

Expectations

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It is a great honor for me to be here tonight to present the Twenty-Second Henry Thornton lecture. In preparing this lecture, it has been fascinating to read parts of Thornton's great book, *An Enquiry into the Nature and Effects of the Paper Credit of Great Britain*, published in 1802, and F.A. Hayek's introduction to the 1962 reprint of *Paper Credit*. I recall reading Thornton years ago, but remember little of it. Rereading him today, I certainly appreciate Thornton's insights to a far greater extent than I did when I first read his book. I have also found it instructive to read several previous Thornton lectures. I'll refer to these lectures and to Thornton himself on several occasions this evening.

It is standard practice for Federal Reserve officials, with the exception of the Chairman, to begin every public presentation with a disclaimer. Thornton himself wrote a disclaimer in the introduction of his book, and I will adopt his disclaimer as my own for this lecture. Thornton wrote:

That [this work's] leading doctrines are just, the writer feels a confident persuasion. That it may have imperfections, and some, perhaps, which greater care on his part might have corrected, he cannot doubt. But he trusts, that a man who is much occupied on the practical business of life, will be excused by the public, if he should present to them a treatise less elaborate, and, in many respects, more incomplete, than those on which he has found it necessary to remark. Future inquiries may possibly pursue, with advantage, some particular topics on which he has felt a certain degree of distrust.

It may not be irrelevant or improper to observe, that the present work has been written by a person whose situation in life has supplied information on several of the topics under discussion . . .¹

As one now pursuing the "practical business" of central banking, I can relate easily to Thornton's disclaimer. I would just add that I value the conversations on these subjects with my colleagues at the St. Louis Fed, especially Robert H. Rasche, but that I am responsible for the views expressed. These views do not necessarily reflect official positions of the Federal Reserve System.

Almost every aspect of human behavior is conditioned by expectations. Indeed, a distinguishing feature of humans among all living things is that humans, to an unmatched degree, calculate behavior in light of possible future outcomes. I cannot discuss the whole of human behavior in one lecture, or in one lifetime. Even the topic of expectations in a macroeconomics context is overly broad; I will concentrate rather unsystematically on aspects of this topic that are of special interest to me because of my current responsibilities. I will discuss issues from the perspective of central banking problems, but much of what I say applies to other areas of government policy.

By "rational expectations" I mean that market outcomes have characteristics as if economic agents are acting on the basis of the correct model of how the world works and that they use all available information in deciding on their actions. That information includes probable future monetary policy actions and, more generally, how monetary policy actions are likely to depend on various possible states of the economy. Expectations may be nonrational in an infinity of ways.² Almost every economist is familiar with the colorful language Keynes used to describe his view on how security values were determined. In one of his more succinct statements, Keynes (1936, p. 154) said that, "A conventional valuation which is established as the outcome of the mass psychology of a large number of ignorant individuals is liable to change

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¹ F.A. von Hayek (1962, p. 69): first published in 1939, this book contains Hayek's introduction, Thornton's *An Enquiry into the Nature and Effects of the Paper Credit of Great Britain*, two of Thornton's speeches in the House of Commons in 1811, and other materials.

² I use the word "nonrational" rather than "irrational" because the latter sometimes carries connotations that I do not intend. Expectations may depart from full rationality without being "crazy," "silly," "emotional," or "stupid."

violently as the result of a sudden fluctuation of opinion due to factors which do not really make much difference to the prospective yield.” Keynes and many others have viewed expectations as being driven by emotion and efforts to ride market trends without regard to underlying values. Popular commentary on bond, stock, commodity, and foreign exchange markets often focuses on presumed patterns in the data, such as resistance and support levels, that make no theoretical sense and are completely unsupported by careful empirical investigation.

In econometric models, economists have often used adaptive expectations, which are simple, and simple-minded, extrapolations of the past. Adaptive expectations are the antithesis of the emotional process Keynes emphasized. Adaptive expectations, as averages of recent observations, change relatively smoothly and continuously. They are unaffected by news items per se; if news moves the market, the adaptive expectation incorporates only a fraction of the unexpected price adjustment into expected future prices.

I will take up four topics. The first is what we can learn about expectations from banking panics and, more generally, from sharp disturbances in financial markets. The second is central bank credibility. The third is inflationary expectations. The fourth is the extent to which the market can predict central bank actions. I will connect these topics to produce what I hope will be a coherent account of certain expectations issues from the perspective of a practicing central banker.

I do not doubt that expectations are sometimes nonrational. My main theme, however, is that we central bankers should not be smug in assessing our presumably superior understanding of what expectations *ought* to prevail. We need to reflect on our possible role in creating and sustaining expectations that we regard as nonrational, and on the possibilities for pursuing policies that yield market outcomes closer to those reflecting rational expectations.

WHAT DO PANICS TELL US ABOUT EXPECTATIONS?

Sudden and unpredictable changes in market sentiment create problems for all sorts of businesses. Hayek, in his introduction to Thornton’s *Paper Credit*, quotes from a contemporary account of an incident Thornton had to face in 1810.

[Thornton] was on his road with his family to

Scotland. It was a time of severe pressure upon banks and trading interests . . . The bank in which Mr. Thornton was a partner felt the pressure, and felt it severely, just after their most able partner had left London for the North. Had Mr. Thornton known what was impending, he would not have absented himself. The news reached him on his route to Scotland, and caused him some embarrassment. To return from a journey undertaken and generally known, would have spread rumors which might have brought on the very crisis that was to be feared. This course, therefore, could not be thought of. He decided to continue his journey, but he opened himself in confidence to one valued friend, and stated his wish that some thousands of pounds might be placed at the disposal of his partners in the bank. No sooner was the hint given than it was met by ample support. Funds poured in from all quarters—Wilberforce, with generous ardour, hastening to lead the way; and the money came in such a flood, that his bank saw itself lifted above the sands on which it was settling, and floated into deep waters with abundant resources. (p. 27)

This incident is interesting because it focuses on the problem of managing market expectations. From a central-banking perspective, the issues have been quite well understood since Walter Bagehot published *Lombard Street* in 1873. A central bank can resolve a banking panic by providing liquidity to solvent banks.

Let’s look at the nature of the expectations issue when financial panic strikes. The place to start is with this question: Are the rumors sparking the crisis true? In the incident recounted above, the rumor was untrue. The bank was solvent and had access to ample sources of liquid funds; once it marshaled the funds, the problem was solved. In other cases, of course, rumors are true. In the fall of 1998, for example, Long Term Capital Management (LTCM) was severely overextended. The firm was indeed in danger of being unable to meet its obligations, and market participants were right to question its solvency. Moreover, the obligations outstanding were so large that significant market disruption might have occurred had the firm defaulted.

A central bank faces several issues in cases like LTCM. Without action, market prices may decline

so much that a thinly capitalized firm goes under. But intervention may have the undesirable effect of propping up an institution that failed to meet the market test. This is the problem of moral hazard; other firms may bet on central bank intervention in similar cases in the future and thereby manage their affairs in a way that increases the probability of a crisis. Bagehot's solution to the moral hazard problem was for the central bank to lend at a penalty rate of interest. Marshaling private lenders who accept the risk works the same way.

What is the nature of expectations in a panic? Is the distinction between rational and nonrational expectations helpful here? I think we must look at two issues: One is that solvency may not be clear even to the best informed, most rationally calculating observer; the other is that the problem is sometimes just informed versus incompletely informed expectations.

Academic battles over rational expectations have often focused on rational expectations versus expectations driven by emotion or a failure to calculate sensibly. However, I think that panics large and small are sometimes driven by the lack of complete information, and in those cases the policy issue is relatively simple.

Consider an incident during the banking crisis in the state of Rhode Island in 1990-91. I was on the faculty of Brown University and lived in Providence, Rhode Island, at that time. A number of state-chartered credit unions and savings banks were insured by a private deposit insurance company. One of these credit unions, by the way, was the Brown University Employees' Credit Union. As I recall the chronology of events, in November 1990 one of the savings banks discovered a large embezzlement, which led to its failure. That failure nearly wiped out the assets of the deposit insurance company, which in turn led to widespread concern about the safety of deposits in other insured institutions. The crisis was reported in the Providence newspaper day after day. CNN sent a reporter to cover the story, and the reporter went on camera standing in front of a local bank—the Old Stone Bank. The next day, following the CNN report, there was a run on Old Stone Bank. Old Stone was federally insured and had nothing whatsoever to do with the crisis of the locally insured credit unions and savings banks.

Was it rational for Old Stone's depositors to pull their funds out of the bank? Those of us involved in banking and finance might easily say

that such behavior was irrational because that bank was federally insured. But as I reflect on my own behavior in areas where I am less well informed, I am not so sure that judgment is sound. For example, when the recent publicity concerning Firestone tires hit the newspapers, I went out to my garage to look at the tires to figure out how my cars were equipped.

Information is costly, and our brains have only a finite number of cells to hold information. When an event or rumor brings an issue to public attention, many people will inevitably and appropriately react on the basis of highly imperfect information. The reactions may be perfectly sensible—rational, if you will—given the limited information at hand. Given incomplete information, I think it is completely rational for depositors to pull funds out of a suspect bank. Indeed, in the Eighth Henry Thornton Lecture, Karl Brunner argued that money itself exists because it helps to alleviate information problems. I agree with Brunner that the full-information version of the rational expectations hypothesis provides valuable insights for certain problems but is incapable of explaining some important phenomena.

Returning to the case in Rhode Island, the run on Old Stone Bank was quickly halted through the spread of accurate information. The bank itself and banking authorities emphasized to the public that Old Stone was federally insured and had no connection to the statewide banking crisis.

Many panic cases in practice reflect highly incomplete information. Given the costs of obtaining information, I think situations of this kind, which are not uncommon, provide compelling evidence against a pure, full-information version of the rational expectations hypothesis. Not only are some market participants poorly informed, which is obvious, but market outcomes can reflect poorly informed views. However, it is essential that we not equate expectations based on incomplete information with expectations that are hopelessly emotional and irrational; provision of information does have observable effects on market outcomes. From a policy perspective, that means that provision of accurate information is the first line of defense in cases of financial panics.

If this argument seems almost self-evident, we need to remember that from time to time central banks (and government authorities more generally) have contributed to the problem rather than alleviating it. Sometimes panics are driven by rumors that turn out to be substantially accurate. In such

circumstances, those in authority may attempt to alleviate or avoid panic by glossing over the severity of the problem. Doing so may help to manage a particular incident, but at the cost of damaging the long-run credibility of the authorities.

A particularly clear, and expensive, example of this process was the U.S. savings and loan (S&L) industry. From the mid-1960s to the late 1980s, the U.S. government and regulatory bodies took numerous steps to deal with the institutional and financial weaknesses of numerous S&Ls. The process culminated in a \$150 billion government bailout of the Federal Savings & Loan Insurance Corporation (FSLIC). Congress closed down FSLIC and the regulatory agency, the Federal Home Loan Bank Board. The political careers of several members of Congress were damaged or ended by the voters. I am convinced that the government could have avoided this entire mess if it had required market value accounting for S&Ls from the beginning.

Providing information prospectively, as with market value accounting, is perfectly feasible in many cases. In the Rhode Island banking crisis, and others, part of the problem has been that depositors genuinely believed that their deposits were perfectly safe—as safe as the currency in their wallets. The Rhode Island incident was not unique; the United States has a long history of failure of private and state deposit insurance funds.³ If a government can standardize the definition of Scotch whiskey, why can't it standardize the definition of "deposit"? Given that depositors have so often been confused in the past, why not reserve the word "deposit" in the United States for a liability insured by the U.S. government?

Along the same lines, in the United States we need to clarify the extent of the federal guarantee for the liabilities of governmentally sponsored enterprises (GSEs). Although the legal situation differs from one enterprise to another, the liabilities of GSEs often carry no explicit guarantee, yet the market prices these obligations as if there were a federal guarantee. Based on past practice and continuing debate, market participants have every reason to assign a relatively high probability to a federal bailout should a GSE come close to defaulting on its obligations. Similar issues surround the "too big to fail" doctrine applied to large private financial institutions.

If a market crisis emerged one day because investors came to believe that the federal government was prepared to let one or more of these firms fail, would the crisis be the fault of nonra-

tional expectations or of government policy that failed to clarify the issue?

The appropriate government role in guaranteeing financial obligations is a complex issue, and I don't intend to explore the merits of various positions here. But I do feel strongly that the government itself, not the market, is responsible if market expectations over a potential default seem emotionally driven and volatile. I hope I'm wrong, but I'm willing to speculate that the issue will remain unresolved in the United States until a threatened or actual default forces the issue. The United States did not address the S&L issue until it became too large to ignore. The political response is likely to depend heavily on the facts, or perceived facts, at the time, especially claims about who will be hurt by whatever decision is made and who is "at fault" and therefore deserves to be punished. Neither I nor market experts who know more about these matters can form confident expectations about outcomes in such cases. But I want to reiterate that the issues surrounding government guarantees can and should be addressed before a crisis strikes.

The rational expectations revolution in macroeconomics made clear that the distinction between policy and policy actions is critical. *Policy* reflects the general regularity of behavior of policymakers over time; *policy actions* are the individual responses case by case. Whenever policymakers believe that market expectations are irrational, policymakers ought first to look into the mirror and ask whether policy is coherent. Market expectations about policy cannot be coherent if policy is not coherent. I've suggested that U.S. policy toward federal guarantees is currently ill defined, and now I want to turn more explicitly to monetary policy.

I must say that there is amazingly little academic research providing solid guidance as to what I ought to do to help define a more coherent monetary policy. I am not implying, of course, that I believe that Fed policy is incoherent today. What I am saying is that research showing how we can do better, or even just characterizing more accurately the policy followed in recent years, is surprisingly thin. Research on monetary policy reaction functions seems quite unfruitful to date. Among those who have worked on this issue, I think the view is nearly unanimous that in recent years Federal Reserve policy has been better than

³ See English (1993).

any proposed explicit policy rule. That means that no one has been able to write down a policy rule that accurately characterizes Fed policy.

This observation has a direct implication for research into the rationality of expectations. The key idea of the rational expectations hypothesis is that the market forms expectations based on estimates of model parameters that match the true model parameters. No one should be surprised if economists have difficulty confirming the rationality of market expectations about inflation, for example, if economists cannot even characterize Fed policy with much accuracy. Why should economists judge the market by standards they themselves, with all their knowledge of theory and econometrics, cannot meet? Indeed, this line of argument opens up the possibilities (i) that the market may behave *as if* it were able to characterize policy correctly and (ii) that economists' tests of rational expectations fail because economists fail rather than because markets fail. In the last section of this lecture, I'll describe some recent research at the St. Louis Fed suggesting that markets in fact understand recent Fed policy far better than economists do.

I've argued that market panics, and inexplicable changes in asset prices more generally, may not reflect the irrationality that many economists seem to assume. Panics may arise, at least in part, from the failure of policymakers to follow clear and coherent policies. Everyone agrees that, in general, asset prices ought to change when policy changes. If policy is ill defined, then no one should be surprised when asset prices change as market perceptions about prospective policy change. These perceptions will be weakly held and are therefore subject to change, perhaps even abrupt change, because it is not rational to have firm views about policy when policy is ill defined.

An objection to this view might be that it provides no explanation of the timing of panics and sharp changes in asset prices. But this objection is unconvincing. If an accurate empirical model—whether an economic or a psychological model—of timing existed, then the market would use that information to seek the profit implied. An uncontested implication of rational expectations theory and evidence is that there are no easy profits to be had in asset markets. Panics and market crises *must* be unpredictable. To me, as a policymaker, the implication of inexplicable and unpredictable panics and asset price changes is not that we need

a new, nonrational expectations approach to understanding expectations. Instead, we need to examine how policy bodies can more effectively transmit accurate information to the market and how policy can be made more coherent and reliable. In short, policymakers need to reallocate their thinking time more to looking inward at what they do and less to looking outward at what markets do.

WHERE DOES THIS CREDIBILITY COME FROM?

This discussion leads naturally to the broader subject of credibility. Markets should view economic policy in terms of a rule or regularity of behavior. Markets interpret individual policy actions in the context of their consistency with the policy, given the facts of the current situation. If authorities mislead the public in a particular situation, then public confusion or distrust will make it more difficult for policymakers to deal with the next crisis. It is important to emphasize the enormous benefit of central bank credibility in all areas in which it exercises its powers.

Central bankers have not always appreciated the importance of credibility. To relate a personal example from the 1970s, while on the faculty of Brown University I had many contacts with Federal Reserve officials. As inflation continued over the course of the decade, I became increasingly skeptical of the Federal Reserve's profession of allegiance to the goal of low inflation. I said, in effect, to some of my Fed friends, "I don't believe you." I think they were insulted by what I said, but the markets increasingly did not believe the Fed either. Although criticism from many different directions is a fact of life for central bankers, they should take such criticism seriously. At the same time, they should be careful not to assume that comments reflecting general esteem for those in office necessarily are a vote of confidence in the policies being pursued.

There is now an extensive literature on central bank credibility; I can hardly claim to be familiar with all of it. But what does strike me about this literature, as useful as it is, is that it does not go very far in providing specific advice to central banks about building credibility. The practical problem I face is in trying to decide how, if at all, to react to the latest release of employment data, inflation data, and the steady flow of other information of all kinds day by day. The problem is to make individual policy actions add up to a coher-

ent policy. To be credible, the central bank must be successful in achieving its stated goals. To deliver on these goals, the central bank must know how to respond to the steady flow of information, and its responses to this information must make sense as policy. That is, every central bank needs a monetary policy strategy in which the goals are clear and the policy actions to achieve the goals are well defined.

Many market participants have great expertise in monetary matters, and they form reasoned judgments about the performance of central banks. We may call the view that emerges “reasoned credibility.” But there is another aspect of credibility that arises from the fact that most of any individual’s views and expectations come not from personal study and investigation but from acceptance of views of trusted authorities, or experts. No one has the time to be expert about everything. Reliance on experts is a consequence of the costliness of information. If a central banker is a trusted authority, his or her view on a wide range of economic issues, including many far removed from monetary policy, will carry great weight. Because trusted experts differ, and we all face the problem of picking which experts to believe, over time a central bank can develop special credibility among competing authorities. We may call this general trust of a central bank “institutional credibility.”

Credibility in both its dimensions is earned, or lost, day in and day out, over big issues and small, and is not compartmentalized. In other words, a central bank cannot be distrusted in one area of its operations and retain high credibility in other areas.

The value of credibility is particularly clear in a crisis. When information is highly incomplete and the true state of affairs murky, it is extremely valuable for society if the markets can look to the central bank as a trusted authority and accept its judgments and actions. If the central bank is indeed well informed and competent, its credibility in the markets will obviously make its task far easier.

In 1985, Michael Parkin presented the Seventh Henry Thornton Lecture. His title was, “Inflation Expectations: From Adaptive to Rational to ...?” As a part of his insightful review of expectations issues, Parkin discusses the failure of inflation expectations to fall promptly with the change in

U.K. monetary policy in the early 1980s. He concluded that, given the history and the incentives to inflate, “it is not rational to expect, and act upon the basis of, a low rate of inflation” (p. 13). Both the United States and the United Kingdom bore heavy costs to reestablish expectations of low inflation and central bank credibility.

Central banks around the world today enjoy high credibility compared with the situation only 20 years ago. Just as there were observable market consequences—deep recession—of impaired credibility in the United States and United Kingdom in the early 1980s, there are observable market consequences today.

What are these observable consequences? I will speak only to the situation in the United States, where I know the history and data in detail. I think that there are many such observable consequences and that one of them is the sustained favorable surprise in the unemployment rate. Unemployment as low as the rate the United States has enjoyed in recent years could not have occurred without entrenched expectations of continuing low inflation. In the conventional Phillips curve, the rate of inflation depends on expected inflation and the gap between the actual and natural rates of unemployment. Anecdotal reports from employers and systematic information suggest that the U.S. labor market has been stretched abnormally tight for several years now. I think the best explanation of how these tight labor market conditions can continue is that expectations trump the gap. Firms are just not willing to bid aggressively for labor to fill empty positions because senior management does not believe that higher wages can be passed on in higher prices. Expectations of continuing low inflation dominate the outcome.

That is my tentative hypothesis anyway, but because I do not have research results to support it at this time I’ll not pursue the matter further except to offer one more observation. Most economists believe, I think, that the rational expectations hypothesis is extremely valuable in understanding outcomes in auction markets—like those for equities, bonds, foreign exchange, and commodities—but is of limited application in the labor market. The labor market, so the argument goes, is dominated by institutional behavior, attitudes concerning equity, and slow adjustment to changing conditions. In econometric models of the labor market, adaptive expectations seem to work

well enough. What I'm suggesting is that the U.S. unemployment rate has departed from the conventional estimate of the Phillips curve because that estimate failed to account adequately for the role of rational inflationary expectations in the labor market. The theory of rational expectations provides guidance in understanding economic behavior in all parts of the economy, not just in auction markets.

WHAT DO WE MAKE OF INFLATION EXPECTATIONS?

Thornton had a clear understanding of the distinction between the nominal and real rate of interest. In a speech before the House of Commons in 1811, he noted the following: "If, for example, a man borrowed of the bank a thousand pounds in 1800, and paid it back in 1810, having detained it by means of successive loans through that period, he paid back that which had become worth less by 20 or 30 percent than it was worth when he first received it. He would have paid an interest of 50 pounds per annum for the use of this money; but if from this interest were deducted the 20 pounds or 30 pounds per annum, which he had gained by the fall in the value of the money, he would find that he had borrowed at 2 or 3 percent, and not at 5 percent as he appeared to do" (Hayek, pp. 335-36).

A thorough understanding of the distinction between real and nominal interest rates is a great advance in central banking practice over the last 35 years. We've finally caught up with Thornton. In the United States, at least, in the mid-to-late 1960s, the practical importance of the distinction between real and nominal interest rates was not appreciated. Rising interest rates in the late 1960s were misinterpreted as evidence of a more restrictive monetary policy, when, in fact, nominal rates were not even keeping up with the increase in inflation expectations.

Compared with 35 years ago, the Federal Reserve today has access to far more data on expectations. With inflation-indexed bonds outstanding, we have day-by-day evidence on the behavior of the spread between conventional and indexed bonds. Survey information is widely available. I watch these data closely because they provide clear evidence of the central bank's success in maintaining credibility in achieving sustained low inflation.

The logic of the credibility argument, however, suggests that inflation expectations data do not

provide definitive evidence about whether monetary policy itself is on track. Given that the Fed enjoys very high credibility today, the markets will not necessarily bid up inflation expectations when and if policy goes astray. High credibility means that the market trusts the Federal Reserve's policy judgments. That being the case, the Federal Reserve cannot reliably extract information from data on expectations about the appropriateness of current policy actions.

It is logically possible that policy actions are inconsistent with sustained low inflation at the same time that the market simply trusts the Fed and does not perform a separate analysis of policy actions. Why should any of us, on any matter, engage in a costly investigation when we can instead simply accept the judgment of a trusted authority? The answer is obvious: If the authority is completely trusted, and if separate confirmation of the information is costly, then the cost-efficient thing to do is simply to accept the authority's judgment.

Let me summarize this analysis. The expected rate of inflation over a five-year, or longer, horizon is a direct measure of central bank credibility regarding inflation. At any given time, monetary policy—policy, not policy actions—may or may not be consistent with long-term inflation expectations. Eventually, of course, expectations and policy must be consistent because one or the other will adjust.

Failure to understand this point could foster policy mistakes. When credibility is high, as it is in the United States today, inflation expectations will be slow to adjust. Actual inflation, influenced by expected inflation, may also be slow to adjust. Therefore, expected inflation, certainly, and actual inflation, probably, are poor guides as to the appropriateness of monetary policy in the short run. Similarly, when inflation expectations are high and credibility low, the central bank has the twin problems of getting policy turned around to be consistent with lower long-run inflation and of adjusting policy as credibility builds over time.

If the Fed cannot rely on actual and expected inflation to judge the appropriateness of current policy, because these measures are dominated by the market's assessment of Fed credibility, what can it rely on? We need to concentrate on the underlying determinants of inflation and early

warning signs. The rate of money growth, spreads in financial markets, the supply-demand balance across industries in general, and the behavior of specific prices likely to lead overall inflation are relevant. The aim of policy should be to act *before* changes in inflation appear; clearly, once these changes do appear, the task of restoring credibility and reversing all the adjustments that firms and households have started to make becomes more difficult.

WHAT IS THE SIGNIFICANCE OF MARKET PREDICTIONS OF CENTRAL BANK POLICY?

I'm now going to bring the various strands of my discussion together. My colleague Robert Rasche and I have been pursuing a line of research on the predictability of monetary policy actions. The paper (Poole and Rasche, 2000) is available in the working papers section of the St. Louis Fed Web site; it will be published in the *Journal of Financial Services Research*. I'll outline the basic idea in that paper and then connect it to the argument of this lecture.

Consider a state of monetary policy nirvana in the world we actually live in. That is, if the central bank did as good a job as you can imagine in today's world—a world with many gaps in knowledge, data inaccuracies, and all the real problems real central banks face—what would we observe?

Let's suppose that you think a measured CPI inflation rate of 1 percent per year is optimal and that you believe the central bank can offset some financial and real disturbances to cushion fluctuations in output and employment without compromising the inflation objective. This is a short description of what I believe, but you can substitute your own specification for mine.

The market will, in due time, learn of the policy objective and the policy actions designed to achieve that objective. Real central banks almost without exception implement policy by setting a target for a short-term interest rate, usually an overnight bank rate. In the United States, that target rate is the federal funds rate. So, I'll assume that our real central bank implements policy actions that way.

I've given you a very simple description of what the central bank wants to do and its procedure for pursuing its objective. Given the assumed nirvana state of monetary policy, the central bank

does its job efficiently. By that I mean that it responds sensibly to all the ambiguities and problems real central banks face. As new information arrives, the central bank efficiently processes its significance and adjusts its target for the overnight rate as required to achieve its policy goals. Given the inherent gaps in knowledge and data, sometimes the central bank will act too quickly or too slowly, by too much or too little. But my presumption is that the central bank can avoid cumulative errors and recover from policy missteps without missing its objectives.

Participants in financial markets will understand what the central bank is doing. To understand market outcomes in this setting, one other observation is needed. In the United States—I'm not sure about the situation elsewhere—the central bank has no significant informational advantage over the market. The Fed and the markets receive government statistical data at essentially the same time. The Fed does have an advantage over the market in that it has a very large staff and does obtain anecdotal information not generally available. However, individual firms have much more extensive information about their own markets than the Fed does. I think it is approximately correct, and certainly appropriate at the level of theoretical modeling, to assume that the markets and the Fed receive the same information at the same time.

Market participants have ample incentive to form accurate expectations about central bank policy actions. How accurate are those expectations likely to be? Given my assumptions, the market ought to be very accurate in predicting policy actions. The market and the central bank get the same data at the same time; the market understands the policy objectives and the policy actions appropriate to achieve the objectives. As new data arrive, the market should interpret the data the same way the central bank does, at least most of the time, and reach the same conclusion about the significance of the data.

Rasche and I have explored this hypothesis for the United States. Our research is ongoing, but at this time we can report that as of the last few years the market has been quite accurate in forecasting Fed policy actions. Since 1988, when trading opened in the federal funds futures market, we have had a very direct reading on market expectations about Fed policy. Since 1994, that market has predicted policy actions quite accu-

rately on the whole.

It is instructive to note that 1994 was a watershed year. In February 1994, the Federal Open Market Committee (FOMC)—the Fed's main monetary policy body—first began to release a policy decision about its federal funds rate target immediately following the FOMC meeting. Before that time, the market learned of policy actions by observing open market operations conducted by the Open Market Desk at the New York Fed. Moreover, before 1994, policy actions occurred more often between regularly scheduled FOMC meetings than at the meetings. Since February 1994, almost all policy actions have been taken at regular FOMC meetings.

Although the FOMC adjusts the target federal funds rate most often by only 25 basis points, it sometimes has made larger adjustments. But these adjustments have been well predicted by the market.

This evidence shows conclusively that it is possible for a central bank to pursue a highly predictable policy, in the sense that, given the available information at the time of a policy meeting, the market can predict the policy action. Policy actions cannot be predicted far in advance because the information driving policy decisions cannot be predicted far in advance. But, as information accumulates before a policy meeting, the market and the central bank can converge on a common interpretation of the information.

Moreover, the market is well ahead of economists in understanding this process. I know of no econometric models that predict both the timing and the magnitude of Fed policy moves with anything close to the accuracy of the predictions in the federal funds futures market. There is an important research agenda implied by this observation. We need a deeper understanding of U.S. monetary policy to increase the probability of extending recent policy successes into the indefinite future.

This experience also shows that the central bank can change what it does to promote more accurate market expectations. By disclosing policy decisions quickly and by confining policy actions to regularly scheduled meetings, the FOMC has made possible improved market forecasts of monetary policy actions. The change in practice in February 1994 illustrates the point I emphasized earlier—that the central bank can improve the accuracy of information available to the market.

I believe that the simple step of prompt disclo-

sure in February 1994 also imposed a valuable discipline on the FOMC itself. By confining most policy actions to days of FOMC meetings, the Committee made its own behavior more predictable. Now, everyone knows that a policy action at another time is special. The FOMC must think carefully about whether it wants to send a special message by changing policy between meetings and, if it does, what the message is. What the central bank does will shape expectations; for the central bank to be able to predict its effects on expectations, its own behavior must be as regular as possible.

WHAT SHOULD THE AGENDA FOR CENTRAL BANKS BE?

The rational expectations revolution in macroeconomics changed forever how we think about economic policy. We know that understanding markets requires that we understand market expectations about monetary policy. We know that the distinction between policy actions and policy itself is of central importance. We know that expectations are not always fully rational, but I have been at pains to argue that some of the problems caused by nonrational expectations are correctable.

I know of no policy models indicating that the economy works better when markets are kept guessing about monetary policy. The presumption must be that market participants make more efficient decisions—decisions that maximize economic growth by minimizing the wastage of resources from expectational errors—when markets can correctly predict central bank actions. That does not require that central bankers and market participants be able to forecast the unforecastable, but that they have a common understanding of the strategy governing policy actions.

I've suggested a large agenda—one that is indefinitely large—for central banks and governments. We need to focus on areas where market expectations are hazy because government policy itself is or may be ill defined. These include the nature of government guarantees, monetary policy objectives, and the strategy to reach those objectives. Some of the things we need to examine may appear terribly mundane. For example, I think that the FOMC probably meets more often than necessary. Market interest rates have ample room to fluctuate for any given federal funds rate, and it is rare that anything happens within the usual six weeks between FOMC meetings to require a

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reassessment of policy. If the markets and the central bank really do have a common understanding of monetary policy, it is hard for me to believe that outcomes for the 10-year bond rate, say, will depend on whether the policy meetings occur once a month or once a quarter. However, each meeting is an object of speculation; the market would be better served if traders would concentrate on the fundamentals behind policy decisions than on the meeting itself. My point is not actually to take a firm position on the minor issue of the meeting schedule but instead to point out that all sorts of things should be discussed as possible ways to improve the market's understanding of monetary policy.

I finish with a plea to both academics and central bankers. Of academics, I ask that research address this question: How, very explicitly, should policy instruments be adjusted? That is, what should central banks do and when should they do it? Of my central bank colleagues, I ask that we spend more time focused on defining general policy rules, or regularities, within which we will fit individual policy actions. Both enterprises promise significant improvements in the accuracy of market expectations and the stability of markets.

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