

**Meeting of the Federal Open Market Committee on  
January 28-29, 2003**

A meeting of the Federal Open Market Committee was held in the offices of the Board of Governors of the Federal Reserve System in Washington, D.C., on Tuesday, January 28, 2003, at 2:30 p.m. and continued on Wednesday, January 29, 2003, at 9:00 a.m. Those present were the following:

Mr. Greenspan, Chairman  
Mr. McDonough, Vice Chairman  
Mr. Bernanke  
Ms. Bies  
Mr. Broaddus  
Mr. Ferguson  
Mr. Gramlich  
Mr. Guynn  
Mr. Kohn  
Mr. Moskow  
Mr. Olson  
Mr. Parry

Mr. Hoenig, Mses. Minehan and Pianalto, Messrs. Poole and Stewart, Alternate Members of the Federal Open Market Committee

Messrs. McTeer, Santomero, and Stern, Presidents of the Federal Reserve Banks of Dallas, Philadelphia, and Minneapolis respectively

Mr. Reinhart, Secretary and Economist  
Mr. Bernard, Deputy Secretary  
Mr. Gillum, Assistant Secretary  
Ms. Smith, Assistant Secretary  
Mr. Mattingly, General Counsel  
Ms. Johnson, Economist  
Mr. Stockton, Economist

Mr. Connors, Ms. Cumming, Messrs. Eisenbeis, Goodfriend, Howard, Hunter, Judd, Lindsey, Struckmeyer, and Wilcox, Associate Economists

Mr. Kos, Manager, System Open Market Account

Messrs. Ettin and Madigan, Deputy Directors, Divisions of Research and Statistics and Monetary Affairs respectively, Board of Governors

Messrs. Slifman and Oliner, Associate Directors, Division of Research and Statistics, Board of Governors

Mr. Whitesell, Deputy Associate Director, Division of Monetary Affairs, Board of Governors

Messrs. Clouse and Reifschneider,<sup>1</sup> Assistant Directors, Divisions of Monetary Affairs and Research and Statistics respectively, Board of Governors

Mr. Simpson, Senior Adviser, Division of Research and Statistics, Board of Governors

Mr. Skidmore, Special Assistant to the Board, Office of Board Members, Board of Governors

Mr. Fallon,<sup>2</sup> Senior Counsel, Legal Division, Board of Governors

Ms. Haltmaier,<sup>3</sup> Section Chief, Division of International Finance, Board of Governors

Messrs. Lebow,<sup>3</sup> Sack,<sup>1</sup> and Tetlow,<sup>1</sup> Senior Economists, Divisions of Research and Statistics, Monetary Affairs, and Research and Statistics respectively, Board of Governors

Mr. Zakrajsek,<sup>3</sup> Economist, Division of Monetary Affairs, Board of Governors

Ms. Low, Open Market Secretariat Assistant, Division of Monetary Affairs, Board of Governors

Mr. Lyon, First Vice President, Federal Reserve Bank of Minneapolis

Messrs. Fuhrer and Hakkio, Ms. Mester, Messrs. Rasche and Rosenblum, Senior Vice Presidents, Federal Reserve Banks of Boston, Kansas City, Philadelphia, St. Louis, and Dallas respectively

Messrs. Altig and Croushore, Ms. Hargraves, Messrs. Miller and Rudebusch, Vice Presidents, Federal Reserve Banks of Cleveland, Philadelphia, New York, Minneapolis, and San Francisco respectively

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<sup>1</sup>Attended portion of meeting relating to discussion of gradualism in policymaking.

<sup>2</sup>Attended portion of meeting relating to FOMC rule changes.

<sup>3</sup>Attended portion of meeting relating to the FOMC's review of the economic outlook.

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**January 28—Afternoon Session**

CHAIRMAN GREENSPAN. Good afternoon, everybody. I have a welcome for Sandy Pianalto. Since she will not officially be a Reserve Bank President for a number of days, we will put your welcome in escrow, and you may withdraw it at the appropriate time.

MS. PIANALTO. Thank you.

CHAIRMAN GREENSPAN. As you all know, this is the organizational meeting for the year. Accordingly, I will turn the proceedings over to Governor Ferguson.

MR. FERGUSON. Thank you very much. As all of you know, maybe with the exception of Sandy, the reason I have the floor now is to organize the election of a Chairman and a Vice Chairman of this Committee to serve until our first meeting of 2004. So, let me open the floor for nominations for the positions of Chairman and Vice Chairman of the FOMC. Don Kohn.

MR. KOHN. Governor Ferguson, as the Speaker of the House will say tonight, I have the great privilege and high honor of nominating Alan Greenspan to be Chairman and William J. McDonough to be Vice Chairman of this Committee.

MR. FERGUSON. All right, those sound like two credible nominees. [Laughter] Are there any other nominations? Assuming not, could I have a vote? All in favor say "aye."

ALL. Aye.

MR. FERGUSON. Sounds as if it's unanimous. Congratulations yet again to you both.

CHAIRMAN GREENSPAN. The next item on the agenda, if I can find it, should be the vote for our staff officers. Do you have the list to read?

MR. BERNARD. Yes, Mr. Chairman.

Secretary and Economist  
Deputy Secretary  
Assistant Secretaries

General Counsel  
Deputy General Counsel  
Economists

Associate Economists  
From the Board

From the Reserve Banks

Proposed by President McDonough  
Proposed by President Gynn  
Proposed by President Broadus  
Proposed by President Moskow  
Proposed by President Parry

Vincent Reinhart  
Normand Bernard  
Michelle Smith  
Gary Gillum  
Virgil Mattingly  
Thomas Baxter  
Karen Johnson  
David Stockton

Thomas Connors  
David Howard  
David Lindsey  
Charles Struckmeyer  
David Wilcox

Christine Cumming  
Robert Eisenbeis  
Marvin Goodfriend  
William Hunter  
John Judd

CHAIRMAN GREENSPAN. Without objection, so be it. Would somebody like to move the selection of the Federal Reserve Bank of New York to execute transactions for the System Open Market Account?

MR. FERGUSON. I'll move the selection of the Federal Reserve Bank of New York.

VICE CHAIRMAN MCDONOUGH. Second. [Laughter]

MR. KOHN. Conflict of interest!

VICE CHAIRMAN MCDONOUGH. Maybe for the record somebody else should second the motion.

SEVERAL. I'll second.

CHAIRMAN GREENSPAN. I appreciate the revision. Approved without objection. I would assume and hope that there is no objection to the incumbent Manager of the System Open Market Account, Dino Kos, continuing in that position. Without objection. Thank you very much.

Mr. Kos, would you quickly review your memorandum on the Authorization for Domestic Open Market Operations, the Authorization for Foreign Currency Operations, the Foreign Currency Directive, and the Procedural Instructions with Respect to Foreign Currency Operations?

MR. KOS. Thank you, Mr. Chairman. As this was the organizational meeting I thought I would propose a couple of housekeeping items for the domestic authorization and the “guidelines” for operations in federal agency issues, which go along with the authorization. I would just say a few words on each.

I am proposing that the Committee approve the Authorization for Domestic Open Market Operations with one amendment. The amendment has to do with the minimum lending fee for our securities lending program. When the Committee first approved this minimum lending fee, it was set at 1 percent. That was a reasonable number given that interest rates were then far higher. With interest rates where they are today, there is the risk that if the general collateral rate goes below 1 percent or if the Committee at some point should choose to lower interest rates to 1 percent or less, that would then effectively shut down the securities lending facility. If there were some kind of disruption or otherwise a need for us to lend securities, it would not make economic sense for anybody to borrow at a negative interest rate. So the proposal that I am making is for the Committee to provide that the Manager would have discretion to set the rate depending on the circumstances. Having said that, I must tell you that I have no intention of actually changing the rate anytime soon if the Committee should approve the amendment. But, again, this amendment would give the Manager discretion to act if need be. The objectives would stay the same—that is, the program would remain a secondary source for borrowing securities and a rather temporary source. I’d be happy to answer any questions on this proposal.

CHAIRMAN GREENSPAN. Questions? If not, would somebody like to move it?

VICE CHAIRMAN MCDONOUGH. Move approval, Mr. Chairman.

MR. BROADDUS. This is the domestic authorization, right?

CHAIRMAN GREENSPAN. Yes.

VICE CHAIRMAN MCDONOUGH. It's really a necessary technical correction.

CHAIRMAN GREENSPAN. Any objection? Given no objections, it is approved.

MR. KOS. Thank you. The second item has to do with the Guidelines for the Conduct of System Operations in Federal Agency Issues. In August 1999, the Committee suspended four paragraphs of these guidelines. Prior to that action, the guidelines had not been amended since 1977. In that year, agency issues were a large and actually growing portion of the System Open Market Account. By 1981, agencies were 7 percent of SOMA holdings. Since then, that number has been coming down, first because we stopped buying agencies and then because since the mid-1990s we have allowed them to roll off at maturity. But as we expanded the collateral that we take at the Desk, a couple of the provisions in the guidelines got in the way—inadvertently, I think—of our accepting Ginnie Mae securities as collateral. So we had the odd case in which we were able to take mortgage-backed securities guaranteed by government-sponsored enterprises but not by Ginnie Mae.

In 1999, the Committee took several steps to deal with potential liquidity strains in money and financing markets in the period around the century date change. One such step was to broaden the range of acceptable collateral for repos. The way the Committee did that was to suspend temporarily—until April 30, 2000—paragraphs 3 to 6 of the guidelines. Every year since then the Committee has extended the suspension of those paragraphs. Since mortgage-backed securities have become an almost routine part of System open market operations, rather

than my coming to you every year and asking for another annual suspension I am proposing that the Committee repeal those four paragraphs. Given that agencies in the outright portion of the portfolio are *de minimis* now and actually will be at zero by the end of the year, this should have no material effect. But it is a cleanup of the existing guidelines for the Desk.

CHAIRMAN GREENSPAN. Questions?

MS. MINEHAN. This may sound a little silly, but if we eliminate paragraphs 3 through 6, what are paragraphs 1 and 2 doing for you?

MR. KOS. Well, you ask a good question. In fact, the proposal brought to the Committee in 1999 was to repeal the entire set of guidelines. As I understand it, there was a view in the Committee that the first two paragraphs provided a sense of how the Committee felt about federal agency issues. Retaining those two paragraphs didn't constrain the Desk at all. So, certainly if the entire set of guidelines were repealed, that would be fine from my perspective. But it's up to the Committee whether it wants to retain some sense of how it views agencies in this context.

MS. MINEHAN. Well, just as a matter of housekeeping, I would suggest that when you review the authorization next time—not this time but next year—you might see if you could add a sentence or two to the authorization that conveys the sense of those two paragraphs. If that could be put in the authorization, then we wouldn't need the guidelines any more. That's just a suggestion.

CHAIRMAN GREENSPAN. Further questions on this issue? If not, would somebody like to move approval?

VICE CHAIRMAN MCDONOUGH. Move approval of eliminating paragraphs 3 through 6 of the guidelines.

CHAIRMAN GREENSPAN. Is there a second?

MR. FERGUSON. Second.

CHAIRMAN GREENSPAN. Discussion? All in favor?

SEVERAL. Aye.

CHAIRMAN GREENSPAN. Opposed? Approved without objection.

MR. KOS. Finally, the third item is a proposal to renew without amendment the Foreign Currency Authorization, the Foreign Currency Directive, and the Procedural Instructions with Respect to Foreign Currency Operations.

CHAIRMAN GREENSPAN. Questions?

MR. BROADDUS. I'm not going to make another speech about intervention, Mr. Chairman, but I guess I will respectfully do my tri-annual "no" vote on the foreign currency instruments. If anything, I think we have obtained increased credibility in this Committee, and I am even more strongly against our taking intervention actions now than in the past. So, I thought I'd mention that.

CHAIRMAN GREENSPAN. I'd merely like to state that we've had virtually no intervention—in fact I don't recall any—in the recent past. You may remember that the issue had to do with the Secretary of the Treasury and his willingness to accept our general view as to how intervention works and its impact on markets. That view has generally been accepted. Apparently for political reasons it cannot be accepted fully as an unequivocal directive because the State Department and others would like to hold it slightly in abeyance. But as a practical matter I think the Treasury is doing rather well in this area, and I trust that the incoming Secretary of the Treasury will hold very much the same views. My suspicion is that he does. Would somebody like to move approval?

VICE CHAIRMAN MCDONOUGH. Move approval.

CHAIRMAN GREENSPAN. Is there a second?

SEVERAL. Second.

CHAIRMAN GREENSPAN. All in favor say "aye."

SEVERAL. Aye.

CHAIRMAN GREENSPAN. Opposed?

MR. BROADDUS. No.

CHAIRMAN GREENSPAN. You all received a memorandum on the Program for Security of FOMC Information. Does anybody have any questions relevant to that? If not, would somebody like to move the revisions?

VICE CHAIRMAN MCDONOUGH. Move approval.

CHAIRMAN GREENSPAN. Is there a second?

MR. FERGUSON. Second.

CHAIRMAN GREENSPAN. Without objection. Thank you very much. We have a staff memorandum proposing FOMC rule changes that redefine a meeting quorum, rescind the outdated Emergency Interim Committee, and authorize the appointment of an interim Manager in an emergency. These do not seem particularly controversial. I wondered if anybody had any questions or issues they'd like to raise or if we can go immediately to a motion. Would somebody like to make a motion then?

VICE CHAIRMAN MCDONOUGH. Move approval.

CHAIRMAN GREENSPAN. Second?

MR. FERGUSON. Second.

CHAIRMAN GREENSPAN. Without objection. Now we are back to the usual formal structure of our meetings. I ask your approval of the minutes for the meeting of December 10, 2002.

VICE CHAIRMAN MCDONOUGH. Move approval.

CHAIRMAN GREENSPAN. Approved without objection. We now go to an interesting issue on which we've gotten a significant amount of briefing material. We will hear from Messrs. Sack, Tetlow, Croushore, and Rudebusch. Mr. Sack, would you start us off?

MR. SACK.<sup>1</sup> Yes. I am going to refer to the charts that were distributed. They don't have a cover on them, but the words "Smoothness of the Federal Funds Rate" are at the top of the first chart. For some time, economists have noted that monetary policy rates in major industrialized countries tend to change only gradually. A case in point is the intended federal funds rate, plotted in the top panel of exhibit 1. As can be seen, the stance of policy is typically adjusted in sequences of relatively small steps in the same direction. Over the sample shown, nine out of ten of the policy actions moved in the same direction as the previous change. Moreover, nearly all of the policy moves in the sample were 50 basis points or less.

The smoothness of the federal funds rate can be captured more formally by estimating simple monetary policy rules that measure the systematic response of the policy instrument to key macroeconomic variables. An example is shown in the bottom left panel. In this equation, as in John Taylor's original specification, the quarterly average level of the federal funds rate is assumed to respond to the current output gap and the inflation rate over the previous year. However, in this version we also allow the previous quarter's federal funds rate to enter the equation. Estimating this rule using real-time data from 1987 through 2000, we find that the coefficient on the lagged policy rate is strongly significant and not far below unity—a finding that is common in the research literature. This coefficient causes predicted movements in the federal funds rate to be more inertial than otherwise.

CHAIRMAN GREENSPAN. Do you have an  $R^2$  on that? This is one case in which the lagged dependent variable has policy implications.

MR. SACK. Right, so the  $R^2$  is very high—it's 0.96—reflecting that the lagged dependent variable soaks up a lot of the explanatory power.

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<sup>1</sup> The materials used by Messrs. Sack, Tetlow, Croushore, and Rudebusch are appended to this transcript (appendix 1).

CHAIRMAN GREENSPAN. That means that historically our decisions have been almost right but not quite. [Laughter]

MR. SACK. One can also express the  $R^2$  in terms of the model's ability to predict interest rate changes instead of the level, and there it falls off a good degree—down to 0.42. So part of this, as you noted, is that the level of the funds rate is very predictable.

CHAIRMAN GREENSPAN. But we don't like to be predictable!

MR. BERNANKE. That means our value added is 0.04. [Laughter]

MR. SACK. Of course, simple rules such as this one provide only a rough description of actual policy decisions, and it would not be surprising if the parameters of these rules would change over time. One possible incidence of this is hinted at by the easing of 2001, highlighted in the bottom right panel, which was more rapid than would have been expected under the policy rule estimated through 2000. This episode brings into sharper focus the question of the appropriate speed of adjustment for monetary policy, which is the topic of this briefing. More specifically, we investigate whether gradual movements in the federal funds rate are desirable in terms of achieving the macroeconomic objectives of the Federal Reserve—maximum sustainable employment and price stability.

As summarized in the top panel of exhibit 2, we consider the monetary policy rule that would be optimal assuming that the FOMC desires to limit squared deviations of inflation from a target level and of the unemployment rate from its equilibrium level over all future periods. Inflation and unemployment deviations are penalized equally, and the target for core PCE inflation is taken to be 1½ percent. Note that policymakers do not have a direct preference for smoothness in the federal funds rate. The exercise also assumes that FRB/US is the correct characterization of the economy. We can compute the policy that maximizes the assumed objectives of the FOMC given that model, assuming that the policy is required to have the same form as the estimated rule from the prior exhibit.

As shown in the middle left panel, the coefficients of the calculated policy rule, which we will refer to as the “optimal” rule, differ considerably from those of the estimated rule. In particular, the optimal rule is much more responsive to current economic conditions, as indicated by the larger coefficients on inflation and the output gap, and is much less inertial, as indicated by the smaller coefficient on the lagged federal funds rate. We will focus on both of these characteristics, since each of them would increase the volatility of the federal funds rate relative to the estimated policy rule.

The more aggressive nature of the optimal policy rule can be seen by looking at its prescription for the path of the federal funds rate going forward, assuming that the economy will be subject to the sequence of shocks implied by the Greenbook projection. As shown by the dotted line in the middle right panel, the optimal rule calls for an immediate easing of policy to zero percent in order to boost output toward potential more quickly and then a substantial tightening over the second half of this year to unwind the accommodative stance of policy. By contrast, the path of the federal funds rate under the estimated policy rule, the solid line, is much more stable. The panel also shows the policymaker perfect foresight path that appears in the Bluebook (the dashed line labeled PPF). This path is computed from an exercise that is similar to the one just described, but with two important differences. First, policymakers are endowed with more information, including knowledge of the sequence of shocks that will be hitting the economy in the future. Second, policymakers are assumed to have a preference for a smooth path of the federal funds rate. This latter assumption importantly influences the shape of the PPF path: If the smoothing preference were removed, the PPF policy would push the federal funds rate immediately to zero. Thus, the PPF exercise also suggests that monetary policy should be much more aggressive in the absence of a preference for smoothing.

At first glance, it might seem surprising that the optimal policy calls for movements in the funds rate that are so much more aggressive and volatile than those observed. As described in the lower panel, these characteristics of the optimal rule hinge on three key assumptions underlying this exercise. First, we assumed that the private sector continues to form its expectations as if the FOMC were following its historical policy rule, even when the true policy differs considerably. This assumption implies that large policy moves have sizable effects on the yield curve and on real activity, because private agents do not expect those actions to be quickly reversed. Second, we assumed that the FOMC knows the structure of the economy with certainty and in particular faces no uncertainty about the impact of its policy actions, no matter how drastic they are. Third, we assumed that the FOMC is able to observe the current state of the economy perfectly. That is, there is no measurement error in the macroeconomic data or in policymakers' estimates of potential output and other unobserved variables. Under these circumstances, there is nothing to prevent the central bank from pushing very hard on the economy to achieve its objectives; hence the optimal monetary policy responds aggressively to macroeconomic variables and is quick to reverse course. But clearly these three assumptions do not hold in practice. In the next three exhibits, we investigate the implications of relaxing each assumption in turn.

MR. TETLOW. As just noted, the finding that the federal funds rate should be very aggressive under the optimal policy depends crucially on the manner in which private agents form their expectations, the subject of exhibit 3. The previous exercise assumed that those expectations are formed under the belief that the FOMC is following its historical policy rule, even if that rule is changed going forward. In practice, private agents are likely to take into account changes in the way policy is implemented.

Consider what happens when the private sector understands the policy rule that the central bank is actually using. As summarized in the top panel, if policymakers are following an inertial policy rule, private agents will expect the initial response of the federal funds rate to a macroeconomic shock to be followed by additional policy changes in the same direction. Moreover, those actions will be expected to unwind only gradually as the shock dissipates. Expectations of this persistent response of policy will be incorporated into current asset prices and economic decisions, thus bringing forward the effects of those future policy actions. As a result, an inertial policy response can have an immediate and sizable impact on economic variables, even with relatively small movements in the federal funds rate in each period. By contrast, the large but transitory movements in the federal funds rate that were found to be optimal in the previous exhibit will be less effective, because private agents will recognize the change in the policy rule and look through the near-term swings in the interest rate.

To illustrate the importance of this consideration, we conduct an experiment in which the public forms its expectations as a weighted average of forward- and backward-looking terms. As the middle panel notes, the degree of forward-looking behavior is governed by a single parameter,  $\phi$ . When  $\phi$  equals zero, the model corresponds to the version of FRB/US used in exhibit 2, in which expectations are formed using a “backward-looking” vector autoregression (VAR) model. When  $\phi$  equals unity, expectations are rational—meaning that households and firms fully understand the structure of the model and the policy rule in forming their expectations.

With this set-up, we can calculate the optimal policy rule for different degrees of forward-looking behavior. As shown in the bottom left panel, the optimal coefficient on the lagged federal funds rate moves higher as the parameter  $\phi$  increases. That is, the optimal monetary policy rule becomes more inertial when the public is forward-looking, since expectations of future policy actions lead to larger and more-persistent movements in bond rates and other asset prices that effectively counterbalance the persistent effects of macroeconomic disturbances. Note, however, that the historical estimate of the coefficient on the lagged federal funds rate (0.76) is reached only when expectations are formed in an almost completely forward-looking manner. The bottom right panel shows the complete optimal policy rule for three choices of the degree of forward-looking behavior. As just noted, in the case in which  $\phi$  equals unity, the coefficient on the lagged policy rate is quite high—even higher than that from the estimated rule. Nevertheless, the coefficients on the output gap and inflation are about three times larger than their estimated values. Thus, the optimal rule still calls for much more volatile movements in the federal funds rate than are observed.

Another possible source of gradualism in policy setting is parameter uncertainty, the topic of exhibit 4. In the analysis so far, policymakers have been assumed to know the exact structure of the economy; uncertainty has entered only through additive error terms. To see the effects of this assumption, consider the situation in

the top left panel, which shows the relationship between the output gap (plotted on the horizontal axis), and the real interest rate,  $r$ , relative to its equilibrium level,  $r^*$  (plotted on the vertical axis). The solid line represents policymakers' best estimate of the level of the output gap that would be realized at any given setting of the real interest rate. But because of an additive error term, the realized outcome could lie above or below the central estimate, as indicated by the shaded region. As noted in the top right panel, the amount of uncertainty is not affected by the policy decision. For this reason, it turns out that additive uncertainty has no effect on the optimal policy setting. That is, policymakers should ignore the uncertainty and set policy based on their best estimate of the likely outcome for macroeconomic variables.

However, this framework neglects the obvious fact that policymakers face considerable uncertainty about the values of key parameters in their models of the economy. To see the implications of this type of uncertainty, suppose policymakers are unsure of the value of the policy multiplier, as shown in the middle left panel. The policymakers' best estimate of the relationship again is represented by the solid line, but the actual slope of the relationship could be higher or lower. In those circumstances, policymakers face more uncertainty about the outcome for the output gap the further the real interest rate deviates from its equilibrium level, as indicated by the shaded region. As we note in the middle right panel, this example highlights the key implication of parameter uncertainty—that uncertainty about future economic conditions will be importantly affected by current monetary policy decisions—a factor that policymakers should take into account in formulating those decisions. Under the objectives assumed, policymakers will tend to shade their policy actions toward choices that reduce uncertainty about future levels of unemployment and inflation. Of course, the middle left panel presents just one specific example of parameter uncertainty. Many other parameters are also unknown, in which case the variance-minimizing policy will not be to hold the real interest rate at its equilibrium level. In general, the effects of parameter uncertainty depend crucially on which parameters are unknown and on the variances and covariances of those parameters.

Unfortunately, the complexity of FRB/US makes it difficult to incorporate parameter uncertainty directly into simulations of that model. But we can quantify the effects of parameter uncertainty using the simpler VAR model utilized to characterize expectations in FRB/US. As summarized in the bottom left panel, the VAR captures the dynamics of key macroeconomic variables, including inflation and the output gap. In addition, the VAR provides a convenient measure of parameter uncertainty—namely, the variance-covariance matrix of the estimated coefficients. We can use this measure to assess the effect of parameter uncertainty on the optimal monetary policy rule.

The results are shown in the bottom right panel in two steps. We first compute the optimal policy rule that ignores parameter uncertainty by assuming that the estimated coefficients from the VAR are known with certainty. As shown in the first line of the table, the optimal policy under those assumptions is much more aggressive than the estimated policy rule, as reflected in the larger coefficients on the output gap

and inflation and the smaller coefficient on the lagged policy rate. These findings are qualitatively similar to those found earlier using the FRB/US model. However, when we allow policymakers to recognize that the coefficients of the VAR are uncertain, they choose a policy with smaller coefficients on inflation and the output gap and a larger coefficient on the lagged interest rate. Parameter uncertainty therefore moves the optimal rule in the direction of the estimated rule, but it seems to fall well short of explaining the observed degree of smoothness in the federal funds rate.

MR. CROUSHORE. Exhibit 5 addresses the issue that the macroeconomic variables used to formulate real-time monetary policy decisions are sometimes poorly measured. There are two potentially important sources of measurement error. The first is that initial releases of key macroeconomic data are imprecise and subject to revision. To quantify the magnitudes of such revisions, we use a data set maintained by the Federal Reserve Bank of Philadelphia that records the values of major macroeconomic time series as they were available to policymakers at specific dates in the past.

The top left panel illustrates this type of uncertainty by showing the distribution of revisions to the quarterly growth rate of real output over the quarter following the initial data release for the period from 1965 to 2002. Clearly, revisions can be substantial. As shown in the first line in the top right panel, the average absolute size of this revision is about  $\frac{2}{3}$  percentage point of output. Moreover, as indicated in the remaining lines, subsequent revisions can also be large, in part reflecting rebasing and other methodological changes. The revisions to other NIPA variables show broadly similar patterns. As noted in the middle left panel, the second source of measurement error arises because many of the variables that have prominent roles in our economic models are not directly observed and must instead be estimated. These variables include potential output, expected inflation, and the equilibrium real interest rate. Inevitably, estimates of these variables are subject to significant error that can be highly persistent, given the substantial lags involved in detecting important structural changes in the economy. These two sources of measurement error generate considerable uncertainty about many of the variables that are integral to monetary policy decisions. Some of the strongest policy implications likely come from errors in the measurement of the output gap. The dotted line in the middle right panel shows the staff's real-time assessment of the output gap since 1980—that is, the estimate of the contemporaneous output gap made at the time shown. Those estimates differ considerably from the staff's current assessment of the output gap for that period, the solid line. As indicated in the inset, the real-time errors implied by the difference between these two estimates have a standard deviation of  $1\frac{3}{4}$  percentage points of output and a high degree of serial correlation. As summarized in the bottom left panel, mismeasurement of the output gap could, in principle, have no effect on policy. This would be the case if the real-time estimate of the output gap were uncorrelated with subsequent revisions to that estimate, which might occur if the revisions were based on information not available at the time of the original estimate. In practice, however, that condition has not been met, and large initial estimates have often been revised to be smaller. Under such circumstances, the optimal policy should attenuate

its response to the real-time output gap measure, in order to reduce movements in the interest rate in response to the noise in that measure.

To quantify the effect of measurement error on monetary policy, we return to the FRB/US exercise from exhibit 2, only now assuming that the real-time estimate of the output gap available to the FOMC contains a random error that has the same properties as those observed from 1980 to 1998. As the bottom right panel indicates, measurement error leads to some attenuation of the policy response to the measured output gap (the middle column). However, that coefficient remains well above its estimated value. Moreover, the other coefficients of the policy rule, including that on the lagged policy rate, are largely unaffected. Of course, mismeasurement of variables other than the output gap might also have important policy implications that are not captured by this exercise. Indeed, some recent research suggests that incorporating uncertainty about the equilibrium real interest rate might result in further attenuation and some additional inertia for the optimal policy rule.

The top panel of exhibit 6 summarizes our findings. A simple analysis of optimal policy—one that uses the backward-looking version of FRB/US and assumes that uncertainty enters only through additive shocks—indicates that monetary policy should move more forcefully in response to changes in macroeconomic variables and be less inertial than observed on average since the mid-1980s. We have investigated the sensitivity of that conclusion to three factors—forward-looking behavior, parameter uncertainty, and measurement error. These factors move the optimal policy in the direction of the estimated policy rule, but none of the factors alone seems to fully explain the observed smoothness of the federal funds rate. An important caveat to this finding is that we consider each of the factors separately, owing to the analytical difficulty involved in combining them. These factors likely interact in ways that could affect the desirable degree of interest rate smoothing.

Even with the extensions considered, our analysis surely fails to capture important aspects of the policymaking environment. For example, as noted in the bottom left panel, policymakers face considerable uncertainty about the structure of the model itself. All models are approximations and therefore ignore specific variables that could at times become relevant for policy decisions. Also, the models we have used for this briefing are essentially linear, whereas the economy may under some conditions demonstrate large, discrete responses to monetary policy or other events. Policymakers' concerns about uncertainty may be exacerbated by the fact that some of the optimal policy rules considered called for large swings in the federal funds rate that are well outside of historical norms. The problems involved with significant nonlinearities, for example, might be reflected in a concern by the FOMC about financial fragility. Such a concern could generate a smoother path for the federal funds rate if large policy changes were viewed as having adverse effects on the functioning of financial markets. Transcripts of FOMC meetings show that members of the Committee have at times argued for smaller interest rate changes based on concerns about financial fragility.

The smoothness of the federal funds rate could also result from various institutional aspects of the policymaking process, as summarized in the bottom right panel. For example, the fact that policy decisions are made by a committee, and thus require building a consensus, could generate some inertia in realized policy actions. Alternatively, the FOMC might seek to avoid reversals in the direction of the policy instrument. Such an approach would presumably involve sacrificing some macroeconomic performance, but it might be perceived to have other benefits, such as allowing Committee members to more easily explain their policy choices to the public. Judging from simulations of the FRB/US model, reversals would occur much more often under the optimal policy rule than under the estimated policy rule.

Overall, while no model can encompass all the issues that pertain to interest rate smoothing, the analysis above at least provides some benchmarks against which to gauge the appropriate pace of monetary policy adjustment. Because the observed policy is much smoother than would be prescribed by these benchmarks, it is of interest to determine what aspects of our models or of our assumed preferences may be misspecified.

CHAIRMAN GREENSPAN. Were you planning to move to questions and comments now?

MR. REINHART. You can ask a question whenever you want to, Mr. Chairman. But our intention was to take questions at the end of the presentations.

CHAIRMAN GREENSPAN. I don't know if Glenn's presentation is a formal part of the preceding ones or whether there's a discontinuity.

MR. RUDEBUSCH. They are two separate presentations, but they are on the same topic.

CHAIRMAN GREENSPAN. Well, the reason I ask is that some of the issues that may come up may be addressed in your remarks.

MR. RUDEBUSCH. Yes.

MR. REINHART. Yes, that is certainly the case. That is why we thought we'd run them all together, Mr. Chairman.

MR. RUDEBUSCH. My presentation is entitled "Monetary Policy Inertia," and I will be referring to a handout that was distributed. Based on monetary policy rules estimated from quarterly data, many economists hold the view that the Fed adjusts monetary policy at a very sluggish pace, specifically, that it distributes desired

changes in the funds rate over several quarters—a behavior that is often termed “monetary policy inertia.” I will argue, instead, that there is essentially no policy inertia at a quarterly frequency and that, in fact, the funds rate typically is adjusted fairly promptly to economic developments—within a single quarter anyway. In large part, my argument is based on evidence of a very limited ability of financial markets (for example, Eurodollar futures or fed funds futures) to forecast the next few quarterly changes in the funds rate. Such evidence is informative about policy inertia because any partial policy adjustment obviously means that there is some remaining portion of the policy action that is postponed to the future and is thus predictable. Therefore, the absence of funds rate predictability implies the absence of significant partial adjustment by the Fed.

Before I flesh out this argument, however, let me start on page 1 of the handout and delineate two types of monetary policy inertia. These two types of inertia are often confused in the literature, with discussion of one type often mistakenly applied to the other; however, the two types of policy inertia operate at very different horizons. First, there is very short-term policy inertia or interest rate smoothing that I think does exist, but I won’t be discussing it in detail today. This short-term or week-to-week partial adjustment of the funds rate involves, for example, cutting the funds rate by two 25 basis point moves in fairly quick succession, rather than reducing the funds rate just once by 50 basis points. This type of gradualism or interest rate smoothing was more prevalent in the past, when intermeeting moves were more frequent, though it still goes on to some extent—perhaps induced by concerns of financial market fragility. In any case, this short-term policy inertia is essentially unrelated to the quarterly policy inertia that is relevant for most macroeconomic discussions—including my own.

Quarterly policy inertia is defined as the slow partial adjustment of the federal funds rate on a quarter-to-quarter basis. For example, if the Fed knew it wanted to increase the funds rate by 1 percentage point, it actually would raise the rate only about 20 or 25 basis points per quarter for the next few quarters. It is this type of inertia that I find suspect. The apparent evidence supporting quarterly policy inertia is summarized on the second page of my handout. This evidence is based on estimates of monetary policy rules or reaction functions—that is, estimated equations that attempt to model Fed behavior. These estimated equations usually take a standard partial-adjustment form, where the current funds rate is set as a weighted average of last quarter’s actual funds rate and the current quarter’s desired rate. This partial adjustment form is displayed as the first equation on page 2. The parameter  $\rho$  is the weight on last quarter’s funds rate, and  $1-\rho$  is the weight on the current desired level. A high  $\rho$  means that the funds rate will be adjusted very slowly to its desired level. Based on quarterly data, estimates of  $\rho$  are typically around .75, which puts a  $\frac{3}{4}$  weight on the lagged rate and a  $\frac{1}{4}$  weight on the desired rate. Thus, these empirical rules imply a very slow speed of adjustment of the policy rate—specifically, the Fed would change the funds rate only 25 percent each quarter toward its desired level. This sluggish adjustment of the funds rate over several quarters is widely interpreted as evidence of “interest rate smoothing” or “monetary policy inertia.”

For example, before each FOMC meeting, the financial indicators packet that is distributed contains two estimated monetary policy rules: one with and one without quarterly policy inertia. Both rules set the *desired* funds rate according to the Taylor rule, which is displayed as the second equation. In the Taylor rule, the desired level of the funds rate is based on current readings for the output gap and inflation rate. The  $\alpha$  and  $\beta$  parameters calibrate the policy response to these determinants. The funds rate recommendations from these two rules are shown in the chart at the bottom of page 2. The solid line shows the actual path of the funds rate as a quarterly average. The dashed line shows the estimated rule with no inertia—so  $\rho = 0$ . The dotted line shows the rule with inertia—where  $\rho$  is estimated by the Board staff to be .75. The Taylor rule *without* inertia (the dashed line) fits the actual funds rate fairly well, but there are some large persistent deviations. Notable deviations include 1992 and 1993, when the actual rate was held below the rule; 1996, when the rate was pushed above the rule; and 1999 and 2002, when again the funds rate fell below the rule. The nature of these deviations is a key element in understanding the evidence for policy inertia. The Taylor rule *with* inertia (the dotted line) largely eliminates these deviations and matches the historical path of the funds rate much more closely. That is, the lagged funds rate in this estimated equation is statistically significant. Although this type of econometric evidence appears convincing, it is valid only if the equation is specified correctly. If the desired funds rate also depends on persistent factors other than the current output and inflation in the Taylor rule, then such a misspecification could result in a spurious finding of partial adjustment. Accordingly, based only on these types of policy rule estimates, it is very difficult to distinguish between whether the Fed's adjustment is sluggish or whether the Fed generally follows the Taylor rule with no policy inertia but sometimes deviates from the rule for several quarters at a time in response to other factors.

I will discuss the nature of these persistent deviations in a minute, but first—on page 3—I want to provide some evidence against policy inertia from a different source. This evidence is based on a key implication of policy inertia—namely, that the presence of inertia should imply predictive information in financial markets about the future path of the funds rate. Intuitively, if the funds rate typically is adjusted 25 percent toward its desired target in a given quarter, there's a remaining 75 percent of the adjustment that should be expected to occur in future quarters. In a wide variety of settings, such delayed policy adjustment ensures forecastable future variation in the funds rate. Assuming that financial markets understand the inertial nature of policy, they should anticipate the future partial adjustment of the funds rate. In this case, a regression of actual changes in the funds rate on predicted changes should yield a good explanatory fit and a fairly high  $R^2$ . In fact, researchers have found the opposite. They have estimated interest rate forecasting regressions and, using financial market expectations, have found little predictive information beyond a few months. For example, Eurodollar futures have essentially no ability to predict the quarterly change in the funds rate three quarters ahead. The  $R^2$  of such a regression is zero.

This lack of predictive ability is well illustrated by the most recent episode of easing. The chart at the bottom of the page gives the actual funds rate target and various expected funds rate paths as of the middle of each quarter based on fed funds futures. Under quarterly policy inertia, the long sequence of target changes in the same direction in 2001 would be viewed as a set of gradual partial adjustments to a low desired rate. However, although the funds rate gradually fell in 2001, market participants actually anticipated few of these declines at a six-to-nine-month horizon, as they would have if policy inertia were in place. Instead, markets assumed at each point in time that the Fed had adjusted the funds rate down to just about where it wanted the funds rate to remain based on current information available. Under this interpretation, the long sequence of declines is the result of a series of fairly prompt responses to new information that turned progressively more pessimistic. That is, the presence of quarterly partial adjustment or policy inertia is contradicted by the lack of the forecastability of changes in the funds rate.

Turning to page 4, I will reconcile the evidence for and against quarterly policy inertia. As I said, the persistent deviations of the actual rate from the Taylor rule without inertia are key to understanding what is going on. Under policy inertia, these persistent deviations are explained as sluggish responses to output and inflation, but that interpretation is inconsistent with the lack of funds rate predictability. An alternative explanation is that the Taylor rule is an incomplete description of Fed policymaking and that the Fed responds to other persistent variables besides current output and inflation. Under this interpretation, the Fed does not exhibit quarterly policy inertia, but it responds promptly to a variety of developments that unfold over time.

What would cause such persistent deviations from the Taylor rule? Well, in John Taylor's original analysis, he noted that occasional deviations from his rule were appropriate responses to special circumstances. Two such special circumstances are noted at the bottom of page 4. The deviations in 1992 and 1993 can be interpreted as the Fed's response to a disruption in the flow of credit, in which the funds rate was kept lower than might be expected given the macroeconomic context because of severe financial headwinds. The 1992-93 episode is better described as a persistent "credit crunch" deviation from the Taylor rule than as a sluggish partial adjustment to a known desired rate. In terms of the Taylor rule, the disruption of credit supply can be treated as a temporary fall in the equilibrium real rate, to which the Fed responds by lowering the funds rate (relative to readings on output and inflation). Similarly, in 1998 and 1999, a worldwide financial crisis following the Russian default and devaluation appeared to play a large role in lowering rates—again relative to what the Taylor rule would have recommended. Expectations also can play an important role in tempering the policy response to current readings on output and inflation. Indeed, some have suggested that expectations of future inflation—and, in particular, inflation scares in the bond market—are an important consideration for policy.

Finally, on page 5, I highlight two questions that are in some sense two sides of the same coin. The first question is, How should we think about analyzing or

modeling recent Fed behavior? The second question is, To what extent should actual Fed behavior conform to our models of optimal monetary policy? Let me start with the first question. In modeling the Fed's decisionmaking process, I argue that the Taylor rule is an incomplete description of Fed behavior. However, adding partial adjustment to the policy rule is not a solution; instead, in my opinion, partial adjustment adds another layer of misspecification that substitutes for a clearer understanding of the policy process. Of course, more research is required to characterize the full set of influences and determinants of policy beyond those contained in the Taylor rule.

A closely related question focuses on modeling the underlying motives of policy—more specifically, what kind of loss function should represent Fed behavior? Currently, the policymaker “perfect foresight” path in the Bluebook uses a loss function that assumes the Fed would be equally displeased with any of the following: (1) an unemployment rate 1 percentage point above the natural rate; (2) an inflation rate 1 percentage point above target; or (3) a 100 basis point decrease in the quarterly average funds rate. These equal weights place an implausibly high penalty on funds rate variability. However, without a substantial funds rate volatility penalty, the constructed optimal policy path does not match the recent historical path of the funds rate, and this is true across a variety of models. In my opinion, the high funds rate volatility penalty may be another misspecification that is compensating for some unknown flaw in our calculations of optimal policy. In essence, if policy over the past two decades has been close to optimal, then an important element is missing from the current specifications used by economists to construct optimal monetary policy.

An alternative possibility is that our economic models—without interest rate smoothing in the loss function—are basically correct in finding that under an optimal policy the Fed should be more aggressive in reacting to economic news than it has been. This suggests a second question: Should the Fed deviate from its historical behavior and become more aggressive in changing the funds rate? The analysis above suggests that the Fed has not been sluggish in reacting to economic developments: It has likely set the funds rate equal to its desired rate in each quarter. However, questions remain about whether the desired rate should react more forcefully to economic news. Indeed, researchers typically find that the parameters of an optimal Taylor rule—that is, the  $\alpha$  and  $\beta$  shown on page 2—are much larger than the estimated parameters of a historical Taylor rule. Thus our models, even after trying to take into account various types of uncertainty, recommend much more vigorous policy responses. This raises the question, Has monetary policy been too timid in its responses to economic developments? I personally remain less than convinced that our models capture all the important factors influencing policy.

CHAIRMAN GREENSPAN. It's a very interesting set of papers, gentlemen. As a practitioner of sorts, since what is supposedly being focused on are how the equations fit, let me

see if I can come at it from the other direction. There is a stipulation that we should be looking at the data sets as they existed at the time decisions were made. We should also be looking at the models that existed at the time of the decisions. But let's take the structure as it is today. If we fit a bunch of independent variables into that very complex, very sophisticatedly estimated model and we do not use appropriate add factors, we will get nonsensical results.

What that implies is that the internal structure of the model—its simulating capability—is subject to the same problems that are associated with the fact that we need to use add factors to get the model to a point where it can actually function. So what we do—consciously or otherwise—is to raise continuously the question of variance of the coefficients in the model and uncertainties with respect to the nature of the model. As a consequence, we tack to the wind, if I may put it that way, toward where we think the model's overall structure and our add factors to the model—which are essentially a set of sub-models—are taking us. If we do that, the result—as you point out, Glenn—is a tendency not to engage in sharp changes in the funds rate. Instead of doing, say, one move of 100 basis points, we'll do 50 and then another 50. The reason is that we do not know, and cannot know, the degree of financial fragility in the system. And the reason we can't know is that the presumption that financial fragility is a stable function, capable of being evaluated through history, is clearly not sustainable.

The underlying structure of the economy with which we are dealing and to which we are endeavoring to fit out models is in a continuous state of change. The technologies, the demographics, and the computations that are involved generate a system in which ideally we would have not fixed coefficients in our model but instead estimated coefficients, which would then become variables in a set of other dynamic changes. But we don't know what that is. All we do know is that, to abstract from reality, we need a structure that can essentially simulate the

forces that change that structure, which is exceptionally difficult to construct. I've been building models for fifty years; they tell you something, and you learn something from them. But every time you think you've got it, the structure changes. Obviously it must change unless we have a stable system that would enable us to fit all of our coefficients on the basis of the presumption that the structure is unchanged through the estimation period. Unless we can do that, I'm not sure what we have.

So as a practical matter, every time we sit down and look at the forecast there is always the question of whether the model has changed significantly since the last Greenbook, and that is something we will not know for two years. Remember our problems with projecting M2? All of a sudden, after really quite good fits, the equations no longer worked. In fact, I spent a good deal of time modeling  $P^*$ , which seemed to be a very nice fix on the structure of M2 and its projections just before it collapsed and ceased to be of any use whatever. Those are considerations that induce the actual decisionmaker to hedge all the time.

You raised the loss function issue. The loss function is not a simple function that involves balancing 1 percent of inflation and 1 percent of unemployment. In fact, it's a whole series of dynamic functions. In a sense we are always asking the question in terms of two alternative policies: What are the consequences if we choose A rather than B and A is wrong? In many instances when A and B are very close, there is no loss of any great moment if we make a mistake. But with the presumption of a very sharp change in policy, the probability that we would be making a horrendous error is much higher because some unknown change in the financial structure may have created a degree of fragility that we have not yet been able to infer. Therefore, the decisionmaker is quite reluctant to make a sharp change in policy without testing the real world. So what this Committee would likely do if we thought a 100 basis point move

were the necessary change is that we would move the funds rate 25, 50, or maybe 75 basis points and watch what happens. If the system shook a little and then stabilized, we'd tack on the other 50 or 25 basis points. We'd take that next step on the grounds that all our simulations indicate that the time frame needed to judge a fragility shock is much shorter than the time frame in which the monetary policy takes effect. All of that basically says that we endeavor to construct our models, presumably, in a manner that optimizes our knowledge, recognizing that our models continuously get out of date and have to be revised. We do that largely not by re-estimating the models but basically by add-factoring as we go along.

There is, however, a very significant bias problem in policymaking in this context, which is that, in all of these models, policy should really be based on risk-neutral evaluations. But in fact, we're all human beings, and we are risk averse. Psychologically that's how we behave, and to try to reverse that behavior is exceptionally difficult. I suspect that, if we could distinguish between risk neutrality and risk aversion, we probably would find that we are much closer to risk aversion. I can give you examples in my own personal experience. I used to trade copper, gold, silver, and other commodities on the commodity exchange ring. I would sit there with full confidence that the price of a particular commodity was going to go up and that, therefore, as the price went down I should be doubling up on my position. What did I do? I sold at the end of the day, largely because I wanted to sleep that night. [Laughter] That may seem like an idiosyncratic event. It isn't. That's the way we behave. It strikes me that if we find ways to move away from risk aversion and try to be strictly risk neutral, we will get a far more optimal policy outcome. I'm not sure we can do that, but we ought to try.

Let me then ask a question. What happens to all of this analysis if you use the pre-1987 period? What do you find, and what do you conclude on the basis of what you find?

MR. RUDEBUSCH. In terms of policy rule estimates, the view in the literature very often is that there was a structural break in the 1980s. So policy rules in the 1970s are considered—

CHAIRMAN GREENSPAN. But there is an economic structural break in the 1980s in that regard.

MR. RUDEBUSCH. The statistics generally indicate a break some time in the 1980s in terms of the policy rule estimates. There appears to be a different behavior in the 1970s than in the 1990s if you regress the funds rate on the output gap and inflation. For example, the coefficients on inflation—that is, the response to inflation—don't seem as large.

CHAIRMAN GREENSPAN. That raises an interesting question. Let's say we go back to the 1960s and 1970s and fit our fixed-coefficient models into that period. The implication is that we're saying that the economic forces moving today are the same ones in principle that were moving back then. Why should policy be any different? I don't know why it would be unless there's a learning curve in there or something.

MR. RUDEBUSCH. I think the assumption is that there is a learning curve. Although very often the other equations in the model appear stable, at least to a first approximation, the interest rate equation—the equation that summarizes monetary policy or Fed behavior—appears less stable over time. I believe the conventional view is that there was a learning curve and that policy behavior did change.

CHAIRMAN GREENSPAN. There's a very large learning curve at the Fed on the construction of various models if we go back historically. It's interesting because the Fed may be a unique institution in that it has a sufficient history and constancy to enable one to see how the models actually have changed. In contrast, private-sector models do not have a sufficient

history because the firms sponsoring them are not that stable. My impression is that there has been an extraordinary, very major learning curve in model construction going back into the 1950s and moving forward. Obviously, in the 1970s and 1980s the secular stagflation that the economy exhibited was not replicable by any of the macro models that we set up in the early years.

MR. REINHART. Mr. Chairman, you may recall the paper that Christine and David Romer presented at the most recent Jackson Hole conference, in which they characterized the process as one of learning, forgetting, and then relearning. The thing that is most unstable about the Taylor rules, as Glenn mentioned, is the inflation target. It's very hard to explain the setting of interest rates in the 1990s and today if we use estimates from the 1970s or the first part of the 1980s because the background inflation rate was just so much higher in those earlier years. A distinction that's also important to make is whether one is estimating the rule on the data as we know it now or the real-time data. That can make a difference. It's a factor in how stark the differences are among decade-long estimates of the Taylor rule, for instance.

MR. RUDEBUSCH. In terms of the economic modeling, two things about the 1970s come to mind. One is the emergence of the natural rate hypothesis—that there is not a long-run tradeoff between output and inflation. Also, the sacrifice ratio was considered at the time to be very much higher than we imagine it is now.

CHAIRMAN GREENSPAN. I've monopolized the floor for long enough. Let me see the list of others who wish to comment or ask questions. Governor Gramlich.

MR. GRAMLICH. Well, this is a puzzling issue because both sides had very good papers and, of course, you're arguing positions that are the exact opposites. I'd like to focus on the episode of year 2001 because I think the question is really joined there. The Board staff says

there is a lot of inertia, and Glenn says there is not. I believe that the Board staff would argue that the sequence of small steps proves inertia and Glenn would argue that the unpredictability, as measured by market expectations, proves there is not inertia. I think the Chairman in what he just said was confessing to some inertia. I, myself, feel that in the first years I was here, up through 2000, we probably did have a lot of inertia; it was hard to get rates changed by very much. But in 2001 we changed them quite dramatically in a pretty short period of time even though we did it in relatively small steps. So I find the overall question of whether or not there is inertia quite puzzling. But, Glenn, I might ask you a question. To prove that there wasn't inertia, you've chosen a time when there might not have been. If you had used times when the funds rate was more stable, then I think your test would have indicated much more predictability and, therefore, possible inertia. Isn't that so? Could you be accused of choosing an episode to maximize your case?

MR. RUDEBUSCH. In terms of this picture, I actually didn't look around that much at other periods. This one seemed to work, so I stuck with it. But in terms of the underlying analysis, even though this episode demonstrates the point, it does not provide the strongest test. A lot of people have looked for this type of interest rate predictability by running regressions of actual changes in short-term interest rates on forecasted changes over longer periods. This finding of limited predictability is true, really, over much of the postwar period. The particular regressions that I used were from 1988, the start of the Eurodollar market in readily accessible form, to 2000. So that's the period on which my analysis focused.

At any rate, other people have run these kinds of regressions a lot, and it's remarkable how financial markets often know what the Fed is going to do a month or two in advance. In some episodes—1994, for example—there was even a bit more predictability. Nevertheless, I

think this recent episode is actually fairly typical in that, in the middle of this easing cycle, the markets thought they might get the next 25 basis point move. But in fact, moving out beyond six months, they actually have little predictive ability. That's because, if the funds rate is being set in terms of future movements in output and inflation and other factors, those factors are hard to forecast, and the markets find them hard to forecast as well. But there's no pent-up policy inertia on a quarter-to-quarter basis that gives them a lot of predictive ability.

MR. SACK. May I also try to clarify that? The estimated policy rule from our analysis would actually be consistent with your impression of the 2001 episode. That episode did look as if the policy moves were much more rapid than would have been predicted by the estimated policy rule. It's hard to assess because there are only a few data points in a quarterly policy rule. But if you let the rule choose a different coefficient on the lagged funds rate for that episode, it will put it pretty close to zero. So that episode, in the context of this rule, actually was a very rapid policy easing relative to the average pace of policy adjustment seen from 1987 to 2000.

MR. RUDEBUSCH. You can see that in my handout in the chart at the bottom of page 2. There is a Taylor rule without inertia—that is, there is no lagged funds rate in it—and a Taylor rule with inertia. During 2001, those two rules both did fairly well.

MR. GRAMLICH. Right.

MR. RUDEBUSCH. It doesn't matter that much. The difference in the rules comes in 2002, when for the rule without inertia a persistent deviation emerges. I would argue that there's something other than strict Taylor rule determinants acting during this episode, perhaps some reaction to a collapse of the tech bubble in stock prices or to geopolitical risks—something that's holding the actual funds rate below what a simple Taylor rule would say.

MR. REINHART. Governor Gramlich, before you leave the topic with the sense that the distinction between the people sitting on the two sides of the table is that stark, Brian has done some work estimating policy rules in which he allows a serially correlated error in addition to the lagged dependent variable. I would ask him to comment on what happens then.

MR. SACK. In a recent research paper that I wrote with two colleagues, we show that it is possible to estimate policy rules directly allowing for both factors. So we don't necessarily have to turn to the term structure evidence to separate them. What our paper and several other papers have found is that clearly Glenn's point is right: There are variables omitted from the rule that have serial correlation, which gives some impression of gradualism. But that's not the whole story. In fact, when we apply these methods to our policy rule and allow for serially correlated errors, that decreases the coefficient on the lagged federal funds rate from 0.76 to 0.56. So it reduces the degree of inertia in these rules, but there's still a significant amount of gradualism.

MR. GRAMLICH. You can reduce the degree of inertia by attributing some of that explanatory power to some other error out there that happens to have serial correlation, right?

MR. SACK. Right.

MR. GRAMLICH. So part of the problem is that what appears to be inertia actually is not. We've just responded consistently to something that's the same for a period of time.

MR. TETLOW. Well, perhaps. I'd point to the part of exhibits 2 and 3 where we use the FRB/US model. Now, that is a large model with lots of persistence in it; a large number of lagged states and lagged errors are at work there. Let's say you ask what the optimal parameterization of this simple policy rule would be. You ask it to pick up the very thing that I believe Glenn is describing. What it tells you is that, unless there is a high degree forward-

looking expectations, the optimal policy doesn't want that lag. It doesn't want that lag to proxy for the same kind of things that Glenn argues empirically it is proxying for. Does that mean Glenn is wrong? Not necessarily. It could mean that the model is wrong. But it isn't clear that what Glenn is referring to is not being adequately captured in what we're describing in exhibits 2 and 3.

The same thing is true, I might add, about the term structure evidence. For this term structure evidence to explain what Glenn wants it to explain, he has to assume rational expectations. That's a presumption in his analysis. But as you saw in exhibit 3, if there are rational expectations, the optimal strategy calls for a lot of persistence in the fed funds rate. So one can interpret Glenn's evidence as suggesting that rational expectations are not there, in which case they shouldn't have produced inertia in the first place. There again, it doesn't mean that Glenn is wrong, but it does mean that there is friction between these two views, and it can't be settled at this table.

MR. BERNANKE. Rational expectations in terms of financial markets, not necessarily the rest of the economy?

MR. TETLOW. Yes.

MR. SACK. I think we would agree on the general point of our briefing. We're bickering about what the coefficient is on the lagged federal funds rate in the estimated policy rule, but these issues don't affect our calculations of the optimized rules and don't affect the main conclusion of our briefing. What we find is that these optimized rules result in very aggressive, very volatile movements in the federal funds rate—more volatile than we see in the data regardless of what the exact rule is. Recall that we said there are two aspects in which policy is too smooth. The coefficients on output and inflation appear to be smaller than under

the optimal rules, and the coefficient on the lagged funds rate tends to be bigger. Even leaving aside that second part, as Glenn alluded to in his last exhibit, these types of exercises that we perform would still recommend larger response coefficients and more-aggressive movements in the federal funds rate.

MR. TETLOW. This is also true, if I might add just one last point, in the “policymaker perfect foresight” simulation. Without the usual penalty on interest rate volatility—remember a policymaker in that case is taking everything into account, including the kinds of things that Glenn was referring to such as the tech bubble and current and future geopolitical risks—it, too, predicts very volatile, very aggressive monetary policy as the optimal thing to do. So in short, this outcome has nothing to do with the parsimony of a simple rule and has everything to do with the rest of the structure.

CHAIRMAN GREENSPAN. Governor Bernanke.

MR. BERNANKE. You referred to term structure evidence. This is different from the fed funds evidence that Glenn was referring to or the same?

MR. SACK. When I said term structure, I meant the evidence that Glenn presented.

MR. BERNANKE. I ask because I’m very interested in this basic point that the Fed should be more predictable in order to use the short-term rate to influence long-term rates and whether that is an important issue. In particular, your evidence is very interesting, Glenn. I was wondering if there had been evidence on whether or not the responsiveness of long-term interest rates to movements in the fed funds rate was consistent with the predictability of the type that you propose or the type that uses more partial adjustment. That would seem to be a separate test. I was wondering if you had done anything more directly on this hypothesis.

MR. RUDEBUSCH. Well, the expectations that are most informative are just a few quarters ahead. In ten-year expectations, say, policy inertia doesn't play as big a role. Those expectations aren't able to clarify whether there is inertia or not. So it is term structure evidence, but I'm just looking at the very short end—one year or less of the term structure maturities.

But it is true that there is a link. In what is often called optimal monetary policy inertia, it has been demonstrated in other presentations that, as you have more forward-looking expectations, the monetary authority is able to stabilize the economy, not necessarily by taking actions today but by promising to take actions in the future. Financial markets build that in, and those expected future actions are able to affect the economy today. Those actions reflect inertia. Again, those inertial movements are assumed in optimal monetary policy. I don't consider that something we should be taking too seriously. I don't think we have the empirical evidence of monetary policy inertia, and I don't think optimal monetary policy inertia is very convincing.

MR. REINHART. The other point, Governor Bernanke, is that in the cottage industry of estimating event-study regressions—which might be another place we could look to see how far a given monetary policy surprise gets transmitted through the term structure of interest rates—we get the same sort of results we get in the time series test of term structure expectations. That is, the predictable effects of policy on interest rates die off pretty quickly. In other words, it's the front end of the forward curve that is usually influenced by a policy surprise; and at the longer end, the forward rates go down.

MR. BERNANKE. One might argue that Glenn's interpretation of the Taylor rule is correct—that there is no inertia in the policy rule and that there should be more in order to get more effect on long-term rates. I think that's an open question.

MR. SACK. It might be useful to point out as well that, while policy actions three, four, or five quarters ahead are hard to predict, it's not that they don't get built into the term structure. The Board staff produces an expected path of the federal funds rate based on our readings of the futures markets, and it commonly has policy actions built in at those horizons. In fact, the current forecast is a good example. Policy is expected to be on hold until the fourth quarter of 2003 and then, according to our path, about 150 basis points of tightening is built in for subsequent years. So it's not that future actions don't get priced in at all but that they're not very predictable.

MR. BERNANKE. That's different. That's the interest rate responding endogenously to the expected evolution of the economy.

MR. SACK. Well, that's true; that could be the case as well.

MR. BERNANKE. Thank you.

CHAIRMAN GREENSPAN. President Poole.

MR. POOLE. Let me carry on from this conversation and turn it just a little. If we compare the optimal rule and the estimated rule, the optimal rule is much more aggressive. It probably involves a lot more reversals, and the funds rate would look a lot less smooth if we drew a chart of it. Let's say we use the output from the models that have all the private-sector expectations rolled into them—expectations reflecting knowledge of the rule that the central bank is following. If one were to plot a one-year, two-year, or five-year rate, I suspect that there wouldn't be much daylight between the rates under the estimated rule and the optimal rule. That's my guess because even the amount of persistence we're talking about with the estimated rule indicates readily enough that there's not much difference in terms of a longer-term rate. So if we think about policy being transmitted through interest rates, it's not going to make much

difference—in the way the economy works in terms of growth, employment, and other real variables—which rule is used. Let me just leave that expressed as an assertion for the moment.

Now, if that's the case, it seems to me that a critical dimension of designing the rule precisely in the environment of uncertainty that we face is to promote a good rational expectations equilibrium where the private sector truly understands what we're doing. That's a dimension that you didn't really explore or discuss, but that's a critical part of this whole subject because we're trying to produce this rational expectations equilibrium where the market comes to expect the right things from the central bank. One of the problems with a very aggressive rule, which tends to result in a lot of reversals, is that many people are going to find our policy rather confusing; they will have difficulty trying to figure out what the central bank is doing. From the point of view of promoting an understanding in the private sector regarding what the policy really is, I think there's a big benefit to having a certain amount of smoothness in the funds rate. That's because—this is my guess now—it will be much easier for the private sector to understand what our policy strategy is. That was not addressed in this analysis, but it seems to me to be a critical part of the problem of trying to design a policy that we should follow.

MR. RUDEBUSCH. I think of reversals as being perhaps a bit shorter run. Again, an important point regarding optimal monetary policy the way economists usually construct it is that it's at a quarterly frequency; we use quarterly average rates. So, it's not as if at one meeting the rate is moved up 50 basis points and at the next meeting it goes down 50 basis points. The reversals are not reflected in an up-and-down pattern meeting by meeting. We're talking about quarterly average rates. Therefore, from the point of view of economic analysis, as long as the Fed follows a systematic rule quarter by quarter—however it hits that quarterly average—at the broad level of the way macroeconomic economic models are constructed, that is sufficient. In

terms of reversals, this perhaps goes back to the Chairman's point about implementing policy changes in small steps, given that the Fed has to worry about financial fragility and testing the system.

MR. TETLOW. Let me answer your question in a slightly different way than Glenn did. I interpret your question as saying suppose private-sector agents don't understand the rule or, even more generally, the model. In that case you might ask if there is a role that the Fed can play in the conduct of monetary policy that will assist private-sector agents in learning that rule over a shorter period of time or getting to the right equilibrium. As you know, Jim Bullard at the Federal Reserve Bank of St. Louis works on this. There is a small and growing literature on the subject of learnability, and that literature does say that some inertia in policy is beneficial in helping private-sector agents learn the rule and come to the rational expectations equilibrium. I'm sympathetic to that view myself, but I don't know how much weight to put on it because I don't think it has been tested in a broad enough set of models to know whether that view is universally correct. At this point, all the experiments that have been conducted have been done on extremely simple models that have no inherent persistence other than in the policy rule; they are models that jump instantaneously in response to shocks at all points in time. I have a suspicion that in a model that has intrinsic lags—so that shocks, regardless of the policy, take some time to play out—it might not be as important to have that persistence in the rule. But I can't really say that I know the answer.

MR. POOLE. I think there's inevitably a great deal of learning and evolution involved here in terms of furthering the completeness or sophistication, whatever you want to call it, of the markets' understanding of what we're doing. The environment is very different in that respect from what it was thirty-five years ago, let's say. So part of the problem in trying to model this is

that the world does change and evolve over time, and time and learning go only in one direction—at least we hope they go only in one direction. I don't know where to go with that!

[Laughter]

CHAIRMAN GREENSPAN. President Moskow.

MR. MOSKOW. I want to ask about this financial fragility point a bit more, too. You mentioned that in transcripts of FOMC meetings some Committee members have cited concerns about financial fragility as a reason for smaller interest rate changes than they might otherwise have wanted. I just wondered whether there is any evidence on this. Has any research been done? Or do you have any suspicions about what the relationship is of these up-and-down rate movements to financial fragility?

MR. SACK. Actually, I think there's surprisingly little research relating to that explanation compared with the huge amount of literature on parameter uncertainty and model uncertainty. As far as I know, financial fragility has more or less slipped by.

CHAIRMAN GREENSPAN. All right, Brian, all you have to do is to take a poll of the FOMC members. That's your database.

MR. SACK. Right, and I'm getting the impression that financial fragility is important!  
[Laughter]

CHAIRMAN GREENSPAN. Not important, it's determinant! If we think the market is fragile and it's not, that doesn't matter.

MR. MOSKOW. It gets back to the risk-aversion point.

CHAIRMAN GREENSPAN. Yes.

MR. SACK. We do know a few things, though. First, markets actually have become better at anticipating our policy actions since the early 1990s and especially since 1994. Second,

presumably markets have become better at trading and allocating risk as well. These developments in the economy bear on this issue. But in terms of research indicating what financial fragility does to the optimal rule, there hasn't been very much.

MR. POOLE. May I make a very brief comment on this point, although I'm jumping in out of turn? The way in which dealers manage their positions is going to depend importantly on what kind of policy changes they think are conceivable. If they live in a world where the rate changes by 25 basis points most of the time, with moves of 50 basis points on occasion, that's a very different world from one where the change could be much larger, perhaps 200 or 300 basis points at a shot. The transition from one world to the other is going to be an awful problem and may involve some catastrophes along the way. But the dealers will learn to live with a different environment. It's just that the transition could be extremely difficult.

MR. SACK. Another point is that, while the more aggressive rules would create volatility in the short-term interest rate, it's not really clear what they would do to the volatility of prices of longer-lived assets such as long-term bonds or stocks. To the extent that these rules are better at stabilizing the macroeconomy, they could actually reduce the volatility of those asset prices. In other words, such rules would clearly make the volatility of the term structure more negatively sloped. So in terms of the fragility aspects, there are a lot of subtle points like that to think about.

CHAIRMAN GREENSPAN. Remember, if we're moving the interest rate quickly, the loss function becomes very crucial, whereas if we're moving incrementally, it falls out so we don't really care about it. That can be a very crucial determinant on how we move. In other words, we start with a degree of uncertainty that is very high; it is much higher than it is for those who take the data and put them into a model and do projections. Most modelers are

dealing with a controlled environment in which the number of variables is well short of a thousand. In the real world there are a million, and we don't know which ones are important. So it really matters. Lots of technical things that we do would seem to be wrong in a sort of optimum sense. Yet we do those things because we don't trust the models to be capturing what is going on in the real world. Therefore the base of information on which we act falls away, and risk aversion becomes a very predominant factor in the Committee's judgment of which way to move. I don't know whether we need a psychiatric examination of the Committee members, but I bet it would produce an interesting database! [Laughter]

MR. MOSKOW. See if there are any volunteers!

MR. RUDEBUSCH. I just want to stress again the difference between short-term policy inertia and quarterly policy inertia. A lot of the concerns about financial market fragility would refer just to short-term policy inertia and wouldn't necessarily show up in our quarterly average loss function. Very often in the past if you were going to change the direction of policy, you would start off with a 25 basis point move. Even then—in 1994, for example—we saw large repercussions with the Orange County situation. A lot of people had built up positions, apparently on the assumption that monetary policy would never change, and those positions were hard to unwind. So just a small move in the funds rate seemed to produce large repercussions. A 50 basis point move for that initial move would have been even more disastrous, I think.

CHAIRMAN GREENSPAN. In fact, if you read the transcript of that meeting you will find that there was a very substantial debate within the Committee on exactly that theme.

MR. RUDEBUSCH. Right. But again, if you wanted to get to a total change of 100 basis points from the quarterly average of the first quarter to the quarterly average of the second quarter, that could be done over a sequence of four meetings—with limited concern about

financial fragility. Financial fragility is something that operates on a week-to-week basis. Markets react appropriately given enough time. So I think that distinction has to be made.

CHAIRMAN GREENSPAN. President Parry.

MR. PARRY. Mr. Chairman, I'd like to ask two questions about the first paper. You looked at these three factors in isolation, and then you indicated in a caveat that the factors might interact. It seems to me that, indeed, they might and that could actually change one's conclusion. I can understand, if you're working with the FRB/US model, that with a model that size it would be very difficult to incorporate the three effects simultaneously. Isn't it possible to work with a smaller model that would enable you to look at those effects and how they interact and determine whether or not that leads to somewhat different conclusions?

MR. CROUSHORE. There has been some research that did that, and I think it shows that when you add several of these factors together you get a lot closer to the estimated rule than the optimal rule. That's pretty convincing.

MR. PARRY. Okay. There's another point I'd like to ask about. First of all, we had an interesting meeting in June in which papers on inflation modeling were presented. The discussion revealed some differences around the table in views about which model is relevant. In one case we had a paper based on a Phillips curve, and another was based on a random walk. If the policy participants have different models of the economy, would that perhaps lead one to the conclusion that we should be less aggressive in terms of our approach to policy?

MR. TETLOW. There is a literature on robust policy design in which there are a number of different ways to model this. The one that you seem to be pointing to is a rival model methodology where we put different models up and see what we get if we take the optimal rule from one model and put it into some other model. Most of the literature suggests that policy

should protect against the worst possible case in the set of models that we're willing to consider. The usual prescription that comes out is that policy is more active than it would be under the policy for your base case model. But it's going to depend on what models are in your set. It's certainly possible to have cases in which it's optimal to stay in a narrower range. It's difficult to come up with a definitive answer, but that's where the bulk of the literature seems to be pointing at the moment.

MR. PARRY. It seems a little counterintuitive.

MR. TETLOW. Well, let me give you one particular example. Suppose you had two models that differed in the degree of persistence in inflation—your Bank's random walk model is one of those examples. If you get a shock to the output gap in that kind of model, it produces a cycle of inflation that lasts for an extended period of time. Suppose in the other model, if you shock it, inflation dies out quickly. If you design optimal policy for the model where inflation dies out quickly, that model is going to say don't worry about inflation—just respond to output, and everything will be fine. The other model is going to say, no, inflation is something that you have to attack on a quarter-to-quarter basis. Every time there's a shock to that Phillips curve model, inflation is going to take off on you unless you react. So if you're trying to protect against the worst case in those two models, you're going to respond aggressively.

MR. PARRY. That's interesting. By the way, that's President Stern's random walk!

MR. RUDEBUSCH. It depends, I think, on the structure of uncertainty. This is the argument that Milton Friedman made. His point was that not knowing the model—not being sure of the results—led him to argue against fine-tuning or, in this case, the aggressive policy responses.

CHAIRMAN GREENSPAN. Governor Kohn.

MR. KOHN. Thank you, Mr. Chairman. This discussion has gone on awhile, so let me make just a few points. One is that I'd remind Brian Sack that people sat around this table in October 1979 and made the same argument he just made—that a policy that induced volatility in short-term rates would not get passed through to long-term rates because it would stabilize the economy. And what we found was that the short-term volatility did feed through to long-term rates over the next three years in part because expectations weren't very well anchored and seeing the rate move around in an unpredictable way actually did feed through to long-term rates. There was a paper on this in the staff studies of the new operating procedures.

I guess I come out between the two positions in your presentations to a certain extent. As I've observed the Committee over time, I think there are elements of gradualism in its policymaking but not as much as seems to show up in the data. There are a number of occasions—like 1994, as you've pointed out—when the Committee thought it wanted to go some distance but didn't want to get there really fast because it was worried about financial fragility or other things. Actually, despite the chart, I think there was a bit of that in early 2001 when, once the Committee started to ease, a number of members thought the Committee probably needed to move the funds rate down a couple of percentage points but it took three or four months to get there. On the other hand, my observation is that most of the time when we leave this room we think the rate is pretty close to where we believe it needs to be—not very far away—and we're not looking ahead to long runs of further easing or tightening. So in that case I agree with Glenn. I think an important issue is the serial correlation of forecasting errors that Vincent talked about. We learn slowly over time about the shocks and the way the economy is responding to them. Those answers reveal themselves to us after the economy is shocked. We learn over time how big the shock is, and then we react as we get that information.

With respect to the strength of our responses to output gaps and inflation gaps, I think the Committee hasn't been as gradual or as damped in its responses as the equations say it has. In my view there are a couple of points indicative of biases there. One is that the Committee has been forward-looking, so we're really looking at forecasts and not at existing output gaps. We can often bring information to bear that says that a particular shock will likely go away and we don't need to react so strongly to it. So I think the wrong stuff is on the right-hand side of these Taylor rules; the Committee is doing much more than looking at the current levels of those two gaps. The second point is that these estimates are made on the assumption of a constant inflation target, in this case from 1987 through the present. I don't want to get into a discussion of whether it should or should not have been constant. But I do believe that, from 1987 at least into the second part of the 1990s, the Committee surely did not have a constant inflation target. A number of the former members of this Committee talked about an opportunistic approach to reducing inflation. Inflation was higher than it needed to be over the long run, but there wasn't any extraordinary effort to reduce it. The models wanted us to be stronger in reducing inflation because they had a lower inflation target than the Committee and the Committee didn't react to the model's target but to its own. I think that biases the results to finding that the Committee didn't act as aggressively as the models thought it should, when in fact it acted fairly aggressively—and aggressively enough to get some pretty darn good outcomes for the economy over the past twenty years.

Having said that, I think there is a valuable lesson embedded here, and it goes to the discussion you were having about policy mistakes. It's better generally for policy to act too strongly than too weakly to developing situations. Serious policy errors have been made when policy doesn't react aggressively enough to a developing situation. Examples are the Federal

Reserve in the 1970s or the Bank of Japan in the 1990s. That is the sort of policy error that allows expectations to get out in front. It allows a spiral to develop that becomes very, very hard to reverse. If we react too aggressively, that also can be a policy mistake. But tightening too much because we're afraid of inflation or easing too much because we're concerned about deflation or recession is much more easily reversed without cumulating expectational problems getting built in. So to me the lesson for the Committee from these optimal rules is that we are probably better off being a little too aggressive than being not aggressive enough in terms of the possible consequences for the economy over time.

CHAIRMAN GREENSPAN. You know, that's the issue of risk aversion right there. What prevents us from actually doing what you're suggesting is a fear that is asymmetric. It's very tough to get around that, but we're trying.

MR. KOHN. We can do the psychiatric examinations, but I hope they're not subject to FOIA! [Laughter]

VICE CHAIRMAN MCDONOUGH. Not only have we tried, we've succeeded very well.

CHAIRMAN GREENSPAN. With that thoughtful thought, let's break for ten minutes and come back. We have a number of people who want to speak on these subjects.

[Coffee break]

CHAIRMAN GREENSPAN. Shall we continue? Governor Ferguson.

MR. FERGUSON. Thank you very much, Mr. Chairman. I'd like to pick up about where Bill Poole was and focus on the bottom of exhibit 3 in the paper that the Board staff put out. What that suggests to me is that, if we think the markets have become much more complete and therefore somewhat more forward-looking, then we'd do very well by working with them or

holding onto a more inertial approach here. I would argue as a hypothesis that we are perhaps on the curve. Indeed, while it's hard to say that markets are somewhere between 0.9 and 1 in a forward-looking rational expectations sense, I think it is certainly clear that they have gotten a lot better in that regard over the past twenty years. In that world, the general approach of transparency and gradualism or inertia may well be the best policy in some sense because that way we're working with markets and not, if you will, surprising markets by making large jumps in interest rates. That is exactly what Bill Poole was saying. But I would like to ask the staff whether that is a reasonable interpretation of exhibit 3. Can one say that, because markets have changed sufficiently, we may actually be closer to optimal than some of the earlier specifications might have suggested?

MR. TETLOW. I think we're creeping up that curve on the bottom left.

MR. FERGUSON. Well, give us another red point. [Laughter]

MR. TETLOW. It's hard to say.

MR. FERGUSON. All right. So at least it is a credible theory or a theory that one could put forward that this approach is indeed the right one because the markets have become a lot better, we've become more transparent, and they understand what we're doing. So, in some sense we should validate their expectations.

MR. BERNANKE. Governor Ferguson, the coefficients inferred from our behavior are much lower than the ones that were found to be optimal in the earlier exercise.

MR. FERGUSON. Well, on inflation and output.

MR. BERNANKE. Yes.

MR. FERGUSON. Right, and that's where I was going to go with Don's point—or maybe it was the Chairman's point. Well, let me say a couple of things. One is that I think we

may have been taking advantage of changing perspectives about what level of inflation is acceptable. Second, I think perhaps we have been taking some risks because of financial fragility or external circumstances. We just released the 1997 transcripts, which clearly indicated that the Committee—both before Ned and I joined and afterwards—was taking into consideration some of the risks with respect to the Asian crises and so forth, even though the economy appeared to be growing faster than one would have liked. So I think it's possible—not to pat ourselves on the back exactly but to square this circle—that we take into consideration both the earlier concerns about financial fragility and the fact that most of the markets are functioning better.

That leads to a second point, a comment I have for Glenn. I think you're obviously right to talk about the markets' ability to anticipate but not on a six-to-nine-month horizon. This may be just a different way of looking at it, but I would have assumed that another way to view not necessarily inertia but predictability is whether or not on the day of—or the week before—the FOMC meeting the markets pretty much have it right. My recollection is that by and large they do. We've rarely left this room with the knowledge that we've surprised the markets dramatically. Once in a while we've had to do that. But I suspect that, if in your chart you used the expected funds rate path a week or two before the meeting instead of the expected funds rate path in the middle of each quarter, you'd probably find that the predictability would be higher. Would that be the case?

MR. RUDEBUSCH. Yes, although if you looked at those numbers, I think they would actually strengthen my case. That's because with quarterly policy inertia after you made a move, to the extent that it was not completely anticipated and there was some policy surprise, it would have implications about changes in future rates at a six-to-nine-month or six-to-twelve-month

horizon. The yield curve would not be moving parallel to the existing curve, but its slope would be changing to some extent. In fact, that doesn't appear to be the case.

MR. FERGUSON. That doesn't appear to occur. Okay.

MR. RUDEBUSCH. Again, those inertial movements don't appear to be there because they're not showing up after the FOMC changes the target.

MR. FERGUSON. Okay, good enough. Thank you. Those are my two points.

CHAIRMAN GREENSPAN. President Stern.

MR. STERN. Thank you, Mr. Chairman. I had just a couple of comments. Starting with a point that I think Brian made, for me there's a difference here between inertia and timidity. As far as inertia is concerned, I find Glenn's story pretty convincing. So that's not what interests me particularly. On the other hand, both papers seem to at least allow for the possibility that, relative to some sort of optimal rule, the Committee has been too timid. To the best of my knowledge, by the way, most of the reaction function literature going back to the 1970s and maybe even before seems to come to the conclusion that the Fed has been overly timid. My intuition is to be rather suspicious of that conclusion for reasons that other people have already mentioned. Perhaps the most important one to my mind is that, while the Taylor rule is a useful approximation, I think it's a misspecification in that it omits a lot of important variables. After all, our actions are conditioned not only on things such as how we think the financial markets might react but also on forecasts and all sorts of other variables that are not going to be picked up with a Taylor rule. Having said that, I would admit that I would feel better if we had some empirical work that brought those other variables into play and demonstrated that we got reasonable results. As far as I know we don't have that. So, that's where I am on these issues.

CHAIRMAN GREENSPAN. President Santomero.

MR. SANTOMERO. First let me congratulate Vincent and David for bringing to the table what has been an interesting issue and a worthwhile discussion. I take two things away from this. The first is that the English language is a funny thing. These titles are value laden, and we accept them at times too easily, I think. I'm taken by the phrase "optimal rule." That is, it's optimal assuming that everyone is backward-looking and not optimal as one might think about in a perfect modeling sense. "Optimized rule" I like better. It is a slight spin on the other phrase because it actually says we optimized the rule based upon a model that isn't necessarily optimal in the formation of expectations. The same is true for "policy perfect foresight," which we usually shorten into the "perfect foresight" equation. It isn't perfect foresight. It's a policymaker's perfect foresight when the other economic agents are not using perfect foresight, and therefore it is by construction not perfect. It's not perfectly rational and not even mostly rational.

Now the reason I say that is not to play games with either FRB/US or the English language itself but to recognize that we tend to get ourselves into a game here. We're trying to defend ourselves against something called an optimal rule. It seems that we should be close to it and therefore we should shed the inertia until we're "there." In fact, "there" may be something that is an artifact of the title we gave it, and therefore we have to be a little cautious about getting "there." Are we subject to inertia and gradualism or to timidity? I like that because it really comes to the point of another value phrase in that we wouldn't want to be timid. We might want to be gradual, and we might even want to subject ourselves to some inertia, but we wouldn't want to be timid. [Laughter] The reason I raise it that way is that the reality is that we're dealing in a world in which we seem to observe that we act slowly. But the rationale for acting slowly was actually put on the table. We're not sure about where we are because of data adjustments.

We're not sure exactly of the potency of our actions because of the coefficient uncertainty. Indeed, we're a little concerned about the markets' reaction because of some of the fragility issues. In such a world, it's not surprising that we would act slowly. If in fact the world is as we think we see it, then we may hold steady or make a further move; if it is not, we will reverse an action. As we move closer, if the world backs off and the rationale for an action is an artifact of the data, we will not have to go as far backwards.

So I think in fact our policy behavior was more symptomatic of an environment of uncertainty than we give ourselves credit for. In my view, our actual behavior looks more like a rational response to the uncertain world in the dimensions I just laid out. So rather than try to chase the optimal rule, I suppose my reaction is that we're probably doing a better job than the optimal rule suggests. The data from the markets seem to support that notion, as Glenn reported. Those would be my comments.

CHAIRMAN GREENSPAN. President Broaddus.

MR. BROADDUS. Thank you, Mr. Chairman. I thought this was a very interesting topic, and I thank all the authors for their papers. I enjoyed reading them. I really don't see the two papers as in opposition so much as different approaches to essentially the same issue, and I think the results are both interesting and important. But to me it's important to try to draw insights from the results that the FOMC can actually use in conducting policy and maybe even try to relate them to current policy. Let me take just a quick shot at that, and I want to focus on a particular type of interest rate policy inertia. First, I should say that I agree very much with Tony and others who pointed out that there's a semantic issue here. Timid is bad; cautious is good. It all depends on how you look at it.

I want to talk about one particular kind of inertia that I think we see to a fairly considerable extent in actual policymaking. I would describe it with a phrase that a couple of my Richmond colleagues, including Marvin Goodfriend here, came up with several years ago. They characterized actual funds rate target changes as “highly persistent and seldom quickly reversed.” I think that phrase is used by a lot of people, and it seems consistent with the charts we’ve looked at today.

As we see it, this kind of inertial behavior has both advantages and disadvantages. There has been some allusion to that already. We can see the advantage by recognizing that changes in the funds rate target basically affect the economy through their ability to affect longer-term interest rate movements—to carry those along—as has already been observed here. I think everyone knows that, but just to review it: Longer-term interest rates are linked to expected future funds rates according to the expectations theory of the term structure. With this in mind, having a reputation for not readily reversing changes in the funds rate target implies that a given target change is more apt to carry expected future funds rates with it and therefore carry longer-term interest rates with it as well. For example, if we were easing policy to stimulate the economy, this reputation for inertia would tend to make a reduction in the funds rate more stimulative than it otherwise would be. It would be more likely to move long-term interest rates down, too, and to have a significant impact, which I think is important to consider—especially in the current situation, when we’re near the zero bound. We may need that extra thrust in a number of different situations. In any case, that’s the advantage of having a reputation for this kind of inertia.

But there’s also a cost—or at least it’s not a freebie—because this enhanced effect of changes in the funds rate target works only as long as we maintain our reputation for not

reversing course quickly, even if developments in the economy on occasion make it highly desirable to do so. There isn't a lot of attention given to that in the discussion, but I can certainly think of some situations where that is the case. So in short, garnering the benefits of inertial behavior can conflict with the need at times to act preemptively. Now, on one level that is not exactly late-breaking news, but in my view it's appropriate to think about it along the lines I've described.

Let me quickly try to illustrate this with one particular example, and that's our reaction to the Russian default in the fall of 1998. One way to interpret that event and subsequent events is as follows. We reduced the funds rate, as we all recall, by 75 basis points in three steps in 1998. Because the markets believed that our target changes were highly persistent and seldom quickly reversed—certainly that was the attitude then—the 75 basis point change carried longer-term rates with it. We then reversed those three easings in 1999, but we did so fairly gradually. The first change was in July; there was another one in August and another in November. Now, if you go back and look at the history, the economy was really rather strong in early 1999, and a case could have been made to reverse course much sooner. We didn't do that, and that left our reputation for inertial policy intact. I think one could argue that having that reputation was helpful when we cut rates sharply in 2001 to fight the recession because then, as earlier, the cuts were seen as lasting rather than temporary. But in retrospect one can ask whether or not 1999 might have been one of those times when we should have reversed course more promptly to be more preemptive against the boom, even if it undermined our reputation for inertial policy. I'm not taking a position. I don't know the answer as to which choice would have been best. I'm using that case as an illustration of the kinds of tradeoffs we can confront relative to this issue of inertia.

I find this sort of question very relevant to the situation today, so let me close with a brief comment on that. We currently face the possibility of a potentially sizable negative, maybe geopolitically induced, shock at a time when the nominal funds rate is even nearer to zero than it was in 2001. Of course, the real funds rate is already negative. I can envision a number of situations not too far down the road that would require us to think about these tradeoffs that I just tried to illustrate with that 1998-99 example. Suppose we get a negative shock soon, and we reduce the nominal funds rate even closer to zero, but the economy then improves unexpectedly and quickly. We then would have to weigh the tradeoff between the need to preempt that upside risk, on the one hand, and the harm it might do to our reputation for inertial policy, on the other—a reputation that could well be helpful in other situations when the economy may weaken unexpectedly.

In any event, I'm simply throwing that out as an example of the types of issues that this research and the presentation suggest to me are important for current policy discussions. I would just ask Glenn, Bob, or Brian—or anyone else on the staff—if they might want to comment on that.

MR. RUDEBUSCH. My opinion would be that in the current situation, or even in 1998-99, what is of interest is that inertia is not operating at these quarterly frequencies. These are situations—and one of them would be the repercussions from the Russian default—in which the Committee sees some serially correlated influences that may persist for several quarters and the Committee is responding to that promptly. Similarly, in the current situation there are influences not well summarized by the Taylor rule determinants that the Committee is responding to on a quarter-to-quarter basis. There is no feeling that we have to get somewhere

but we're going to take our time to get there. Again, that's a synopsis of my general impression of the Committee's behavior.

MR. SACK. I'll take the other side. If policy is inertial, what we highlight in exhibit 3 are the benefits of inertia when markets and agents are forward-looking. You provided some very nice examples of exactly what happens in these models. In these models, policymakers by assumption are committed to the optimal rule, which has inertia. That gives them the benefit of bringing forward effects of anticipated, drawn-out policy responses. As you said, for example, in the fall of 1998, expectations were that those easings would not be quickly reversed. Now, that does imply that there will be other situations in which policymakers might want to do something different, but they've committed themselves to this gradual rule. Mike Woodford has done a lot of the research on this theory, and he talks quite a bit about the fact that policymakers often find themselves confirming expectations of policy actions that were built in in advance. It's important to confirm those expectations in order to get this channel operating and to get markets bringing forward the effects of policy actions. I think you gave some good examples of what is going on in exhibit 3.

MR. BROADDUS. If we break this pattern, though, and move boldly in some situation, what is the cost associated with the loss of credibility for inertia, if I can use that phrase? It seems to me that is the kind of thing we have to be informed about if we ever have to make these choices going forward.

MR. TETLOW. That's a difficult question because it depends on how people learn, a mechanism that is not formally in the model itself. If people have completed their learning and know your rule and you do something quite different from your rule, does that cause them to reinterpret what you're doing and conclude that you must not be using the rule they thought they

knew? That's when confusion results, and they can't predict the funds rate ninety days ahead, for example. There is not very much literature on this, mostly because there's no agreed-upon theory about how people learn. What I think is true, and this is just a feeling on my part, is that if the events the Fed is responding to are extraordinary—outside the normal random shocks that occur from period to period—the private sector is quite happy to give you the benefit of the doubt.

MR. BROADDUS. People will cut us a little slack?

MR. TETLOW. Yes. But if you're responding idiosyncratically to normal shocks so that it doesn't seem as if you're acting in a systematic way, that will undermine people's beliefs that you're following a committed rule, or rule-like behavior, that anchors their expectations. That is the key here. One thing we didn't show you in the material we presented is that, if you get to the point Governor Ferguson referred to—where you've moved up the curve in exhibit 3 and are near the top of it so that people are more rational—the performance of the economy is much better than if they're not rational. That's the first point. The second is that people are also very forgiving of mistakes. If you do behave differently than the policy rule would call for—and people don't bail on you and say they don't know what you're doing now—the policy loss from doing something other than the optimal is very small. If people are rational, they are willing to give you that benefit.

MR. BROADDUS. Thank you.

MR. REINHART. Let me make just one point, President Broaddus, which goes back to how this conversation started a while ago. The Chairman asked Brian what the  $R^2$  was in this exhibit on changes, and the answer was 0.4. There is plenty of unexplained variation. It's going to take a while before market participants decide that the rule has changed just because there are

a couple of runs in which a policy action is unexpected. In part it also depends on how policymakers explain what they do in the manner that Governor Ferguson and President Poole talked about. If it can be described as a change in  $r^*$  credibly linked to events, then it's not obvious that a change in the direction of policy is a policy reversal in the underlying sense.

MR. BROADDUS. I feel more comfortable.

CHAIRMAN GREENSPAN. Vice Chair.

VICE CHAIRMAN MCDONOUGH. Thank you, Mr. Chairman. Most of the people that I know in financial markets understand as much about these models as I do, which isn't very much. Having the enormous benefit, unlike all previous speakers, of not having a PhD in economics—or perhaps in English literature, in the case of President Santomero—I think the rule that we need to apply is the rule of what I would call prudent central banking. If we look back on the conduct of the Committee, going back at least to 1987 or to 1993, when I got here, I believe that we've passed that test quite well. If we reexamine what we've done together—with the possible exception of the case President Broaddus mentioned, although I would not agree with his conclusion on the timing of our tightening in 2001—even with the brilliance of hindsight, I believe that we have been prudent central bankers. What do I mean by that? What does that tell us about how the Committee behaves?

I've bored you many times by saying that in my view the most important thing in public life is to distinguish between what we do know and what we do not know. When we reached a point as we did in February 1994 or as we did on January 3, 2001, when it was time for a significant shift in monetary policy—tightening in the case of 1994 and easing in the latter case—what did we know on those occasions? Actually, I should note that I think the seeds of the January 2001 action go back to the December 2000 meeting of this Committee at a time

when the markets were essentially closed for the year. There was an underlying feeling going through the room at the December meeting that we were going to keep monetary policy on hold but that there was a strong likelihood that we'd be chatting soon in a telephone conference call. We did that the very first day the market was open in 2001. I remember that we knew on both of those occasions that a significant change in monetary policy was required—tightening in the first case, easing in the second case. But what didn't we know? We didn't know what the total size of the needed monetary policy corrective move would turn out to be. I certainly didn't know that, and I think even our distinguished Chairman didn't know that at the time. It was very clear with the 25 basis point move in February 1994 or the 50 basis point move on January 3, 2001, that our work wasn't finished. There was more to do.

In such situations, we get into the combination of not knowing how far we're going to go or necessarily how quickly. But we start dealing with the financial markets through which our policy operates, and we observe the reaction in those financial markets. Then we try to judge the likely effect on the real economy of that reaction. If the financial markets are working with us, then the pace of our monetary policy move can be accelerated. We can be bolder, but we are being bolder while being wise and prudent at the same time, which in my view is highly necessary. So I think a prudent central banker is not a timid central banker or a risk-averse central banker but rather one who says the following: This is where I think I want to go; how fast and how far I'm not quite sure, so I'm going to deal with the real world in which we live and do it as effectively as possible.

At the end of most of those lengthy cycles, which usually last about a year, we realize — as we've said frequently in this Committee—that either the last two moves or the last move is going to turn out to have been unnecessary. That was the reasoning behind our explaining the

50 basis point move that we made most recently as an action taken against a soft spot in the economy. We made it very clear that it was an insurance policy against downside risk. Why did we do that? Because when we reverse that move—when we cancel the insurance policy—it will be very easy for financial market participants and the public more generally to understand.

I think the model building is extremely useful, and this kind of discussion is very important and very enlightening for us. But in my view the likelihood—as you suggested, Mr. Chairman—of our ever getting the model so exactly right that we can base anything on it other than a sense of policy direction is very low. If we decide, well, let's be bold, then somehow the markets will figure it out over time; that is a risk that I don't think a prudent central banker will take. Eventually the markets may figure it out, but in the meantime, if we scare the hell out of everybody and tank the economy—losing the confidence of the American people, never mind market participants—that would be imprudent. A central bank should not engage in imprudent behavior. It's wonderful to feel bold, but I think it's even more important to be prudent. Thank you.

CHAIRMAN GREENSPAN. How does it feel to be bold and wrong? [Laughter]

VICE CHAIRMAN MCDONOUGH. That's why you're prudent—also known as risk averse—but prudent sounds so much better.

MR. RUDEBUSCH. I have one brief comment on that, which is how I would come out on this issue. If the choice were whether the Fed should change its behavior to match the models or whether we should change the models to have optimal monetary policy match historical Fed behavior, I'd probably go for the latter. But it's not clear to a lot of researchers exactly how to incorporate this model uncertainty and what needs to—

VICE CHAIRMAN MCDONOUGH. Well, as the Chairman said, there's a good deal of psychology involved. Therefore, we're dealing with all the social sciences, however mathematical we try to make them, at the same time. What is the reaction of financial markets? That's largely psychological. What is the reaction of the real people? It's almost purely psychological. I don't know of any model that perfectly links psychology and economics. Maybe some day we'll have such models. I don't know that they exist yet.

MR. RUDEBUSCH. For example, the policymaker perfect foresight path in the Bluebook is perhaps interesting, but the psychology has to be taken as missing from that.

CHAIRMAN GREENSPAN. Governor Gramlich.

MR. GRAMLICH. After pondering this, I'm going to talk more about policymaking than the papers or models, and I'm going to say what Bill just said in a somewhat different way. We, of course, want to be prudent, responsible, stable, and all those things. It has been assumed that we get prudence, stability, credibility, and so forth on the basis of the changes we make to the target funds rate. But the more I think about it, the more I think that probably doesn't capture it. To go back to something Vincent said, what is important is to clarify to markets what we care about. We care about stable prices and maximum employment. There will be times when we have to move fairly quickly, such as in 2001, to establish our commitment to those objectives. I don't think we should be captive to a feeling that, if we move in a series of small steps but a large distance over a fairly short period, it will somehow make us less credible, understandable, or transparent. As long as we are clear on what we care about, then I think that will give us a little freedom to make big changes if we have to make them or not to make big changes if we don't have to. So I tend to think that the stability and credibility depend on a consistency of objective, not on our behavior in terms of how much we change.

CHAIRMAN GREENSPAN. President Poole.

MR. POOLE. There's a lot more communication with the markets than just the intended fed funds rate itself. One of the things that I find striking is that this Committee and, of course, particularly the Chairman have really been remarkably clear and coherent about a whole variety of things on which it's possible to be clear and coherent. He enjoys talking about obfuscation, but that's not in fact what the markets most of the time take away from what he says. I believe that's an important point. It's one thing that separates the success here, I think, from the problems that some other central banks have had because the predictability that we're talking about is not there for some of those other central banks. There is some literature on that.

Let me mention something that I find interesting. Roger talked about the fact that the fed funds futures market the day before a meeting most of the time has it right. One of the things that Bob Rasche and I have done is to go back and try to figure out how that happens. If one looks at any particular fed funds contract at the beginning of its trading—let's say when it starts to become active three or four months in advance—that forecast that far in advance is often not very accurate. What happens if you follow this day by day is that you see that the information coming into the market moves that rate in a very sensible way most of the time. So let's say the fed funds prediction starts out too high and then it converges to where we actually go; it's a consequence of new data such as a weak report on industrial production or employment and a whole raft of other things. It turns out that about 80 percent of the large fed funds futures changes are a consequence of information of that type and about 20 percent are a consequence of statements or testimony—primarily from the Chairman or occasionally from other members of the Committee. So a coherent picture of how the policy process works is obtained not just from the response function that economists build into their models and work with in their equations.

It's also a consequence of the way the Committee—and again I emphasize particularly the Chairman—has articulated what it is that we are doing.

CHAIRMAN GREENSPAN. President Hoenig.

MR. HOENIG. Mr. Chairman, it's late and some of my intended comments would repeat what others have said, so I'll be fairly brief. One point I would note is along the lines of Vice Chairman McDonough's comment on modeling human behavior. We have two models here, and most of us probably can agree with some dimension of each model depending on the circumstances. As I look at the models and at the circumstances, I find that my thoughts go to the Chairman's earlier point and Don Kohn's. When we are confident enough about what we should do, we act more boldly. When we are less confident, we act either more cautiously because we don't know or we take that one step too many because we don't know. What these models are trying to do is to pick up that behavior. Since that involves the human behavior of a small group, we're going to get some rather contradictory and conflicting outcomes. That's exactly what we've got here, I think, and it has been interesting. I'm not interested in signing up for the psychological test, though! [Laughter]

CHAIRMAN GREENSPAN. Governor Bies.

MS. BIES. Let me make a couple of different comments. Also because of the time, I am not going to repeat some of the comments others have made. One of the things I found interesting in reading these papers was Glenn's chart on page 2, which looked at the different rules and the actual fed funds rate. What strikes me is that the largest variances among the different fed funds rates really occur mostly when either there is a turn or there is noise in the data. I was in the private sector when many of these events were occurring, and I will tell you how I read the situation—and this picks up from what Bill Poole just said. When the FOMC has

a great track record of being persistent—when we know that we’re trying to get out of a recessionary period or we’re really fighting inflation, or whatever our direction is—the market expects us to persevere. So we keep along those paths through both communication of the rate changes and other public comments that we make. But just as our views sometimes differ around the fringes in getting to a consensus on when turns happen, the views on the Street differ as well. To the extent that that’s noise, I think that’s a different issue than the persistence of a policy course through the cycle.

The other comment that I have relates to reacting and overreacting. The market tends to overact. I was chairman of an early asset liability management committee (ALCO), and in that group we called the fed funds rate the administered rate because we saw it as always lagging behind whatever else was going in the markets. With the advent of derivatives and other hedging instruments, the one thing that most bank ALCO managers did not do was to hedge anything to the fed funds rate. That’s because its correlation was so low compared with that of free-moving rates like Libor or Treasury yields or other market indexes that moved more quickly. In the periods we’re talking about—for example, in 1998—some of us can remember that traditional hedges actually reversed on us; and instead of being negatively correlated, they were positively correlated. The fact that the Fed was there signaling that it knew something unusual was happening that caused the movements helped in my view to damp the overreaction of the marketplace. So another element of our not wanting to overreact and to reverse ourselves is that I fear it would build on the market’s own tendency to overreact and reverse on itself. So I think it’s important for us to be persistent, to signal when unusual events are happening, and to communicate that well. To me those are the lessons that we can take away from these papers.

CHAIRMAN GREENSPAN. Thank you very much. Any further comments to close this discussion? If not, we have a report from Dino.

MR. KOS.<sup>2</sup> Thank you, Mr. Chairman. I'll be referring to the package of charts that is being circulated. The first graph shows three-month cash deposit rates in the United States and the euro-area and three-month deposit rates three, six, and nine months forward for both the dollar and the euro. The cash rates were stable in the intermeeting period, but forward rates declined, particularly for the euro. The three-month-forward dollar rates traded through cash rates, partly in response to data that became available as the intermeeting period progressed. Disappointing outlooks from several major corporations and risk aversion driven by geopolitical risks were cited by market participants as reasons that short-term rates were likely to stay low longer than had previously been expected. Some were even building in further reductions to come.

In the euro area, reduced expectations for growth, changing sentiment about the prospects for structural reform in some major economies, and a stronger euro that might curb exports were cited as reasons that interest rates might decline there. For nearly two years now euro-area short-term rates have been higher than dollar rates of comparable maturity. That divergence was not really remarked upon for much of that period. Long-term capital flows, such as foreign direct investment and equity portfolio flows, more than covered the U.S. current account deficit. But with those sources drying up more recently, the expected returns on short-term investments have become much more important to the financing of the deficit. Hence, short-term interest rate differentials have become more of a topic of conversation in markets.

At the longer end, as shown in the bottom panel of page 1, ten-year yields on German and U.S. government bonds recently have shown a rate advantage for the German bonds. Although that spread has nearly converged as of today, German yields have had an advantage over U.S. yields since May 2002. In general, an underlying theme in currency markets recently has been the reduction of expected returns on dollar assets.

Turning to page 2, in the past two months the dollar has shown a steady decline against most major currencies, with the decline of the dollar against the euro most pronounced. The euro has gained about 10 cents versus the dollar in the last two months and is now trading at its strongest level since October 1999. But the dollar has also been falling against the Swiss franc, the Australian dollar, the New Zealand dollar, the pound sterling, the Norwegian kroner, the Canadian dollar, the yen, and almost every other currency except the Mexican peso. Geopolitical concerns in one form or another have been cited as the reason. But if investors have concerns about Iraq, it's not clear why European currencies would be immediately attractive. And if the concern is North Korea, it's not clear why the yen would have a spark. Falling

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<sup>2</sup> The materials used by Mr. Kos are appended to this transcript (appendix 2).

stock prices in the United States are sometimes mentioned, but European stocks have fallen even more.

One variation on the geopolitical factor that may have a bit more attraction in terms of concerns is the extent of generalized uncertainty. That explanation suggests that uncertainty among businessmen and investors has led both groups to stay on the sidelines until the air clears with respect to these geopolitical risks. Given the losses that investors in general have had in riskier assets in the last few years, that yearning to “stay home” is understandable even without the uncertainty generated by event risks. But if Japanese, European, and other investors stay home and the U.S. current account deficit still needs financing, the result is that pressure builds on the exchange rate—and perhaps even on asset prices. A second aspect of developments in the last few weeks involves uncertainty about today’s testimony by the incoming Treasury Secretary. Some market participants had speculated that he might take a different approach toward the dollar policy. Finally, another underlying theme in the markets was that some influential central banks were reallocating reserves from dollars to euros.

The yen also appreciated versus the dollar despite the continuing stream of bad news out of Tokyo, although the rise in the yen was less pronounced than that of other major currencies. In part, the cause of the yen’s appreciation may also be related to asset reallocation, this time by Japanese institutions from yen and dollar assets into euro assets. But another factor may have been the intervention by the Bank of Japan. Since mid-January, the Japanese monetary authority has intervened very, very quietly in markets. In total, they have acquired \$5.6 billion over that period. Markets have not caught on to this activity yet, though they will by early next week when the Bank of Japan’s month-end financial statements are released.

As for the dollar’s value more broadly, as shown in the bottom panel, on an effective basis the dollar is roughly back to the middle of its trading range since 1995 and is also at the average of its value since 1985. While some commentators have taken that as a sign that the currency is perhaps getting close to some sort of equilibrium, others have pointed out that the dollar moves in long multiyear cycles and is prone to overshoot on the upside and also the downside.

Turning to page 3 and moving to domestic markets, there have been some signs of a revival in risk appetites and of easier financing conditions. But these signs are tentative and perhaps not all that convincing in the end. The top left panel shows that the investment-grade corporate bond spread has narrowed sharply in the past three months. Issuance has also shown some signs of picking up. The top right panel shows a similar pattern of narrower spreads and a pickup of issuance for high-yield bonds. Although the trends are favorable, the absolute levels of both spreads and issuance still point to markets being not quite back to normal. The middle panel graphs for the period since January 2000 the monthly corporate bond spread to Treasuries—for investment-grade bonds (in green on the right scale) and for high-yield bonds (in red on the left scale). Spreads are down from their highs for both, but

essentially they have retraced the spike after last summer's corporate scandals and in absolute terms are still on the high side. Similarly, over a longer perspective, issuance also has stopped growing. The bottom panel shows aggregate corporate bond issuance—both investment grade and high yield—by quarter for 2001 in red and for 2002 in blue. In each quarter of 2002 issuance was lower than in the comparable period in 2001. So far this month, through January 24, issuance has totaled \$47 billion compared with nearly \$85 billion for the full month last year and more than \$100 billion in 2001.

Market participants also point to absolute levels of Treasury yields as another indication of risk aversion. As shown in the top left panel page 4, the two-year yield remains near its record low at about 1.65 percent. Longer-term yields have declined a bit less, but they, too, remain at low absolute levels. The result is that the curve has steepened again. The middle panel graphs three views of the curve's steepness since January 1991. The red line depicts the thirty-year yield minus the three-month rate, the blue line shows the ten-year yield minus the three-month rate, and the green line graphs the ten-year yield minus the two-year rate. Each is at a very steep level and is comparable to the peaks recorded in 1992. The positive spin on this steep yield curve is that it is forecasting an economic recovery as it did in the early 1990s. The negative interpretation that some are taking is that longer-term rates, although low in absolute terms, have remained unusually high despite the fall of short-term rates. In the latter view, that's either (1) because the return of budget deficits is forecasting a substantially higher supply, which is being priced into the curve, or (2) because foreign investors in particular are demanding a higher rate of return to keep accumulating U.S. assets. Given the short-end policy rates, that higher rate needed to attract foreign investors is showing up at the long end. The picture in equity markets has been mixed, with signs of risk appetites recovering early this year. But with the declines of stock prices in the past two weeks and the spike in volatility, as shown in the bottom two panels, risk aversion seems to have the upper hand there as well.

Turning to the next page, I just wanted to say a few words about some intra-European developments. The top panel graphs from last November the S&P 500, the DAX, and the Dow Jones Euro Stoxx index. In general, despite the rally in the euro, the situation in euro-area markets has not been very rosy—especially in Germany. The DAX has depreciated more than the S&P and for that matter more than other European indexes. Germany has been criticized in the markets for moving too slowly on structural reform and for letting its finances breach the Stability Pact threshold. Somewhat less noted among analysts has been the compression of spreads relative to Germany among European sovereign bonds. French government bonds have traded close to German bonds for some time. But Italian and Spanish bonds, which were traditionally grouped in the so-called periphery—and typically yielded 2 to 3 percent more than German paper before the launch of the euro—have seen their spreads compressed. As shown in the bottom panel, despite Italy's budget problems, its sovereign debt is now trading less than 20 basis points over Germany's. Spanish government bonds are trading on par with France's, at only a handful of points over

Germany's. A number of market participants have noted that Spain has actually moved among the fastest in the EU on the structural reform side.

Turning to page 6, I have just a few quick words on reserves. The graph there shows the composition of the System Open Market Account in terms of its three main components—the permanent SOMA, long-term RPs, and short-term RPs acquired since January 26, 2002. You'll recall that after currency unexpectedly drained reserves in the fall, the Desk compressed the System's balance sheet, mainly by reducing the size of the long-term repo book to \$6 billion. As we moved toward year-end, a more normal seasonal pattern of currency growth emerged, and the Desk accommodated that primarily by expanding the long-term repo book back up to \$26 billion. As the seasonal pattern reversed, the long-term repo book has been taken down to \$14 billion, a level we feel comfortable maintaining for the time being.

Mr. Chairman, there were no foreign operations in this period. I will need a vote to ratify domestic operations, and I would be happy to take any questions.

CHAIRMAN GREENSPAN. Questions for Dino?

MR. GRAMLICH. Just one, Dino, on your dollar chart on page 2. You said that some people think the dollar is in equilibrium now because it is back at its historical level. Has anybody looked at the current account deficit to inform those judgments?

MR. KOS. Well, the people citing that view are perhaps not taking the analysis as far as you're suggesting. I think it's probably more mechanical—looking at the dollar's highs and lows and figuring that, since it's somewhere in between, it might be approaching something of an equilibrium. But, again, many people tend to look at these exchange rate movements as having very long cycles; they tend to think that we may have more to go on the dollar.

CHAIRMAN GREENSPAN. Further questions? Cathy.

MS. MINEHAN. I was interested in your comments on risk aversion and the various ways that you see it in the market. In the last couple of statements after our meetings, we've referred to geopolitical uncertainty. But with the weakness apparent in the incoming economic data, there also has to be a degree of uncertainty that simply reflects people wondering what is

going on in the economy. Do you have any sense of the breakdown between those two types of uncertainty with regard to how market people are seeing them?

MR. KOS. That's a very good point, President Minehan. I think that is reflected in the concerns about some of the corporate reports that have been coming out and about the weakness in the production and employment data. It's very hard to put percentages on that, but that type of uncertainty about the underlying strength of the economy is certainly part of it. Much of the market commentary has been that there are a lot of uncertainties involving big events that could go one way or the other way in the next few weeks and months, and market participants are having a hard time pricing for those risks because there are quite a number of them.

MS. MINEHAN. Yes. It seems to me that if all the uncertainties center on a discrete geopolitical event—a go/no-go decision such as we go to war or we don't go to war—that has one implication for how to look at the second half of the year. As in the Greenbook, one could look at various scenarios that make some big assumptions about the shortness of a war or whatever. If the uncertainties hedge around underlying fundamentals—growing out of the view that this is a very different kind of recession than that around which our models and people's memories are built because this “recovery” compared with previous ones is so slow—then that says something different about the role of uncertainty. That is a different story in terms of when the uncertainty might get resolved and the implications for the second half of the year.

MR. KOS. I don't want to comment on the forecast or what the market might or might not be expecting with precision. I think many have an assumption that the second half will be strong. So that's one of the factors for which there might be—

MS. MINEHAN. They are thinking a little more of a discrete event or that kind of thing—something that is resolved faster rather than slower.

MR. KOS. Well, the way that I would put it is that the forecasts for the third and fourth quarters are relying upon a lot of positive things happening in the next few weeks on the geopolitical front and also on the assumption that the data will get better. Now, if things do not turn out that way, then quite a bit of risk might lie ahead in several markets. That's the way I would think of it.

MR. STOCKTON. President Minehan, one thing that makes the kind of decomposition you're suggesting especially difficult to do is that, if geopolitical risks actually have affected business decisions on hiring and production, then some of what appears to be a response to weak employment and production data is indirectly a response to the fallout from the geopolitical risks.

VICE CHAIRMAN MCDONOUGH. May I slide a comment in here? In talking with people in the New York, London, and Paris financial centers, it's very, very hard to determine to what extent they are saying that the uncertainty is geopolitical when it's really a cover story for uncertainty about economic issues. It's absolutely impossible to distinguish between the two. My own view is that people think it's rather fashionable to say you're worried about geopolitical risks—it's such an eloquent word—when the real fact is that they're worried very much about economic developments. The point is that, if all the concerns are geopolitical and we do something in Iraq and it's over very successfully, one might think, wow, the economy could take off. If on the other hand it's a cover story for concern about the economy, the reaction to a successful war effort might not be anywhere near as positive. I don't know how to distinguish this mix of uncertainty and risk aversion.

CHAIRMAN GREENSPAN. That's the real dilemma we're looking at for the next month and a half.

MS. MINEHAN. Yes.

VICE CHAIRMAN MCDONOUGH. Exactly.

CHAIRMAN GREENSPAN. Governor Ferguson.

MR. FERGUSON. I want to ask a question about your page 3. When I see a chart like this that shows spreads of corporate yields versus Treasuries for a short period, the question that comes to my mind is, What should one consider the norm? If one had a much longer historical chart, I don't know what it would show. Is a spread somewhere in the range of 150 to 200 basis points about right—I'm looking at the U.S. domestic rates—or is that way off? Can you give us a little sense of how this fits in the broad historical scheme of things? That would pick up a little on the earlier discussion about risk aversion. That spread has come down some, but has it come down a great deal by historical standards or is it still elevated by historical standards?

MR. KOS. Well, if we go back to the 1997-98 period, spreads were extremely tight. If anything, they were probably too tight and were not factoring in as much risk as people were undertaking. So in that sense I've intentionally left that out. But if we exclude that period, at least based on the sense I get from people in the market, "normal" would be something south of these numbers but not as low as the 50 basis points seen in that earlier period on some bonds that were bordering on junk. So the area we would be thinking of is something higher than that but lower than what they are today. Certainly for the high-yield bond the spreads are about 800 basis points now, and I believe they bottomed out at about the mid-200s, which was extremely low. So a spread in the 400s or the 500s is intuitively what people in the markets feel might be a bit more "normal," if you will.

MR. REINHART. As you know, Governor Ferguson, and as Dino noted, these spreads move around a good deal. We're struck by the fact that they've come down of late, but they've

come down from an unusually high peak. The high-yield spreads bottomed out, as Dino said, in the neighborhood of 240 basis points at a time when we think risk aversion was unusually low and investors were too willing to take on risk—at the end of 1997. Subsequently they rose about 800 basis points and in recent months have come off a couple hundred basis points, as you see here.

MR. KOS. Another way of looking at this is that these spreads now are roughly where they were in January 2001, when the Committee first started easing and when there was a lot of risk aversion, especially in the high-yield market. They are also close to the levels of October 2001 right after the terrorist attacks. So they're back to levels that most people in the market would not view as necessarily reflecting a healthy state of affairs.

MR. REINHART. In fact, if you want an even more evocative comparison than that, the last time the spreads were there before then was in 1990.

MR. FERGUSON. Thank you.

CHAIRMAN GREENSPAN. Governor Bies.

MS. BIES. I have a question on page 3 also, on the bottom chart showing a decline in U.S. corporate debt issuance. Do those figures also include obligations involving funds raised by corporations through securitization, or is that just straight corporate debt?

MS. KOS. I believe it is straight corporate debt. I would have to check on that, but I don't believe it would include Ford ABS, for example.

MS. BIES. Well, that's what I was wondering. Back to your risk aversion—to the extent that corporate debt has gotten very expensive to issue, some companies are substituting commercial mortgage-backed securities, collateralized debt obligations, and those types of things in lieu of straight corporate debt.

MR. KOS. Yes, some clearly have. That was especially true in the fall, when a lot of corporations could not issue straight debt, and they went that route because it was still available to them.

VICE CHAIRMAN MCDONOUGH. We ought to amplify the charts to show that.

CHAIRMAN GREENSPAN. Yes, I think that's right. If it included securitization, those data, which are included in the sources and uses of funds, would have to show a huge sale of securities. They don't show that, which suggests that it is a different set of data.

MR. REINHART. The other form of substitution that firms used at that time, Governor Bies, was to run down liquid assets. In the flow of funds accounts we see a big decline in liquid assets.

MS. BIES. Right. That was another question I had. To the extent that corporate cash flows have gotten a little better, I wondered whether that has had an effect too.

MR. KOS. Certainly there was a run-down in commercial paper being "termed out." There was also some paydown of commercial paper financed by running down cash balances. Some of that was going on as well.

MS. BIES. Okay.

CHAIRMAN GREENSPAN. Any further questions? If not, let's adjourn until—

VICE CHAIRMAN MCDONOUGH. Mr. Chairman, I move approval of the domestic operations. Sorry, I almost forgot.

CHAIRMAN GREENSPAN. Oh yes. Without objection they are approved. Let's adjourn then until 9:00 a.m. tomorrow.

[Meeting recessed]

**January 29, 2003—Morning Session**

CHAIRMAN GREENSPAN. Good morning, everyone. We'll begin today's session with the chart show presentation.

MR. SLIFMAN.<sup>3</sup> Before we start the chart show itself, I want to give you an update on the data released yesterday on orders, shipments, and inventories. These are on the separate sheet inserted in the chart show package. As shown on line 1, new orders for nondefense capital goods rose 2.8 percent last month—about in line with our expectation. In addition, the November number was revised up reflecting, in part, a whopping revision to aircraft orders. The shipments numbers, lines 6 through 10, were weaker than expected and, all else being equal, would shave 0.1 percentage point off fourth-quarter GDP and put us on a slightly lower trajectory going into the first quarter. However, inventories at manufacturers of durable goods, line 11, are reported to have soared at an annual rate of nearly \$30 billion last month, with almost all of the accumulation in the aircraft industry (line 12). Given what we know from Boeing about their production and deliveries last month, we're puzzled by the size of this number. Nevertheless, taking the figure at face value, it would add about 0.4 percentage point to fourth-quarter GDP.

Let me turn now to the chart show. In putting together the Greenbook, two of the questions we asked ourselves were, "What the heck happened to the economy in the fourth quarter?" and "How do we get from an economy that appeared to be dead in the water late last year to one that's growing at a 4½ percent rate in the second half of this year?" Many of you may well have asked yourselves the same questions.

So, what happened in the latter part of 2002? Two different factors seemed to have been at work. First was the return of the production of motor vehicles to a more sustainable pace in the fourth quarter (the red dot in the top left panel) from the elevated third-quarter rate. We estimate that the drop in assemblies deducted about 1 percentage point from fourth-quarter GDP growth. But as shown by the open dot, we expect this sector to be essentially neutral for GDP growth in the first quarter. As shown in the top right panel, the other factor helping to explain the pause of GDP growth during the fourth quarter was a resumption of inventory liquidation outside the motor vehicle sector following the modest accumulation in the preceding quarter.

The remaining panels of this exhibit trace out the main elements of the production, demand, and inventory story in the second half of last year. The high-frequency data in these panels and the anecdotal reports in the Beige Book and from our business contacts highlight a feature of last year's economic performance that is obscured by the arithmetic of quarterly averaging—namely, the abrupt halt in the growth of non-auto factory output that occurred in middle of last year (the middle left panel). The retrenchment doubtless was related in part, as one contact put it, to a

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<sup>3</sup> The materials used by Mr. Slifman, Mr. Struckmeyer, and Ms. Johnson are appended to this transcript (appendix 3).

“complete loss of business confidence in the wake of the corporate governance scandals.” Despite some retrenchment of production, final sales excluding motor vehicles continued to expand. As shown in the middle right panel, consumer spending (line 1) and housing activity (lines 2 and 3) were both well maintained through the end of the year, although business spending (line 4) remained sluggish. The shortfall of production from demand outside the auto sector had as its tautological counterpart a reduction in inventories, especially for consumer goods and business equipment. As we noted in the Greenbook, because final sales have continued to increase, we are not viewing last quarter’s liquidation as signaling a major problem with unwanted stocks that could cumulate into even deeper production cuts. The days’ supply of inventories, illustrated in the bottom left panel, does not suggest any serious imbalances, nor do the reports from purchasing managers on their customers’ inventories (the bottom right panel). In GDP terms, we expect non-auto inventories to be a neutral factor in the current quarter after subtracting a percentage point from growth last quarter.

Your next exhibit begins to lay out our answer to the second question I raised initially: “How do we get from here to there?” In the first half of 2003, when GDP is projected to rise at a 2¾ percent rate, the answer is essentially the mirror image of the one for the fourth quarter of this year—an absence of drag from motor vehicles and inventories coupled with continued gains in final demand. Indeed, we already may be seeing the start of this outcome: Factory production excluding motor vehicles ticked up in December, and most reports from purchasing managers have been upbeat of late. In our projection, activity steps up sharply after midyear and remains well above the growth rate of potential through the end of the forecast period. With output increasing faster than potential, the unemployment rate begins to fall later this year. Even so, enough slack remains in the economy to result in a further deceleration in consumer prices. The acceleration of GDP after midyear reflects several factors, some of which are highlighted in the middle panel. As shown in the first bullet, we assume that the cloud of uncertainty and pessimism hanging over the business sector will begin to lift as we go through the year. In addition, strong gains in structural productivity boost real incomes and spending. As regards monetary policy, the stimulus associated with past easings, as well as an assumed accommodative policy in the projection period, provides significant forward momentum. Finally, we expect new doses of fiscal stimulus to be injected into the economy in mid-2003 and the beginning of next year.

The fiscal package we’ve assumed involves bringing forward in time several tax cuts that currently are scheduled to be phased in between 2004 and 2010—specifically, an increase in the child tax credit, an expansion of the 10 percent tax bracket, marginal rate reductions, and marriage penalty relief. We have not included the Administration’s dividend exclusion proposal in our baseline assumptions. The bottom left panel shows our fiscal impetus indicator, which is a measure of the initial impulse to aggregate demand arising from discretionary changes in federal spending and taxes. The red line shows the amount of fiscal stimulus in the pipeline under current tax law. The shaded area illustrates the extra stimulus that results from our

assumption that future tax cuts will be accelerated. The panel on the bottom right uses simulations of the FRB/US model to estimate the direct and indirect effects of our fiscal assumption on the growth rate of GDP as well as the effects of adding in the dividend exclusion proposal. The solid gray portion of the bars indicates our estimate of what GDP growth would be if the Congress made no changes to current tax law. This corresponds to the “political gridlock” scenario shown in the Greenbook. As you can see, even in the absence of another shot of fiscal stimulus, we would still expect the economy to grow smartly in 2003 and 2004. The red shaded area highlights the effects of our assumed acceleration of future tax cuts, while the yellow portion adds in an estimate of the effects of adopting the dividend exclusion proposal. As discussed in the memo sent to the Committee last Friday, there are a number of very thorny issues related to the economic effects of cutting the tax on dividends that are not settled in the economics literature. Accordingly, the simulation results have a very wide confidence band.

Much of the stimulus from monetary and fiscal policy manifests itself in the household sector, the subject of your next exhibit. Consumer spending (the blue bars in the top left panel) was well maintained last year, spurred in part by low interest rates and the tax-cut-related jump in real disposable income (the yellow bars). Looking forward, we expect that the strong gains in structural productivity and the tax cuts assumed to come on line this year and next will support DPI growth through the projection period. In addition, we assume that there will be no further deterioration in net worth relative to income over the projection period, as shown in the panel to the right. The middle left table provides a parsing of these effects on the growth rate of real PCE. A step-up in the growth of structural productivity boosts the contribution from potential GDP (line 2); this is augmented by the stimulative influence of the tax cuts (line 3) and some waning of the negative wealth effects (line 4). One risk to the outlook for consumer spending that has been raised by some analysts is the possibility that households are overextended and are unusually vulnerable to unanticipated disruptions to income. As shown in the insert in the middle right panel, household debt growth is projected to step down from the rapid pace in 2002, reflecting a moderation in the pace of mortgage borrowing (the yellow bars).

Nonetheless, the growth of household debt continues to exceed the rise in nominal income, continuing the upward trend in the overall debt–income ratio (line 1 in the bottom left table). However, we don’t see this increase in debt burden as likely to impose serious restraint on consumer spending. In part this is because the rise in debt burdens is heavily concentrated at the upper decile of the income distribution—households with incomes above \$108,000 in 2001, according to the Survey of Consumer Finances. As shown on line 2, the staff estimates that between 1995 and 2002 the debt–income ratio for the lower 90 percent rose 9 points, compared with the 30 point increase for the top decile (line 3). Thus the bulk of the rise in debt ratios has been concentrated among households with the means to service these obligations. Moreover, as shown in the bottom right panel, low interest rates have helped keep required consumer payments broadly defined—that is, mortgage debt service as well

as required household payments for property taxes, home insurance, tenant rent, motor vehicle leases and consumer credit—below previous peaks.

Your next exhibit focuses on the business sector. As shown in the top left panel, we expect real investment in high-tech equipment and software to accelerate over the projection period, with an increase of more than 20 percent during 2004—about in line with the gains observed during the last half of the 1990s. The recovery in spending for other equipment, excluding transportation, shown in the top right panel, is more drawn out; but we think that eventually it, too, will begin posting robust gains, boosted in part by the partial-expensing provision enacted last spring. More generally, the pickups for both high-tech and other equipment reflect our assumed lifting of business gloom as well as the direct and indirect effects of monetary and fiscal policy.

In light of the dismal performance of the equipment sector in recent years, you would be justified in being somewhat skeptical that such a strong recovery will occur any time soon—even with the favorable cost of capital and tax incentives. The middle two panels will, I hope, go some way toward persuading you of the reasonableness of our forecast. The charts translate the level of real gross investment into the growth rate of the net capital stock using the same depreciation rates that the BEA uses in constructing the national accounts. You can see that, even though gross investment is rising rapidly, projected capital stock growth is rather conservative by historical standards. Not only do we think that the investment forecast is reasonable, we also think that, in the current financial environment, it is achievable. As shown in the bottom left panel, firms have taken advantage of low interest rates to restructure their balance sheets away from short-term debt, lightening their current repayment obligations. Moreover, as was discussed yesterday, corporate bond spreads have come in recently (the bottom right panel), and bank financing (not shown) appears to be readily available for creditworthy firms.

As I said near the beginning of my remarks, a key element in helping the economy get from here to there is the strong growth of structural productivity that we continue to assume, which Sandy will now discuss.

MR. STRUCKMEYER. One of the defining characteristics of the economy over the past two years has been the lack of any net employment gains despite a recovery in economic activity. As shown in the top left panel of chart 5, nonfarm payrolls in the fourth quarter of last year (the T+4 observation) were lower than at the time of the apparent business cycle trough in the fourth quarter of 2001. Indeed, payrolls have followed pretty closely the pattern of 1990-91—the so-called jobless recovery. As shown in the top right panel, the obvious flip side of this record is that labor productivity has been quite strong in the current episode, with output per hour rising an estimated  $3\frac{3}{4}$  percent over the four quarters of last year.

These developments have once again led us to raise our estimates of structural multifactor productivity growth. As shown in the middle left panel, we now estimate

that structural MFP increased 1.8 percent last year. In our view, a good part of this acceleration reflected corporate actions to restructure operations and eliminate inefficiencies. Such actions boosted the level of structural MFP and hence had only a transitory influence on the growth rate; we anticipate some further gains of this sort in 2003. But we also have inched up our estimate of the permanent component of structural MFP growth to 1½ percent. Technology has continued to improve in recent years, aided by rising real expenditures on research and development (shown in the middle right panel). Although the growth of real R&D spending is down from the pace early in the decade, lagged effects of past increases arguably should still be boosting structural MFP growth. As you can see in the table at the bottom, these adjustments, together with a few refinements to our projection of capital deepening, raised the growth rate of structural productivity to 2¼ percent in 2002 and 2003 and to almost 2½ percent in 2004; these revisions carried through to our forecast of potential output growth as well.

Chart 6 presents the implications of these assumptions for the expected performance of the labor market. As we have noted before, we believe that the gains in labor productivity over the past year have stretched work forces beyond levels that are sustainable in the long run and that hiring will pick up as the prospects for sales and profits improve. Although we expect nonfarm payrolls to be about flat over the next few months, hiring averages about 100,000 per month in the first half of this year, 225,000 per month in the second half, and about 300,000 per month in 2004. As a result, actual labor productivity grows 1¾ percent, on average, over the next two years—about ½ percentage point below its structural pace. We expect this near-term weakness in the labor market to result in a rise in unemployment, and we are forecasting the unemployment rate to peak at 6.2 percent in the first half of this year. The unemployment rate then is projected to drop back to 5.4 percent by the end of the projection period as economic activity accelerates. As indicated in the middle left panel, this projection closely follows the predictions of the staff model of Okun's law when allowance is made for the TEUC program, which we estimate raises the unemployment rate by 0.2 percentage point.

Of course, we could be wrong about our structural productivity assumptions, and in the Greenbook we explored two alternative structural productivity scenarios. It is possible that the gains in productivity last year were entirely cyclical and that there has been no recent acceleration in structural productivity growth (the blue line in the middle right panel). As shown in the table, if this "slower" MFP hypothesis were correct, real GDP growth would run below the baseline forecast, and the inflation rate would turn out higher. Alternatively, if all of the acceleration in structural MFP last year represented a permanent change in MFP growth (the red line), we would be understating the long-run potential growth rate of the economy. Under the assumption of "faster" MFP growth, real GDP growth expands at a faster pace than in the baseline forecast, and inflation is lower.

Our compensation projection is the subject of chart 7. Although our main measures of hourly compensation have painted somewhat different pictures of

compensation growth in recent years—mainly reflecting the movement of stock option realizations that are included only in P&C compensation per hour—we expect both measures to trend downward over the forecast period. This downtrend is most evident in the wages and salaries component of the employment cost index (the middle left panel) where the combination of falling inflation expectations (the bottom left panel) and slack in labor markets—as measured by the unemployment gap shown at the bottom right—continue to temper workers’ wage demands. In contrast, we expect the rising costs of employer-provided benefits (shown in the middle right panel) to offset some of the deceleration in wages. Rising contributions for health insurance premiums and a step-up in employer payments to defined benefit pension plans—as the result of the decline in the stock market in the past two years—are the principal reasons for the acceleration.

Similarly, as shown in chart 8, consumer price inflation is projected to slow in 2003 and 2004. The PCE chain price index (shown in the top left panel) is forecast to rise at a 1¼ percent pace over the next two years, down about ½ percentage point from the pace last year. After peaking in the current quarter, crude oil prices are expected to decline over the projection period, resulting in falling prices for consumer energy products (the blue bars in the right panel). In contrast, food prices (the red bars) are expected to rise moderately in the next two years. Core PCE inflation (the red line in the middle panel) is forecast to move lower over the next two years. As you can see in the two bottom panels, a continued wide margin of slack in product markets puts downward pressure on prices, and this is only partially offset by the expected updrift in non-oil import prices.

Chart 9 reviews the analysis that was sent to the Committee last November on the macroeconomic consequences of a potential war with Iraq. As you will recall, we went to great lengths to emphasize that what we don’t know about the economic effects of such a conflict far exceeds the little that we do know. Our analysis was and is intended to serve as a framework for thinking about this issue, and it should definitely not be construed as a forecast of the conduct of the war or its quantitative effects. We examined two potential military scenarios: a successful one-month conflict that entailed an incremental budgetary cost of \$20 billion and a successful six-month war that bore a \$50 billion incremental price tag. In our analysis, we did not make any special allowance for exogenous confidence effects, swings in risk premiums, or the consequences of retaliatory terrorist attacks. Clearly, such responses could be the key elements in the macroeconomic response to a war with Iraq, but lacking a convincing means of quantifying such events, we decided not to include them.

The FRB/US model was used to simulate four war and oil price combinations under the assumption that monetary policy follows a Taylor rule. In the “quick victory” scenario, the war lasts one month, no oil production is lost, and as shown by the red line in the middle panel, oil prices drop \$4 per barrel below baseline immediately after the conflict. Oil prices continue to fall gradually over time as additional oil production comes on line, eventually reaching a level of \$17 per barrel

by 2010. As you can see in the bottom panel, such a scenario gives a boost to economic growth in the near term and reduces the inflation rate. In the “six-month war” scenario, Iraqi oil exports cease, and oil prices rise \$10 per barrel above baseline (shown as the black line in the middle panel) in the first half of this year; prices then drop back below the baseline path when the war is successfully concluded. There are two offsetting effects on real GDP growth this year: The increase in defense spending tends to push up output, while higher oil prices have a depressing effect. Thereafter, the stimulative consequences of lower oil prices dominate. In the third scenario, a six-month war causes a shutdown of oil production in Iraq and Kuwait and induces several radical states to impose a temporary oil embargo. With the more significant loss of supply, oil prices rise \$30 per barrel above baseline in the first half of this year (the blue line in the middle panel) before dropping back later in 2003. Under these assumptions, real GDP declines  $\frac{1}{4}$  percentage point below the baseline path this year, and inflation rises sharply. Lower oil prices and interest rates eventually push real GDP growth above baseline in 2004 and 2005. In the final scenario, a six-month war is accompanied by the loss of 4 million barrels per day from the world oil market for a period of three years, raising oil prices \$20 per barrel above baseline (the green line in the middle panel). Rising non-OPEC production eventually causes oil prices to fall but only to a long-run price of \$25 per barrel.

CHAIRMAN GREENSPAN. Are these in real terms?

MR. STRUCKMEYER. No, these are nominal terms. In this scenario, real GDP falls this year and next, whereas inflation is higher in both years. Real GDP regains some of the shortfall relative to baseline in 2005, largely in response to easier monetary policy. These model simulations suggest two tentative conclusions about the macroeconomic consequences of a potential war with Iraq. First, to the extent that any war is short, successful, and results in a lasting increase in world oil production, the direct economic consequences are, on net, positive for the United States. Second, if the war produces adverse geopolitical developments that result in a persistent reduction in the supply of oil sold on world markets, the direct economic consequences are negative. Karen Johnson will now continue with our presentation.

MS. JOHNSON. Chart 10 presents recent developments in selected global financial markets. The decline in the exchange value of the dollar in terms of the major foreign currencies has been a feature of these markets since early 2002. The top left panel shows the movements of the dollar in terms of its index of other major currencies (the black line) and in terms of the yen (the red line) and the euro (the blue line). The data are plotted so that the lines coincide at the point about one year ago when the major currencies index reached its peak. The depreciation of the dollar against the euro has exceeded that against most other currencies in the index, with a significant further move down coming since your previous chart show in mid-2002. At its peak last year, this index of the dollar was 40 percent above its low point in April 1995. Currently, it is a little more than 20 percent above that low. Recent market commentary has pointed to the heightened tensions concerning Iraq as a factor in the latest downward pressure on the dollar. These political risks are apparently

affecting the terms on which market participants are willing to finance the large and growing U.S. net international indebtedness.

Yields on ten-year sovereign bonds, shown in the panel to the right, have moved down since the spring of last year. On balance, German and U.S. rates have moved about the same amount, but a small differential unfavorable to the dollar opened during the second half of last year, and some differential remains. Despite their low absolute level, Japanese rates have moved down as well. The ten-year rate crossed below 1 percent late in 2002 and has since moved down further as demand for JGBs continues to be strong. The middle panels show the change in market expectations over the past year for euro (on the left) and yen (on the right) three-month rates as captured in futures contracts. Disappointing macroeconomic performances during 2002 in these two economies and more generally globally contributed to shifts down in futures rates. For euro rates, almost all of that shifting has occurred since the June chart show as real output growth slowed in the second half of the year and expectations of monetary easing became established. The ECB did lower its minimum repo rate 50 basis points, to 2.75 percent, in December; and markets now appear to be pricing in additional easing by mid-2003. Futures rates in Japan have shifted down as well; and the curve has become noticeably flatter, suggesting that markets have postponed further any expected move back up in rates. Stock indexes are shown in the bottom left panel, with the lines scaled to coincide at the time of your last chart show. Stock prices are generally down over the full period shown, falling further since mid-2002. U.S. stock prices have compared favorably with European and Japanese stock prices since the June chart show.

Overall, these financial developments reflect the generally weaker tone to economic activity that has emerged, especially during the second half of last year. Interest rates have moved lower, partly in response to some additional monetary easing. But stock prices have fallen, reflecting investor caution. Market conditions are generally supportive of a recovery in economic activity and, for the most part, do not by themselves pose additional risks. There are some exceptions, however. For example, the United Kingdom appears to be experiencing a housing price bubble, illustrated in the bottom right panel, with prices up 40 percent over the past two years. The circumstances under which this rise will come to an end and the consequences for the U.K. economy are a source of uncertainty to the foreign outlook, which is the subject of your next chart.

The top left panel of chart 11 illustrates the deceleration of real GDP in the second half of last year both here and abroad. U.S. and average foreign growth have been roughly comparable and are expected to remain so through midyear. Over the remainder of the forecast period, activity abroad is expected to accelerate but less vigorously than is U.S. output. Past and some prospective monetary easing should boost growth abroad, but there is very limited scope for fiscal stimulus. Recovery of the U.S. economy, along with resolution of some of the geopolitical uncertainties currently impeding growth everywhere, should also support the return to higher growth abroad.

Consumption spending has been a key factor in maintaining output growth in many industrial countries. However, employment growth (shown in the top right panel) has been strong only in Canada, raising questions about the prospects for future consumption elsewhere. We look for household spending in most industrial countries to continue to expand, but we do not see consumption as sparking a rise in output growth in the euro area or Japan. Rather, we think improvement in investment spending is essential if growth in those countries is to rebound. Orders data (shown in the middle left panel) appear consistent with our view that, at least in the near term, activity in Japan will remain sluggish, with investment spending falling further. German manufacturing orders picked up in November, but that move was entirely because of stronger foreign, rather than domestic, orders. We remain fairly pessimistic about the prospects for investment in Germany but expect that, for the euro area as a whole, investment spending will switch from contributing negatively to growth to being a small net positive. Such an outcome is far from certain, however. As can be seen to the right, survey responses gathered by I/B/E/S imply that expectations of long-term earnings growth of companies in the euro area have come down sharply since early 2001, with the second half of 2002 showing a particularly steep drop. These reduced expectations likely reflect not just changes in the circumstances of individual firms but also market perceptions of greater uncertainty and heightened downside risk that are a consequence of global tensions.

As can be seen in the bottom left panel, for this year we anticipate that growth in the euro area and in Canada will result entirely from expansion of total domestic demand. Exports from both regions should expand but will be offset by rising imports. Robust domestic demand should underpin output growth at near its potential rate in Canada, whereas weak growth of domestic demand in the euro area will leave that region with a lackluster performance for the year. In Japan, we look for net exports to be the major positive component of very weak growth. The table to the right presents our real output forecast through 2004. We do expect some further strengthening in 2004, with Canada and the United Kingdom continuing to outperform the other foreign industrial countries.

The economic performance of the emerging-market countries, the subject of chart 12, has continued to be uneven. The emerging Asian economies led the global economy into recovery and continued to outperform in 2002 but cooled somewhat in the second half as global demand, particularly for high-tech products, slipped. The value of the dollar in terms of the Korean won (the black line in the top left panel) moved down in mid-2002 and, on balance, has remained about unchanged since then. The Singapore dollar also gained somewhat against the U.S. dollar during the second half of 2002. Its limited move reflects the fact that high-tech industries were particularly hard hit by the slowdown during the second half of the year. Stock prices, in the right panel, rose in Korea and, to a lesser extent, in Singapore during the first half of last year, as these economies grew vigorously, but then retreated as the global slowdown made itself felt.

Despite relatively strong economic performance in the region, price inflation in the Asian developing economies has been low. Attention has focused on the potential for persistent deflation in some of these countries, in addition to the ongoing issue of deflation in Japan. The middle left panel reports consumer price inflation for selected emerging-market Asian economies. Deflation was the case during 2002 in China and Taiwan; in Singapore, deflation early in the year became very low inflation in the second half. In Taiwan and Singapore, prices decelerated in response to exchange rate appreciation as well as to the weakening of activity during the second half of the year. These economies are relatively small and very open and sensitive to the fluctuations in high-tech industries. We expect that the rebound in activity projected for this year will lift inflation in these countries, including China, to a low, positive number. These economies show no signs of being caught in a debt deflation process as a consequence of the deflation to date.

The panel on the right gives the staff growth outlook over the forecast period for developing Asia. We see no signs that growth in China will flag from the 7½ to 8 percent pace that has been reported for recent years. Continued government spending and strength in exports should support output growth. For the remainder of emerging Asia, the projected rebound in U.S. growth and the return to healthy expansion in the global high-tech sector are essential to the return of growth to the 5 to 6 percent range that we have forecast for these countries.

In Argentina and Brazil, financial market developments are both a barometer of how the economy is currently faring and the channel by which stress is propagated through the economy. Spreads on international debt, shown in the bottom left panel, have stabilized and even retraced somewhat their previous spikes, albeit much more in Brazil than in Argentina. Similarly, exchange rates and stock prices in these two countries, not shown, have come back off their extremes. The situation in Argentina is in a kind of suspended animation, awaiting the outcome of the election now planned for April. While the observed stabilization in markets is welcome and we have written down low, positive growth as can be seen to the right, none of the really hard work of fixing the problems in Argentina has been done. Prospects remain very uncertain. In Brazil, markets have been giving President Lula the benefit of the doubt since the election. But the most recent moves on financial markets have been to take back some of the good news of lower spreads and stronger currency. Much depends on whether the politics of his program can succeed in an environment of fiscal and monetary restraint, and uncertainty remains very great. Only in Mexico do we see grounds for optimism. Our outlook for acceleration in Mexican output is closely tied to the projected recovery in U.S. manufacturing production.

Your final international chart (chart 13) addresses the external sector of the U.S. economy. The real exchange value of the dollar as measured by our broad index has depreciated on balance since its peak in early 2002, as the staff projected at the time of the June chart show. The most recent move down reflects significant nominal depreciation in terms of the other major currencies. With the real dollar already substantially lower than one year ago, we project only modest further depreciation

through the end of the forecast period. We judge that the ever-present need to attract growing amounts of net financial inflows to finance the widening current account deficit will weigh on the dollar. We estimate that real imports (shown to the right) grew 9 percent last year, with extremely rapid expansion in the first half. Real exports grew 5 percent, held back by past appreciation of the dollar and only moderate growth abroad. For this year and next, we project that real exports and imports will rise at comparable rates. Depreciation of the dollar should boost exports as foreign output growth remains moderate and should restrain imports some as U.S. GDP accelerates more strongly. With imports already substantially greater than exports, similar growth rates over the forecast period imply a small negative contribution to U.S. real GDP growth from the external sector.

Our projection for a widening trade balance largely explains the increase expected in the current account balance, shown in the middle left panel. That deficit should reach about \$625 billion by the end of next year,  $5\frac{1}{4}$  percent of GDP. The most recent data available on the financial flows that are the counterpart to that deficit, shown to the right, give some clues as to the factors moving exchange rates in recent months. Our estimate for the fourth quarter implies that, during 2002, the current account balance (line 1 of the table) widened a little more than \$100 billion. Increased foreign official holdings of dollars in the United States (line 2) were nearly as large. Private foreign investors (line 3) purchased substantial quantities of U.S. securities, but at a rate slightly below that observed in 2001. Private U.S. investors (line 4) greatly scaled back their acquisition of foreign securities, lessening the total financial inflow needed to achieve balance. With mergers and acquisitions very much reduced, net foreign direct investment into the United States (line 5) is estimated to have been negative last year.

The final two panels present some foreign detail for two of the alternative simulations that we have recently provided to you. The panel on the left reports the change in foreign real GDP growth that our model projects in the case of a six-month war with a limited embargo, one of the four scenarios that Sandy discussed. For these countries, there are no positive impulses from enlarged government spending, only the effects of higher oil prices and the spillovers that occur across countries. For 2003, the consequences for foreign output growth range from negligible to about minus  $\frac{3}{4}$  percentage point. In 2004, as in the United States, the assumption that the oil price falls below baseline by mid-2003 results in a boost to output growth, and our model calls for growth above baseline for these foreign economies. The panel to the right gives detail for the Greenbook scenario of a \$20 rise in the price of oil that lasts four quarters and that includes an additional shock to confidence. In this case, the oil price rise is a bit less than assumed for the limited embargo, but it lasts twice as long. As a consequence, the oil-producing countries of Mexico and Canada experience this as a positive shock to output in 2003. For the other countries, the added confidence factors significantly increase the contractionary effect of the higher oil prices. With oil prices back to baseline in 2004 and the effects of the shock to confidence waning, output growth rebounds to varying degrees in most of these countries. Larry will now complete our presentation.

MR. SLIFMAN. The final chart presents your forecasts for 2003. You have revised down your projection for the growth of real GDP and raised your forecast of the unemployment rate. Your projection for PCE prices this year has been lowered a touch. That concludes our prepared remarks, Mr. Chairman. We'd be happy to take any questions.

CHAIRMAN GREENSPAN. I don't have any difficulty with the underlying U.S. forecast. I am bedazzled by the Canadian forecast. It used to be a forecast proxied by the U.S. outlook; it clearly isn't today. The projections for the two countries are diverging considerably. It's scarcely a manufacturing industrial commodity type of issue. The strength appears to be in domestic demand, not exports. So it's not the currency. What is it?

MS. JOHNSON. You know, I've asked every Canadian economist I've run into over the past nine months why Canada is doing so well when other countries are not. Partly it may be a fortuitous mix in what their economy produces. Canada is not as heavily high-tech oriented as we are, Nortel notwithstanding, and it did not experience the excesses of the high-tech bubble to the extent that we did. So the capital overhang in that sector as a proportion of their total GDP structure—

CHAIRMAN GREENSPAN. Is the wealth effect significantly less? I ask because Toronto's stock prices look about like ours.

MS. JOHNSON. They do, but Nortel itself is a huge share of the Toronto stock index. Off the top of my head I can't answer specifically how large the Canadian wealth effects are. We do have estimates of that. I didn't bring them with me so I can't tell you, but I can certainly find out. Another issue is the exchange rate. The Canadian dollar, all things considered, has been somewhat weak on a fairly consistent basis.

CHAIRMAN GREENSPAN. Shouldn't that be showing up in export demand?

MS. JOHNSON. It should be showing up in exports, but it could also show up to some degree in the willingness of domestic producers to invest. It's not that exports haven't been reasonably strong. It's just that Canada has been importing as well, so the net export effect is not all that much. But exports have been doing their share. To some extent the performance of the auto industry is a factor. The auto industry has been a big part of the strength in the United States, and Canada shares in that strength in a very direct way. Canada also has been experiencing a phenomenon in the housing sector that is similar to ours. That sector is very strong, and it is supporting consumption demand.

CHAIRMAN GREENSPAN. Has the corporate governance problem in Canada mirrored what has happened here, or is it significantly less?

MS. JOHNSON. I don't know of any specifically Canadian firms that have been making headlines whereas I could name some European firms, for example. That leads me to conclude, merely on the face of it, that it may be a bit less in Canada.

CHAIRMAN GREENSPAN. The reason I raise the issue is not just for the sake of entertainment or interest regarding what is going on in Canada but because I think their economic performance is telling us something. It would be very interesting to figure it out. Let me give you a hypothesis. The American economy was moving up reasonably quickly until the WorldCom news hit. I'm not saying that that was the cause of the slowdown in our economy; I'm talking about the time frame.

MS. JOHNSON. Right.

CHAIRMAN GREENSPAN. The effects of the corporate governance scandals have diffused since then. There are some—Wrightson, for one, among the Wall Street analysts—who claim that that was the turning point or a very significant impact point, and indeed the data are

not inconsistent with that. The divergence in Canada emerged from that time on. Now, it's hardly conceivable that corporate governance uncertainties are of an order of magnitude that one can explain the extent of the second-half weakness in the United States and, even more important, the differential between economic growth in Canada and the United States. My interest in Canada, aside from being a good neighbor, is that I think it's telling us something about the United States, but I don't know what it is.

MS. JOHNSON. Well, I might mention another issue that we are constantly looking into. I can't claim it as a fact, but I still maintain it as a hypothesis. Canada was always a place where we were looking for an acceleration in productivity growth comparable to the U.S. acceleration because of their links to us and their similarities to us. It didn't happen in the 1997-2000 period. It is possible that some of the strength in Canada in 2001 and 2002 is due a bit to the fact that their productivity improvement is happening a little behind ours in real time, so that it's supporting their economy now. But I don't have actual facts to back up that hypothesis.

CHAIRMAN GREENSPAN. Am I correct that their productivity growth in 2002 was not greater than ours?

MS. JOHNSON. It was not, in part because their employment growth has been so strong. If one had a crystal ball and could discern the changes in structural productivity from the adjustment components and so forth, one could draw some conclusions. We on the staff remain equally interested in and to some degree puzzled by the Canadian performance. We will look into these specific issues and everything else we can think of to try to learn more about what is going on in Canada.

CHAIRMAN GREENSPAN. Second, in the productivity analysis for the United States we always used to factor out capital composition, for example. We've ceased doing that in the last year or two. Is there any particular reason why?

MR. STRUCKMEYER. The capital composition?

CHAIRMAN GREENSPAN. In other words, there was a shift toward higher valuated capital stock as differentiated from the constant dollar value.

MR. STRUCKMEYER. I believe that's in there.

MR. SLIFMAN. It's in there through the way we calculate the capital services part of the capital deepening.

CHAIRMAN GREENSPAN. I understand that. What I'm saying is that you used to split it out either as a separate category or a memo item. You tend not to do that anymore.

MR. SLIFMAN. Well, I think that was many years ago, and that's because we used capital stock growth rather than capital services and we would then make the adjustment for changes in composition. But when we shifted over to using capital services, which incorporates that effect, we no longer showed that separately.

CHAIRMAN GREENSPAN. But you still do show the constant dollar capital stock from which one can in fact infer the differential. What is it that you forecast? Do you have it by chance?

MR. STRUCKMEYER. I'm not sure I have it with me.

CHAIRMAN GREENSPAN. Don't worry about it now.

MR. SLIFMAN. Yes, we may have to send something to you on that later.

CHAIRMAN GREENSPAN. When you get it, just send it on. I think I have it somewhere, but I can't find it. I noticed in the last several weeks that the implicit CPI forecast, which is on the Treasury inflation-adjusted securities, jumped significantly. Is that a technical—

MR. REINHART. We've found over the last couple of years that inflation compensation inferred from the indexed debt is very sensitive to oil prices—a little oversensitive. So we can explain part of that by the run-up in oil prices.

CHAIRMAN GREENSPAN. Thank you. President Broaddus.

MR. BROADDUS. I have two questions, Mr. Chairman. One quick detail question: On the middle left panel of chart 5, what is the difference between the trend and the transitory components of structural productivity?

MR. STRUCKMEYER. The trend component was the part that we thought would persist; the transitory part reflected the level effects that we saw going on. So if a business restructures—makes some one-time efficiency gains that we think are going to last in terms of the level of its productivity—we call that the transitory effect. We saw that type of restructuring effect a lot last year as opposed to an ongoing introduction of new technologies that would revolutionize the way businesses operate—as we saw in the late 1990s. So we were trying to distinguish one effect from the other.

MR. BROADDUS. Thanks. The second question I have is for Karen; it has to do with the dollar. I've been on the call for the last month, and one day we had a brief discussion about the unusual nature of the current situation. In the past, in times of great uncertainty and geopolitical risks the dollar often has been considered a safe haven. Money from around the world flowed into dollar assets. That's not happening this time; in fact, the opposite seems to be happening. At one level the reason is obvious. The United States is now a terrorist target, so we

are not nearly as safe a haven, just in a physical sense, as we were. Maybe some other things are going on. We speculated a bit in Richmond that perhaps there's a concern on the part of some international money managers that, if we get into a crisis, the United States might freeze some accounts. There is that risk. In any event, it seems to me that there's some possibility that the dollar could decline even more substantially than you're now projecting. So I would ask what sort of adjustments that would induce in the U.S. economy. I know that's a broad question, Karen; but if you could speculate on that a little, it would help me.

MS. JOHNSON. Well, the staff members who deal with the domestic side of the economy might be better able to answer that question. As a preliminary comment on your question, I would have to say that we've thought about this a fair amount, and we really don't have any answers. But one of the things that we think helps the thought process is the realization that, to the extent people are less interested in taking on cross-border exposures, it has an impact on the current account deficit. That is how that long-term structural problem in the United States interacts with the geopolitical situation. The euro area and the rest of the world—Japan, in particular—are running a surplus vis-à-vis the United States. So, let's say investors in those areas wish to take on fewer new cross-border commitments. Given that their countries are running a current account surplus—and conversely we are the deficit country—that sets up a need for asset prices and exchange rates to change in a way that will induce those investors to take on enough foreign commitments to enable the balance of payments to balance. To the extent that U.S. investors seek to keep their funds at home, that helps a bit.

I think the box on chart 13 in the chart show illustrates this point. Buried in column 3 of that chart are both fixed-income and equity transactions. Foreign investors are still willing to purchase claims on the United States. They're investing a substantial amount in the United

States—mostly in fixed-income assets, not so much in equities. The figure was \$361 billion last year, based on not quite complete data. The problem is that our current account deficit is bigger than that. So a \$361 billion inflow from investors seeking to take on assets in the United States just isn't sufficient to do the job any longer. There's a willingness among foreigners to acquire dollar assets, but a slightly smaller willingness than earlier. U.S. investors are helping by not wishing, in a gross flow sense, to put assets overseas. But the rest of the world relative to us is in imbalance. That would be the case even if we pulled the flow of dollar investments overseas back to zero. Of course, we can make that number positive by not selling our claims in the rest of the world, so zero is not a bound in any sense. Nevertheless, the order of magnitude is such that it was a fairly important factor, if you will, in financing our current account deficit last year. Could it become a whole lot higher? Absolutely. There is no real benchmark for how big these numbers might become in the various categories if the dollar were to fall sharply.

We can look back at the episode from 1985 to 1987 and ask ourselves, How bad was that? The United States did rather well, actually. The capacity of the U.S. economy to absorb relative price changes and to make the shifts necessary is remarkable, I think. The U.S. economy can probably adjust to a sharply declining dollar just fine. It would help the export sectors and manufacturers and others who need the help right now and, in some respects, might be just what the doctor ordered. My concern is that the rest of the world might not be as able to make the counterpart adjustment. So when they get what is in essence a deflationary shock coming from the exchange rate, they probably are not going to adjust policy as quickly as we would to maintain total demand as we did in 1995 to 2002. Nor are their economies inherently as able to adjust to a change in the mix of manufacturing versus services or the export sector versus the domestic sector. So global demand may not be invariant to a change in exchange rates that shifts

demand from production abroad to production in the United States. Therefore, for the global economy, a sharply falling dollar may have more-adverse consequences than it will have for the U.S. economy.

CHAIRMAN GREENSPAN. Karen, that's a very important issue that you've just pointed out. Would you have somebody write a short memorandum encompassing the thesis and the evidence supporting it? In other words, there's a differential here in terms of the flexibility of adjustment in the United States and the rest of the world. It would be useful to get a sense of whether that differential has been changing in any significant way.

MS. JOHNSON. We will look into it and do what we can.

CHAIRMAN GREENSPAN. Governor Bernanke.

MR. BERNANKE. Your decomposition of multifactor productivity into permanent and temporary components is, I guess, largely statistical. I wanted to push you a bit more as to whether you had direct evidence on the permanence of MFP growth and on technological dynamism in the U.S. economy more generally. You do have that graph on R&D spending, but what information do you have, for example, on the stock of R&D investment, patents, and the diffusion of innovation across industries or from surveys on types of innovation? I note the negative impact of venture capital drying up and those sorts of factors. I'm concerned about this for a couple of reasons. One is the related issue of the extent to which innovation is capital embodied. To the extent that we want to have an investment-led recovery, we'll want to see a lot of these innovations being translated into new investments. So that's an important question.

Another issue—besides, of course, the basic issue of the sustainability of productivity growth—involves one of the leading alternative hypotheses to the geopolitical risk hypothesis, which is what I call the real business-cycle theory. That theory says that perhaps the

technological hype of the new economy was overstated and we might have a less exciting period now in terms of technological opportunity, which might lead to a slower growth phase in the near future. These are very important issues. Again, my question is, To what extent do we have more-direct evidence on the technological development of the economy?

MR. STRUCKMEYER. We don't have a ton of direct evidence. Basically that R&D graph was an attempt to get at the idea that technology has continued to advance in recent years but perhaps not as rapidly as the rate of advance in the late '90s. If one digs a little deeper into the statistics, it is apparent that the growth in R&D over the last couple of years has been financed mainly by the federal government—not by private companies. By way of comparison, in 1999 and 2000 those numbers for private companies were in the 6 percent growth rate range. So as we've watched these developments and judgmentally done the parsing here, the reason we've gravitated more toward the transitory as opposed to a major ratcheting up in the longer-term growth rate was the fact that those trends don't look quite as favorable as before. In addition, if we throw in the embodiment hypothesis, clearly the lack of an investment boom comparable to what we had in the late 1990s should be taking something off structural productivity growth. That doesn't necessarily reduce the level, but it doesn't produce the added impetus that it was providing. So our attempt here has been to be cautious in saying how much is permanent. The 1.5 percent multifactor productivity growth is still quite strong. It's just not as strong as what we saw last year. In part we think there were a lot of adjustments going on—some related to the aftermath of September 11 that were unique to 2002 and others that are more likely to be one-time or occasional events than to be repeated consistently over our forecast period. That's the thought process that we've gone through.

MR. FERGUSON. Could I make a two-handed intervention here? I'm rather surprised, Sandy, that in response to Governor Bernanke's important question you didn't talk a little about developments in the world of semiconductors. If one listens to folks in that industry, they cite a number of, I think, reasonably credible but yet-to-be-proven stories about their ability to build larger and larger semiconductors and to etch more capabilities into these semiconductors. They go on to talk about nanotechnology and other things. These stories are not dramatically different from the kinds of stories they were starting to tell in 1995 and 1996 that proved to be true. So while I think the question is a quite legitimate one and, as you say, very important, there are some indications out there about the basic building blocks of this IT boom that suggest that there still is some room—

MR. STRUCKMEYER. There are obvious cases like that in biotechnology also. What strikes us is that today these tend to be more evolutionary in the structure of technology than revolutionary the way they were perhaps in the 1990s, when a whole new industry and way of doing business came into being.

MR. FERGUSON. That's fair, but there are still some in the industry—and this will be my last comment—who would argue that there's still further to go.

MR. STRUCKMEYER. I'm not saying that there isn't further to go. That will happen. But over our forecast period, given the other conditioning assumptions, this is what we view as the most likely scenario.

MR. BERNANKE. Do you do any kind of sectoral breakdown of your MFP projections?

MR. STRUCKMEYER. No.

MR. BERNANKE. Thank you.

CHAIRMAN GREENSPAN. Vice Chair.

VICE CHAIRMAN MCDONOUGH. Thank you, Mr. Chairman. Let me shift to the international arena. I think two very important events occurred yesterday that affect which of the likely Iraq scenarios will play out. One was obviously the State of the Union speech by the President. The other, which may be equally important, was that President Putin of Russia gave a clear signal that the Russians are shifting their view. If they do shift, the European powers that have been giving us a bad time in the United Nations will be faced with becoming irrelevant, which usually gets their attention. Therefore, I think it is very likely that we will have the one-month successful war scenario sooner rather than later. As laid out, and I have no dispute with that, I think that is very good news economically. In my view what this Committee will be thinking about next year, the year after, and five years from now is what the longer-term effect of that will be on the Islamic/Arab world. You will recall that in the sixteenth century [laughter]—

SPEAKER(?). We're getting on a bit from that period!

VICE CHAIRMAN MCDONOUGH. The West, after being subservient to a predominantly and powerful Islamic world, began to modernize. The Islamic world had a choice of either competing or of retreating into religion and an unwillingness to modernize. That has continued ever since. Iraq is the seat of civilization as we know it, never mind Islamic civilization. It is the great intellectual leader of Arab and Islamic thought. A successful war in Iraq, if it were to bring about a change in Iraq that looks anything like a modern regime, would have a great shock effect of the rest of the Arab/Islamic world. What we don't know, first of all, is whether the change would just involve Saddam being replaced by a more benevolent general, in which case there would be very little effect.

CHAIRMAN GREENSPAN. The Saudi's Abdullah last week started to raise the question of Arab reform.

VICE CHAIRMAN MCDONOUGH. Indeed. That's exactly where I'm going. If there is a successful modern regime and there is reform, that would be wonderful. The question is, Will the reform be benign? Will it take place over an orderly period of time, therefore allowing that part of the world to modernize and become a seat of stability and of growth for the world? Or will we see regimes that simply are not capable of changing and thus will be toppled, in which case we could have year after year in this Committee a question of what is going to happen in the oil-producing areas? I think we have to remember that. That's not going to affect us for the rest of this year or maybe next year, but it will be a challenge to the Committee over time.

Let me shift to another area, following up on the exchange rate discussion. One of the things that the dollar's strength depends on—against the background of a huge, and in my view unsupportable over time, current account deficit—is whether the people of the world have confidence in world leadership, which is not completely but very largely American leadership. For whatever reason, our leadership is not providing a very clear view of the way we would like to see the world economy functioning. Sometimes when that happens, people do some very unfortunate things.

So, my question is to Karen, and it relates to what is going on in South America at the moment. The International Monetary Fund has decided—their staff was pushed by the member nations to do something that the staff thinks is unwise, and I agree with them—to reward Argentina for a violation of the most basic rule of law, which is that one is supposed to pay one's debts. Argentina has been rewarded by a rollover of its obligations so it can pretend to be current with the IMF and other international institutions. At the same time, across the river Plata, the Uruguayans have been trying very hard to do the right thing—not quite making it but

certainly putting forth a very good effort. But the IMF has decided that Uruguay may not be able to pay its debts in a couple of years, so why not have Uruguay declare default now. I might just add that the econometric models used by the Fund in this analysis have conditions that probably would make the United States look potentially bankrupt. Put those two cases together. One country does everything wrong and is rewarded by the IMF saying we'll roll over your debt. The other poor little country tries to do everything right—and like the rest of us isn't perfect—and the IMF decides that it will not allow them to pay their debts but, in effect, requires them to default. Let's move slightly north into Lula da Silva's Brazil. When the international community is saying to one nation that it's okay if you don't pay your debts—and to another that if you try like the devil to pay your debts and aren't quite perfect, you should default—why should Brazil jump through hoops and pay its debts? They can figure that out. My question is this: Is anybody in this capital at the International Monetary Fund or anywhere else realizing what I'm convinced is a signal to all the emerging-market countries that the rules have changed?

MS. JOHNSON. You've painted the picture in its extreme form, shall we say, for the sake of the discussion.

VICE CHAIRMAN MCDONOUGH. Deliberately.

CHAIRMAN GREENSPAN. It sounded factual to me! [Laughter]

VICE CHAIRMAN MCDONOUGH. The sad part is that it's exaggerated but factual.

MS. JOHNSON. Yes. Let me put one additional fact on the table and then try to give some kind of answer. Brazil's biggest debt problems are the debts that the Brazilians owe to other Brazilians. So the consequences for Wall Street or the industrial countries of default by Brazil vis-à-vis Uruguay differ. Default by Brazil doesn't really translate into a direct answer as to how within Brazil to reconcile the pressure for meaningful change in income distribution, in

opportunities, in government policies, and a host of other regional and structural kinds of problems. Given the obligations of one Brazilian to another that exist on paper now, how can that whole situation be worked out and not break down into other problems? The situation could lead to violence, unilateral default on some pieces of debt, or behavior on the part of the government that throws into question the stability of other facets of the social structure. That really is a much bigger problem than what Brazil owes the rest of the world, and that's the problem I think they're really grappling with.

Setting aside Brazil, however, there is this issue of why other countries—Ecuador, to pick a country almost at random—won't somehow think the rules have changed. I don't minimize this problem that you have posed, but I guess I would use slightly different words to describe what was done for Argentina. Argentina was not going to pay its debts on January 17, January 24, December 31, or any other date one could name. In no meaningful sense was Argentina going to pay the IMF or anybody else. So the question for the IMF was, How do we recognize that fact and try to get ourselves in a position where what happens subsequently in 2003 will have the best chance of being constructive? Rightly or wrongly, the G-7 governments felt it was more likely that the new government in Argentina could be worked with to foster constructive developments with respect to the country's long-term problems if the fiction were maintained for a little while longer that Argentina was not in default to the IMF. It was not entirely the United States pushing this view, although this country was certainly on that side, but it was the Italians, the Spanish, and others. So that was done. On the surface of it, I wouldn't really disagree with that. I don't know that forcing the crisis into January, given that we still haven't seen the sorting-out in the political parties in Argentina as to who is going to run in the election for president—and we certainly haven't had the election—would have made for a better outcome.

But as you mentioned, there are spillover effects in terms of how it was done, and in some respects those have created very real problems.

It is certainly true, and it is symptomatic of why Argentina is where it is today, that the picture painted in the Argentine press was that it had looked the IMF in the eye and the IMF had blinked. As far as I know, the Argentine politicians drew that conclusion, too. So until somebody is prepared to hit those people over the head with a brick and tell them that this isn't the way the world works, this is going to continue. If you have any bricks handy, [laughter] I invite you to do it because that's why—a year and a half into the crisis—the Argentines still haven't figured out who's going to pay even a piece of the bill, whereas at this point in time the Asians are busy growing again. The problem is largely within Argentina; it's a political problem, and people are still dancing around it. The United States is obviously in a very difficult situation because it's hard to do the brick throwing without looking like a heavy to somebody, particularly to the people hit on the head with a brick. The chances of it somehow all coming out favorably don't look good.

CHAIRMAN GREENSPAN. We can have an amendment to the Sarbanes-Oxley bill to the effect that the accounting is to apply to the IMF as well as everybody else!

MS. JOHNSON. Well, it's a tough situation.

VICE CHAIRMAN MCDONOUGH. Just as a footnote, I think Karen's answer is what one would have to say; it's the right answer. In these countries when you forbear, you appease the worst of their politicians, and you discourage the ones—they may be somewhere—who are sensible enough to do the right thing. So the likely next president of Argentina probably is going to be weaker as a result of this action than he or she would have been if the action had been tougher. That's I think the ultimate tragedy.

CHAIRMAN GREENSPAN. You know, an actual default changes nothing. A good part of the issue involves the internal politics of the IMF and the need to replenish capital in the event of loss, which gets to the taxpayers of the G-7, and that is not an insignificant element in their decision. I am correct that the staff at the IMF was not enthusiastic about this decision?

MS. JOHNSON. The staff at the IMF wanted a real program. If it was going to be called a program, they wanted it to have teeth. Indeed, the managing director had been told originally, when he first took office, that the IMF was going to have smaller programs and that it was going to be more realistic and firmer in conducting these types of negotiations. Then he is confronted with the situation in Turkey and after that Argentina, and it's very clear that consistency is not exactly at a high point.

CHAIRMAN GREENSPAN. President Hoenig.

MR. HOENIG. Thank you. Circling back from those lofty questions, I have a relatively mundane one on the risks to your forecast and the outlook. It has to do with the consumer, who has been very important to our economy's ability to maintain itself through this difficult time. If one looks on chart 3 at what I'll call the debt burden ratio of consumer payments, it is nearly at a record high—with interest rates at a record low. Looking ahead, if in fact our economy begins to pick up, the expectation is for interest rates to increase, and there will be a migration into a heavier debt burden—depending on other circumstances, of course, including income growth and so forth. Since the consumer's role has been so important and since it will be a factor going forward, how do you assess the downside risks there, given that debt burden, which as you noted in your opening remarks people are concerned about?

MR. SLIFMAN. Well, the simplest answer is that empirically we've never actually been able to find a relationship between debt burdens and consumer spending at the aggregate level.

We attempt to look at some of these data at a more disaggregated level, and the bottom left panel is one way of trying to do that. As I pointed out earlier, the debt burden levels are far higher for the upper-income consumer; much of the action has occurred in the upper decile, where we think there's a large cushion to protect against income disruptions.

We also looked at the Survey of Consumer Finances to see, for example, if there had been any changes between the 1998 survey and the 2001 survey in the data on the households that are late making their payments. At the aggregate level we didn't see any real change in payment problems. We did see an increase, however—and this perhaps goes to your question—in difficulties in making payments for the lower-income, low-wealth, younger households. I think the category was those under the age of 35, which to me is quite young. So, there are clearly households for which this is a problem, but we don't have the sense that it is going to be a widespread problem. As I said, empirically we don't see evidence—in the aggregate anyway—that debt burden matters for PCE. It may well be that it does. We just can't find a relationship.

MR. STOCKTON. Obviously, from a broader perspective, one can say that there are some downside risks associated with the consumer sector. We are expecting a very weak labor market over the first part of the year. There are already some signs of concern in the household sector, and those concerns could be compounded by a continuing rise in the unemployment rate and lack of any perceptible growth in payroll employment. On top of that is the fact that we think households are still in the process of adjusting to the hit that their balance sheet has taken. On our forecast of a relatively benign stock market going forward, we see some stabilization of wealth to income, so we're expecting the effects of that hit to wane. But it still would have to constitute a downside risk.

Apropos of our discussion yesterday regarding model uncertainty in policy, it's clear that if we get into a situation where the economy is beginning to improve and interest rates are rising, some of the ameliorative effects of low interest rates on consumer debt burdens will begin to wane. But that might just mean that we'll need less of an increase in interest rates to produce the kind of restraint ultimately desired and not necessarily that it would trigger a contraction in the household sector. That suggests that you may be confronted with not knowing exactly how big a reaction you will get in terms of aggregate demand from the rise in interest rates that ultimately may be necessary. That will be a question you'll have to face in determining your policy response.

MR. HOENIG. Thank you.

CHAIRMAN GREENSPAN. President Poole.

MR. POOLE. Thank you, Mr. Chairman. After these very large issues I have a rather mundane one. I've been struck in recent weeks and months by the movements in commodity prices, and I noted particularly the chart on commodity prices on page 36 in Part 2 of the Greenbook. It looks as if the commodity price increases really took hold perhaps a little before the exchange rate started to move. To what extent are these dollar increases in commodity prices outrunning what can be explained by the exchange rate per se? That is, is a worldwide increase in commodity prices, as measured in euros and other currencies, taking place; and what are the implications, if any, if that observation is correct?

MS. JOHNSON. Well, it's certainly true that commodity prices are up a bit in some categories. I don't have them corrected in an SDR basket or the like, although I could do that at some point just to see what it shows. But we would suggest that the increases are occurring selectively in certain categories where for the most part we think we can explain it on the basis of

special factors. We don't see it as a leading indicator of a global recovery or something of that sort. In a few of the agricultural commodities—cotton and some others that are probably spelled out in the Greenbook, but I don't have them memorized—supply-side disappointments or crop failures or the like have caused prices to go up. Those categories—in contrast to the metals, say—are the ones in which we've seen prices rising. That suggests to us that this chart reflects more or less a weighted average of a number of market-specific, idiosyncratic developments.

CHAIRMAN GREENSPAN. Steel scrap is a major one—its spot prices have risen dramatically—in the metals components of the general Commerce index.

MR. STOCKTON. President Poole, we also think that it's probably an indication that the very modest improvement we believe is occurring in industrial production is in fact happening. In some sense, I think it reflects more than just the dollar effect. Our sense is that it's also signaling that the softness we saw in industrial production earlier in the fall has probably abated some and that these prices have become relatively firm. They are reasonably well correlated with industrial activity.

CHAIRMAN GREENSPAN. President Minehan.

MS. MINEHAN. I have some mundane issues as well. First, I guess I'm struck by how much stronger the second half of this year and 2004 are in the Greenbook forecast than in the majority of other forecasts, such as that of DRI. Particularly for 2004 the staff's numbers are way out there. Second, each of the factors in chart 2 that Larry went through—the forces shaping the outlook—seems to me to have a fair amount of downside risk. It's hard for me to see the upside risks on any of them. We were talking earlier about consumer spending. I think housing wealth is even more of a factor in people's spending—if wealth is a factor in spending—than equity markets. Now, given the sales data that have come out in the last couple of days,

maybe these charts need to be redone, but I've seen some work that suggests that the value of housing wealth may be leveling off. That raises the question of whether the boost to spending we've seen from refinancings, at least the part that stems from increases in housing wealth, will continue. That's one element of concern I have.

Another issue is the stimulus associated with past changes to monetary policy. How much is still there, and how much will be there, particularly as we get to 2004? As for expansionary fiscal policy, the fiscal impetus that the staff shows in the chart in the bottom left-hand panel is stronger in 2002 than is projected for 2003, even with the tax cuts. Moreover, I thought the attitude in the Greenbook with regard to the agony that state and local governments are going through was quite dismissive. Yes, they still have some reserves that they can spend, but they are all going to have to cut back expenditures sharply unless this economy picks up the way you say it's going to pick up and their revenues really start to grow. I'm just wondering how these four factors are weighted in your assessment of the outlook and where you see some upside risks on them.

MR. SLIFMAN. I'll start, and others can join in. First, let me make a brief comment on our forecast versus those of many outsiders. It's hard to know exactly, but I think one of the main differences between our forecast and many of the outside forecasts—especially when we're talking about 2004—is our productivity assumption. We clearly have a stronger assumption and that feeds through in a variety of ways.

MS. MINEHAN. Yes.

MR. SLIFMAN. Let me go through a couple of the other issues you raised and try to address some of them. The main question you asked was, in effect, where are the upside risks in this forecast. If I were to go through the upside risks, an important one would be capital

spending. The point of chart 4 on capital spending was to show that it would actually by itself be considered fairly conservative in terms of what we have the growth of capital stock doing. There is a lot of potential there on the upside if businesses really were to become convinced that a strong recovery was in place and they felt comfortable about the outlook going forward. The rates of return on investment seem to be high; certainly that's consistent with our productivity forecast being very high. They're related, but my point is that it doesn't require just that productivity assumption to get the possibility of a strong upside on capital spending if this pessimism lifts.

MS. MINEHAN. Compared with other forecasts of P&E, the staff forecast already has a strong number.

MR. SLIFMAN. Granted. But you're asking for the upside risks, and I'm just saying that I think there is some upside risk there.

MS. MINEHAN. So you think it could be even stronger.

MR. SLIFMAN. It certainly could be stronger, and that would be an important risk I would point to. Is there a possibility that we've been low-balling productivity growth? Perhaps. I wouldn't put a lot of weight on that one. As for the stimulus associated with past changes in monetary policy, we still have some stimulus in train. I forget the exact numbers, but I think it's in the range of something like ½ percentage point increments going forward for a while before it finally peters out. As you know, our fiscal policy assumption is just that—an assumption. I don't know what more to say about that in terms of upside or downside risks.

Now, let me briefly comment on the state and local government situation, if I may. That clearly is a possible source of restraint in the forecast, and we have built fiscal restraint into this forecast from the state and local sector. We've built it in both by lowering the growth of state

and local government spending to the levels we were seeing in the 1990s—the last time they went through difficulties—and by making adjustments on the tax side as well in their revenue streams. So we've actually put in a dose of fiscal restraint from that sector, recognizing exactly the problems that you've highlighted. I think Dave Stockton has some comments that he wanted to make as well.

MR. STOCKTON. Actually, on the fiscal policy side, I see the risks as more to the upside than the downside. We've built in less stimulus than the Democrats have proposed and less than the Administration has proposed. If our forecast is correct, we will have an economy in which the unemployment rate is going to be rising. In that circumstance, I believe there's a considerable possibility that we could get a significant further dose of fiscal stimulus. So I think there are upside risks associated with that.

On the structural productivity issue, I would just mention—as exotic as this might look—that our statistical filtering models actually would want to put in even more growth than we did, based on the course of productivity over the past year. Now, those models were fooled in the early 1990s when the growth of productivity picked up, a development they interpreted as a bigger step-up in structural productivity than in fact turned out to be the case. Indeed, much of that step-up proved to be cyclical. So we feel quite comfortable that we have discounted that evidence. But I think there are risks on both sides of that.

I'd say one other thing, too, which is that looking at the forecast and the risks associated with it simply in terms of the GDP growth rate is not the only way to look at it. We revised up both the supply side and the demand side in this forecast. In fact, this is a projection in which the GDP gap is larger than before. There is more slack implicit in the economy over the next two years than we had in the forecast last time; we show a higher unemployment rate and a larger

GDP gap. So it would be wrong to think about this as just a story of strength. One could look at it the other way around and say that this is a story of some additional slack, in part because we think there will be productivity gains in the short run that will lead to this higher unemployment rate. So in that regard there are risks on both sides of this.

Again, as I think we tried to make clear in the Greenbook, we recognize that in this outlook there's a lot of tension between the near-term weakness that we can actually measure and the strength that we're showing in the second half of the year. That pickup requires a lot of things to happen in the same direction in the second half of this year—dissipation of the pessimism, a big dose of fiscal stimulus, and a reduction in the wealth effects that we think currently are exerting a drag on the economy. It would be hard for us to know whether all those things would be concentrated in the beginning of the second half, around midyear, or whether some would occur later. Some could be accelerated and others stretched out to produce a forecast that may have as much growth over the next two years on net, but it may be distributed differently—either significantly delayed or pulled forward. There's not a lot of evidence to go on, in part because we're so unsure about the lifting of the uncertainty and gloom. We're talking here about when and to what extent a residual—that is, what we don't know about in the investment area over the last couple of years—goes away. We face considerable risks there in both timing and magnitude.

MS. MINEHAN. Right.

MR. STOCKTON. We just don't have a lot of science that we can bring to bear here.

CHAIRMAN GREENSPAN. Okay, any further questions? If not, who would like to start our roundtable? President Parry.

MR. PARRY. Thank you, Mr. Chairman. The Twelfth District economy continued to expand in recent weeks but at a very modest pace. Consumers turned in a disappointing performance during the holidays, and early numbers for January suggest that they remain hesitant and price conscious. One retail consultant characterized the current environment as a “race to the bottom,” with consumers willing to hold out until they get goods at cost. Retailers have responded—offering nearly continuous sales, rebates, financing incentives, and price guarantees. District businesses also are looking for bargains, especially in real estate and IT support services. One commercial landlord said he fields daily calls from tenants threatening to move if their lease rates are not lowered. A contract manager at SUN Microsystems reported increased pressures to lower prices for long-term service contracts and one-time technical support.

Now, let me say a few words about the state budget crises. The genesis of these crises, not only in the West but elsewhere as well, appears to be overly optimistic revenue expectations and, to a lesser extent, cost overruns. Revenues are running well below expectations, with especially large shortfalls in states dependent on capital gains revenues. On the cost side, Medicaid seems to be the main culprit due to rapid increases in prescription drug prices and provider fees. Although a recent survey of state governors found that twenty-four believed their fiscal crisis is the worst in the nation, it appears that things are especially bad in the Twelfth District. [Laughter] District states account for approximately 21 percent of gross state product, but they account for about one-half of the estimated total state budget shortfall in the United States. Of course, California’s gap is the largest—\$26 billion or \$35 billion depending on whom you talk to—and that’s for both this and the next fiscal year.

While these budget shortfalls pose significant challenges for state lawmakers, their economic impact is less clear. For one thing, estimated budget shortfalls represent the difference between desired spending and current revenues. They do not represent budget deficits. Therefore, they typically overstate the tax increases and cuts in spending that are required to balance the budget. For example, California has a projected shortfall, at least as projected by the governor, of \$35 billion. But it actually faces a deficit of \$15 billion. For another, states usually spread the pain of budget deficits over several years, tempering the immediate impact on state spending and employment growth. That being said, there are real costs to such large budget shortfalls. California's bond rating was downgraded in part because of the announcement of a \$35 billion budget shortfall. With the recent downgrade, rating agencies now score California's current fiscal crisis as equivalent to that faced during the state's severe recession in the early 1990s. Moreover, the state faces severe cash flow problems, so it probably will need to take on more debt to meet current payment obligations. On the brighter side, exporters and importers breathed a sigh of relief last week on word that a new West Coast port contract had been signed.

Turning to the national economy, obviously recent data have been mixed, with employment and industrial activity on the weak side and consumer spending doing fairly well. On balance, though, the data have been somewhat disappointing. Our forecast for this year looks a lot like the one in the Greenbook. We've revised down our estimates of real GDP growth in the fourth and current quarters about  $\frac{1}{4}$  percentage point, to  $\frac{1}{2}$  percent and  $2\frac{1}{2}$  percent respectively. Assuming a constant funds rate this year, the most likely scenario for the third and fourth quarters is that real GDP growth will rise above the potential rate by  $\frac{1}{2}$  to 1 percent, depending on what happens with fiscal policy. The excess capacity in the economy brings

consumer inflation down at a gradual pace, and inflation in the core PCE price index falls to about 1¼ percent in 2004.

I have some concerns about this outlook. First, of course, the long-anticipated pickup in growth has yet to materialize. This pickup seems to depend importantly on an acceleration in business fixed investment occurring before consumer spending falters. The longer the growth has to depend on the auto and housing sectors, the riskier the situation becomes especially in the context of geopolitical uncertainties. Second, even the projected expansion is modest at best, and it still would leave the economy with excess capacity through the end of next year. This brings me to my third concern. Our forecast also would leave us with an inflation rate next year that's below 1 percent after taking out the estimated bias. In my view, that inflation rate is slightly on the low side.

To see how these concerns play out in the longer-run forecast, we ran a number of perfect foresight simulations as in the Bluebook. We used a couple of different models, including FRB/US, and some alternative assumptions about FOMC policy preferences, including different assumptions about interest rate smoothing and also the degree of responsiveness to the output gap. In all cases where we assumed a target for measured core PCE inflation of 1½ percent, the optimal policy involved significant near-term funds rate decreases. These simulations nicely capture the implications of our current situation. We have excess capacity, prospects for only a modest increase in real GDP growth, and a fairly low inflation rate. Adding any downside risks for economic activity to this picture would only strengthen the argument that perhaps a further easing of policy might be appropriate before too much more time passes. Thank you.

CHAIRMAN GREENSPAN. President Broaddus.

MR. BROADDUS. Thank you, Mr. Chairman. Our District economy has been fairly sluggish overall since the last meeting, and I have a sense that there probably has been some deterioration in both household and business confidence. The cold weather may be part of it. It was colder in Myrtle Beach the other day than in Anchorage, if I'm not mistaken. [Laughter] I think concern about Iraq is restraining household and business spending in our region as elsewhere in the country. Consumer spending in our District seems to have followed what I understand to be the same pattern that has been reported for other parts of the country—generally weak holiday sales but a revival of automobile sales in December as some of the incentive programs were reintroduced. We have a director in Charlotte who runs a huge car dealership in North Carolina. He said that December was a spectacular month. He's a pretty sharp guy, and he speculated—I guess based on conversations he's had with some of his customers—that people are deferring or even forgoing purchases of other major items in order to take advantage of the car deals before they go away again.

Labor markets, in keeping with what I've already said, appear to have softened further in our area. We hear more reports of layoffs. Unemployment rates are rising in all of our District states. The majority of the layoffs are at factories, and general manufacturing remains rather weak in our region. In such an environment, not surprisingly, the information we have on business investment suggests that it's still quite soft. We have heard a few reports of increased spending on computers for upgrading and that sort of thing, but nothing much beyond that. The only vigorous and bright spot in the District is housing.

On the national economy, maybe in some contrast to Bob Parry, I think the staff has made a good case—both in the Greenbook and also in response to Cathy's question a minute ago—for its projection. The Greenbook forecast as a point forecast is as plausible as any I can

think of. It basically says that the recovery will gradually, or maybe a bit more than gradually, strengthen over the projection period. As I see it, the two principal underlying fundamentals that support the forecast are the same two main factors that have been supporting the recovery, such as it is, up to this point—an accommodative monetary policy and strong productivity growth. We have eased monetary policy substantially over the last two years as a whole, including the most recent move in November. I think, as the Greenbook says, there's a good chance that we haven't seen the full impact of that yet. With respect to productivity growth, as has already been suggested here today, obviously there's no guarantee that the elevated structural productivity growth of recent years will continue this year and next year. On the other hand, I don't see any strongly compelling or obvious reason to think that it won't continue. I believe there's a good chance that it will continue for reasons that you mentioned, Mr. Chairman, in your speech on productivity to the AEI in October of last year. If it does, that would support continued strong growth of disposable household income and spending and presumably at some point would stimulate, or at least help to stimulate, business investment. Another source of support is the fiscal stimulus. I wouldn't give as much weight to that as I think the staff does, but certainly it's in the right direction.

Nevertheless, I consider the Greenbook's point forecast plausible. I also think that the confidence interval around it is symmetrical but exceedingly wide, mainly because of Iraq. We've had some discussion of this already. It's rare, at least in my memory, that the near-term economic outlook has been so heavily dependent on the prospect and timing of one contingent event. If we invade in the next few weeks and the war is short, successful, and decisive, both business investment and the overall recovery could strengthen quickly and markedly. I enjoyed very much the part of the chart show that dealt with that. Also, we could get the same result if

somehow this impasse is resolved without an invasion. There is still some small possibility of that, though it doesn't seem very likely now. But in either of those situations I think our current policy stance would be much too accommodative.

However, if we do invade and the war triggers some other crisis like another terrorist attack somewhere, then confidence could be eroded further, businesses could continue to restrain investment, and the recovery then would become even more vulnerable to some of the downside risks that have been mentioned here today. In such a situation, we might need to ease further, and we might need to do so aggressively—or preemptively if I may use that word—even taking account of some of the tradeoffs and tough choices we'd have to make, as we discussed yesterday. In any case, given the unusual degree of uncertainty in the outlook and the wide range of possibilities, the key point for policy—particularly against the background of our discussion yesterday and with all due respect to prudence—is that we may have to adjust policy substantially and promptly in one direction or the other in the months ahead. In my view we need to be prepared for that possibility.

CHAIRMAN GREENSPAN. President Hoenig.

MR. HOENIG. Mr. Chairman, my comments are going to sound fairly familiar. The situation hasn't changed much since the last time we met. The District economy has been and continues to be sluggish. There aren't a lot of signs of improvement since our last meeting. Manufacturing activity, from what we've observed in the region, actually weakened somewhat in December, disappointing us given the growth that we had seen in October and November. Production and new orders both moved back below year-ago levels after firming in October. Consumer spending has been sluggish since the last meeting, and in most areas holiday retail sales were flat compared with a year ago despite some heavy discounting. I had a conversation

with an owner of major shopping malls in the Midwest—in Kansas City, Denver, and elsewhere—and I found his comments about the post-Christmas season interesting. He said that he thought sales were pretty robust in the first week of January. But since then, in the last two weeks, they've dropped off dramatically. Retail activity is just dead, and he hasn't been able to figure out why. It is a concern because that pattern is not unique to one city. It has occurred throughout the Midwest, though Denver in particular has been very hard-hit in terms of a slowdown.

Our commercial real estate sector is depressed, with a number of vacancies as well as a lot of space that is being leased but not used. We have some real issues there. Housing activity, as elsewhere, continues to be the bright spot in the District except in Colorado, where a slowdown has developed even though prices haven't adjusted yet to that slowdown. I don't know whether that's coming, but I suspect it is. Energy activity in the District actually has been flat despite the oil price increases, and that's because no one knows exactly where that price is going to go. Many feel it could easily plummet, and if it does, no one wants to be in the position of having made that kind of capital investment. So activity in that sector has remained relatively slow. Wage and price pressures are largely subdued; there's nothing unique on that front.

On the national scene, I really can't quibble with the Greenbook, given the levels of uncertainty. As we've noted, the fact is that monetary policy is stimulative, and fiscal policy is likely to be. Another positive is that financial market conditions, given the economic situation we are witnessing, are relatively strong compared with what they've been in the past. So the markets are in a position to foster strengthening economic activity. I, too, see the issue as the fact that the risks on both the upside and downside are bound to be so much larger than usual. We could have a very good takeoff or a real slowdown. That is the situation we're faced with.

Whether the outcome is to the upside or the downside, I think perhaps the new phrase for policy that may come from all of this is “prudently bold.” But for the time being we’re looking at possibilities on both sides, and I think we’re in a position to wait and see. Thank you.

CHAIRMAN GREENSPAN. President Guynn.

MR. GUYNN. Thank you, Mr. Chairman. Economic activity remained sluggish in our Southeastern region through December and early January this year. Many of our regular contacts in those sectors that are still seeing little or no rebound are saying, “What recovery?” Someone I talked with recently dusted off an old Southern country boy expression when he said that he just hopes the economic situation doesn’t deteriorate into a hog wallow. I’ll translate that into city boy language during the break, but I think you get the idea.

Our regional bright spots and soft spots reflect the national picture in most respects. Our contact at the corporate headquarters of UPS in Atlanta was helpful in piecing together the picture of Christmas holiday sales. As we all know and have talked about at various times, there have been significant changes in where people shop. The traditional mall retailers are losing market share to discounters and the Internet. UPS’s chief financial officer told us that their Internet-related deliveries were up some 24 percent from year-ago levels. Despite those big gains, and I guess they were on a small base, everything we know suggests that holiday sales in our region were about flat compared with a year ago, with late-in-the-season spending helping to save the day. The pattern of later shopping surely has multiple explanations, but we would suggest that it may be additional evidence of the broader pattern of uncertainty and postponed commitments that we’re seeing elsewhere in the economy.

Job growth in our region has been stubbornly absent. In our District, the manufacturing sector, which is still a bit larger as a proportion of total employment than is the case nationally,

the extent of job losses and the significance of those losses are very different between durable and nondurable manufacturing. Durable goods manufacturing employment declined by a somewhat smaller percentage than for the nation, mainly because our District's durable goods firms are less concentrated in industrial and electronic equipment. In contrast, though, nondurable goods manufacturing employment fared somewhat worse than in the nation; much of the employment losses there were from plant closings rather than reduced hours and shifts. So the job recovery in that sector does not look very promising.

Not surprisingly, the other major problem we're seeing—and others have already highlighted it—is the condition of state and local finances. Deficits and budget problems abound because ramped up spending during the late 1990s was not curtailed quickly enough as conditions deteriorated. It's our sense that the hurt at the state and local level, and consequently implications for economic drag, may be even greater than portrayed in the Greenbook. Although our states may be small and Bob Parry's explanation may be what is most important, at least in our six states the very real tax increases and spending reductions look to be quite significant.

There are the continuing bright spots. Residential construction remains healthy and strong, with no early signs of slowdown. Current mortgage rates should sustain the high level of activity, although the potential for a further pickup in that activity is questionable in my view. Commercial construction is another story. With the current high vacancy rates, at the present rental rates it's hard to see a meaningful bounceback anytime this year. Our tourism industry continues to see a slow, steady recovery, although tourism is still not back to the levels in 2000. Business travel and convention business have not recovered at a commensurate rate. So our regional picture is very mixed. As I've said before, our region is not getting the special early recovery bounce that has often led the nation at this point in past cycles.

At the national level I keep looking for the expected signs that help is on the way—that those sectors that have yet to get some traction are beginning to come back. I've been trying to practice my own advice of being patient. All things considered, I do share the broad view that the economy will continue to improve and that the recovery will become more broad-based as we move through 2003 and beyond. At the same time, my staff and I are a bit less convinced than the Greenbook authors that we'll see such strong a recovery as early as later this year. While we do see some pickup beyond the early part of the year, there may be some good reasons—already pointed out by others—to be somewhat cautious about expecting a quick and large bounce. Fourth-quarter profit numbers are just coming in and so far seem to be showing modest improvement compared with year-ago levels and are up significantly in some sectors. However, I'm less certain about the assumed strength of productivity growth and the further growth in housing activity and business investment in the near term that is embedded in the Greenbook forecast for the second half of the year.

The initial leveling out in labor markets last year is beginning to seem extended. Lots of business people I talked with still seem to be very, very focused on further cost reductions, with more job cuts and delayed hiring a big part of that focus. While certainly there must now be considerable pent-up demand for additional staff to relieve some of the “do more with less” mode that businesses have been in, it may be awhile longer before the unemployment rate moves down and the economy gets a positive kick from sustained employment growth.

Despite the political pressures to do something on the fiscal side—and despite Dave Stockton's assertion that the fiscal assumptions embedded in the staff forecast are quite modest—it's not clear to me that the fiscal stimulus we'll get will be targeted and timed to affect the near-term slack in the economy. In fact, I'm actually a little encouraged that there seems to

be some debate about the longer-term negative consequences of certain specific fiscal actions. Finally, as has been noted repeatedly, how the war worries will play out is still not completely clear. At least for awhile longer, that overhang and the related short-term run-up in oil prices are not helpful and are masking what might otherwise be developing in the real economy.

For all those reasons, we see growth in 2003 as more modest than in the staff forecast, with less of a sharp pickup toward the end of the year. Still, with monetary stimulus already in place and at least some additional fiscal stimulus probably coming, with more and more imbalances and excesses having been worked off, and with the prospect that geopolitical drags will eventually become less worrisome, we think we're on a reasonable path at the moment.

Thank you, Mr. Chairman.

CHAIRMAN GREENSPAN. President Moskow.

MR. MOSKOW. Thank you, Mr. Chairman. Economic activity in the Seventh District generally appears to have remained soft in December and January. Our contacts' expectations for 2003 are mixed, although perhaps a little better than a month ago. So let me start with the good news.

The automobile industry ended another very strong sales year with a flurry of activity in December. While light vehicle sales apparently slowed in January, our contacts at each of the Big Three have told us that the decline has been in line with their expectations, reflecting the expiration of incentives and sales pulled ahead into December. The major issue for 2003 is the contract negotiations with the UAW. Key issues of contention are likely to be capacity reductions and health care costs.

In the Chicago purchasing managers' report for January, which won't be released to the public until Friday, the overall index moved up from 51.7 to 56, which is above the consensus

estimate of 53. Orders and production in particular increased. The employment component, however, still remained very weak. In heavy-equipment industries, some of our contacts are expecting a pickup in production in the near term. They believe that final users will want new equipment soon—at a minimum for replacement purposes—and they know their distributors' inventories are very lean. We've also heard from producers of machine tools and heavy trucks that they are receiving more requests for price quotes. Still, apart from the new Chicago PMI that I mentioned, we've seen few tangible signs of a broad-based sustainable recovery in our manufacturing sector.

In terms of the not-so-good news, most retailers were disappointed with holiday sales, and it appears that little has changed so far this year. Retailers remain cautious about ordering and continue to be aggressive in discounting merchandise. In addition, both of the major temporary-help firms headquartered in our District, Kelley and Manpower, were less optimistic than a month ago. One, who last month saw a few signs of strengthening labor demand in manufacturing, is now characterizing his business as “inching forward.” The other, who last month was already pessimistic, thinks the recovery actually has stalled. Neither thought they were close to seeing the robust growth their industry experienced following the 1990-91 recession. With regard to the overall employment picture, Manpower's national index of hiring intentions for the second quarter will be somewhat lower than for the first quarter. That index figure is preliminary at this point and won't be released for quite some time—not until February 24.

Turning to the national outlook, as we all know, the news since our last meeting has been mixed. We've been in a slow period, and it's always difficult to be upbeat when we're receiving negative employment reports and the like. Nevertheless, as I just noted, the anecdotes from most

of our manufacturing contacts—while still not rosy—are not as full of doom and gloom as they were last fall. I hope that this is a sign that businesses are working through some of the uncertainties they faced over the past year and that this process will soon show through as increases in payrolls or solid gains in investment. Such a turnaround by the business sector is important because the recent labor market weakness certainly increases one's concerns about the ability of the household sector to continue leading the expansion, which we discussed earlier.

As was noted, further declines in employment can make households more cautious about spending. To be sure, the ongoing strength in motor vehicle sales and housing activity indicates that, at least for now, households feel confident enough about job security to take on commitments associated with the big ticket purchases. But I wonder how long this confidence and spending will be maintained if job growth doesn't resume soon. Still, like the Greenbook, I see the retrenchment of the household sector as more of a risk to the forecast than a factor to build into our baseline assumptions. Importantly, the expansion continues to be supported by the things we've talked about—our accommodative monetary policy and productivity gains, which provide the underpinning for profits and real income. And, of course, although the legislative debate has a long way to go, I think it is likely that we will get a boost to aggregate demand from fiscal policy.

Taking all these factors into consideration, our forecast for 2003 is that real GDP growth will be in the range of 3 to 3½ percent, somewhat lower than in the Greenbook, and that inflation will edge down.

CHAIRMAN GREENSPAN. President Minehan.

MS. MINEHAN. Thank you, Mr. Chairman. Not a lot has changed in the New England region. Labor markets remain relatively weak with continuing job losses mostly in

Massachusetts. Such losses continue to be most severe in manufacturing, with other industries showing marginal gains and losses. Unemployment did trend down slightly in November, and it remains well below the national level. This recent change, however, apparently was due to a decline in the size of the labor force, which we and other analysts presume was a result of discouragement about job prospects.

Residential real estate markets continue to hold up surprisingly well, with 2002 seen as likely to have been the strongest year for single-family home sales in recorded Massachusetts state history. Commercial real estate remains moribund, however, with the Boston market particularly affected. Regional consumer confidence fell sharply in December—both current and future expectations were affected—and is now below the level reached in the aftermath of September 11. Business confidence rose a bit, however, and may be one indicator of a glimmer of a hope that there is light at the end of the tunnel. Local manufacturers reported little change in demand over the past few months. Nonetheless, they seemed more confident about the potential for future growth, and some believed that they might be able to beat current expectations. Similarly, a leading indicator index for the region pointed to positive growth over the next six months—not large but enough to suggest that we might be approaching a turning point.

Meetings of the Bank's Academic Advisory Council and a group of investment managers that I see regularly echoed similar downbeat messages about the current state of the economy and the markets. Both groups emphasized the many uncertainties both of a geopolitical nature and about the nature of this slow recovery. The academics saw a need to ease policy, even with the fiscal stimulus proposed by the Administration, to deal with what they saw as a widening output gap in the context of declining inflation. The investment managers saw similar weakness and market unease, with dimming prospects for profit growth in 2003, but they thought that

further monetary ease would do nothing to increase business investment or decrease uncertainty. In fact, they felt it might increase uncertainty.

As I look at the national scene, I find myself a bit torn between the perspectives of these two groups. At the last meeting I believed that uncertainty was easing a bit, that credit and equity market conditions had become more hospitable, and that the beginning of some optimism about business spending might be in the works. The incoming data, however, have definitely been on the soft side in my view, with equity markets hitting low points, job losses mounting, and business spending apparently flat. Only the consumer with his seemingly insatiable demand for housing and cars seems to be keeping up his end of the bargain, though confidence readings and the slide in equity markets suggest some concern about future softness in consumer spending as well.

Our near-term forecast is not unlike the Greenbook's—almost no growth in Q4 and a pickup to modest rates of growth in the first half of this year. But then we differ, in part because the assumed path of fiscal policy in the Greenbook is more stimulative, taking into account as it does the likely effect of the Administration's proposals. Even when that is added back in, however, we don't get quite the bounceback evident in the Greenbook forecast of the second half of 2003 and certainly not as much as in 2004. This reflects, we think, the degree to which reduced uncertainty seems to affect the Greenbook forecast. This reduction occurs in the first half of this year and its positive effects are felt in the second half. Clearly, uncertainty is a major factor in the economic outlook. What will cause that uncertainty to subside, however, is difficult to determine. Will the go/no go decision about war make businesses more confident about the future? Or will the economy's current soft patch have to show real signs of firming to achieve that end? Or, as Dave Stockton suggested yesterday, are these two sources of uncertainty so

intertwined that it's hard to tell one from the other? I wish I could answer that question, as I think it is critical to assessing the risks in the Greenbook forecast. As you've probably inferred from my questions earlier, I do see the risks mostly on the downside. I don't see a wide error band on the upside.

That takes me to the quandary posed by the differing perspectives of my Academic Council on one hand and the investment group on the other. The academics were urging proactive further ease, using logic not unlike that which we discussed yesterday in the interest rate smoothing presentation. Obviously their concerns focus primarily on the slowdown and the need to shore up the economy to face the possibility of other shocks. The investment group saw the uncertainty largely in the context of the war and thought monetary policy really wouldn't be a useful tool and that easing might even be counterproductive. When I look at the Greenbook forecast—even if one takes it at face value as the most likely outcome—it still projects, as President Parry remarked, considerable slack in the form of unemployment by year-end 2004 and dropping inflation. That might suggest that further easing would be the right direction for policy, to address more clearly the risks that are there. But I find myself attracted to the advantages of inertia, at least for now. Things are uneasy, an unknown amount of fiscal stimulus is in the works, and markets don't expect the Fed to move. Perhaps we need to be one of the more certain aspects of the situation at this very uncertain time.

CHAIRMAN GREENSPAN. Governor Kohn.

MR. KOHN. Thank you, Mr. Chairman. The economy remains suspended between ongoing weakness in the here and now and prospects for future strength, and we've seen a bit more evidence supporting each of these sides over the intermeeting period. There's a long list of factors pointing to a strengthening trend for economic growth over the intermediate to longer

run, and a number of these have become more compelling over the intermeeting period. Real interest rates for businesses have declined further—substantially for below-investment-grade businesses—partly reflecting reduced perceptions of risks on the part of lenders. These reduced perceptions were fed by the continued absence of new revelations of corporate wrongdoing and some sense that the credit problems accumulated during the boom period are beginning to top out. Fiscal policy is poised to be more expansionary than previously anticipated and perhaps even more so than in the staff forecast if the unemployment rate edges higher as seems likely. Estimates of underlying productivity growth have been revised up. Rapid increases in productivity should support business and household incomes. The household response to low interest rates and continued growth in incomes has been even greater than expected, supporting ongoing strength in housing and consumer durables spending. The resulting upward revision to private final sales in the fourth quarter leaves a more convincing upward trend in final demand from the first to the second halves of 2002. This should eventually underpin a pickup in investment. The favorable fundamentals of accelerating sales, high cash flow, and a low cost of capital should lead to much stronger investment demand over time. Stocks of inventories and capital have been reduced considerably relative to the putative level of final sales at the economy's potential, and capital is wearing out rapidly. Replacement cycles have already been stretched out, and unless they are further extended, replacement should begin to show through to spending. This is a trend we can already see in computers. Credit markets seem pretty well convinced that stronger growth is coming. Not only have we seen a decline in risk spreads, but also the yield curve remains unusually steeply upward sloped, as steep as in the past when recessions were about to be over.

But these positive factors have yet to show through convincingly in the data.

Importantly, business investment continues to disappoint, not yet showing signs of a sustained upturn, and largely as a consequence, the economy remains weak. Undoubtedly war jitters and other geopolitical risks are playing a key role in this, but we can't be sure how big a role. As several people remarked yesterday, "geopolitical risk" is an all-purpose label we're putting on forecast errors and equation residuals. [Laughter]

My sense is that the risks to the intermediate-term to longer-term outlook are skewed toward even greater acceleration in output, but these risks are balanced by a skew toward economic underperformance in the near term that could have important consequences for the economy. Most prominently among the longer-term upside risks, business spending could snap back sharply—even more sharply than in the staff forecast—as international uncertainties abate, as financial markets' skittishness continues to wane with fewer problems of governance and credit, and as the ongoing rise in final sales bolsters confidence about the future. In the current environment, as I already noted, considerably more fiscal stimulus is a distinct possibility and that stimulus might well take effect just as the economy was recovering in any event.

In terms of the downside risks to the near term, I think genuine geopolitical risks could continue to damp demand to a considerable degree—either because the Iraq situation takes longer to resolve or because situations arise that create new uncertainties in the manner of the Korean and Venezuelan developments of recent months. Or we could find that factors other than geopolitical risks are really restraining demand. This business-investment-led cycle is a new experience for most of us. Recently the Chairman and a visiting economist engaged in a dialogue about the recession of 1846 as a comparable episode, [laughter] but that was a little before my time. Protracted near-term weakness for whatever reason, despite forecasts of strong

future growth, could present a difficult challenge for the Committee at a future meeting. Inflation is already low and poised to decline further, perhaps by more than the staff has projected, given the much steeper declines that we've seen in recent years in price indexes other than core PCE. That by itself is probably not a problem. It shouldn't feed back much on demand provided that inflation expectations don't ratchet down substantially, which would raise the real funds rate and lower asset prices. In the "low NAIRU" simulation in the Greenbook, the expansion continues as projected. But it does leave the economy more exposed to downward shocks in the sense that, with inflation expectations likely to be at least a little lower, the zero bound is a greater constraint on our ability to reduce real interest rates. If that situation threatens, we may need to recall the lesson I was drawing yesterday afternoon—that mistakes of overly aggressive policy are more easily reversed than those of a policy that gets behind the curve.

Thank you, Mr. Chairman.

CHAIRMAN GREENSPAN. Governor Gramlich.

MR. GRAMLICH. Thank you, Mr. Chairman. I'm an avid reader of the "news clips," and I had seen reports about several of your talks mentioning lights at the end of the tunnel, the economy being well positioned for recovery, and that sort of thing. I was going to add some moderately downbeat comments today. Now that I have actually heard many of your reports, I'm afraid that, instead of being a crotchety outlier, I'm going to be a lemming! [Laughter] Let me proceed anyway.

The first point to note is that the near-term economic weakness does persist. There are still plenty of positive signs—many of them just cited by Don. But the general property of the forecasting exercise seems to be that the near-term data that can be seen pretty well remain weak while it takes the longer term, not so clearly visible, for the forecasters to become more positive.

The Greenbook, for example, made positive changes in the out quarters, but these are based partly on more-aggressive and exogenous assumptions about fiscal policy, partly on the link between higher productivity and spending demands and, I suppose, partly on the belief that business cycles can't last forever. They can't, but perhaps we should still pay attention to the data we can see rather clearly and worry more about persisting weakness.

The financial press seems confident that the cause of all economic weakness now is the possibility of and uncertainties surrounding potential military action against Iraq. Of course, it may be; but we don't observe this uncertainty directly. What we observe is that investment is slow to turn around, the stock market is weak, the dollar is falling, oil prices are high, consumer confidence is falling, and deficits are rising. We tend to look for a unifying explanation that could explain all of these negative events, and Iraq certainly could do that. But perhaps Iraq doesn't explain all the sources of weakness, and perhaps the geopolitical uncertainties are now generating further indirect sources of weakness. The key question, as we asked yesterday, is whether everything will turn around once the geopolitical uncertainties are resolved. I, for one, am not so sure that they will.

On Iraq itself there is little that a mere economist can contribute to knowing how to deal with these uncertainties. But there may be something a football coach can contribute. The coach at the University of Michigan, Bo Schembechler, never passed much. When asked why, he said that when you pass three things can happen, and two of them are bad. [Laughter] If I could adapt Schembechler's comment to the issue of geopolitical uncertainties, one of the possible outcomes is the potential for further delay. Especially in the last few days, it does not appear that events are speeding up. There are still several forces that could lead to delay. It will be a month or so before we have enough troops in the Middle East. There will be continuing uncertainty

about whether weapons inspectors can find the missing weapons, or whether Iraq is or is not in material breach. There's uncertainty, too, about whether the likely outcomes improve if more allies are brought into the coalition and what it might take to bring these allies into the coalition. Another possible outcome is that the war is prosecuted but does not turn out well. There doesn't seem to be much doubt that the United States would prevail in a conflict with Iraq, but prevailing in a war such as this could entail many difficult after-effects. There could be serious damage to the oil fields or other unimaginable types of ugliness. The ultimate cost, ramifications, and economic uncertainties of any war, no matter how successful, could be quite serious and could be very much in doubt for a long period of time.

None of this says that the optimistic talk is wrong, and none of this argues that the economy is not well positioned for recovery. As for policy, there's probably very little we could do now at this time of maximum uncertainty, and it is not costly to wait a bit for the situation to clarify. But forgive me if I don't join the optimistic crowd.

CHAIRMAN GREENSPAN. President Stern.

MR. STERN. Thank you, Mr. Chairman. Let me begin with a quick rundown of what has been happening in terms of the readings on the District economy. All in all the reports remain mixed, but I would say that on balance they may be a bit better. A couple of sectors aren't better. One is agriculture, where the combination of unfavorable weather conditions and lower prices for some commodities probably has worsened the situation, so attitudes among many producers are quite negative at this point. Another sector that isn't better is tourism. Again, weather seems to be the principal problem there, especially the lack of snow.

Moving beyond those two sectors, for the most part commercial construction is soft, but retail space in the Twin Cities is quite tight, so there is a substantial amount of new retail

construction under way. Labor market conditions appear to have stabilized; the changes in employment and unemployment in recent months have been trivial. And the manufacturing sector appears to be improving. The improvement is small, but we've had better anecdotal reports and better readings out of that sector for the last several months now. Consumer spending, as most people have commented, is mixed, depending on the region and depending on the retailer. As the retail space additions in Minneapolis suggest, some people are optimistic in that arena. Of course, optimism certainly pertains to virtually all measures of housing activity—single-family construction, multifamily construction, and sales across the board without regard to price levels. Finally, let me say a word about credit quality. The bankers I've spoken with certainly seem comfortable with the credit quality of households but less so with that of businesses today.

As far as the national situation is concerned, I wrote down numbers very similar to those in the Greenbook. I don't know if this will make anybody feel better or not, but I went and looked back at last January's Greenbook to see what the Board staff had forecast for 2002, and they got it just about exactly right. It's really remarkable. So I hope that between the staff and myself we're right again, at least as far as 2003 is concerned. I do believe that there are some fundamental reasons that the Greenbook forecast is not a bad one. These reasons aren't meant to be additive because the phenomena are interrelated. One is the fundamental resilience and flexibility of the U.S. economy, a point that somebody touched on a little earlier. I don't think we want to lose sight of that. I would add that monetary policy is, of course, accommodative. We are anticipating further fiscal stimulus, and some of that will lead to sustained growth in disposable income. Finally, there's the favorable productivity outlook. If I ask myself where I might be missing something that would jeopardize that forecast, one area is the state and local

government budget situation, for which the consequences may turn out to be more severe than I expect. Another is the labor market. I'm not sure that labor is as stretched as some people seem to think and that employment will pick up rapidly any time soon. So that weakness may be extended. Another possibility is that we may be a little optimistic about productivity. But in the end, I think this is one of those situations in which all of that is probably dwarfed by how the geopolitical developments play out, and I don't have any special expertise there.

CHAIRMAN GREENSPAN. Okay. Let's take a relatively short break

[Coffee break]

VICE CHAIRMAN MCDONOUGH. Governor Gramlich and I had a fascinating discussion over coffee about the Revolutionary War. I will spare you that conversation.

SPEAKER(?) Which revolution?

VICE CHAIRMAN MCDONOUGH. The American Revolution.

MR. GRAMLICH. I couldn't go back to the sixteenth century! [Laughter]

VICE CHAIRMAN MCDONOUGH. The Second District economy has been mixed but generally weaker since the last report. The labor market has softened noticeably. Housing activity has retreated, but manufacturing conditions have improved a bit. Retailers report that holiday season sales were generally sluggish, marked by very steep discounting but decent unit sales. Consumer confidence fell to a cyclical low in December. While unemployment rates in the District were mixed in December, private-sector employment retreated sharply, mainly reflecting reductions in retail holiday staffing.

Sales of both single-family homes and apartments slowed noticeably in the latter part of the year, but selling prices remained well ahead of a year earlier. In part what I think is going on is that people are unwilling to accept real prices and therefore are slow to sell. That will have to

change. New home construction also retreated in October and November but remains at a fairly high level. Office markets in downstate New York were relatively stable in the fourth quarter but office vacancy rates in New Jersey and Connecticut continued to escalate. Manufacturers and purchasing managers report mixed but generally improving conditions in the last few weeks. The state and local governments in the area are considering ways to close sizable budget gaps projected for the upcoming fiscal year, and they are doing it at this stage with varying degrees of realism. I mentioned at the last meeting the possibility of a very crippling transit strike. That fortunately did not take place. Bankers are reporting increased loan demand from commercial borrowers as well as tighter lending standards on that segment of their business. They also note a widespread retreat in consumer delinquency rates.

On the national picture and the international picture, I am by nature an optimist, and therefore I am very inclined to think that the Greenbook forecast, with which we largely agree, is a quite reasonable one and is likely to take place. But we do have an enormous amount of uncertainty. So the question is, What does the prudent central banker do in an atmosphere of enormous uncertainty? It seems to me that one should think very hard, do nothing, and stay extremely alert. Now, if fortune is kind and the large degree of uncertainty is dissipated, I share the view that when we begin a policy move it is likely that boldness will be appropriate—more along the model of January 3, 2001, than the 1994 example. But that is a decision that we will make appropriately at that time. Thank you.

CHAIRMAN GREENSPAN. President McTeer.

MR. MCTEER. The economy in the Eleventh District has continued its lackluster expansion. If we use employment as our measure, Texas is having a jobless recovery in which output grows while employment slows. As best we can tell, given the lags in regional data,

income and output have been growing—assuming our productivity growth mirrors the rest of the nation. Overall, the District economy probably is growing, but there's not a lot of forward momentum. Businesses and households are in a hunker-down mode. Whether it's driven primarily by the impending war and other bad news is a matter of conjecture. Nonetheless, the mood is quiet and cautious. Those two words also summarize the tone at the December and January meetings of the Dallas Fed's board of directors.

Like the rest of the nation, single-family home construction and sales are doing well, but the market may be getting saturated, and sales of new homes are expected to slow this year. One real estate analyst in the Dallas area, where new homes sales are predicted to decline 6 percent in 2003, commented that while this might sound dismal it would still be the third best year in history. All other categories of construction have been declining, and that is expected to continue throughout this year. One segment that has stopped sliding is the oil and gas sector. In spite of high energy prices, that sector had been shedding jobs for over a year. That seems to have ended. While oil companies do not expect today's prices to last, drilling budgets have loosened a bit. Natural gas prices are expected to remain above the average of the last few years, and activity in that sector is gaining some momentum. One of my directors has noted the slowdown in the building of new electricity-generating facilities over the last couple of years and anticipates some shortage of gas as the demand for electricity expands in response to a resumption of higher economic growth. Defense contracting is another segment of growth in the Dallas District's economy. The Dallas–Fort Worth area will benefit from the Defense Department's decision to continue production of several aircraft and from Poland's choice to purchase the F-16 instead of one of its European competitors.

Looking at the national picture, it seems to me that the reductions in the staff's estimate of fourth-quarter GDP reflect a catching-up of the forecast to the last several Beige Books. One has to worry that, like a bicycle, the economy has to maintain some speed to stay upright and we're rapidly losing that speed. Having said that, I must confess that our projections for 2003 show no discernible differences from the staff forecast. But my sense of uncertainty and lack of conviction about our projections are as great as they've ever been. The risk as I see it—and this is reinforced by the nature and tone of the questions I've received from people throughout the District—is primarily on the downside. I'm not alone in this. That's the view out there, and I think it calls into question the continued credibility of our neutral bias.

CHAIRMAN GREENSPAN. President Poole.

MR. POOLE. Thank you, Mr. Chairman. Unlike Ned Gramlich, who used a football metaphor, I'm going to use a boating metaphor. I think the economy is like a high-powered speedboat moving forward; however, we don't know how far forward the throttle is. There's a rope over the stern—this is the war anchor—but we don't know how big that anchor is and to what extent it is holding the boat back. The boat's speed will change when and if the war anchor is lifted. We don't know exactly how this is going to play out, but it's possible to imagine the rope being severed and the speedboat shooting ahead. However, what we observe in the data is the forward speed of the boat. We don't know to what extent that speed is being held down by that anchor—it might be a really little anchor—or how much of the speed is due to the fundamentals of the economic situation. I do think that, at some point, we're going to find ourselves scrambling in an environment that could be very different from the current one.

I think the staff did a spectacular job, by the way, in describing the outlook and presenting a very thought-provoking and cogent exposition of the considerations and the risks.

Nonetheless—if I could switch the analogy here a bit—if you’re skiing on a mountain that may experience an avalanche, you may think you’re safe, and in fact you may be safe. But when that mountain starts to rumble and that avalanche comes down, you’re going to have to stop and take stock and try to figure out where you are. We don’t know how the markets are going to respond if and when the bombs start to fall. I can think of a wide range of possibilities there. What seems to me to be most clear is that the situation is extremely fluid and we really don’t know how all this is going to play out. So while I think the staff did a great job of looking at the fundamentals, we actually don’t know how the situation is going to unfold. What will be critical for us is to form a sound policy response which, of course, may be not to do anything until we have some resolution or a greater amount of information on the situation.

From people I talk with I hear phrases like “flat loan demand” or descriptions of the situation as “spotty” or “mixed.” Those are the types of comments one hears over and over again. I think that’s the tone of the reports around the table today; it’s what all of us are hearing. I talked to my Wal-Mart contact yesterday, and he said that some very peculiar features have emerged in the retail business. One is that consumer behavior is tilting toward chicken away from steak. By that he means that there’s a widespread phenomenon of people buying more goods at lower value price points. We see this also in the reports we get from FedEx and UPS. There’s a substitution of ground for express services, for example, as people look very hard for ways to economize. I think it’s a very generalized phenomenon.

But strangely enough, at the same time that Wal-Mart notes this movement toward chicken and away from steak—a behavior that is true across almost all lines of their business—consumer electronics, which are viewed as involving highly discretionary types of purchases, are also strong. My Wal-Mart contact says that his firm just doesn’t understand what’s going on

there. I was amazed when he told me that Wal-Mart has computerized every single one of its sales tickets for the last nine years. It's a mind-boggling database. They analyze the data to try to understand what they can about consumer behavior, for example, in terms of the mix of goods people buy. He says this recent pattern is a mystery; they don't have an explanation for it.

I've been pressing my contacts on their capital expenditure plans. Wal-Mart takes a long view. They have a business strategy with a fairly long time horizon, and they're not changing that strategy one iota in terms of the investments they make in new stores and warehouse facilities and so forth. I asked my contact at FedEx particularly whether they are expecting to move ahead some of their capital expenditures to beat the expiration of the incentives in—what is it—September or so of 2004. He said that their planned expenditures are essentially flat this year over last year though there are a lot of expenditures they would really like to make. He's on the edge of springing for \$250 million to \$300 million of outlays, primarily in the technology area. In particular, they're studying the prospects for bringing some outlays forward into 2004 that would otherwise have come in 2005. I think that's something we would want to continue to follow closely to try to understand what these numbers mean as we go through coming quarters.

CHAIRMAN GREENSPAN. President-presumptive Pianalto.

MS. PIANALTO. Thank you, Mr. Chairman. I'll begin my remarks with a report from La Paz, Mexico, where Jerry Jordan is taking possession of his new sailboat. He sent me an e-mail a few days ago saying that he had found a dollar store there—sort of. [Laughter] It is called "Uno Precio," and everything in the store is priced at 10 pesos. So at just over 10 pesos to the dollar, he notes that it's a bit more expensive than the dollar store he found in Canada. But the Mexicans who are packing this place still find it a great bargain. Jerry's final comment to me was "price stability reigns." I noted in reading the transcript of the December meeting that

many of you commented that you're going to miss Jerry's anecdotes and vignettes. So I'll do my best to bring interesting but, more important, entertaining anecdotes from the Fourth District.

Economic conditions in our District have been moving sideways for the past six months, and this intermeeting period was no different. Manufacturers in the District continue to express their disappointment about the current state of economic affairs more vocally than just about any other group. Automobile manufacturers are doing a bit better than most, but even in that sector there are differences depending on which plant and what model one is looking at. Home sales and new home construction continue strong, as many others have mentioned about their Districts. One director who last week attended a national convention for homebuilders indicated that there was a great deal of optimism in that group. Her company is a supplier to homebuilders and they as well as other suppliers are seeing strong orders. So, that area of the economy continues to be optimistic. Auto sales in our District have continued to be brisk, although they are backing off a bit from the record levels of last year. Consumer spending is flat to down over the past two months compared with a year ago.

We made a point of asking our advisory council members about the poor state of capital spending. Specifically, we asked them how the geopolitical situation might be affecting their capital spending plans. Although the sample is not really representative of anything, what we heard was interesting. They told us that they don't put a great deal of weight on the view that terrorist activity or the pending war with Iraq is holding back a lot of capital spending. Businesses are spending. But they're spending on higher health care costs, increased insurance premiums, and the higher costs of maintaining their old plant and equipment. So if this view has any merit, the easing of geopolitical tensions may not lead to the immediate surge in capital spending that some analysts are predicting.

Regarding the national outlook, my view is consistent with the Greenbook; the economy does appear capable of continued growth. However, using Larry Slifman's term from this morning, I am "somewhat skeptical" about the timing of the snapback in business fixed investment, which many forecasters believe is necessary to propel the economy by the summer back to the higher growth trend. Given the reported figures on excess capacity in the economy, it may be that capital services can expand without a substantial snapback in investment expenditure, at least in the short run. My guess is that it depends on whether the excess capacity represents past investments that are simply not likely to become productive in the short run—those that were highly speculative in the high-tech industry—or whether the excess capacity represents a more traditional weakness in demand. At least some of the individuals I have spoken with in the Fourth District suggest that it is the weakness in demand. They have the capacity to meet increased demand but seem to be saying that they're not going to be in a hurry to invest in new capital equipment when business picks up again. I know that would break from the historical patterns we've seen, so maybe this attitude will prove to be just pessimism and not reality.

I believe that we're seeing in our region the same phenomena many of you have mentioned in the labor markets. Firms are looking at ways to produce more with their existing workforce. I agree with Sandy's comment this morning that the relatively tepid employment growth we're seeing is mirroring the pattern of the 1990-91 recovery more closely than other postwar recoveries. If that pattern continues, we may face a second year of very little employment growth while GDP again is growing. Thank you, Mr. Chairman.

CHAIRMAN GREENSPAN. Governor Ferguson.

MR. FERGUSON. Thank you, Mr. Chairman. One of the things I've observed in various committees I've been on and in other decisionmaking situations is the difficulty of knowing what you know and knowing what you don't know. This meeting strikes me as one of those cases where understanding that difference is key. Just to review what we know, it is primarily what has happened in the recent past and, as many of you already described, the data have been quite mixed. What we don't know is whether or not that recent past is a precursor to a further slowing going forward or indeed, as is consistent with the Greenbook forecast, a precursor to some growth. It strikes me that the risk of renewed slowing is not sufficient at this stage to warrant any action by the Committee today. To put it another way, although the dichotomy between the recent past and the forecast for the future is quite palpable, at this time I would place some reasonable odds on something along the lines of the baseline forecast as being generally correct.

There are a number of reasons for that judgment. One is that monetary policy continues to be, I think, reasonably accommodative. I believe fiscal stimulus is in the pipeline or soon will be. Inventories-sales ratios are quite low. We see some anecdotal evidence to suggest that demand for replacement investment is emanating from various businesses and may actually show through. That's the fundamental sense of what we know from the recent past. What we don't know is what the future is going to look like. But in that regard I'd say that the staff forecast is not unreasonable. Obviously, the other thing we don't know is the impact of the geopolitical uncertainties. I think the effort the staff has made in the work put forward by Sandy Struckmeyer is very useful and quite instructive. But we really are confronting a great deal of uncertainty there.

So, given the configuration of monetary and fiscal policy, financial conditions that have changed, leading and lagging indicators, and other issues, the key question is what we should do today. Ned Gramlich quoted a football coach; I'm going to quote the cartoon character, Dilbert, who says that 85 percent of the time doing nothing is the right response. I will leave it at that.

CHAIRMAN GREENSPAN. Governor Olson.

MR. OLSON. I'd like to add two points to the discussion. One is based on having talked with a number of bankers—in this case, representatives of some of the largest lenders of the thrift industry—who reaffirm what we have learned from other sources about the residential mortgage market. Their figures on applications and closings track the Mortgage Bankers Association data, which is to say that they, too, are strong. I'd also mention a couple of variations on the asset quality issue. The lenders tended to support what we've heard around the room that the asset quality of the consumer portfolios is strong. But my contacts were quick to say that they have adjusted their lending standards. One said that they have raised the minimum FICO score for borrowers about 5 percent, which I think is significant. The other noted that they have developed a more-sophisticated internal scoring model—it's FICO-based—and they attribute a great deal of the current strong quality of their portfolio to having changed their standards. That can be done very quickly on the consumer side.

On the residential mortgage side, the largest lender that I talked to indicated that in very recent months they have seen a noticeable uptick in their nonperforming first-mortgage residential real estate loans. They attribute that to the long lag between a downturn in the economy and the effect on home mortgage loans. People will sacrifice a great deal before they let their individual residences go into foreclosure or become a loan that is in a nonaccrual status. One of the lenders also maintains a segment of his loan portfolio in commercial real estate based

loans, and those typically are to franchises. He said that the performance of that portion of the portfolio is strong, with the notable exception of convenience stores. He attributes that to the impact of the increase in oil prices both on the cost side—they're not able to pass on their increased costs—and on the demand side because there is some downturn in demand. So, that was the notable exception to high credit quality across the board.

Moving to the broad subject of fiscal policy, as you probably noticed, this week the Congress had to pass another continuing resolution, either the third or fourth such resolution. We still don't quite have a budget. The Senate produced an omnibus budget bill, but it will take probably until the end of next year before it is reconciled with the House! As for the tax bill, two pressures are threatening the tax bill as it stands now. The first, and perhaps the most obvious, is the concern about the dividend exclusion. That is getting a lot of attention, and much of it is focused on the anecdotal examples of the effect on the richest people in the country. But the other pressure, which I think will be very persistent and will have a real impact on the debate, comes from the status of the state economies. A number of you have talked about the budget difficulties faced by state governments. I think there are as many as twenty new governors who currently are meeting with state legislatures and are dealing with very serious budget issues. From the federal government side, among the issues that they're dealing with are the mandated but unfunded costs related to homeland security. If a dividend exclusion is added to that, for states that use federal government taxable income as the basis for the calculation of state income, that means a reduction in income that is taxable. But the dividend exclusion, if enacted, will become law after the state legislatures will have met for the most part. It may well take a special session of the state legislatures to address the issue. So the two effects on the states are both

negative at perhaps the most critical time in their fiscal situations in many, many years. The anticipation, therefore, is that the pressures on the Congress from the states will build.

How will this play out? I think in one of three ways. One, we could get a bill very similar to what we have now if it is perceived that it is indeed stimulative to the extent that we've described it. Another is that we could get a scaled-down version of the bill that includes only the most obviously stimulative features. That's not impossible. You may remember that a year ago the Congress did in fact adopt the top two priorities identified by our own economists as the two priorities they'd like to see enacted, and they were indeed passed in a single bill. The other possibility is that the Congress could move away from the stimulus issue and simply passing some bill will become the goal, in which case we might see a combination of some reduction in the dividend exclusion and direct grants to the states. In terms of the economic impact of a bill like that, I think all bets are off. We've seen that kind of thing recently; that essentially is what happened with the ag bill last year, as you may recall. The bipartisan goal ultimately became producing a bill, the economic consequences notwithstanding. For those reasons I would say that the segment of the forecast that presumes an economic stimulus package is not certain, and I think it bears watching very closely

CHAIRMAN GREENSPAN. Governor Bernanke.

MR. BERNANKE. Thank you, Mr. Chairman. I continue to believe that structurally the U.S. economy is reasonably healthy, both financially and in real terms. So why is the economy struggling? A few stories have circulated. In my view, the various analyses we've been hearing comparing the United States economy to the post-bubble Japanese economy are overwrought to say the least. There's little evidence of important remaining capital overhang except in a few sectors. Moreover, as I've said before, I don't think it's meaningful to talk about a generalized

capital overhang. To my mind “generalized capital overhang” is just another name for insufficient aggregate demand or low general capital utilization. In any case, the main post-bubble problems in Japan were financial, and there is certainly no comparable set of problems here. As my earlier question suggested, another possible explanation for the slow recovery is that there’s a lull in the technological opportunity for growth, a real business cycle. This also seems somewhat implausible to me, but we’ll have to wait and see. If that is the case, then there’s not much that monetary policy can do about it.

At this juncture the leading hypothesis must still be the geopolitical uncertainty and its damping effects on hiring and investment decisions. I feel some déjà vu here. My PhD thesis twenty-five years ago considered the problem of a firm contemplating an irreversible physical investment in the face of uncertainty. As it happened, the example I used in my paper was uncertainty about the long-term price of oil. I showed in my dissertation that the firm’s optimal hurdle rate for investment not only increases with the degree of uncertainty, as might be expected, but also was higher the nearer the expected resolution of the uncertainty. Intuitively, uncertainty that is expected to be resolved relatively soon is a strong incentive to delay commitment.

Currently the geopolitical situation is not only one of high uncertainty but also one in which the uncertainty may be resolved at least partially in a matter of weeks or a few months. The damping forces of uncertainty on the economy are therefore currently at their maximum level. A reasonably likely scenario, one that we all hope for, is that the geopolitical situation will be speedily and favorably resolved and that a significant economic recovery will therefore follow. Frankly, therefore, I don’t think there is much we can do about this now. We’re just going to have to wait and see what happens.

There is, of course, also the possibility that the economy will continue to move sideways into the spring either because the geopolitical uncertainties drag on or because the new investment and hiring that we're expecting now simply are not forthcoming, perhaps because of continuing business pessimism. Given the ongoing slack in utilization of labor and capital and our projection that core PCE inflation may slip to 1 percent or lower, I would hope that in such a circumstance we would be prepared to ease aggressively earlier rather than later on the grounds that the risk of inaction at that point would be greater than the risk of action. Thank you.

CHAIRMAN GREENSPAN. President Santomero.

MR. SANTOMERO. Thank you, Mr. Chairman. Since our last meeting there has been very little change in economic activity in the Third District. The recovery continues at a slow pace. While the fourth quarter ended on a weak note, this wasn't a surprise. Data suggest that consumers in the region pulled back on spending on nondurables, and that story is consistent with the points that were made by President Broaddus. Most of our retail contacts, including two national chains and one large regional department store chain, reported that holiday sales generally did not meet expectations. The one exception was auto sales, which showed a strong pickup at the end of December, fueled by incentives.

Manufacturing activity in the District paused from August to October but has shown some improvement since then. Our business outlook survey's general activity index has been positive in the last three months, and the index for new orders has increased steadily since August. Still, signs of a pickup in business investment are mostly in terms of expectations. In the manufacturing sector, low capacity utilization is restraining capital expenditures. According to a special question in our January survey, which seemed to have been developed expressly for our new president, almost half of our respondents indicated that they were operating at below

70 percent of capacity. We asked our respondents how much of an increase in production would be necessary for them to increase capital expenditures; nearly three-fourths indicated that they would need an increase in production of at least 15 percent before they would respond by increasing plant and equipment spending.

Labor markets in the District, particularly in manufacturing, remain weak. Manufacturing jobs are still declining on a monthly basis, although the pace of losses has abated somewhat. According to another special survey question, it will take less output growth for firms to begin hiring workers again than to start investing in plant and equipment. This suggests that respondents are beginning to be stretched in terms of productivity gains expected from the current workforce. Still, 70 percent of the respondents said they would not add employees unless output in their firms increased more than 10 percent, and they didn't expect to be hiring in any sizable number until later this year. Nonmanufacturing firms in the District are more optimistic. Nearly two-thirds of the respondents to our South Jersey survey, which includes retailers, service-sector firms, and manufacturers, plan to increase employment this year, and half of those plan to do so in the first quarter.

Continued weakness is having a detrimental effect on state budgets, as nearly everyone has mentioned. So far in fiscal year 2003, revenues are falling 1 to 2 percent below projections in each of our three states. Pennsylvania and New Jersey have already exhausted the surpluses they accumulated over the decade of the 1990s and will be less able to mitigate the negative effects of economic weakness going forward. I'd summarize by saying that the situation is little changed from last year. The fourth quarter was weak but was expected to be weak. The recovery continues at a languid pace.

My view of the national economy is similar. The recovery continues at a sluggish pace. There are few tangible signs of an imminent pickup in investment spending, capacity utilization remains at a low level, and factory orders remain weak once month-to-month swings are smoothed out. Employment and manufacturing are also weak. On the positive side, the housing market remains healthy, and consumer spending has held up.

The Philadelphia staff forecast is similar to the Greenbook forecast in that they both expect the economic recovery to gain momentum in 2003, with faster growth in the second half than in the first. They also both acknowledge that there are significant risks to the forecast, especially regarding the timing and duration of a war in Iraq. Our work suggests somewhat weaker growth over the next two years, partly because our forecast incorporates a smaller impact from the fiscal stimulus and partly because of differing assumptions about rate movements in 2004. Both forecasts expect growth in consumer spending to continue at a moderate pace, buoyed by reasonable underlying growth of real incomes and the expected tax cuts. We are less optimistic about business fixed investment than the Greenbook. Philadelphia's analysis suggests that low capacity utilization will have a stronger drag on business fixed investment this year. This view is supported by the business outlook survey results I just discussed. While the Greenbook sees double-digit growth in business investment by the end of the year, we don't see it picking up such strength until the second quarter of next year. The Board staff is also more optimistic about residential investment. We believe the single-family housing sector will remain strong but won't be the driver of growth because we expect refinancings and cashouts to slow. In both forecasts, businesses don't begin to add to their payrolls until later this year. Again, the Greenbook is somewhat more optimistic than our staff. This time I hope that the Board staff is correct and we are not.

I think it's important to restate what others have said: There are significant risks. This time the risks are on the upside and the downside. The largest downside risk is geopolitical, and I'll spend no more time on that. But there are also upside risks. The most obvious is dissipation of the geopolitical uncertainty, as has already been mentioned. In addition, there may be significantly more stimulus in the tax package. Frankly, I'm not convinced of that for some of the reasons that Governor Olson indicated. That is in fact a very uncertain event. On balance, I see little reason to change our policy stance at this meeting. I do have some concern, though, that when the fourth-quarter GDP numbers are released and activity is shown to be relatively weak, the public reaction may not be all that favorable. Perhaps we should be prepared to address this in our statement or at least be cognizant of it when those numbers come out. Thank you.

CHAIRMAN GREENSPAN. Governor Bies.

MS. BIES. The factors underlying the momentum in the economy continue to be split, as we've been saying around the table. Households continue to show optimism, and businesses continue to find ways not to expand. Consumers bought cars for Christmas and housing starts reached sixteen-year highs. Mortgage refinancings supplied additional cash flow for spending and to help pay down consumer debt, which declined for the first time in years. Core consumer price inflation is running well below 2 percent, and people are shopping for bargains. While jobs are declining, personal income continues to grow at a modest pace. Yet business activity continues to show signs of weakness: Industrial production has fallen in four of the last five months; employment and production hours worked are below August levels; and inventories have fallen in the last couple of months after expanding in the summer and early fall. There are also long-term structural problems that are becoming more prominent given the slow expansion

that we're going through—namely that several key industries in this economy are struggling with excess capacity. As we look at companies' announcements of restructuring plans, we know that the weakness in these sectors is going to continue for quite a long time into the future.

The concerns about imminent war and the unknown repercussions, such as terrorism, are affecting financial markets, and those concerns provide another excuse for businesses not to expand. On the other side, as others have mentioned, we know there are potential tax reductions. But even if the Congress acts, that probably won't happen for several months, and the impact won't be felt until late in the year. The staff forecast is for very modest expansion in final sales even with the expected stimulus from tax reforms. That leaves the output gap very wide. We know when the economy is soft that it's more vulnerable to outside shocks. Because of that I think we need to be more vigilant in the coming weeks regarding what the uncertainties about war could do to the economy so that we will be able and willing to respond appropriately as events transpire.

CHAIRMAN GREENSPAN. Mr. Reinhart.

MR. REINHART.<sup>4</sup> Thank you, Mr. Chairman. I'll be referring to the materials that are being handed out. One of the more difficult aspects of putting together the materials supporting your policy discussion was reconciling the divergent movements of key financial asset prices over the intermeeting period. The first exhibit reviews those tensions, not because I'm fishing for sympathy but because it bears on today's deliberations. The financial developments I am most confident in explaining are plotted in the top portion of the exhibit. As evidenced by the most recent path of the expected federal funds rate inferred from futures quotes (the black line), market participants do not expect a policy change to be announced this afternoon. Mixed economic data, a pall cast by gloomy corporate earnings guidance, and concerns about a conflict with Iraq led investors to push back the anticipated start of policy firming until year-end. Surveys suggest that, as noted in the middle row in the table at the right, market participants are mostly of the view that you will assess the risks to your goals as still balanced. The sense that policy will be on hold for longer than previously expected pulled Treasury yields lower, with most of the decline, as shown in the middle left panel, attributable to lower forward rates at the front end of the yield curve. In addition to a downward revision to the near-term outlook associated

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<sup>4</sup> The materials used by Mr. Reinhart are appended to this transcript (appendix 4).

with worries about global tensions, Treasury yields may have benefited from flight-to-quality demands, in that other indicators of skittishness, such as gold and oil prices, rose as well (the middle portion of the chart). Such relative shifts might help to explain why major equity indexes, at the far right, shed 3 to 5 percent over the intermeeting period, with those losses mounting in recent days.

The chief puzzle is that corporate bond risk spreads have narrowed considerably, particularly for the riskiest credits (the black line in the bottom left panel). Even so, as President Minehan noted yesterday, a longer perspective shows that spreads remain on the high side of the experience of the past dozen years. Moreover, to an important extent compositional effects matter, shown in the inset by the fact that excluding the telecom and energy sectors spreads have narrowed by far less. This increase in the relative price of risky debt instruments, even as investors otherwise moved to safety and liquidity, may be evidence that an unusual and overdone pessimism about default and recovery rates on corporate debt, inflamed by revelations of corporate wrongdoing, is in the process of unwinding. Associated improvements in the liquidity of the markets where those securities trade have probably also whetted investors' risk appetites.

With markets more receptive to corporate debt, firms should be able to fund new capital projects—when they shake their reluctance to spend. That hesitancy appears to be due to elevated worries about the world situation, but implicit in the configuration of market prices must be the average expectation that these tensions will abate starting sometime soon. If not, it is hard to understand why futures market quotes have oil prices moving lower and the Committee beginning to tighten, albeit not by much, by year-end. This is one of the observations made in the box in the Bluebook on geopolitical tensions and monetary policy. Namely, your outlook, to the extent that it anticipates some reversion nearer to normalcy in interest rate spreads, oil prices, and business hiring and spending decisions, implicitly must incorporate at a least a partial unwinding of global tensions. Moreover, you've adjusted policy already to offset at least some of the restraint imposed on spending by those tensions in the interim—by lowering the federal funds rate to 1¼ percent.

I'd like to repeat two more observations from the Bluebook but recast them in light of yesterday's discussion. For one, restraint on spending, as households and businesses view deferring purchases as a more attractive option at a time of elevated volatility, would seem to be an adverse additive shock to aggregate demand. All of our modeling efforts thus far advise that you should take your best guess as to the net restraining effect on aggregate demand of such influences and try to offset them. For another, though, some aspects of geopolitical tensions would seem—by making investors more skittish and potentially complicating market dynamics—to make the consequences for financial prices of your actions more unpredictable. If so, this multiplier uncertainty would suggest that you should scale back the size of any desired action in light of the wide range of potential outcomes.

Committee members might be less optimistic than is implicit in markets about the timing and the extent to which restraints on spending associated with geopolitical tensions will lift. That would provide a reason to doubt the staff projection that the economy will transit from about-unchanged real GDP last quarter to growth above that of potential by the second half of this year. Such a position might incline you to ease policy at this meeting. To be sure, it would come as a complete surprise to market participants, but that very surprise would imply a more forceful transmission of that policy impetus to the financial markets. The case for easing does not solely rely on doubting the staff forecast.

The policymaker perfect foresight simulations—shown on your next page, which duplicates chart 4 from the Bluebook—take the staff assessment of the economy completely on board, including both the structure of the FRB/US model and projections of the forces impinging on the economy in the extended Greenbook baseline. As President Parry already noted, the simulations suggest that there is some scope to work down unused resources a bit faster in the near term by easing policy, with virtually no risk to the attainment of what you may view to be a reasonable inflation goal. Indeed, even a long-run target for core PCE inflation of 1 percent would allow some scope for modest additional policy stimulus according to the simulation. You might find that argument particularly persuasive if you saw inflation of 1 percent at the low end of the range that you'd consider a working definition of price stability.

As the Committee devoted a considerable portion of yesterday discussing policy gradualism, it is worth noting some of the limitations involved in this optimal planning exercise, beyond the obvious one that FRB/US is only a rough approximation of reality. In particular, in this simulation the reaction of economic agents to your policy action is estimated from history—that is, the exercise uses the version of the model with expectations following a vector autoregression. While the funds rate is assumed to be as smooth as observed in the past, it is also varied more aggressively in response to perceived resource slack than observed in the past. This systematic difference between the way that investors mechanically anticipate how you will conduct policy and how you actually do it may give a false impression of the extent to which policy easing influences the economy—a point President Santomero raised yesterday. The bottom line is that, among other problems with this exercise, you might not get as tidy a financial market response as in the figure. Speaking outside the model, this raises the issue of how market participants will react should they read the action and the accompanying words as an implicit acknowledgment on your part that economic prospects are darker than previously thought.

Even given a strong desire to make more inroads in reducing resource slack, you might not think it is within your ability to do much about the unemployment rate edging up to 6¼ percent in the near term, given the lags in monetary policy and the uncertainty attendant to how markets would react. Indeed, the staff has revised up considerably its projection of economic growth in the second half of 2003 and all of 2004, the window in which your action today would mostly be felt. Moreover, the

Committee might believe sufficient monetary stimulus is in the pipeline to push growth even beyond that pace as the forces currently impairing business confidence abate and additional fiscal stimulus kicks in. You might be influenced in that judgment by the fact—as shown in your next exhibit, which repeats chart 3 from the Bluebook—that the real federal funds rate has run considerably below its equilibrium value over the past year.

The outlook in the Greenbook and in the central tendency of your own projections retains the contrast that has marked the previous few meetings. Decidedly subpar economic performance is seen as giving way to a robust expansion in just a few quarters. This suggests two ways of assessing the balance of risks surrounding your current policy setting. First, are you satisfied with the temporal dimension of the economic outcomes that your policy is projected to help foster? That is, does your distaste of the slow performance in the near term about balance your concern that the expansion may pick up too much steam later this year and next? This is the balance that Governor Kohn was weighing in his remarks. Second, within the period of time when you think the bulk of any action today would be felt, does the risk of some further slippage in inflation—perhaps into an undesirable region—about match the chance of growth running significantly faster than that of potential output?

As I've noted, market participants mostly believe that you will assess the risks to your dual objectives to be about balanced, probably because they believe you are answering the second question and balancing potential outcomes at some point in the foreseeable future. For most forecasts, economic performance at that later date looks a little more robust than seen previously, which would support retaining the assessment that the risks are balanced. The minority of participants who are calling for a switch back to risks unbalanced toward economic weakness probably think that you're answering the first question and comparing economic performance in the near term with that in the longer term. They see the "soft spot" as a little softer and the rebound to above-trend growth as a bit further removed in time. If the path were graded solely by the measure of resource slack, you might judge that they had a case. Even though the staff has revised up its projection of the future growth of aggregate demand, slack persists at a higher level for a while because aggregate supply also has been revised up. Inclining you against changing the risk assessment, however, would be a concern that the announcement of that shift would impair confidence and make the outcomes you fear a little more likely.

CHAIRMAN GREENSPAN. Questions for Vincent? If not, let me see if I can review what has been said around this table.

I think there is a general consensus that the evolution of geopolitical risks, the rise in oil prices, and the increased probability and nearer time frame of a war in Iraq have essentially masked what the underlying structure of the economy is doing. We know a number of facts,

notably that the business community has been holding down its expenditures to a very substantial extent. That is, capital appropriations are at levels that seem to reflect only those perceived as necessary to carry on essential activities. Most interesting is the behavior of inventories.

Limiting inventory stocks has generally been the case across the board, and indeed the consensus of purchasing managers as expressed in their recent report is that inventories are getting to levels that are subnormal. We often see contractions in inventories when they generally are viewed as excessive irrespective of their levels. This is one of those rare cases in which inventories are perceived to be very low but are being held down to a considerable extent.

All this raises the interesting issue as to what will happen if and presumably when the geopolitical risks are removed. Will we be looking at a bounceback as this particular risk is removed, or will we be shocked to find that the sluggishness is still there? I don't know any way to judge analytically the relative probability of those two potential outcomes. We can guess. We may say that history suggests such and such, but we really can't assess with confidence the probability of the two events.

In a way it probably doesn't matter insofar as monetary policy is concerned. The reason it doesn't matter is that, unless I misread the military tea leaves, we're going to get a resolution of this Iraqi issue reasonably quickly. If we look at the pattern of the logistical moves of our military forces, it's evident they're all focused on a near-term military campaign. In this regard one can look at the movement of our aircraft carriers; the relatively delayed deployment of personnel, which can be accelerated as needed; and the recently begun movement of heavy equipment, which requires a relatively protracted period to be transported from the United States and other U.S military equipment depots around the world. All are indicative of our positioning for a substantial U.S military presence in the Persian Gulf area.

This is a very large and a very expensive operation. The military cannot realistically undertake these preparations and then sit tight, especially with summer beginning to emerge on the desert. There is also the fear that the potential for chemical and biological warfare is by no means negligible. It would be a rather sad event if this “smoking gun” were to materialize in the midst of battle. The difficulty that the UN inspectors are having and indeed our own intelligence is having is that Iraq has 180,000 square miles of territory, the size of California, and the Iraqis have had four years in which to bury or otherwise hide such materials. The most recent hypothesis is that they have put all of these materials on trucks that can be moved around indistinguishably so that the inspectors cannot find them.

Over the past ten years it's pretty evident that the Iraqi military has not been able to regain the stature it had before the Gulf War, whereas the technology that the United States military has obtained over the past decade is close to awesome. We are going to find that both the relative number and the capabilities of the so-called smart bombs that were used in the Persian Gulf War have been dramatically increased so that the vast proportion will now be guided missiles with accuracies far greater than those available in the Gulf War. So what we can envisage is a fairly quick resolution of the military phase of this confrontation, with a probability of somewhere between, say, .9 and .95. The problem is that the .05 to .10 residual is really scary. The reason that markets are behaving as they are is that, if a residual with a very small probability has a very large outcome associated with it, the discounted risk is a very major issue. It's not that the Iraqi military has somehow been strengthened and can give us fairly significant opposition in battle. They can't. The problem basically is that the Iraqis have relatively high-tech chemical and biological warfare capability, and they are likely to spring it on us, perhaps even in advance of our attack. The one big uncertainty here is that they may force us to move a

lot faster than we are planning, largely because we cannot anticipate what Saddam might do under these conditions.

Even if the initial situation is wholly in our court, it's not likely—in contrast to what happened during the Gulf War—that the air war by itself will turn the probabilities around. There is no question that we will prevail in the air war. We can do huge damage. The question is whether chemical and biological agents will be used in this war. We probably will not know that until after the ground war begins and is well under way. So the impact on our economy may well differ from that related to the Gulf War—when the probabilities of success became very evident shortly after the air war began, with the result that risk premiums in financial markets came down sharply from their highs and the price of oil plummeted. Everything effectively was in place for a strengthening economy, with consumer confidence popping—as I recall, some 22 points in the Conference Board numbers. It was quite an extraordinary swing. That is not likely to happen with an air war under present circumstances or at least not anywhere near the extent to which it happened in the past unless it becomes acutely evident that our military superiority has been greatly underestimated. But until we have contained Saddam and his operatives on the ground in a manner that eliminates the risks of chemical or other types of mass destruction warfare, we are not apt to get any significant reduction of the uncertainty.

Then there is the risk of secondary reactions in the form of potential uprisings in the Middle East or just further concerns about terrorist actions in the United States. Accordingly, I would not anticipate a jump in confidence. It will take a while, though perhaps not a great deal of time, for us to know whether there is a coiled spring under this economy ready to take off once the geopolitical risks have been contained or whether in fact there is no spring at all. In my judgment we should have enough in the way of an answer to that question by the time of our

next meeting on March 18. There are a lot of things that can go differently. Saddam could go off to a South Sea island with some of his loot, but even that might not be the ideal solution because we're not quite sure what's left of the Baath party. There could also be concerns about reduced supplies of oil.

The bottom line to all of this is that the military uncertainty is so overwhelming with respect to the question of potential monetary policy actions that the less we do, even in how we phrase our post-meeting statement, the better off we are. The problem, as the Vice Chair of the Board said, is that we do not know what will happen, and like him I think that it's important for us to hedge our judgment at this stage. Those of you who are arguing for potentially aggressive action are in a way saying that something is currently suppressing a vigorous economic expansion or that the hope for such an expansion will turn out to be false when the war is over. It is conceivable that we may want to take more than just a modest incremental monetary policy action in the near-term future, but it's not clear in which direction, and that does create some degree of inhibition.

I would propose that we stay where we are and retain a balanced risks statement. Strangely, the one problem none of us has really discussed, which is not irrelevant and is not related to the possible war, is the Venezuelan oil problem. Our country does not have enough crude oil capacity. If we lose access to both Iraqi and Venezuelan oil, we will almost surely have to tap into the strategic petroleum reserves. It's not that crude oil inventories are inadequate worldwide, but they are very badly distributed. The huge oil distribution structure that moves oil from Venezuela through Curaçao and through the Caribbean into the United States has essentially been shut down. Venezuelan production has come back a little from a low point of 200,000 to 300,000 barrels a day to well above one million barrels, but that is still substantially

below normal output, and it is not clear how long the recent level of production is going to last. Moreover, that could create a shortage because, even if there's a military action in Iraq that is very effective and short, there is a probability of damage to the Iraqi oil fields. The resulting loss of production could be very readily handled if Venezuela were fully productive. However, even if the Venezuelan crisis gets resolved fairly quickly, the shutdowns have been quite damaging, and it's going to take a while to get that production system back to full operation.

By March 18 we should have an answer to the major question of whether the economy is buoyant or not. I'm not sure that the Venezuelan crisis will be completely resolved by then, and I'm not sure what the state of production of Iraqi crude will be because some disruption is inevitably going to occur in the event of an invasion. We may well have an inordinately high oil price, which would be a restrictive force, even though the forward market might be somewhat benign. So we will not have an altogether clear picture by March 18, but it is very likely that the major questions confronting us will be resolved at that point. So my recommendation is essentially that we stay with a 1¼ percent federal funds rate and leave the risks balanced as they are. Vice Chair.

VICE CHAIRMAN MCDONOUGH. Mr. Chairman, I think in an atmosphere of enormous uncertainty it's the easiest call in the world to agree with your recommendation, which I support fully.

CHAIRMAN GREENSPAN. Governor Ferguson.

MR. FERGUSON. I also support your recommendation.

CHAIRMAN GREENSPAN. President Hoenig.

MR. HOENIG. Yes, I support your recommendation.

CHAIRMAN GREENSPAN. President Guynn.

MR. GUYNN. I support your recommendation, Mr. Chairman.

CHAIRMAN GREENSPAN. President Santomero.

MR. SANTOMERO. I support your recommendation, Mr. Chairman.

CHAIRMAN GREENSPAN. President Pianalto.

MS. PIANALTO. I support your recommendation, Mr. Chairman.

CHAIRMAN GREENSPAN. Governor Gramlich.

MR. GRAMLICH. I support your recommendation.

CHAIRMAN GREENSPAN. Governor Kohn.

MR. KOHN. I support your recommendation.

CHAIRMAN GREENSPAN. President Minehan.

MS. MINEHAN. I support it as well.

CHAIRMAN GREENSPAN. President Broaddus.

MR. BROADDUS. I support your recommendation.

CHAIRMAN GREENSPAN. Governor Bies.

MS. BIES. I support your recommendation.

CHAIRMAN GREENSPAN. Governor Bernanke.

MR. BERNANKE. I support both parts of your recommendation, Mr. Chairman.

MR. POOLE. I support both, Mr. Chairman.

CHAIRMAN GREENSPAN. President Stern.

MR. STERN. I support.

MR. MOSKOW. I support it.

CHAIRMAN GREENSPAN. President Parry.

MR. PARRY. I support it as well.

CHAIRMAN GREENSPAN. Anybody left? Well, let me put it the other way around. If we were to call a vote, would anybody object? Okay, let's go with it.

MR. BERNARD. The draft language is in the Bluebook. The page is not numbered, but I guess if it were, it would be page 14: "The Federal Open Market seeks monetary and financial conditions that will foster price stability and promote sustainable growth in output. To further its long-run objectives, the Committee in the immediate future seeks conditions in reserve markets consistent with maintaining the federal funds rate at an average of around 1¼ percent." For the balance of risk sentence for the press release: "Against the background of its long-run goals of price stability and sustainable economic growth and of the information currently available, the Committee believes that the risks are balanced with respect to prospects for both goals in the foreseeable future."

CHAIRMAN GREENSPAN. Call the roll.

MR. BERNARD.

|                         |     |
|-------------------------|-----|
| Chairman Greenspan      | Yes |
| Vice Chairman McDonough | Yes |
| Governor Bernanke       | Yes |
| Governor Bies           | Yes |
| President Broaddus      | Yes |
| Governor Ferguson       | Yes |
| Governor Gramlich       | Yes |
| President Guynn         | Yes |
| Governor Kohn           | Yes |
| President Moskow        | Yes |
| Governor Olson          | Yes |
| President Parry         | Yes |

CHAIRMAN GREENSPAN. The press statement that we scribbled out is perhaps slightly more optimistic than was the tone of the Committee's discussion, but it fits pretty well the forecasts that the individual Bank presidents and Board members have submitted. I think what we're confronted with is what we were discussing yesterday. There is a sense of risk

aversion here. That is, if we have a risk neutral evaluation in this type of environment, we tend to be more concerned about the downside. Anyway, take a look at the draft of the press statement. I think we've got it as close as we can get. My preference would have been to issue no statement, but we can't retreat from our practice.

MR. STERN. Not issuing a statement would attract a lot of attention.

CHAIRMAN GREENSPAN. Absolutely.

VICE CHAIRMAN MCDONOUGH. A lot more attention than the statement would.

MR. GRAMLICH. As a bear, let me say that this middle paragraph is vague enough that it's fine.

VICE CHAIRMAN MCDONOUGH. Perfect draftsmanship.

CHAIRMAN GREENSPAN. Any questions? If not, we will go with it. I forgot to mention earlier that for those of you who'd like to change your forecasts, please give the revised forecasts to Dave Stockton by the close of business this Friday. The meeting is adjourned. We will reconvene on March 18, if not before.

END OF MEETING