rate to expected inflation. Those who ignore the effect of taxes on the nominal interest rate tend to focus on the before-tax real rate of interest. The before-tax real rate may appear high by historical standards. However, there is growing evidence that the tax effect does exist, and this paper presented some further evidence on its full existence. The empirical results reported here imply that investors have fully recognized the effect of income taxes in reducing the after-tax expected real rates of interest and therefore have adjusted nominal interest rates to insulate real rates from the effect of taxes. In view of this, it is more appropriate to focus on the behaviour of the after-tax real rate of interest.

Several analysts, focusing both on short- and long-term real rates, have expressed the view that real rates are excessively high by historical standards. This view may not be entirely correct. For the evidence from an estimate of short-term real interest rates presented in this paper shows that the range of the after-tax real interest rate observed in recent years is not different from the range observed in the '50s and the '60s. The after-tax real interest rate was positive during the years 1952-1970 and turned negative in the '70s. Recently, it has been positive. Since the real rate has been positive in recent years, it does indeed appear excessive when compared with the negative real rate observed in the '70s. However, the level is well within the range experienced during the period of positive real yields.[12]

The simple interest rate equation reported and estimated in this paper suggests that accelerating expected inflation and, to some extent, adverse supply

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[12] The result concerning short-term real rates does not imply that long-term real interest rates may not be high by historical standards. However, the evidence on the existence of the tax effect reported in this paper does imply that it might be appropriate to adjust long-term nominal interest rates for effects of expected inflation and taxes.

shocks produced abnormally low real rates of interest in the late '70s. Recent years, however, have witnessed a drastic reduction in the expected inflation rate and considerable stability in oil prices. These two factors together caused the real rate to rise from its severely depressed level of the late-'70s. However, the interest rate equation reported in this paper still cannot explain all of the recent rise in the real rate. But this observation notwithstanding, the level of the after-tax real rate observed in recent years falls well within the range experienced during the '50s and the '60s.

APPENDIX

THE J-TEST OF NON-NESTED REGRESSION MODELS: REVIEW AND AN APPLICATION

This Appendix reviews the J-test of non-nested regression models proposed by Davidson and MacKinnon (1981). This test is used by Joe Peek (1982) to prove the presence of the tax effect on nominal interest rates.

In applied econometric work, researchers very often face the problem of testing the specification of an econometric model in the presence of one or more other models which purport to explain the same phenomenon. The conventional techniques for hypothesis testing (such as the F-test) allow one to test the validity of a particular specification of an econometric model by testing restrictions on an alternative specification more general than the one being tested, conditional on the more general specification being valid. Since the specification whose validity is being tested (called the null hypothesis) can be obtained by imposing restrictions on the more general specification (called the alternative hypothesis), such hypotheses are said to be nested, i.e., the null hypothesis is nested within the alternative hypothesis.

However, in many cases, the alternative specifications suggested by economic theory are non-nested, meaning that any given specification whose validity we might be interested in testing is not nested within the alternative specification and could not be obtained by imposed restrictions on the latter. This is usually the case when each competing specification of the econometric model is characterized by the presence of some explanatory variables which are unique to that specification. Since the competing specifications are non-nested, the conventional F-test is not directly applicable. Recently, more powerful tests of non-nested hypotheses have been proposed,[13] and the J-test is one of them.

[13] Pesaran and Deaton (1978), Davidson and MacKinnon (1981), Pesaran (1982), and Davidson and MacKinnon (1983).

In order to illustrate how the J-test differs from the conventional F-test and how it is implemented, consider the simple model of interest rate determination discussed in the text. The nominal interest rate equation suggested by this model can be expressed as

$$i = (1/(1-T))\,[A_0 + A_1\pi + A_2X + A_3SS + A_4M + A_5Z] + u_1, \qquad (A1)$$

where all variables are defined as before and u_1 is the error term. Suppose one wants to test the hypothesis that one or more explanatory variables (say, Z and SS) suggested by the above model (A1) have no influence on the nominal interest rate. The conventional F-test sets up the following as the null (H_0) and the alternative (H_1) hypotheses

$$H_0:\ i = (1/(1-T))\,[A_0 + A_1\pi + A_2X + A_4M] + u_2, \qquad (A2)$$

$$H_1:\ i = (1/(1-T))\,[A_0 + A_1\pi + A_2X + A_3SS + A_4M + A_5Z] + u_1, \qquad (A3)$$

and then tests whether the restrictions implied by (A2) are correct, i.e., whether $A_3 = A_5 = 0$ in (A3). Note that the alternative specification (A3) is more general than the one being tested (A2) and that the latter is nested within the former.

Now suppose one wants to test the hypothesis that there is no tax effect on nominal interest rates. As explained in the text, the issue here is whether we should estimate equation (A1) by multiplying all the right hand side explanatory variables by (1/(1-T)) or not. So, the two competing specifications suggested by the tax issue can be expressed as

$$i = [A_0 + A_1\pi + A_2X + A_3SS + A_4M + A_5Z] + u_4, \qquad (A4)$$

$$i = [B_0 + B_1\pi^* + B_2X^* + B_3SS^* + B_4M^* + B_5Z^*] + u_1, \qquad (A5)$$

where the starred variables in (A5) are derived by multiplying the corresponding variables in (A4) by (1/(1---T)). Since the average marginal tax rate on interest income varies over time, we have entirely different values of the explanatory variables appearing in (A5). Therefore, one can view (AS) as an interest rate equation with a different specification of the right hand side explanatory variables. The specification (A4) implies that it is appropriate to estimate the interest rate equation ignoring the presence of taxes on interest income. The specification (A5) implies that it is appropriate to take into account the presence of an effective marginal tax rate on interest income and that tax effects are complete.

We can now see why the conventional F-test in this case is not directly applicable to the problem of testing the validity of a given specification (A4) (that there is no tax effect) against the alternative specification (A5) (that there is the full tax effect); the null hypothesis (A4) is not nested within the alternative hypothesis (AS) as the latter contains an entirely different set of explanatory variables. The alternative hypothesis here does not include the variables suggested by the null hypothesis, and one could not test the restrictions implied by the null hypothesis. However, there exists several non-nested test procedures which can be employed to test the validity of the alternative specifications of an econometric model.

The important point in the methodology of non-nested testing is that there is no presumption about the validity of any specification; each specification is on an equal footing with every other specification. This is so because the alternative specifications are non-nested by assumption and can not be ranked by the level of generality as can be done when the models are nested. To follow the non-nested test procedure, one takes the alternatives one at a time, assuming each one in turn to be true and inferring from the behaviour of the alternatives against the data whether or not the temporarily maintained or working alternative can or cannot explain the behaviour of the phenomenon one is interested in. One thus makes pair wise tests of each pair of alternatives and asks the question, is the performance of an alternative j against the data consistent with the truth of an alternative i?

In the present case, we have two alternative specifications (A4) and (A5). If one's working or currently maintained hypothesis is that (A4) is true, then one tests whether the performance of (A5) against the data is consistent with the truth of (A4). Similarly, if one's maintained hypothesis is that (A5) is true, then one tests whether the performance of (A4) against the data is consistent with the truth of (A5). In this procedure, it is conceivable both alternatives may be rejected, or that neither may be rejected. It is also conceivable that one may be rejected and the other may not be, in which case one would presumably want to choose the latter over the former. The case in which both specifications are rejected is interesting; it implies that there is some element of truth in both specifications, and that the researcher should expand the model to incorporate the important factors suggested by these competing non-nested specifications.

The J-test proposed by Davidson and MacKinnon (1981) can be implemented in two steps. The first step generates estimates of the regression parameters in (A4) and (A5) by using an estimation procedure that provides consistent estimates of the parameters. Since the error terms in (A4) and (A5) are assumed to be serially uncorrelated, homoscedastic, and uncorrelated with the right hand side explanatory variables, consistent estimates of the parameters of (A4) and (A5) are provided by the ordinary least squares estimation procedure. The estimated regression equations are then used to generate the within sample predictions of the dependent variable under the two alternative specifications. The second step consists of estimating two expanded regressions which can be expressed as

$$i = A_0 + A_1\pi + A_2X + A_3SS + A_4M + A_5Z + \gamma\hat{i} + u_6, \qquad (A6)$$

$$i = B_0 + B_1\pi^* + B_2X^* + B_3SS^* + B_4M^* + B_5Z^* + \gamma\hat{\hat{i}} + u_7, \qquad (A7)$$

where $\hat{i}$ and $\hat{i}$, respectively, are the predicted series for the dependent variable i from equations (A5) and (A4) estimated in step one. In the estimating equation (A6), the maintained hypothesis is (A4); one is testing the truth of it given the performance of the alternative (A5) against the data. If the specification (A4) is true, then the true value of *y* is zero. As shown by Davidson and MacKinnon (1981), one may validly test whether y=0 in (A6) by using a conventional t test or, equivalently, a likelihood ratio test. Thus, by testing the significance of the parameter y in (A6), one tests the truth of the maintained hypothesis (A4) given the performance of the alternative hypothesis (A5). The process is reversed in the estimating equation (A7); the maintained hypothesis here is (A5) and one tests the truth of it given the performance of the alternative (A4) against the data. Therefore, one tests the truth of (A5) given the alternative (A4) by examining the significance of the parameter y in the estimating equation (A7).

Since the J-test uses t statistics from the expanded regression equations (A6) and (A7) to draw inferences about the truth of the alternative specifications, it is imperative that error terms in these regressions satisfy the important assumptions of the classical linear regression model, i.e., zero mean, homoscedastic variance, absence of serial correlation, and no correlation with the right hand side explanatory variables, etc. It is well known that t statistics are biased if error terms fail to possess some of these properties.[14]

Table III presents results of performing the J-test along the lines suggested above; it shows estimates of the relevant parameter y and the associated t-statistic from the estimating equations (A6) and (A7). Two sets of estimates are reported; the first set (labelled as y_1 and t-statistic$_1$) is based on the ordinary least squares estimates of equations (A6) and (A7) and the second set (labelled as y_2 and t-statistic$_2$) is based on the estimation of equations (A6) and (A7) assuming the presence of the first order serial correlation. Since the nature of serial correlation can differ across the alternative specifications, we let the serial correlation coefficient differ in equations (A6) and (A7).

Since the t-statistic is biased if the error term is serially correlated, we focus on the second set of estimates. These estimates are consistent with the following inferences : In the estimating equation (A6), the maintained hypothesis that there is no tax effect on the nominal interest rate is rejected (y_2 is significantly different from zero as evidenced by a significant t value) given the performance against the data of the alternative that the tax effect does exist. However, in the estimating equation (A7), the maintained hypothesis that the tax effect does exist is not rejected (y_2 is not significantly different from zero) given the performance against the data of the alternative that does not allow tax effects. These results together then imply that the specification of the interest rate model, which allows the existence of the full tax effect on the nominal interest rate, is the preferred specification when judged against the one which completely ignores the existence of taxes on interest income.

[14] See Davidson and MacKinnon (1983) and McAleer, Fisher, and Volker (1983) for an extension of the non-nested tests to cover the issues raised by the violation of some of these assumptions.

Table III

RESULTS OF THE J TEST

Sample Period 1952-1979

Maintained vs Alternative Hypotheses	Estimating Equation	No Correction for Serial Correlation		First Order Serial Correlation Correction		
		γ_1	t-statistic$_1$	γ_2	t-statistic$_2$	ρ
(A4) vs (A5)	(A6)	2.53	2.87*	2.78	2.52*	.3
(A5) vs (A4)	(A7)	−1.53	−1.74*	−1.78	−1.62	.3

* Significant at the .05 level; the two-tailed test.

Note: See the Appendix for on explicit description of various equations. ρ is the first order serial correlation coefficient; the equations (A6) and (A7) are estimated by the Hildreth-Lu estimation procedure.

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A REVIEW OF BANK PERFORMANCE IN THE FIFTH DISTRICT, 1983

F. Ward McCarthy Jr.

The profitability of Fifth District banks improved dramatically in 1983. The .98 percent return on average assets and 15.2 percent earned on average equity capital were well above the average returns of recent years. With interest rates well below prevailing yields of the previous few years and loan demand that lagged the increase in business activity by several months, most banks found it difficult to generate a strong stream of interest revenue. Consequently, noninterest revenue sources and cost reductions contributed more to increased profits than did growth in interest income. Despite changes in liability structure and lower market rates, which caused a significant decrease in average interest expenses, net interest as a share of average assets still fell 17 basis points. A strong gain in noninterest income offset most of the decline in net interest margins, however. Reductions in provisions for loan loss and losses on securities transactions, and lower noninterest expense growth were major factors in increased net earnings.

The cost structure of Fifth District banks was strongly influenced by deposit deregulation. The Garn-St. Germain Depository Institutions Act of 1982 authorized banks to offer a money market deposit account (MMDA). MMDAs became available on December 14, 1982 and permitted the public to earn market rates of interest on deposits with limited transactions features. MMDAs are available to all customers and carry a reserve requirement of 3 percent on nonpersonal accounts, but no reserve requirements on personal accounts. The Depository Institutions Deregulation Committee (DIDC) also authorized banks to offer a Super-NOW account on January 5, 1983. Super-NOWs are fully transactional accounts that pay unregulated interest rates on initial and maintained balances of at least $2,500. Super-NOWs carry transaction account reserve requirements of 12 percent and are available to a limited clientele including nonprofit organizations, households and government agencies. Fifth District banks attracted over $15 billion in MMDAs and Super-NOWs. In doing so, these banks altered the structure of liabilities and greatly increased the yield sensitivity of deposits. This recomposition was instrumental in reducing interest expense since a large volume of the funds that flowed into these deregulated consumer accounts were shifted from higher cost-managed liabilities or longer term deposits.

Banks of all sizes expanded revenue from noninterest sources and reduced loan-loss provisions and noninterest expense. In spite of the increase in aggregate profitability, cash dividends declined 3 basis points as a percent of average assets. Retained earnings, however, increased almost 45 percent. As a consequence, both the rate of retained earnings and internal equity growth also increased substantially. Nonetheless, asset growth outpaced equity growth so that leverage increased for the third consecutive year. Table I summarizes the main components of income and expense relative to average assets for all Fifth District banks for the years 1979-83.

Interest Revenue

The gross return on assets, which is the ratio of gross interest revenue to average assets, declined for the second year in a row. In the aggregate, Fifth District banks collected 9.58 percent for each dollar of assets compared with 10.86 percent in 1982. This reduction in gross returns is a reflection both of prevailing market yields that remained substantially below the average yields of the past few years (see Chart 1) as well as the pattern and composition of asset growth over the year. While banks of all sizes expanded loan and investment security portfolios, security holdings grew substantially faster than loans until the fourth quarter. As a consequence, banks were less successful in generating current interest income than in expanding the asset base. Approximately 70 percent of Fifth District banks reported

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Table I

INCOME AND EXPENSE AS A PERCENT OF AVERAGE ASSETS
FIFTH DISTRICT COMMERCIAL BANKS, 1979-1983

Item	1979	1980	1981	1982	1983
Gross interest revenue	8.49	9.46	11.15	10.86	9.58
Gross interest expense	4.53	5.60	7.29	6.93	5.82
Net interest margin	3.96	3.86	3.86	3.93	3.76
Noninterest income	.80	.90	1.01	1.03	1.16
Loan loss provision	.26	.26	.25	.28	.25
Other noninterest expense	3.24	3.37	3.48	3.53	3.45
Income before tax	1.26	1.13	1.14	1.15	1.22
Taxes	.28	.20	.19	.18	.22
Other[2]	−.04	−.04	−.09	−.10	−.02
Net income	.94	.89	.86	.87	.98
Cash dividends declared	.30	.32	.33	.37	.34
Net retained earnings	.64	.57	.53	.50	.64
Average assets ($ millions)	80,671	88,280	97,217	108,439	121,173

[1] Average assets are based on fully consolidated volumes outstanding at the beginning and at the end of the year.

[2] Includes securities and extraordinary gains or losses after taxes.

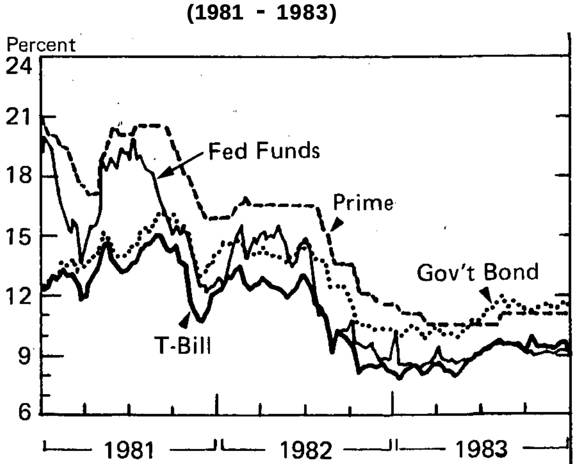
year-end 1983 interest earnings in excess of the previous year's figure. Of those that reported higher interest earnings, few were able to accumulate interest revenue proportionally to asset growth.

The sharpest deterioration in gross returns occurred at banks with $750 million or more in assets. As a group, these large banks experienced a 141 basis point reduction in the interest revenue average assets ratio (see Chart 2). None of these institutions reported an increase in gross return on assets. An inability to generate a stream of interest revenue commensurate with asset growth characterized banks in all size categories, however. Only 6 percent of the banks with less than $750 million in assets recorded an increase in the gross return on assets. In contrast, over 70 percent of all banks in the Fifth District reported an increase in interest revenue scaled to average assets in 1982.

Chart 1

SHORT- AND MEDIUM-TERM RATES

(1981 - 1983)



As indicated in Table II, the effective yield on gross loans declined 176 basis points on average. The reduction in loan yields at banks with less than $100 million in assets was more modest. Specifically, these small banks reported a decline in loan yields of 89 basis points. Because of a relatively high incidence in small bank portfolios of fixed-rate consumer loans and mortgages bearing the high yields inherited from the past, the average yield at small banks was partially insulated from the reduction in market rates. Conversely, the decline in the return on loan portfolios was steepest at the large banks because these institutions are more vulnerable to interest rate fluctuations. Short-term and floating-rate loans with yields that are sensitive to market conditions account for a large fraction of large-bank loan portfolios. Medium-sized banks with loan portfolios similar in character to large bank portfolios

Table II

AVERAGE RATES OF RETURN ON SELECTED INTEREST-EARNING ASSETS FIFTH DISTRICT COMMERCIAL BANKS, 1979-1983

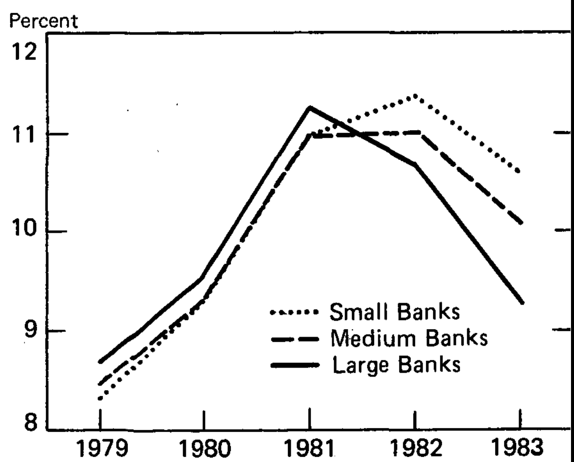
Item	1979	1980	1981	1982	1983
Gross loans	11.25	12.50	14.48	14.14	12.38
Net loans	11.37	12.63	14.64	14.30	12.53
Total securities	6.43	7.15	8.57	9.27	9.20
U. S. Government	8.14	9.16	11.22	11.79	11.17
State and local	5.17	5.56	6.11	6.68	6.74
Other	2.88	3.25	4.20	5.82	5.96
Total interest-earning assets	10.09	11.28	13.18	12.68	11.11

also reported a significant deterioration in average loan yields. Medium-sized banks are banks with less than $750 million in assets but more than $100 million.

The share of Fifth District bank assets allocated to loans rose by approximately one percent. There was significant variation in the pattern and rate of growth of different loan categories during the year (see Table III). Only the volume of commercial real estate loans grew steadily throughout the year, although consumer credit activity accelerated over the last three quarters after a lethargic first quarter. Consumer mortgage and commercial and industrial (C&I) loan extensions were considerably more erratic. Growth in all four major loan categories

Chart 2

GROSS INTEREST RATIO*



*Interest revenue divided by average assets.

Table III

QUARTERLY GROWTH RATES IN SELECTED LOAN CATEGORIES IN 1983

Loan Category	Q1	Q2	Q3	Q4
Home mortgages	2.1	2.0	1.6	7.0
Commercial real estate and development loans	3.0	4.1	6.5	9.2
Commercial and industrial loans	2.5	3.8	2.5	11.7
Consumer loans	−2.7	5.1	7.1	11.4

peaked in the fourth quarter. The expansion in C&I loans and consumer credit occurring after September exceeded 40 percent on an annual basis. C&I loan growth over that period was even stronger for the large bank group.

Returns from securities portfolios at all banks declined 7 basis points. This decline reflected the lower yields on federal treasury and agency securities and the enormous volume of these investments which banks purchased. Fifth District banks added almost $6 billion of these investments to asset portfolios. This growth in federal security holdings was especially strong over the first three quarters but tapered off in the fourth quarter to coincide with the resurgence in loan demand.

Interest Expense

With market rates remaining substantially below the average level of recent years, the average cost of interest-bearing liabilities declined 186 basis points (see Table IV). In response to the ongoing deposit deregulation, banks of all sizes expanded their holdings of rate-sensitive liabilities and reported sub-

Table IV

AVERAGE COST OF FUNDS FOR SELECTED LIABILITIES
FIFTH DISTRICT COMMERCIAL BANKS, 1979-1983

Item	1979	1980	1981	1982	1983
Time and savings accounts	7.15	8.68	10.63	9.91	8.19
Large time deposits	9.96	11.33	14.35	12.05	7.62
Deposits in foreign offices	10.28	13.17	15.18	12.79	7.73
Other deposits	6.16	7.54	9.23	9.12	8.34
Subordinated notes and debentures	8.19	8.20	8.11	8.34	8.32
Federal funds and repurchase agreements	11.94	13.34	15.54	11.21	8.52
Other	6.98	8.65	13.49	11.29	8.75
Total	7.60	9.13	11.23	10.10	8.24

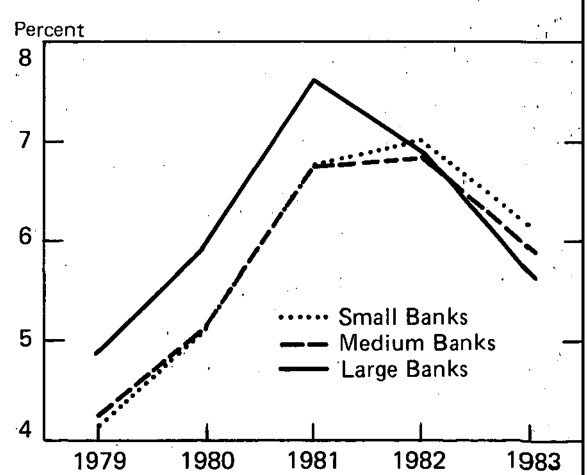
stantial reductions in the average cost of funds. Interest expense per dollar of average assets, the interest expense ratio, declined from 6.93 percent to 5.82 percent, on the average. The decline was most pronounced at the large banks where interest expense ratios declined 120 basis points (see Chart 3). Reductions in interest expense were evident at banks of all sizes, however. District-wide, 97 percent of the banks reported lower expense ratios and 65 percent lower total interest expenditures than in 1982.

Most categories of interest-bearing liabilities showed an average cost decline of at least 250 basis points compared with 1982. The decline in the effective interest rate paid on certificates of deposits (CDs) and balances of foreign offices was markedly steeper. Because a substantial portion of CDs bearing high interest rates matured and were repriced at the relatively lower yields that prevailed in 1983, the average cost of CDs decreased almost 4.5 percentage points; the 5.06 percentage point decline in the average cost of the highly liquid and rate-sensitive foreign office, deposits was also due directly to the lower market rates. On the other hand, the average interest expense associated with subordinated notes and debentures was virtually unchanged because of the fixed interest rates and relatively long maturities which these liabilities carry. The average effective rate paid on "other" deposits is a weighted average of the interest expense on deposits such as savings and small time deposits, negotiable order of withdrawal (NOW) accounts, Super-NOW accounts and MMDAs. The relatively small decline in the average cost of these funds reflects the net effect of lower market rates and a shift from fixed or low interest deposits, such as savings deposits and NOW accounts, to MMDAs and Super-NOWs, which carry market rates.

Both MMDAs and Super-NOWs were very successful, in attracting funds and both stimulated a major restructuring of Fifth District bank liabilities. The growth of MMDAs was especially dramatic (see, Table V). The weekly flow of funds into MMDAs averaged well over $1 billion for the first month that the deposit was offered. By early March, however, the weekly flow had decelerated to about

Chart 3

INTEREST EXPENSE RATIO*



*Interest expense divided by average assets.

Table V

MONTHLY BALANCES IN MONEY MARKET DEPOSIT ACCOUNTS AND SUPER-NOW ACCOUNTS[1]

(in millions of dollars)

Date	MMDA	Super-NOW
12/15/82	287.1	-
12/29/82	3,530.2	-
1/26/83	7,581.8	452.8
2/23/83	9,360.7	643.1
3/30/83	10,523.3	799.1
4/27/83	10,975.8	897.3
5/25/83	11,629.6	951.2
6/29/83	12,084.8	1,003.7
7/27/83	12,369.1	1,064.1
8/31/83	12,613.1	1,139.9
9/28/83	12,772.3	1,154.9
10/26/83	13,140.7	1,219.9
11/30/83	13,646.9	1,270.5
12/28/83	13,850.7	1,314.6

[1] Does not include balances at banks with less than $15 million in deposits.

$500 million but still remained at a greater than $100 million pace throughout the first half of the year. By midyear, MMDAs comprised more than one quarter of all savings and time deposits. By year end, they made up approximately 28 percent of these deposits. This share was about ten percentage points lower, on average, at small banks, however.

The growth of Super NOWs was less spectacular than that of MMDAs. However, Fifth District banks accumulated approximately $1.3 billion in Super-NOWs. By December, Super-NOW balances comprised almost 20 percent of all checkable deposits other than demand deposits, such as NOW, ATS and Super-NOW accounts, and 6 percent of traditional demand deposits. At small banks, however, Super-NOW balances comprised well over 30 percent of other checkable deposits and 14 percent of demand deposits by the end of the fourth quarter.

Rates available to MMDA depositors were substantially higher than yields on Super-NOWs throughout the year (see Chart 4).[1] Because of the broad transactions features of Super-NOWs, these accounts carry transaction account reserve requirements and are more costly to service than MMDAs. MMDAs have at most a small reserve requirement and lower service costs than Super-NOWs because they have limited transactions features. The positive spread between MMDA and Super-NOW yields is associated with the different costs of the two accounts. This rate differential was also influenced by marketing strategies, however. The widest spread between MMDA and Super-NOW rates occurred in January when banks were still competing aggressively for MMDAs, in some cases with promotional rates that were out of line with other short-term rates. The spread narrowed to as little as 108 basis points in March and April before rising again in the second half of the year and leveling off at around 140 basis points.

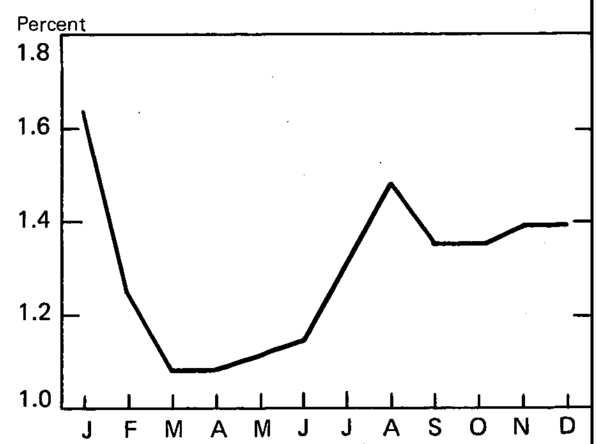
In spite of the higher average return associated with MMDAs, Super-NOW depositors maintained average balances that were substantially above the minimum required to avoid a ceiling on the interest rate paid on the account. Through August, Super-NOW balances exceeded the minimum requirement by an average of almost $12,000.[2] Depositors who maintained such large Super-NOW balances rather than shifting excess funds to an MMDA, forfeited interest at the average annual rate of 1.3 percentage

[1] Yields on MMDAs and Super-NOWs are based on a stratified sample of Fifth District banks and are weighted averages. Constituting the weights are the balances of the individual institutions.

[2] Based on a stratified sample of Fifth District banks. Data are not available after August 1983.

Chart 4

SPREAD BETWEEN MMDA AND SUPER-NOW RATES



points. Assuming average excess Super-NOW balances of approximately $12,000 per account were maintained throughout the year, then these depositors sacrificed approximately $150 in interest per account.

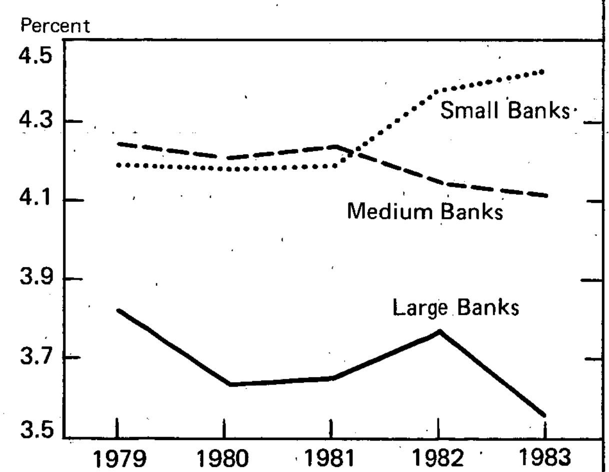
Net Interest Margins

Net interest income, that is, the difference between interest income and interest expense, declined 1 7 basis points relative to the average assets of Fifth District banks. Banks in different. size categories, however,, reported markedly different experiences, experiences that are obscured by the aggregate figure (see Chart 5). Only 13 percent of the banks with $750 million or more in assets recorded increases in net interest margins from 1982. The ratio of net income to average assets declined 21 basis points for these large institutions as a group. Net interest margins expanded 5 basis points at small banks as 55 percent of banks with less than $109 million in assets reported increased margins. While margins also increased at a majority of the medium-sized banks, the net income average assets ratio declined 4 basis points for these banks as a group because of the relatively steep declines registered at some of the larger banks in this asset category.

With aggregate interest income virtually unchanged and the ratio of interest income to average assets declining at 95 percent of Fifth District banks, the ability to control interest expense was a critical determinant of the level and pattern of change in net interest margins during 1983. On the average, banks with expanded net interest margins managed to generate only 1.1 percent more interest income in 1983 than in the previous year; banks with contracted margins reported a .l percent. decline in interest income (see Table VI). Differences in interest expense were more significant. Interest expense declined 7.2 percent and 3.4 percent, respectively, for banks reporting expanded, or conversely, contracted net interest margins. Banks with increased net margins were able to reduce interest costs more rapidly than banks with unchanged or depressed margins because these institutions held a higher proportion of liabilities bearing, market yields.

Chart 5

NET INTEREST MARGIN*



*Net income divided by average assets.

Noninterest Revenue and Expenses

Provisions for loan loss decreased relative to average assets for all banks. This decline accounted for a 3 basis point increase in aggregate profitability. The reduction in loan loss provisions relative to average assets was of approximately the same magnitude at large and small banks and was associated with an improvement in loan quality due to the cyclical expansion.

Cash losses net of recoveries declined approximately 12 percent. Relative to average assets, loan losses decreased most rapidly at the small banks, but were lower at banks of all sizes. Actual loan charge-offs declined 3 percent in the aggregate, while cash recoveries grew by over 22 percent.

Increases in noninterest revenue outpaced growth in assets, as noninterest income rose by over 26 percent in 1983. This dramatic increase in noninterest earnings reflects the more widespread use of explicit pricing of services and a greater dependence on noninterest income as a source of profit. For example, revenue from credit card fees, loan service fees and other miscellaneous fees rose by over 30 percent. Service charges on deposits increased by 19 percent. The increase in deposit service fees is associated with the growth of deposits bearing market interest rates. The largest banks registered the largest increase in deposits service charge income.

The ratio of noninterest expense to average assets declined at banks of all sizes. Increases in wages and salaries were almost 20 percent lower than in 1982. This deceleration in the rate of growth of labor costs accounted for three quarters of the 8 basis point contraction in noninterest expense ratios. Increases in other operating and occupancy expenses were in the order of 10 percent.

Table VI

CHANGES IN NET INTEREST MARGINS IN RELATION TO INTEREST INCOME AND INTEREST EXPENSE GROWTH RATES AND LIABILITY COMPOSITION IN 1983

Total Assets ($ millions)	Number of Banks	Interest Income Growth	Interest Expense Growth	Percent of Rate-Sensitive Liabilities[1]	Percent Change in Net Margin
Less than 100					
Increased margin	269	3.8	- 5.4	59.4	10.6
Others	228	4.1	2.4	57.4	- 8.0
100 to 750					
Increased margin	51	1.9	- 6.6	59.4	9.8
Others	38	.9	- 1.7	57.0	- 8.8
750 and over					
Increased margin	6	- .8	- 8.4	61.2	2.1
Others	28	- .7	- 4.2	59.5	- 8.9
All banks					
Increased margin	326	1.1	- 7.2	60.3	6.2
Others	294	- .1	- 3.4	59.1	- 8.8

[1] Rate-sensitive liabilities include deposits in foreign offices, fed funds purchased, interest-bearing demand notes issued to the U.S. Treasury and other liabilities for borrowed money, and all time and rovings deposits except: NOW accounts, ATS accounts, savings deposits subject to federal regulatory ceilings and IRA and Keogh plan accounts.

Profits and Dividends

Before-tax profits edged up 7 basis points to 1.22 percent of average assets in 1983. The improvement in profitability was twice as great at small banks. However, an increase in taxes relative to average assets offset more than half of the gains in before-tax returns. In the aggregate, taxes increased 4 basis points as a share of average assets. The increase in the tax average asset ratio was almost 6 basis points at small banks.

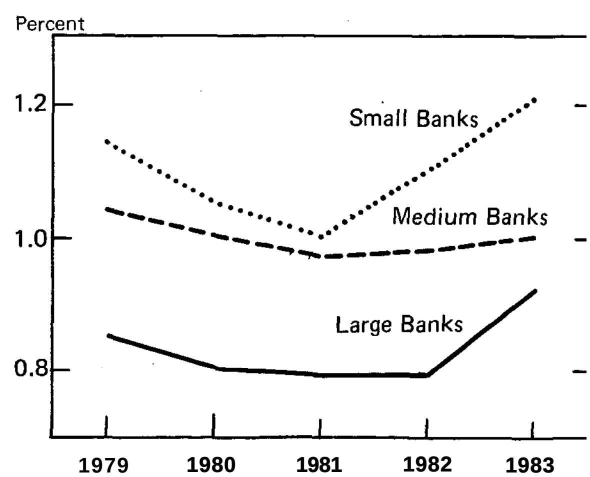
Banks of all sizes reduced losses on securities transactions. Small and medium-sized banks broke even on the year. While large banks registered some losses, these banks did report a substantial improvement in the performance of security operations. In the aggregate; reductions in securities and extraordinary losses contributed to an 8 basis point improvement in net returns.

Net income as a percent of average assets rose to .98 percent, an improvement of 11 basis points over 1982. The gains in average returns were equally impressive at both large and small institutions; gains in earnings rates at medium-sized banks were more modest (see Chart 6). The average return on equity rose by an impressive 2.09 percentage points (see Table VII). The increase in the return on average equity exceeded the improvement in the earnings rate on average assets due to the increase in aggregate leverage. Aggregate leverage measures, such as the average assets/average equity ratio, have increased every year in the Fifth District since 1980.

In spite of the increased profitability, cash dividends on common stock were virtually unchanged from last year and declined 3 basis points relative to

Chart 6

RETURN ON ASSETS*



*After-tax net income divided by average assets.

Table VII

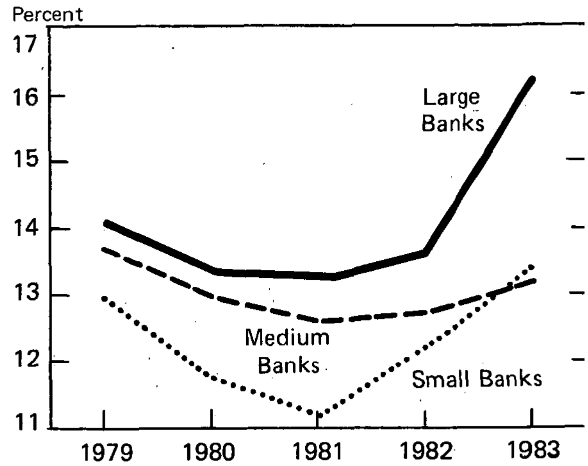
RATES OF RETURN AND LEVERAGE FOR FIFTH DISTRICT COMMERCIAL BANKS[1]

Year	Return on Assets		Assets/ Equity		Return on Equity
1979	.94	x	14.37	=	13.51
1980	.89	X	14.35	=	12.79
1981	.86	x	14.56	=	12.56
1982	.87	X	15.06	=	13.12
1983	.98	X	15.53	=	15.21

[1] The return is net income; assets and equity ore averages. Discrepancies in calculations are due to rounding error.

Chart 7

RETURN ON EQUITY*



*After-tax net income divided by average assets.

average assets in the aggregate. Dividend policies differed significantly at large institutions and banks with less than $750 million in assets. Most of the increase in income at small and medium-sized banks were distributed to stockholders, as, cash dividends increased 15 percent and expanded relative to average assets while retained earnings' kept pace with asset growth. On the other hand, large banks decreased cash dividends and increased retained earnings by an average of 80 percent. Consequently, retained earnings scaled to average assets increased 150 percentage points for the large bank group. In the aggregate, retained earnings relative to average assets rose 14.5 basis points.

Equity capital was expanded by $853 million in 1983, $300 million more than in 1982. Nonetheless, the capital growth rate of 10.3 percent was 2 percent slower than asset growth, and the aggregate leverage ratio, defined as average assets divided by average equity, increased by 47 basis points. This increase in leverage accounted for approximately 20 percent of the 209 basis point increase in the return on equity (see Table VII). The increase in profitability was responsible for the remaining 167 basis point increase in return on equity.

The rate of internal equity growth rose 2.5 percentage points in 1983 and, at an annual rate of 9.96, 'was higher than it has been in a number of years (see Table VIII). As a consequence, the discrepancy between asset growth and internal equity growth narrowed. Asset growth has exceeded internal equity growth since 1980, contributing to the increase in

Table VIII

INTERNAL EQUITY GROWTH RELATIVE TO ASSET GROWTH FOR FIFTH DISTRICT COMMERCIAL BANKS

Year	Return on Equity[1]		Rate of Retained Earnings[2]		Internal Equity Growth	Asset Growth	Internal Equity Growth - Asset Growth
1979	13.51	x	.6819	=	9.21	5.19	4.02
1980	12.79	X	.6418	=	8.20	9.43	-1.23
1981	12.56	X	.6116	=	7.68	10.12	-2.44
1982	13.12	X	.5695	=	7.47	11.54	-4.07
1983	15.21	X	.6547	=	9.96	12.30	-2.34

[1] See Table VII, footnote 1.

[2] The rate of retained earnings is the ratio of net retained earnings to net income.,

aggregate leverage over that period. The increase in the rate of retained earnings and greater profitability contributed about equally to a higher rate of internal equity growth. The rate of retained earnings in 1983 was higher than in any year since 1979. Nonetheless, the increase in equity capital from retained earnings declined substantially (see Table IX). Banks raised $80 million in equity from sources other than income retention such as the equity markets.

Summary and Conclusions

The profitability of Fifth District banks improved significantly in 1983. Dollar profits rose more than 25 percent, and the 98 percent earned on average assets was an 11 basis point improvement over the .87 percent earned in 1982. Moreover, the rate of return on average equity capital increased 209 basis points to 15.21 percent, as asset growth exceeded equity growth for the third consecutive year. This district-wide increase in leverage occurred even though the rate of retained earnings and the rate of internal equity growth increased.

Because market interest rates were below the average levels of the previous few years and loan growth lagged the economic expansion, few banks were able to expand the gross return on assets. As a consequence, the level and pattern of change for net interest margins were strongly influenced by the ability to control interest expense. Banks with a cost structure that was relatively sensitive to changes in market conditions were the most successful in reducing interest expense and increasing net interest margins; many of these low-cost institutions attracted a substantial volume of funds in MMDAs and Super-NOWs. Aggregate profitability was enhanced. by a large increase in noninterest revenue and reductions in noninterest expense and provisions for loan loss.

Given the continued strength in the economy, growth in loan demand and the upward movement in market interest rates, Fifth District banks should be able to expand the flow of interest revenue and increase the gross return on assets in 1984. Since deposit deregulation has led to an increased sensitivity of the commercial bank cost structure to changes in market rates, net interest margins and profitability in general will depend on the ability to contain interest expense should interest rates rise as the year progresses., Net interest margins are likely to be more volatile. Consequently, Fifth District banks must also attempt to increase the revenue flow from noninterest sources and control noninterest expense, especially labor costs, in order to maintain profitability.

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Table IX

RATE OF RETAINED EARNINGS AND SOURCES OF TOTAL EQUITY CAPITAL FOR FIFTH DISTRICT COMMERCIAL BANKS

Year	(1) Net Income ($000)	(2) Net Retained Earnings ($000)	(3) Rate of Retained Earnings1	(4) Increase in Equity Capital ($000)[2]	(5) Increase in Equity Capital from Retained Earnings[2,3]
1979	758,804	517,398	.6819	557,787	.9276
1980	788,145	505,872	.6418	542,487	.9325
1981	840,834	514,278	.6116	558,561	.9205
1982	944,785	538,068	.5695	545,990	.9855
1983	1,179,971	772,571	.6547	852,862	.9059

[1] See Table VIII, footnote 2.

[2] The figures for 1979-1982 have been adjusted to correct for data error.

[3] The increase in equity capital from retained earnings is calculated by dividing column (2) by column (4).