The Federal Reserve Board

Meeting of the Federal Open Market Committee
January 28-29, 2003 Presentation Materials -- Text Version

Presentation Materials (2.79 MB PDF)

Pages 155 to 195 of the Transcript

Appendix 1: Materials used by Messrs. Sack, Tetlow, Croushore, and Rudebusch

Exhibit 1
The Smoothness of the Federal Funds Rate

This exhibit presents information on the smoothness of changes in the target federal funds rate over time.

Top panel
Intended Federal Funds Rate

The top panel plots a time-series of the intended federal funds rate over the period from 1987 to present. The chart demonstrates the FOMC has tended to adjust the stance of policy with a series of fairly small consecutive tightenings or easings. In the chart, 88% of policy actions moved in the same direction as policy action at the previous meeting, and 96% of policy actions were 50 basis points or less.

Bottom panels

The bottom two panels examine one way of formalizing this idea of smoothness in the federal funds rate target.

Bottom-left panel
Estimated Monetary Policy Rule

ff_t = 0.35 \pi_t + 0.19 y_t + 0.76 ff_{t-1}
(5.83) (7.24) (10.18)

ff - federal funds rate
y - output gap
\pi - one-year GDP inflation

Estimated using real-time data from 1987 to 2000

T-statistics shown in parentheses. Rule also contains a constant term.

Bottom-right panel
Policy Easing in 2001

The bottom-right panel demonstrates how well this specification works in explaining the policy

easing episode in 2001. The actual path of the funds rate is plotted along with the projected value of the funds rate derived from the estimated equation. The chart indicates that the estimated equation captures much of the observed behavior of the funds rate in 2001, although the actual path of policy easing was somewhat faster than the model would have predicted.

Vertical line between 2000:Q4 and 2001:Q1 denotes end of sample period.

Exhibit 2
Optimal Monetary Policy: A First Pass

Top panel
Defining "Optimal" Policy

- FOMC desires to limit squared deviations of:
  - inflation from a target level
  - unemployment rate from its equilibrium level
- FRB/US is the correct characterization of the economy.
- The "optimal" policy is conditional on the model and the objectives assumed.

Middle-left panel
"Optimal" and Estimated Policy Rules

	Coefficient on:		
	Inflation	**Output Gap**	**Lagged FF Rate**
"Optimal" Rule	3.30	2.43	-0.15
Estimated Rule	0.35	0.19	0.76

Rules also contain a constant term.

Middle-right panel
Prescribed Policy Paths

The middle-right panel illustrates how the prescriptions from the estimated and optimal policy rules differ. The prescription for the funds rate from the estimated policy rule falls gradually from about 1.25 percent at the end of 2002 to about 0.75 percent by the end of 2003 and then gradually increases to about 1 percent by the end of 2004. In contrast, the optimal policy rule incorporates much more aggressive easing, with the funds rate falling from about 1.25 percent to near 0 percent in the first quarter of 2003. Thereafter, the funds rate increases to 3 percent by the middle of 2004 and then falls to about 2 percent by the end of 2004. For reference, the chart also displays the policymaker perfect foresight path from the Bluebook. This path falls gradually to about 50 basis points in the third quarter of 2003 and then gradually increases to about 2 percent by the end of 2004. This path is smoother than the optimal policy path because the objective function used in generating this path assumes that the FOMC has a preference for smooth policy adjustment.

Bottom panel
Why Is the "Optimal" Policy So Aggressive?

- This finding hinges on three key assumptions:
  1. Expectations formed as if FOMC following historical policy rule.
  2. FOMC knows the structure of the economy with certainty.

3. No measurement error in macroeconomic data.

- We evaluate the implications of relaxing each assumption in subsequent exhibits.

Exhibit 3
Forward-Looking Expectations

This exhibit presents information on the way in which forward looking behavior affects the optimal policy rule.

Top panel
Implications of Forward-Looking Behavior

- Private agents will expect the initial response of the federal funds rate to be followed by additional policy changes.
- Expectations will be incorporated into current asset prices and economic decisions.
- Inertial response can have an immediate and sizable impact on economic variables.

Middle panel
Varying the Degree of Forward-Looking Behavior

- Degree of forward-looking behavior governed by a single parameter, \phi.
- Expectations = \phi(rational expectations) + (1 - \phi)(VAR-based expectations)
- \phi = 0 : completely backward-looking
  \phi = 1 : completely forward-looking

Bottom-left panel
Optimal Coefficient on Lagged FF Rate

The bottom-left line chart shows how the coefficient on the lagged funds rate in the optimal policy rule varies depending on the degree of forward looking behavior. In general, the coefficient on the lagged funds rate is negative and small in magnitude when expectations are completely forward looking. In contrast, when expectations are completely backward looking, the coefficient on the lagged funds rate is positive and close to 1.

A point on the curve is labeled "Estimated Coefficient (0.76)" and corresponds with \phi equal to approximately 0.95.

Bottom-right panel
Impact of Forward-Looking Behavior

	Coefficient on:		
	Inflation	**Output Gap**	**Lagged FF Rate**
\phi = 0	3.30	2.43	-0.15
\phi = 0.5	3.51	2.42	0.08
\phi = 1.0	1.01	0.60	0.87
Memo: Estimated Rule	0.35	0.19	0.76

Rules also contain a constant term.

Exhibit 4
Parameter Uncertainty

This exhibit presents information on the way in which uncertainty about the structure of the economy can affect the optimal policy rule.

Top-left panel
Effects of Additive Uncertainty

The top-left panel displays an example of additive uncertainty; the chart plots a downward sloping relationship between the real funds rate (r - r^{\ast}) on the vertical axis and the output gap on the horizontal axis. Additive uncertainty in this relationship moves this line up and down in a parallel fashion.

Top-right panel
Implications of Additive Uncertainty

- Amount of uncertainty is not affected by the policy decision.
- No effect on "optimal" policy setting.

Middle-left panel
Effects of Parameter Uncertainty

The middle-left panel presents a chart that illustrates the impact of parameter uncertainty. In this case, uncertainty affects the slope of the line describing the relationship between the funds rate (r - r^{\ast}) and the output gap.

Middle-right panel
Implications of Parameter Uncertainty

- Uncertainty about future economic conditions affected by current policy decisions.
- Shade policy actions toward choices that reduce uncertainty.

Bottom-left panel
Parameter Uncertainty in a VAR

- VAR (vector autoregression) captures dynamics of key macroeconomic variables.
- Parameter uncertainty measured by variance-covariance matrix of coefficients.
- Use VAR to assess effect on "optimal" policy rule.

Bottom-right panel
Impact of Parameter Uncertainty

	Coefficient on:		
	Inflation	**Output Gap**	**Lagged FF Rate**
"Optimal" Rule ignoring Parameter Uncertainty	1.48	1.93	0.28
"Optimal" Rule allowing for Parameter Uncertainty	1.22	1.62	0.45
Memo: Estimated Rule	0.35	0.19	0.76

Rules also contain a constant term. "Optimal" rules are approximated as simple policy rules.

Exhibit 5
Measurement Error in Macroeconomic Data

This exhibit presents information on the role of measurement error in macroeconomic data in influencing optimal policy.

Top-left panel
Revisions to Real Output Growth Rate*

The panel in the top-left presents a histogram of revisions in the quarterly growth of GDP based on the changes from the first publication of data to data published one quarter later. In general, the chart demonstrates that there are often sizable revisions to initial estimates of GDP growth in a given quarter. As a result, policymakers must be aware of the fact that the picture of the economy they see based on initial data may change significantly over time based on revised data.

* Initial to one-quarter revision, one-quarter growth, expressed at an annual rate. Data are from 1965:Q3 to 2002:Q2. Return to text

Top-right panel
Revisions to Real Output Growth Rate*

Time Since Initial Release	Average Absolute Revision (percentage points)
Release to 1 quarter	0.65
1 quarter to 1 year	0.61
1 year to 3 years	0.87
3 years to latest	1.39

* One-quarter growth, expressed at an annual rate. Return to text

Middle-left panel
Unobserved Variables

- A number of important variables are not directly observed.
- These variables include potential output, expected inflation, and the equilibrium real interest rate.
- Estimates subject to significant error that can be highly persistent.

Middle-right panel
Output Gap Measures*

The chart in the middle-right panel demonstrates this effect by comparing measures of the output gap based on data available at the time and data available through the present. The chart shows that the two series diverge substantially over extended periods of time. For example, the output gap measure in real time during much of the 1980s was well below the most recent estimate of the output gap over that period.

Real-time Error

Standard Deviation	1.77
Serial Correlation	0.84

* Staff estimates taken from Greenbooks; unit is percentage points. Return to text

Bottom-left panel

Policy Implications

- No effect if real-time estimate uncorrelated with subsequent revisions.
- In practice, large initial estimates often revised to be smaller.
- Under such conditions, attenuate response to output gap.

Bottom-right panel
Impact of Measurement Error

	Coefficient on:		
	Inflation	**Output Gap**	**Lagged FF Rate**
Optimal Policy with No Measurement Error	3.30	2.43	-0.15
Optimal Policy with Measurement Error	3.50	1.80	-0.16
Memo: Estimated Rule	0.35	0.19	0.76

Rules also contain a constant term.

Exhibit 6
Summary and Alternative Explanations

Top panel
Summary of Findings

- A simple analysis indicates that monetary policy should move more forcefully and be less inertial than observed.
- Investigated the sensitivity to three factors -- forward-looking behavior, parameter uncertainty, and data measurement error.
- None of the factors alone seems to fully explain the observed smoothness of the federal funds rate.
- Caveat: These factors likely interact.

Bottom-left panel
Other Considerations

- Policymakers face uncertainty about structure of model.
- Economy may demonstrate large, discrete responses.
- FOMC may be concerned about financial fragility.

Bottom-right panel
Institutional Aspects

- Policy decisions are made by a committee.
- FOMC might seek to avoid reversals.

Frequency of Reversals*–

Estimated Rule	10%
Optimal Rule	51%

* Based on quarterly changes in federal funds rate from FRB/US simulations. Return to table

Monetary Policy Inertia

Material for a presentation to the FOMC
January 28, 2003

Glenn Rudebusch
Federal Reserve Bank of San Francisco

Page 1
Two Types of Monetary Policy Inertia

There is a widespread view among academic and central bank economists that monetary policy is slowly adjusted in response to information about the economy. Such behavior is often called "policy inertia," "gradualism," or "interest rate smoothing."

It is important to distinguish types of monetary policy inertia that operate at different horizons:

Short-term policy inertia:

- A week-to-week partial adjustment of the policy interest rate. For example, cutting the funds rate by two 25-basis-point moves separated by several weeks instead of reducing it all at once by 50 basis points.
- Breaking up a large interest rate movement into smaller changes may help reduce any adverse reactions in financial markets; however, this motive appears to operate at a very short horizon.
- Such short-term partial adjustment is often apparent, but it is essentially unrelated to policy inertia at a quarterly frequency.

Quarterly policy inertia:

- A quarter-to-quarter partial adjustment of the federal funds rate. For example, if the Fed wanted to increase the funds rate by a percentage point, it would raise the rate by only about 20 basis points per quarter for the next few quarters.
- Quarterly monetary policy inertia is the conventional interpretation of the estimated monetary policy rules that are widespread in the economics literature. For example, Clarida, Gali, and Gertler (2000, pp. 157-158) describe their empirical estimates of Fed behavior as
  "…suggesting considerable interest rate inertia: only between 10% and 30% of a change in the [desired interest rate] is reflected in the Funds rate *within the quarter of the change*." [emphasis added]
- My discussion below refers only to the issue of quarterly gradualism in monetary policy actions.

Although many have argued that quarterly policy inertia is an important empirical result, my analysis, in contrast, suggests that the federal funds rate is not adjusted gradually over several quarters but that the Fed responds promptly to a wide variety of economic developments.

Page 2
Apparent Evidence for Quarterly Policy Inertia

Policy inertia--the view that the funds rate is adjusted at a very sluggish pace over several quarters--is apparently supported by numerous estimates of monetary policy rules.

- These policy rules take a partial adjustment form, where the current funds rate can be expressed as a weighted average of last quarter's actual rate and the current quarter's desired funds rate. The parameter \rho--which indicates the amount of inertia--is the weight on last quarter's funds rate level:
  {funds rate}_{t} = \rho \times {funds rate}_{t-1} + (1-\rho) \times {desired funds rate}_{t}.
- With quarterly data, many estimates put about a ¾ weight on the lagged funds rate (\rho = .75) and a ¼ weight on the desired rate. The usual interpretation of this partial adjustment is that the Fed adjusts the funds rate only 25 percent toward its desired level in each quarter--a very sluggish policy response.

For example, the FOMC Financial Indicators packet contains two estimated monetary policy rules: one with and one without policy inertia.

- Both rules set the desired funds rate on the basis of the Taylor rule, that is, in response to current readings on the output gap and inflation rate:
  {desired funds rate}_{t} = \alpha \times {output gap}_{t} + \beta \times {inflation}_{t}.
- The estimated Taylor rule with inertia follows the actual funds rate path much more closely than the estimated rule without inertia, which apparently supports gradualism.

Bottom panel

A line chart displays the actual funds rate (solid line), Taylor rule without inertia (dashed line), and Taylor rule with inertia (dotted line). The period covered is from 1988 through 2002. As noted above, the estimated Taylor rule with inertia follows the actual funds rate path much more closely than the estimated rule without inertia, which apparently supports gradualism.

Page 3
Evidence against Quarterly Policy Inertia from the Yield Curve

A key implication of policy inertia: Future funds rate movements are very predictable.

- With sluggish partial adjustment, if the funds rate typically is adjusted by only 25 percent toward its desired target in a given quarter, then the remaining 75 percent of the adjustment will be expected to occur in future quarters.
- Therefore, a significant amount of policy inertia implies a significant amount of predictive information in financial markets about the future path of the funds rate.

In fact, funds rate predictability is far lower than quarterly policy inertia implies.

- If the Fed slowly adjusted the funds rate (if, for example, \rho = .75), then a regression of actual changes in the funds rate on predicted changes from financial markets (eurodollar or fed funds futures) would yield a good fit (i.e., a moderately high R^2).
- Many researchers have examined this regression and found little predictive information about the funds rate in financial markets beyond the next few months. For example, eurodollar futures have essentially no ability to predict the quarterly change in the funds rate three

quarters ahead (an R^2 of zero).

- The chart below gives the actual path of the funds rate during the past three years and various expected paths as of the middle of each quarter (based on fed funds futures). Although the funds rate gradually fell in 2001, market participants anticipated few of these declines at a 6- to 9-month horizon, as they would have under policy inertia.

Bottom panel

A line chart displays the target federal funds rate (solid line), and the expected funds rate path as of the middle of each quarter (dashed lines). The period covered is from 2000 through 2002. As noted above, although the funds rate gradually fell in 2001, market participants anticipated few of these declines at a 6- to 9-month horizon, as they would have under policy inertia.

Page 4
The Illusion of Monetary Policy Inertia

How can the estimates of sluggish partial adjustment (specifically \rho = .75) be explained given the low amount of funds rate predictability in financial markets?

Answer: The Fed's reaction to information and events outside the scope of the Taylor rule could be incorrectly interpreted as sluggish policy adjustment.

- The case for gradualism is that the Taylor rule without inertia appears to fit poorly because there are large persistent deviations of the actual funds rate from the rule. The Taylor rule with inertia explains these persistent deviations as a sluggish response to output and inflation.
- However, 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.
- These two explanations are difficult to distinguish through direct estimation; however, the low predictability of the funds rate indicates the absence of inertia.

What "other persistent variables" does the Fed react to so that the funds rate deviates from the Taylor rule (and induces the illusion of monetary policy inertia)?

Answer: The Taylor rule takes into account current output and inflation; however, the Fed also responds to other information about the economy including variables that affect the outlook and credit and financial flows.

- During 1992 and 1993, when the funds rate was persistently below the Taylor rule recommendations, Chairman Greenspan stressed the reaction of the Fed to a credit crunch: "In an endeavor to defuse these financial strains, we moved short-term rates lower in a long series of steps that ended in the late summer of 1992, and we held them at unusually low levels through the end of 1993--both absolutely and, importantly, relative to inflation."
- For the period during late 1998, Governor Meyer described policy this way: "There are three developments, each of which, I believe, contributed to this decline in the funds rate relative to Taylor rule prescription. The first event was the dramatic financial market turbulence, following the Russian default and devaluation. The decline in the federal funds rate was, in my view, appropriate to offset the sharp deterioration in financial market conditions, including wider private risk spreads, evidence of tighter underwriting and loan terms at banks, and sharply reduced liquidity in financial markets."

Page 5
Two Unresolved Questions

1. How should the Fed's monetary policy decision-making process be modeled?

- The Taylor rule is an incomplete description of Fed behavior, and more research is required to characterize other influences and determinants of policy. Adding partial adjustment to the policy rule is not a solution; instead, partial adjustment is a misspecification that substitutes for clearer understanding of the policy process.
- A closely related question is, What kind of *loss function* should represent Fed behavior? Currently, the policymaker-perfect-foresight (PPF) path in the Bluebook uses a loss function that assumes the Fed would be equally displeased with: (1) an unemployment rate one percentage point above the natural rate, (2) an inflation rate one percentage point above target, and (3) a 100-basis-point decrease in the quarterly average funds rate. These equal weights place an implausibly high penalty on funds rate volatility. However, without a substantial penalty on funds rate volatility, the PPF path does not match the recent historical path of the funds rate, so the high penalty may be another misspecification that is compensating for some unknown flaw in our calculations of optimal policy.
- 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.

2. Should the Fed deviate from its historical behavior and become more aggressive in changing the funds rate?

- It may be 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.
- 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, there remain questions about whether the desired rate should react more forcefully to economic news, that is, whether the Fed has been too timid.

Page 6
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Appendix 2: Materials used by Mr. Kos

Page 1

Top panel

Title: Current 3-Month Deposit Rates and Rates Implied by Traded Forward Rate Agreements
Series: U.S. and Euro Area LIBOR fixings, U.S. and Euro Area 3-, 6-, and 9- Month Forward Rate Agreements
Horizon: November 1, 2002 - January 27, 2003
Description: Three-month Libor fixings and rates implied by traded forward rate agreements in the U.S. and euro area declined during the intermeeting period.

Bottom panel

Title: 10-Year U.S. Treasury and German Bund Yields
Series: 10-Year U.S. Treasury and German Bund Yields
Horizon: November 1, 2002 - January 27, 2003
Description: Ten-year U.S. Treasury and German Bund yields declined over the intermeeting period.

Page 2

Top panel

Title: Euro-Dollar Exchange Rate
Series: Euro-USD
Horizon: January 1, 2002 - January 27, 2003
Description: The dollar has appreciated against the euro.

Middle panel

Title: Dollar-Yen Exchange Rate
Series: USD-Yen
Horizon: January 1, 2002 - January 27, 2003
Description: The dollar has depreciated against the yen over the intermeeting period.

Bottom panel

Title: Trade Weighted U.S. Dollar
Series: Trade-Weighted U.S. Dollar
Horizon: January 1, 1995 - January 27, 2003
Description: The trade-weighted dollar has depreciated over the last year.

Percent change in U.S. dollar vs. major components of the index 12/9/02-1/27/03: Canadian dollar -2.31%, yen -4.04%, euro -7.36%, British pound -3.51%, Swiss franc -7.68%, Australian dollar -4.64%, Mexican Peso +6.36%.

Page 3

Top-left panel

Title: Corporate Spreads to U.S. Treasuries and Corporate Issuance Data: Investment-Grade
Series: Investment Grade U.S. Corporate Bond Index, Weekly Investment Grade U.S. Corporate Issuance
Horizon: November 1, 2002 - January 24, 2003
Description: The investment grade U.S. Corporate Bond Index has decreased over the past few months.

Source: Lehman Brothers and SDC

Top-right panel

Title: Corporate Spreads to U.S. Treasuries and Corporate Issuance Data: High Yield
Series: High Yield U.S. Corporate Bond Index, Weekly High Yield U.S. Corporate Issuance
Horizon: November 1, 2002 - January 24, 2003
Description: The high yield U.S. Corporate Bond Index has declined over the past few months.

Source: Merrill Lynch, Reuters and Selected Dealers

Middle panel

Title: Monthly Corporate Bond Spreads to U.S. Treasuries
Series: Investment Grade and High Yield U.S. Corporate Bond Indices
Horizon: September 3, 2002 - January 24, 2003
Description: The spreads between investment grade and high yield U.S. corporate bond indices and U.S. Treasury yields have narrowed during the intermeeting period.

Source: Merrill Lynch and Lehman Brothers

Bottom panel

Title: Total U.S. Corporate Debt Issuance
Series: Quarterly U.S. Corporate Debt Issuance
Horizon: 2001-2002
Description: Total U.S. corporate debt issuance declined between 2001 and 2002.

January Issuance to 1/24:

2001	$108.7 billion
2002	$84.8 billion
2003	$47 billion

Source: SDC

Page 4

Top-left panel

Title: 2-Year U.S. Treasury Note and Fed Funds Target Rate
Series: 2-Year U.S. Treasury Note Yield, Fed Funds Target Rate
Horizon: November 1, 2002 - January 27, 2003
Description: The 2-year Treasury yield has declined during the intermeeting period.

Top-right panel

Title: 10-Year U.S. Treasury Note
Series: 10-Year U.S. Treasury Note Yield
Horizon: November 1, 2002 - January 27, 2003
Description: The 10-year Treasury yield remains little changed since the last FOMC meeting.

Middle panel

Title: U.S. Treasury Yield Curve Spreads
Series: Spread between 30-Year and 3-Month, 10-Year and 2-Year, and 10-Year and 3-Month Treasury Yields
Horizon: January 1, 1991 - January 27, 2003
Description: In the last two years, 10- and 30- year Treasury yields have risen more than 3-month and 2-year Treasury yields.

Bottom-left panel

Title: S&P 500 Index
Series: S&P 500 Index
Horizon: November 1, 2002 - January 27, 2003
Description: The S&P 500 Index declined sharply in the last two weeks.

Bottom-right panel

Title: S&P 100 Volatility Index (VIX)
Series: VIX Index
Horizon: November 1, 2002 - January 27, 2003

Description: Implied volatility in equity markets has risen sharply in the last two weeks.

Page 5

Top panel

Title: Global Equity Indices
Series: S&P 500 Index, Dow Jones Euro Stoxx Index, German DAX Index
Horizon: November 1, 2002 - January 27, 2003
Description: Global equity indices have declined over the last two weeks.

Bottom panel

Title: 10-Year European Sovereign Debt Spreads over German Bunds
Series: Spreads between 10-Year Italian, Spanish, and French Sovereign Debt Yields and the German Bund Yield
Horizon: November 1, 2002 - January 27, 2003
Description: The spreads between Italian, Spanish, and French sovereign debt yields and the German Bund yield have narrowed.

10-Year European Sovereign Debt Spreads over German Bunds
Basis points

	1993-99	1997-99
France	26	0.13
Italy	288	73
Spain	247	49

Page 6

Top panel

Title: Domestic Portfolio: Permanent SOMA Holdings, Long-Term RPs, & Net Short-Term Operations
Series: Permanent SOMA Holdings, Long-Term RPs, Short-Term RPs
Horizon: June 26, 2002 - February 19, 2003
Description: Long-term RPs outstanding are projected to decline further.

Source: FRBNY

Appendix 3: Materials used by Mr. Slifman, Mr. Struckmeyer, and Ms. Johnson

Material for Staff Presentation on the Economic Outlook
January 28, 2003

STRICTLY CONFIDENTIAL (FR) CLASS I-FOMC*
*Downgraded to Class II upon release of the February 2003 Monetary Policy Report.

Chart 1
Near Term Outlook

Top-left panel
Production of Motor Vehicles

The period covered is from 2000 through 2002, with a scheduled quarterly average for production shown in 2003:Q1. The seasonally adjusted data are in millions of units at an annual rate.

The figure shows data plotted on a curve that depicts the production of motor vehicles. The curve starts in 2000:Q1 at about 13.5 million, decreases to about 13.15 million, increases to about 13.25 million, and falls to about 12.25 million near the end of 2000:Q2. In the third quarter of 2000, the curve increases to almost 13 million and then falls to about 10.75 million near the beginning of 2001:Q1. The curve then generally increases to reach approximately 12 million near the end of 2001:Q2, drops to about 10.75 million near the beginning of 2001:Q4, then climbs to about 12.25 million later in that quarter. The curve stays at about that rate through 2002:Q1 and midway through 2002:Q2, then increases to about 13.25 million near the beginning of 2002:Q3. The curve drops to about 12.25 million near the beginning of 2002:Q4, increases to almost 13 million at midquarter, then decreases to just below 12 million in December 2002.

The figure also shows 12 dots that denote quarterly averages and generally follow the contour of the curve. A 13th dot in 2003:Q1 represents scheduled quarterly average production. Approximate values are as follows.

	Average
2000:Q1	13.25
2000:Q2	13.2
2000:Q3	12.5
2000:Q4	11.75
2001:Q1	11.0
2001:Q2	11.75
2001:Q3	11.6
2001:Q4	11.6
2002:Q1	12.25
2002:Q2	12.4
2002:Q3	12.9
2002:Q4	12.4
2003:Q1	12.4

Top-right panel
Change in Nonfarm Inventories (Excluding Motor Vehicles)

Billions of 1996 dollars, annual rate

	Inventories	Forecast

	Inventories	Forecast
2000:Q1	58.04	ND
2000:Q2	74.90	ND
2000:Q3	63.90	ND
2000:Q4	50.10	ND
2001:Q1	-12.16	ND
2001:Q2	-47.01	ND
2001:Q3	-63.45	ND
2001:Q4	-70.00	ND
2002:Q1	-45.67	ND
2002:Q2	-15.42	ND
2002:Q3	13.93	ND
2002:Q4	ND	-16.30

ND No data Return to table

Middle-left panel
Industrial Production

The period covered is from 1998 through 2002. The data are plotted on a curve and represent manufacturing output, excluding motor vehicles. The data are expressed as index values (1996 equals 100).

At the beginning of 1998, the curve is at about 103. It continues generally upward and reaches about 116 by mid-2000. The curve stays at about that point through year-end 2000, then decreases throughout 2001 to end the year at about 108. The curve increases to approximately 111 in mid-2002, decreases to about 109, and increases to about 110 by the end of 2002.

Middle-right panel
Demand Indicators

	Q3	Oct.	Nov.	Dec.
1. Real PCE excluding motor vehicles*	.1	.4	.3	.3p
2. New Home Sales (millions)	1.02	1.01	1.05	1.08
3. Single-family Housing Starts (millions)	1.34	1.38	1.40	1.47
4. Shipments of Nondefense capital goods*	.1	1.2	-1.8	-1.1

* Average monthly percent change Return to table

p Projection Return to table

Bottom-left panel
Days' Supply of Inventories

The period covered is from 1998 through 2002. The data are inventory levels, excluding motor vehicles, and measured in days. The days' supply of inventories is an industrial production-based flow of goods system.

The data are plotted on a curve. At the beginning of 1998, the curve is at about 55.25 days and dips

to about 54.75 days near the end of the first quarter. The curve then moves generally upward, reaching a little above 56 days by year-end. The curve moves generally downward through 1999, falling to about 54 days by the end of the year. In 2000:Q1, the curve increases to about 54.75 days, decreases to approximately 53.5 in Q2, increases to about 54.6 days in Q3, then decreases to about 54 days toward the end of 2000. The curve trends upward throughout 2001, peaking at about 57 days by year-end. In 2002:Q2, the curve falls to about 54.5 days, increases to about 55.25 days, then dips to about 54.5 days. In 2002:Q3 and into 2002:Q4, the curve increases to about 55 days, then decreases and ends at about 54.25 days in December 2002.

Bottom-right panel
Customer Inventories

The period covered is from 1998 through 2002. The data are diffusion index values and are shown as per ISM, or Institute for Supply Management. The data are plotted on a curve, and a horizontal line is drawn at 50. Data above 50 are presented as too high, and data below 50 are presented as too low.

The curve starts at about 47 at the start of 1998. It then decreases to about 46, increases to about 49, and drops to about 44 in 1998:Q2. The curve then increases to about 51, decreases to about 49, and returns to about 51 by the end of 1998:Q3. The curve then decreases through 1998:Q4 and into 1999:Q1, ending at about 43. The curve fluctuates between 43 and about 45 through 1999:Q3, then increases to about 48 toward the end of the year. The curve trends generally upward through 2000 and reaches about 56 by year-end. It then generally moves downward, decreasing to about 45 by mid-2001, followed by an increase to about 48 in 2001:Q3. The curve then decreases through 2002:Q2 to about 39. The curve then increases to approximately 44 in that same quarter, drops to about 41 in 2002:Q3, and increases to about 47 in 2002:Q4 before decreasing to about 43 in December 2002.

Chart 2
Forecast Summary

Top panel

(Percent change, annual rate*)

	2002		2003		2004
	H1	H2	H1	H2	
		projection			
Real GDP	3.1	2.1	2.7	4.5	4.7
Unemployment rate**	5.9	5.9	6.2	6.1	5.4
PCE price index	1.9	1.8	1.7	1.0	1.2

* Years are Q4/Q4; half years are either Q2/Q4 or Q4/Q2. Return to table

** Percent, end of period. Return to table

Middle panel
Major Force Shaping the Outlook

- Uncertainty and pessimism gradually lifts.
- Strong gains in structural productivity boost real incomes and spending.
- Stimulus associated with past changes to monetary policy as well as an assumed accommodative policy going forward provides significant forward momentum.

- Expansionary fiscal policy (relative to current law)
  --Adds $40 billion (annual rate) to after-tax income in mid-2003.
  --Adds $95 billion in early 2004.

Bottom-left panel
Fiscal Impetus

Percent of GDP

	Current Law	Jan. GB
1998	0	ND
1999	0.3	ND
2000	0.1	ND
2001	0.6	ND
2002	1.1	ND
2003	0.5	0.6
2004	0.4	0.8

Data for 2003 and 2004 are projections. Data above 0.0 are presented as stimulative, and data below 0.0 are presented as restrictive.

Bottom-right panel
Real GDP

Percent change, Q4/Q4

	Current Law	Fiscal policy assumption	Dividend exclusion proposal
2002	2.6	ND	ND
2003	3.5	0.1	0.05
2004	4.4	0.3	0.2

Chart 3
Household Sector

Top-left panel
Real DPI and PCE Growth

Percent*

	DPI	DPI Forecast	PCE	PCE Forecast
2002	5.92	ND	2.55	ND
2003:H1	ND	1.23	ND	2.35
2003:H2	ND	4.09	ND	3.89
2004	ND	4.79	ND	4.22

* Years are Q4/Q4; half years are either Q2/Q4 or Q4/Q2. Return to table

Top-right panel
Ratio of Household Net Worth to Total DPI

The period covered is from 1998 through 2004. The data are given as a ratio of household net worth to total disposable personal income, or DPI, and are plotted on a curve.

The curve begins at about 5.75 at the start of 1998 and then decreases to about 5.4 by Q3. The curve increases through mid-1999 to about 5.9, dips to about 5.8 in Q3, and increases to about 6.3 near the end of 1999. The curve declines through 2001:Q1 to about 5.5. It then increases to about 5.6 at the beginning of Q2, decreases to about 5.3 in mid-2001, and increases to about 5.5 by year-end. The curve declines to about 4.8 by 2002:Q3. The curve then increases to about 4.8 at the end of 2002 and is projected to remain near that point through the end of 2004.

Middle-left panel
Real PCE Growth

(percent change, Q4/Q4)

	2001	2002	2003	2004
1. Real PCE	2.8	2.6	3.1	4.2
Direct contribution from (percentage points):				
2. Potential GDP	2.8	3.2	3.2	3.5
3. Fiscal policy	0.8	0.4	0.4	0.7
4. Wealth effects	-1.0	-1.4	-1.1	-0.6
5. Other	0.2	0.4	0.6	0.6

Middle-right panel
Household Debt Growth

Percent

	Consumer Credit	Consumer Credit Forecast	Home Mortgage	Home Mortgage Forecast	Total	Total Forecast
2002	3.7	ND	11.2	ND	8.9	ND
2003	ND	2.8	ND	7.7	ND	6.3
2004	ND	4.4	ND	7.4	ND	6.5

Bottom-left panel
Debt-Income Ratios by Income Decile

	1995	2002	Net Change
1. Total	.87	1.02	.15
Income group			
2. Lower 90 percent	.78	.87	.09
3. Upper 10 percent	1.09	1.39	.30

Bottom-right panel
Ratio of Consumer Payments to Total DPI

The figure shows the ratio of consumer payments to total disposable personal income, or DPI. Consumer payments include mortgage service, rental payments, motor vehicle leasing, and consumer credit payments. The data are expressed as a percent and plotted on a curve. The period covered is from 1985 through 2002.

The curve starts at about 18.5 percent in 1985 and increases to about 19.75 percent near the beginning of 1987. The curve then decreases to about 18.6 percent near the beginning of 1989. The curve increases to about 19 near the beginning of 1990, then decreases to about 17.1 percent near the end of 1992. The curve fluctuates between about 17 and 17.2 through early 1994, then increases to reach a little less than 19 percent in the second half of 1997. The curve then decreases to about 18.75 near the beginning of 1998, then increases to about 19 percent near the end of 1999 and into early 2000. It then decreases to about 18.8 in 2000:Q1, then increases to about 19.2 in 2001. The curve decreases to about 19 percent near the end of 2001, then increases to about 19.6 percent in early 2002. The curve decreases and ends at a little less than 19 percent in 2002:Q4.

Chart 4
Business Sector

Real Investment

Top-left panel
High-tech Equipment and Software

Percent change, Q4/Q4

	Percent Change	Forecast
1998	25.69	ND
1999	18.28	ND
2000	14.20	ND
2001	-11.87	ND
2002	9.28	ND
2003	ND	12.24
2004	ND	23.28

Top-right panel
Other Equipment*–

Percent change, Q4/Q4

	Percent Change	Forecast
1998	3.99	ND
1999	2.35	ND
2000	5.28	ND
2001	-7.87	ND
2002	2.50	ND
2003	ND	3.78
2004	ND	11.79

* Excluding high-tech and transportation Return to text

Real Net Capital Stock

Middle-left panel
High-tech Equipment and Software

The period covered is from 1974 to 2005. The data are plotted on a curve and represent a four-quarter percent change with a scale of 0 to 20.

The curve begins at just under 10 in 1974, dips to about 7 in 1975, and increases to about 19 in 1980. The curve then decreases through the early 1980s, dropping to about 13 in 1984. It then increases to about 16 in 1985. The curve then drops to about 8 in 1987, remains at about that level through 1989, then decreases to about 5 in 1990. The curve moves generally upward, reaching about 18 in 1999. It then decreases to about 5 in 2001, then turns upward to end at about 6 in 2002. Projections show the curve reaching about 9 in 2005.

Middle-right panel
Other Equipment

The figure shows other equipment excluding high-tech and transportation. The period covered is from 1974 to 2005. The data are plotted on a curve and represent a four-quarter percent change with a scale from negative 2 to 8. A horizontal line is drawn at 0.

The curve begins at about 5.5 in 1974, dips to about 3 in 1976, then increases to about 5.5 in 1979. The curve generally decreases through the early 1980s, falling to just under 0 in 1982. It then increases to just under 2 in 1984. The curve decreases to about 1 in 1987, then increases to just above 2 in 1989. It drops to a little above 0 in 1991, then generally increases to just below 4 in 1997. The curve decreases to about 3.5 in 1999, then increases again to just below 4 in 2000. It then decreases and ends at about 2 in 2003. Projections show the curve increasing to about 3 in 2005.

Bottom-left panel
Short-term Debt Relative to Total Debt

The period covered is from 1998 to 2004. The data are plotted on a curve and are expressed as percent.

At the beginning of 1998, the curve starts at about 40 percent and remains at about that level until 1999:Q1. The curve decreases to about 39 percent at mid-1999 and stays at about that level until 2000:Q1. It increases to about 40 percent in 2000:Q2 then decreases to about 39 percent near the end of 2000. The curve decreases to about 32 percent in 2002:Q2, stays near that level until about 2002:Q3, and decreases to just under 32 percent in about 2002:Q3. Projections show a decrease to about 30 percent by the end of 2004.

Bottom-right panel
Interest Rate Spread[*]

	Percent
8-Jan-1998	0.87
15-Jan-1998	0.88
22-Jan-1998	0.89
29-Jan-1998	0.93
5-Feb-1998	0.92
12-Feb-1998	0.91
19-Feb-1998	0.92
26-Feb-1998	0.94
5-Mar-1998	0.92

	Percent
12-Mar-1998	0.93
19-Mar-1998	0.92
26-Mar-1998	0.94
2-Apr-1998	0.93
9-Apr-1998	0.94
16-Apr-1998	0.91
23-Apr-1998	0.92
30-Apr-1998	0.91
7-May-1998	0.91
14-May-1998	0.91
21-May-1998	0.93
28-May-1998	0.92
4-Jun-1998	0.91
11-Jun-1998	0.93
18-Jun-1998	0.95
25-Jun-1998	0.94
2-Jul-1998	0.99
9-Jul-1998	0.99
16-Jul-1998	1.00
23-Jul-1998	1.00
30-Jul-1998	1.04
6-Aug-1998	1.10
13-Aug-1998	1.13
20-Aug-1998	1.16
27-Aug-1998	1.19
3-Sep-1998	1.64
10-Sep-1998	1.59
17-Sep-1998	1.61
24-Sep-1998	1.56
1-Oct-1998	1.59
8-Oct-1998	1.61
15-Oct-1998	1.63
22-Oct-1998	1.64
29-Oct-1998	1.69
5-Nov-1998	1.79
12-Nov-1998	1.77
19-Nov-1998	1.79
26-Nov-1998	ND
3-Dec-1998	1.64

	Percent
10-Dec-1998	1.65
17-Dec-1998	1.65
24-Dec-1998	1.59
31-Dec-1998	1.61
7-Jan-1999	1.62
14-Jan-1999	1.53
21-Jan-1999	1.55
28-Jan-1999	1.57
4-Feb-1999	1.48
11-Feb-1999	1.44
18-Feb-1999	1.41
25-Feb-1999	1.42
4-Mar-1999	1.43
11-Mar-1999	1.38
18-Mar-1999	1.36
25-Mar-1999	1.34
1-Apr-1999	1.34
8-Apr-1999	1.35
15-Apr-1999	1.35
22-Apr-1999	1.33
29-Apr-1999	1.36
6-May-1999	1.33
13-May-1999	1.30
20-May-1999	1.32
27-May-1999	1.33
3-Jun-1999	1.39
10-Jun-1999	1.40
17-Jun-1999	1.40
24-Jun-1999	1.42
1-Jul-1999	1.42
8-Jul-1999	1.44
15-Jul-1999	1.41
22-Jul-1999	1.40
29-Jul-1999	1.44
5-Aug-1999	1.47
12-Aug-1999	1.48
19-Aug-1999	1.47
26-Aug-1999	1.49
2-Sep-1999	1.54

	Percent
9-Sep-1999	1.53
16-Sep-1999	1.53
23-Sep-1999	1.52
30-Sep-1999	1.53
7-Oct-1999	1.51
14-Oct-1999	1.46
21-Oct-1999	1.45
28-Oct-1999	1.49
4-Nov-1999	1.48
11-Nov-1999	ND
18-Nov-1999	1.49
25-Nov-1999	ND
2-Dec-1999	1.46
9-Dec-1999	1.46
16-Dec-1999	1.44
23-Dec-1999	1.42
30-Dec-1999	1.37
6-Jan-2000	1.43
13-Jan-2000	1.45
20-Jan-2000	1.50
27-Jan-2000	1.50
3-Feb-2000	1.42
10-Feb-2000	1.48
17-Feb-2000	1.48
24-Feb-2000	1.45
2-Mar-2000	1.63
9-Mar-2000	1.58
16-Mar-2000	1.62
23-Mar-2000	1.61
30-Mar-2000	1.80
6-Apr-2000	1.80
13-Apr-2000	1.88
20-Apr-2000	1.93
27-Apr-2000	1.97
4-May-2000	2.02
11-May-2000	2.05
18-May-2000	2.09
25-May-2000	2.18
1-Jun-2000	2.20

	Percent
8-Jun-2000	2.15
15-Jun-2000	2.10
22-Jun-2000	2.06
29-Jun-2000	2.05
6-Jul-2000	2.03
13-Jul-2000	2.07
20-Jul-2000	2.02
27-Jul-2000	2.04
3-Aug-2000	2.04
10-Aug-2000	2.04
17-Aug-2000	2.02
24-Aug-2000	2.05
31-Aug-2000	2.04
7-Sep-2000	2.02
14-Sep-2000	2.03
21-Sep-2000	2.04
28-Sep-2000	2.01
5-Oct-2000	2.02
12-Oct-2000	2.06
19-Oct-2000	2.09
26-Oct-2000	2.12
2-Nov-2000	2.11
9-Nov-2000	2.09
16-Nov-2000	2.14
23-Nov-2000	ND
30-Nov-2000	2.21
7-Dec-2000	2.25
14-Dec-2000	2.23
21-Dec-2000	2.20
28-Dec-2000	2.18
4-Jan-2001	2.18
11-Jan-2001	2.14
18-Jan-2001	2.17
25-Jan-2001	2.15
1-Feb-2001	2.09
8-Feb-2001	2.10
15-Feb-2001	2.06
22-Feb-2001	2.11
1-Mar-2001	2.13

	Percent
8-Mar-2001	2.12
15-Mar-2001	2.14
22-Mar-2001	2.13
29-Mar-2001	2.13
5-Apr-2001	2.13
12-Apr-2001	2.15
19-Apr-2001	2.14
26-Apr-2001	2.10
3-May-2001	1.97
10-May-2001	1.97
17-May-2001	1.95
24-May-2001	1.91
31-May-2001	1.89
7-Jun-2001	1.85
14-Jun-2001	1.88
21-Jun-2001	1.94
28-Jun-2001	1.93
5-Jul-2001	1.95
12-Jul-2001	1.97
19-Jul-2001	2.00
26-Jul-2001	1.97
2-Aug-2001	1.92
9-Aug-2001	1.94
16-Aug-2001	1.94
23-Aug-2001	1.97
30-Aug-2001	1.95
6-Sep-2001	1.95
13-Sep-2001	ND
20-Sep-2001	2.19
27-Sep-2001	2.22
4-Oct-2001	2.19
11-Oct-2001	2.17
18-Oct-2001	2.15
25-Oct-2001	2.18
1-Nov-2001	2.27
8-Nov-2001	2.30
15-Nov-2001	2.19
22-Nov-2001	ND
29-Nov-2001	ND

	Percent
6-Dec-2001	2.00
13-Dec-2001	2.06
20-Dec-2001	2.02
27-Dec-2001	1.97
3-Jan-2002	1.90
10-Jan-2002	1.92
17-Jan-2002	1.94
24-Jan-2002	1.92
31-Jan-2002	1.99
7-Feb-2002	2.18
14-Feb-2002	2.12
21-Feb-2002	2.18
28-Feb-2002	2.09
7-Mar-2002	2.01
14-Mar-2002	2.00
21-Mar-2002	1.99
28-Mar-2002	1.95
4-Apr-2002	1.97
11-Apr-2002	1.97
18-Apr-2002	1.94
25-Apr-2002	2.00
2-May-2002	2.14
9-May-2002	2.17
16-May-2002	2.18
23-May-2002	2.16
30-May-2002	2.09
6-Jun-2002	1.98
13-Jun-2002	2.02
20-Jun-2002	2.10
27-Jun-2002	2.20
4-Jul-2002	ND
11-Jul-2002	2.26
18-Jul-2002	2.30
25-Jul-2002	2.48
1-Aug-2002	2.55
8-Aug-2002	2.68
15-Aug-2002	2.83
22-Aug-2002	2.68
29-Aug-2002	2.69

	Percent
5-Sep-2002	2.75
12-Sep-2002	2.69
19-Sep-2002	2.82
26-Sep-2002	2.89
3-Oct-2002	2.89
10-Oct-2002	3.17
17-Oct-2002	3.10
24-Oct-2002	3.09
31-Oct-2002	3.03
7-Nov-2002	2.87
14-Nov-2002	2.84
21-Nov-2002	2.64
28-Nov-2002	ND
5-Dec-2002	2.56
12-Dec-2002	2.59
19-Dec-2002	2.36
26-Dec-2002	2.36
2-Jan-2003	2.31
9-Jan-2003	2.22
16-Jan-2003	2.29
23-Jan-2003	2.36

* Ten-year BBB corporate yield less 10-year Treasury Return to text

Chart 5
Productivity

Top-left panel
Nonfarm Payroll Employment

The figure's X-axis shows time periods from T through T+4. The Y-axis represents an index (trough equals 100); the range is from 99.0 through 100.5. The data are plotted on two curves. The first curve is for the current episode, trough equals 2001:Q4, and the second curve is for the 1990-91 recession, National Bureau of Economic Research (NBER) trough.

Top-right panel
Labor Productivity

The figure's X-axis shows time periods from T through T+4. The Y-axis represents an index (trough equals 100); the range is from 99 through 106. The data are plotted on two curves. The first curve is for the current episode, trough equals 2001:Q4, and the second curve is for the 1990-91 recession, National Bureau of Economic Research (NBER) trough.

The current episode curve begins at about 100 in the middle of period T, increases to approximately

102 in the middle of T+1, and increases again to about 102.5 in the middle of T+2. The curve increases to about 104 in the middle of T+3, then decreases to and ends at about 103.8 in the middle of T+4.

The 1990-91 recession curve starts at about 100 in the middle of period T. It increases to about 101.2 in the middle of T+1 and increases again to approximately 101.5 in the middle of T+2. The curve increases to about 102.2 in the middle of T+3, then increases to and ends at about 104.1 in the middle of T+4.

Middle-left panel
Structural Multifactor Productivity Growth

Percent

	Trend Component	Trend Component Forecast	Transitory Component	Transitory Component Forecast
2001	1.3	ND	ND	ND
2002	1.5	ND	.3	ND
2003	ND	1.5	ND	.1
2004	ND	1.5	ND	ND

Middle-right panel
Research and Development Expenditures

The period covered is from 1952 to 2003. The data are plotted on a curve and are expressed in billions of 1996 dollars.

An inset box shows the percent change at 4.0 percent for 2001, 2.4 percent for 2002, and 1.9 percent for 2003 (estimate).

The curve starts at about 20 billion dollars in 1952. It increases to about 90 billion in 1968. The curve remains near that level through about 1974, then increases to about 180 billion in 1992. The curve decreases to about 175 billion in 1993 and increases to about 260 billion in 2002. A dot represents an estimate of about 275 billion in 2003.

Source: NSF and Battelle Institute

Bottom panel
Structural Productivity and Potential Output Growth

(percent change)

	2001	2002	2003	2004
1. Structural Productivity	1.9	2.3	2.2	2.4
Previous	*1.9*	*1.9*	*2.0*	*2.3*
Contributions of:				
2. Capital Deepening	.4	.3	.3	.7
3. Labor Composition	.3	.3	.3	.3
4. Multifactor Productivity	1.3	1.8	1.6	1.5
Memo:				
5. Potential Output	2.9	3.3	3.2	3.4

	2001	2002	2003	2004
Previous	*2.9*	*2.9*	*3.0*	*3.3*

Chart 6
Labor Markets

Top-left panel
Nonfarm Payrolls

	Average Monthly Change	Forecast
2001:H2	-203.00	ND
2002:H1	-26.00	ND
2002:H2	-5.00	ND
2003:H1	ND	107.00
2003:H2	ND	225.00

Top-right panel
Actual Labor Productivity

Chained 1996 dollars per hour

	Actual	Actual Forecast	Trend	Trend Forecast
2000:Q1	37.11	ND	37.19	ND
2000:Q2	37.66	ND	37.43	ND
2000:Q3	37.72	ND	37.68	ND
2000:Q4	37.88	ND	37.92	ND
2001:Q1	37.75	ND	38.10	ND
2001:Q2	37.72	ND	38.28	ND
2001:Q3	37.91	ND	38.46	ND
2001:Q4	38.59	ND	38.64	ND
2002:Q1	39.40	ND	38.86	ND
2002:Q2	39.56	ND	39.09	ND
2002:Q3	40.10	40.10	39.31	39.31
2002:Q4	ND	40.05	ND	39.54
2003:Q1	ND	40.30	ND	39.76
2003:Q2	ND	40.37	ND	39.97
2003:Q3	ND	40.60	ND	40.19
2003:Q4	ND	40.76	ND	40.41
2004:Q1	ND	40.97	ND	40.65
2004:Q2	ND	41.18	ND	40.89
2004:Q3	ND	41.34	ND	41.14
2004:Q4	ND	41.48	ND	41.38

Middle-left panel
Okun's Law

Percent

	Actual	Forecast	Simulation
2000:Q1	4.02	ND	4.1
2000:Q2	4.00	ND	3.9
2000:Q3	4.06	ND	4.1
2000:Q4	3.97	ND	4.3
2001:Q1	4.19	ND	4.5
2001:Q2	4.47	ND	4.8
2001:Q3	4.84	ND	5.1
2001:Q4	5.61	ND	5.3
2002:Q1	5.62	ND	5.5
2002:Q2	5.93	ND	5.7
2002:Q3	5.74	ND	5.7
2002:Q4	5.91	5.91	5.8
2003:Q1	ND	6.16	5.9
2003:Q2	ND	6.21	6.0
2003:Q3	ND	6.20	6.0
2003:Q4	ND	6.11	5.9
2004:Q1	ND	5.97	5.8
2004:Q2	ND	5.82	5.6
2004:Q3	ND	5.61	5.5
2004:Q4	ND	5.40	5.3

Middle-right panel
Alternative Paths for Structural Multifactor Productivity Growth

Percent

	Baseline	Baseline Forecast	Slower	Slower Forecast	Faster	Faster Forecast
2000	1.2	ND	ND	ND	ND	ND
2001	1.3	ND	1.3	ND	1.3	ND
2002	1.8	ND	1.3	ND	1.8	ND
2003	ND	1.6	ND	1.3	ND	1.8
2004	ND	1.5	ND	1.3	ND	1.8

Bottom panel
Alternative Structural MFP Scenarios

(Deviations from baseline)

	2003		2004
	H1	H2	
Real GDP Growth			
Slower	-.1	-.3	-.4
Faster	.1	.4	.5
Core Inflation			
Slower	.1	.1	.2
Faster	.0	-.1	-.1

Chart 7
Compensation

Top panel
Hourly Labor Compensation

Four-quarter percent change

	P&C compensation per hour	P&C compensation per hour simulation	Employment cost index	Employment cost index simulation
1995:Q1	1.25	ND	2.98	ND
1995:Q2	2.02	ND	2.87	ND
1995:Q3	2.59	ND	2.60	ND
1995:Q4	2.57	ND	2.59	ND
1996:Q1	2.75	ND	2.73	ND
1996:Q2	3.11	ND	2.79	ND
1996:Q3	3.18	ND	2.85	ND
1996:Q4	3.25	ND	2.99	ND
1997:Q1	3.23	ND	2.89	ND
1997:Q2	2.47	ND	2.87	ND
1997:Q3	2.72	ND	3.00	ND
1997:Q4	3.42	ND	3.44	ND
1998:Q1	4.56	ND	3.42	ND
1998:Q2	5.70	ND	3.54	ND
1998:Q3	5.83	ND	3.74	ND
1998:Q4	5.30	ND	3.40	ND
1999:Q1	5.39	ND	3.01	ND
1999:Q2	4.05	ND	3.28	ND
1999:Q3	3.84	ND	3.17	ND
1999:Q4	4.29	ND	3.43	ND
2000:Q1	6.17	ND	4.56	ND
2000:Q2	6.56	ND	4.58	ND

	P&C compensation per hour	P&C compensation per hour simulation	Employment cost index	Employment cost index simulation
2000:Q3	7.87	ND	4.68	ND
2000:Q4	7.13	ND	4.50	ND
2001:Q1	4.20	ND	4.23	ND
2001:Q2	3.65	ND	4.05	ND
2001:Q3	1.79	ND	3.94	ND
2001:Q4	1.40	ND	4.10	ND
2002:Q1	1.39	1.38	3.86	ND
2002:Q2	2.35	2.36	3.95	ND
2002:Q3	3.29	3.42	3.66	3.66
2002:Q4	ND	4.14	ND	3.49
2003:Q1	ND	4.33	ND	3.43
2003:Q2	ND	4.14	ND	3.17
2003:Q3	ND	3.55	ND	3.38
2003:Q4	ND	3.24	ND	3.34
2004:Q1	ND	3.14	ND	3.34
2004:Q2	ND	3.12	ND	3.34
2004:Q3	ND	3.11	ND	3.34
2004:Q4	ND	3.09	ND	3.33

Middle-left panel
ECI Wages and Salaries

Percent change, Q4/Q4

	Percent Change	Forecast
2000	3.9	ND
2001	3.8	ND
2002	3.0	ND
2003	ND	2.5
2004	ND	2.4

Middle-right panel
ECI Benefits

Percent change, Q4/Q4

	Percent Change	Forecast
2000	5.8	ND
2001	5.1	ND
2002	4.7	ND
2003	ND	5.5
2004	ND	5.7

Bottom-left panel

Inflation Expectations

Michigan SRC One-year ahead, median

	Percent
Jan 1999	2.70
Feb 1999	2.50
Mar 1999	2.70
Apr 1999	2.70
May 1999	2.80
Jun 1999	2.50
Jul 1999	2.70
Aug 1999	2.80
Sep 1999	2.70
Oct 1999	2.90
Nov 1999	2.90
Dec 1999	3.00
Jan 2000	3.00
Feb 2000	2.90
Mar 2000	3.20
Apr 2000	3.20
May 2000	3.00
Jun 2000	2.90
Jul 2000	3.00
Aug 2000	2.70
Sep 2000	2.90
Oct 2000	3.20
Nov 2000	2.90
Dec 2000	2.80
Jan 2001	3.00
Feb 2001	2.80
Mar 2001	2.80
Apr 2001	3.10
May 2001	3.20
Jun 2001	3.00
Jul 2001	2.60
Aug 2001	2.70
Sep 2001	2.80
Oct 2001	1.00
Nov 2001	0.40
Dec 2001	1.80
Jan 2002	1.90

	Percent
Feb 2002	2.10
Mar 2002	2.70
Apr 2002	2.80
May 2002	2.70
Jun 2002	2.70
Jul 2002	2.60
Aug 2002	2.60
Sep 2002	2.50
Oct 2002	2.50
Nov 2002	2.40
Dec 2002	2.50
Jan 2003	2.40

FRB Philadelphia One-year ahead

	Percent
1999:Q1	2.20
1999:Q2	2.20
1999:Q3	2.38
1999:Q4	2.53
2000:Q1	2.50
2000:Q2	2.60
2000:Q3	2.70
2000:Q4	2.68
2001:Q1	2.50
2001:Q2	2.50
2001:Q3	2.60
2001:Q4	2.18
2002:Q1	2.20
2002:Q2	2.35
2002:Q3	2.30
2002:Q4	2.20

Bottom-right panel
Unemployment Gap

Percent

	Unemployment rate	Forecast	NAIRU
2001:Q1	4.19	ND	5.00
2001:Q2	4.47	ND	5.00
2001:Q3	4.84	ND	5.00

	Unemployment rate	Forecast	NAIRU
2001:Q4	5.61	ND	5.00
2002:Q1	5.62	ND	5.00
2002:Q2	5.93	ND	5.00
2002:Q3	5.74	ND	5.00
2002:Q4	5.91	5.91	5.00
2003:Q1	ND	6.16	5.00
2003:Q2	ND	6.21	5.00
2003:Q3	ND	6.20	5.00
2003:Q4	ND	6.11	5.00
2004:Q1	ND	5.97	5.00
2004:Q2	ND	5.82	5.00
2004:Q3	ND	5.61	5.00
2004:Q4	ND	5.40	5.00

Chart 8
Prices

Top-left panel
PCE Prices

Percent change, Q4/Q4

	PCE	Forecast
2000	2.50	ND
2001	1.46	ND
2002	1.85	ND
2003	ND	1.31
2004	ND	1.19

Top-right panel
PCE Food and Energy Prices

Percent change, Q4/Q4

	Food	Food Forecast	Energy	Energy Forecast
1998	1.91	ND	-9.58	ND
1999	1.88	ND	12.34	ND
2000	2.41	ND	15.35	ND
2001	3.17	ND	-10.30	ND
2002	1.27	ND	7.67	ND
2003	ND	2.08	ND	-1.61
2004	ND	1.78	ND	-1.23

Middle panel
Core Consumer Prices

Four-quarter percent change

	Current-methods CPI	Current-methods CPI Forecast	PCE	PCE Forecast	Market-based PCE	Market-based PCE Forecast
1995:Q1	2.36	ND	2.59	ND	2.04	ND
1995:Q2	2.49	ND	2.53	ND	1.83	ND
1995:Q3	2.54	ND	2.28	ND	1.78	ND
1995:Q4	2.69	ND	2.28	ND	1.86	ND
1996:Q1	2.60	ND	2.04	ND	1.67	ND
1996:Q2	2.37	ND	1.87	ND	1.53	ND
1996:Q3	2.29	ND	1.74	ND	1.39	ND
1996:Q4	2.21	ND	1.83	ND	1.40	ND
1997:Q1	2.10	ND	1.97	ND	1.39	ND
1997:Q2	2.20	ND	2.11	ND	1.54	ND
1997:Q3	1.99	ND	1.98	ND	1.42	ND
1997:Q4	1.92	ND	1.73	ND	1.19	ND
1998:Q1	2.04	ND	1.54	ND	1.18	ND
1998:Q2	2.01	ND	1.39	ND	1.07	ND
1998:Q3	2.17	ND	1.52	ND	1.27	ND
1998:Q4	2.17	ND	1.58	ND	1.39	ND
1999:Q1	2.01	ND	1.50	ND	1.31	ND
1999:Q2	1.99	ND	1.45	ND	1.34	ND
1999:Q3	2.00	ND	1.42	ND	1.27	ND
1999:Q4	2.08	ND	1.48	ND	1.39	ND
2000:Q1	2.20	ND	1.71	ND	1.49	ND
2000:Q2	2.36	ND	1.81	ND	1.58	ND
2000:Q3	2.51	ND	1.76	ND	1.74	ND
2000:Q4	2.48	ND	1.79	ND	1.76	ND
2001:Q1	2.62	ND	1.94	ND	1.88	ND
2001:Q2	2.63	ND	1.78	ND	1.78	ND
2001:Q3	2.64	ND	1.65	ND	1.74	ND
2001:Q4	2.69	ND	1.87	ND	1.77	ND
2002:Q1	2.54	ND	1.52	ND	1.43	ND
2002:Q2	2.43	ND	1.70	ND	1.43	ND
2002:Q3	2.28	2.29	1.95	1.96	1.34	1.34
2002:Q4	2.05	2.08	ND	1.61	ND	1.16
2003:Q1	ND	1.97	ND	1.56	ND	1.17
2003:Q2	ND	1.93	ND	1.45	ND	1.13
2003:Q3	ND	1.92	ND	1.35	ND	1.11
2003:Q4	ND	1.93	ND	1.34	ND	1.13

	Current-methods CPI	Current-methods CPI Forecast	PCE	PCE Forecast	Market-based PCE	Market-based PCE Forecast
2004:Q1	ND	1.93	ND	1.36	ND	1.18
2004:Q2	ND	1.87	ND	1.31	ND	1.13
2004:Q4	ND	1.78	ND	1.22	ND	1.05

Bottom-left panel
GDP Gap[*]–

	Percent	Forecast
1996:Q1	-1.01	ND
1996:Q2	-0.12	ND
1996:Q3	-0.36	ND
1996:Q4	0.03	ND
1997:Q1	0.26	ND
1997:Q2	0.87	ND
1997:Q3	1.07	ND
1997:Q4	0.92	ND
1998:Q1	1.48	ND
1998:Q2	1.11	ND
1998:Q3	1.19	ND
1998:Q4	1.90	ND
1999:Q1	1.74	ND
1999:Q2	1.30	ND
1999:Q3	1.66	ND
1999:Q4	2.47	ND
2000:Q1	2.21	ND
2000:Q2	2.52	ND
2000:Q3	1.76	ND
2000:Q4	1.14	ND
2001:Q1	0.27	ND
2001:Q2	-0.84	ND
2001:Q3	-1.61	ND
2001:Q4	-1.64	ND
2002:Q1	-1.22	ND
2002:Q2	-1.70	ND
2002:Q3	-1.52	ND
2002:Q4	-2.26	-2.26
2003:Q1	ND	-2.39
2003:Q2	ND	-2.45
2003:Q3	ND	-2.18
2003:Q4	ND	-1.84

	Percent	Forecast
2004:Q1	ND	-1.46
2004:Q2	ND	-1.10
2004:Q3	ND	-0.79
2004:Q4	ND	-0.56

* The GDP gap is defined as actual GDP less potential GDP, divided by potential GDP. Return to text

Bottom-right panel
Core Non-oil Import Prices*

	Four-quarter percent change	Forecast
1999:Q1	-1.31	ND
1999:Q2	-1.03	ND
1999:Q3	0.10	ND
1999:Q4	0.37	ND
2000:Q1	0.79	ND
2000:Q2	1.49	ND
2000:Q3	1.63	ND
2000:Q4	1.61	ND
2001:Q1	1.90	ND
2001:Q2	0.12	ND
2001:Q3	-1.74	ND
2001:Q4	-2.89	ND
2002:Q1	-4.03	ND
2002:Q2	-2.30	ND
2002:Q3	-0.56	-0.56
2002:Q4	ND	0.61
2003:Q1	ND	2.39
2003:Q2	ND	2.63
2003:Q3	ND	2.94
2003:Q4	ND	3.13
2004:Q1	ND	2.38
2004:Q2	ND	2.07
2004:Q3	ND	1.90
2004:Q4	ND	1.74

* Excludes semiconductors and computers Return to text

Chart 9
Scenarios on Potential Iraq War

Top panel

- NOT a forecast of the conduct of the war or its quantitative effects
- Two military scenarios
  -- Successful one-month conflict (costing $20 billion)
  -- Successful six-month conflict (costing $50 billion)
- No exogenous confidence effects, swings in risk premiums or retaliatory terrorist attacks
- Monetary policy follows a Taylor rule

Middle panel
Oil Price Scenarios

(Deviations from baseline path)
Dollars per barrel

	Quick victory	Six-month war	Six-month war with limited embargo	Six-month war with persistent oil production loss
2003:Q1	-2.0	10	30	20
2003:Q2	-1.0	10	30	20
2003:Q3	-0.5	0	0	20
2003:Q4	-0.2	0	0	20
2004:Q1	0.0	0	0	20
2004:Q2	0.0	0	0	20
2004:Q3	0.0	0	0	20
2004:Q4	0.0	0	0	20
2005:Q1	-2.0	-2	-2	20
2005:Q2	-2.0	-2	-2	20
2005:Q3	-2.0	-2	-2	20
2005:Q4	-2.0	-2	-2	20

Bottom panel
Macroeconomic Implications of Alternative War Scenarios

(Deviation from baseline)

	2003		2004	2005
	H1	H2		
Real GDP growth				
1. Quick victory	.3	.1	-.1	-.1
2. Six-month war	.0	.0	.1	.1
3. Six month war with limited embargo	-.3	-.3	.4	.3
4. Six month war with persistent oil production loss	-.2	-.7	-.2	.4
Inflation, PCE price index				
1. Quick victory	-.5	-.1	-.1	-.1
2. Six-month war	1.2	-.9	-.5	-.3
3. Six month war with limited embargo	3.5	-2.0	-1.0	-.5
4. Six month war with persistent oil production loss	2.5	1.2	.2	-.4

Chart 10
Financial Developments

Chart 10 is a three-by-two array of panels, including graphs for nominal exchange rates, ten-year sovereign bonds, three-month euro futures rates, three-month yen futures rates, stock prices, and U.K. housing prices.

Top-left panel
Nominal Exchange Rates

Nominal Exchange Rates, Foreign currency/U.S. dollar, on a weekly basis for 2001 through early 2003. The range of the y-axis is [70, 110]; index, week of January 28, 2002 = 100. The three series are the euro, the yen, and a basket of "major currencies," where the last is the trade-weighted average against major foreign currencies. The major currencies index starts at about 92, moves generally upward to nearly 100 by early 2002, and then declines to about 88 by early 2003. The euro begins at about 92, increases to about 103 by mid-2001, drops to about 95 a few months later, climbs to about 100 by early 2002, and then declines to about 80 by early 2003. The yen starts at about 86, fluctuates around 90 during most of 2001, rises to about 100 by early 2002, declines to about 87 by mid-2002, rises to about 93 by the end of the year, and then declines to about 88 by early 2003.

Top-right panel
Ten-Year Sovereign Bond Yields

Ten-Year Sovereign Bond Yields, on a weekly basis for the United States, Germany, and Japan for 2001 through early 2003. The range of the y-axis is [0, 6]; unit is percent. The U.S. yield starts at about 5 percent, fluctuates around 5 percent through mid-2002, falls to about 3.7 percent by late 2002, then rises slightly and fluctuates around 4 percent, ending just under 4 percent in early 2003. The German yield starts at about 5 percent, fluctuates around 5 percent through mid-2002, and then gradually declines to just over 4 percent by early 2003. The Japanese yield begins at just over 1½ percent and declines gradually to about ¾ percent by early 2003.

Middle-left panel
Three-Month Euro Futures Rates

Three-Month Euro Futures Rates, for mid-2002 through mid-2004, as of January 29, 2002, as of June 25, 2002, and as of January 27, 2003. The range of the y-axis is [2.0, 5.0]; unit is percent. The futures rates as of January 29, 2002, begin in mid-2002 at about 3.7 percent and rise to about 4.9 percent by the end of the period. The futures rates as of June 25, 2002, begin in mid-2002 at about 3.6 percent and rise to about 4.7 percent by the end of the period. The futures rates as of January 27, 2003, begin in early 2003 at about 2.7 percent, decline to about 2.4 percent by mid-2003, and then rise to about 2.8 percent by the end of the period.

Middle-right panel
Three-Month Yen Futures Rates

Three-Month Yen Futures Rates, for 2002 through mid-2004, as of January 29, 2002, as of June 25, 2002, and as of January 27, 2003. The range of the y-axis is [0.0, 2.0]; unit is percent. The rates as of January 29, 2002, begin in mid-2002 at about 0.2 percent and rise to about 0.5 percent by the end of the period. The rates as of June 25, 2002, begin in mid-2002 at about 0.1 percent and rise to about 0.3 percent by the end of the period. The rates as of January 27, 2003 begin in early 2003 at about 0.1 percent and rise to about 0.2 percent by the end of the period.

Bottom-left panel
Stock Prices

Stock Prices, on a weekly basis for the S&P 500, the DJ Euro Stoxx, and the TOPIX for 2001 through early 2003. The range of the y-axis is [70, 160]; index, June 25, 2002 = 100. The S&P 500 starts at about 132 and, with modest volatility, declines to about 95 by late 2001, rises to about 115 by early 2002, declines to about 80 by late 2002, then rises and fluctuates around 90, ending at about 88 at the end of the period. The DJ Euro Stoxx starts at 150 and, with modest volatility, declines to about 95 by late 2001, rises to about 120 by early 2002, declines to about 74 by late 2002, and then rises to just over 80 by the end of the period. The TOPIX starts at about 127, and, with modest volatility, rises to about 140 by mid-2001, declines to about 94 by early 2002, rises to about 110 by mid-2002, and then declines to about 85 by the end of the period.

Bottom-right panel
U.K. Housing Prices

U.K. Housing Prices, on a monthly basis for 2001-2002. The index is a nationwide building society house price index. The range of the y-axis is [90, 140]; index, 2001:Q1 = 100. The series starts at 100 and rises on a gentle slope with few variations to nearly 140 by the end of the period.

Chart 11
Foreign Outlook

Chart 11 is a three-by-two array of panels including graphs of real GDP, total employment, orders, long-term earnings growth forecast for the euro area, and 2003 real GDP contributions, and a table of real GDP growth for industrial countries.

Top-left panel
Real GDP

Real GDP (percent change, SAAR[*]), U.S. and total foreign,[**] as a bar chart for 2002:H1 (actual), 2002:H2 (projected), 2003:H1 (projected), 2003:H2 (projected), and 2004 (projected). The range of the y-axis is [0, 6]. Approximate values for the five periods are as follows.

Percent change, SAAR

	2002		2003		2004
	H1	H2	H1	H2	
United States (red)	3.1	2.1	2.7	4.5	4.8
Total foreign (blue)	3.3	2.4	2.6	3.1	3.5

* Years are Q4/Q4; half years are either Q2/Q4 or Q4/Q2. Return to text

** Total foreign GDP growth is calculated using U.S. total export weights. Return to text

Top-right panel
Total Employment

Total Employment, on a monthly basis for 2001 through November 2002 for the euro area and Japan, and through December 2002 for Canada. The range of the y-axis is [90, 110]; index, Jan. 2001 = 100. All three indexes start at 100 at the beginning of the period. The index for the euro area declines in a nearly straight line to about 96 by the end of the period. The index for Japan declines, with mild

fluctuation, to about 98 by the end of the period. The index for Canada remains near 100 through late 2001 and then rises in a nearly straight line to about 104 by the end of the period.

Middle-left panel
Orders

Orders, on a monthly basis for 2001 through November 2002 for Canada, Germany, and Japan. Orders are defined as manufacturing orders for Canada and Germany, and as private core machinery orders for Japan. The range of the y-axis is [70, 110]; index, Jan. 2001 = 100. All three indexes start at 100 at the beginning of the period. The index for Canada, with some volatility, immediately rises to about 105, declines to about 95 by late 2001, and then rises to about 101 by the end of the period. The index for Germany, with some volatility, declines to about 95 by late 2001, and then rises to about 99 by early 2002, and then fluctuates between about 96 and 99, ending at about 99 at the end of the period. The index for Japan, with some volatility, declines to about 82 by the end of the period.

Middle-right panel
Long-Term Earnings Growth Forecast - Euro Area

Long-Term Earnings Growth Forecast - Euro Area, for 1996-2002, where long-term earnings growth forecast is defined as 5-year earnings growth forecast constructed from I/B/E/S survey of analysts. The range of the y-axis is [10,18]; unit is percent per annum. The series starts at 14 percent, rises with some volatility to about 16½ percent by early 2001, and then drops sharply to about 10½ percent by end-2002.

Bottom-left panel
2003 Real GDP Contributions

2003 Real GDP Contributions. Plots the contributions of domestic demand and net exports to 2003 real GDP growth for the euro area, Japan, and Canada as a bar chart. The range of the y-axis is [0, 3]. Approximate values are as follows.

Percentage points, Q4/Q4

Contribution of	Euro Area	Japan	Canada
Total domestic demand (red)	1.7	0.2	2.9
Net exports (blue)	just above 0	0.3	just above 0

Bottom-right panel
Real GDP Growth

Real GDP Growth (Percent, SAAR) for 2002:H2 (actual), 2003:H1 (forecast), 2003:H2 (forecast), and 2004 (forecast).

Percent, SAAR*

	2002	2003		2004
	H2	H1	H2	
1. Industrial countries**	2.1	2.0	2.4	2.6
2. Euro Area	1.3	1.3	1.9	2.6
3. Japan	1.7	0.4	0.6	0.9
4. Canada	2.5	2.8	3.1	3.1
5. United Kingdom	2.8	2.2	2.5	3.0

* Years are Q4/Q4; half years are Q2/Q4 or Q4/Q2. Return to table

** Calculations use U.S. total export weights. Return to table

Chart 12
Emerging Market Countries

Chart 12 is a three-by-two array of panels focusing on Asian and Latin American emerging market countries. The top four panels are for Asia: a graph of nominal exchange rates, a graph of stock market indexes, a table on CPI inflation, and a table on real GDP growth. The bottom two panels are for Latin America: a graph of EMBI+ spreads, and a table on real GDP growth.

Asia

Top-left panel
Nominal Exchange Rates

Nominal Exchange Rates, Foreign currency/U.S. dollar, on a weekly basis for the Singapore dollar and the Korean won for 2001 through early 2003. The range of the y-axis is [90, 110]; index, Jan. 5, 2001 = 100. The indexes for both currencies start at 100 at the beginning of 2001. The index for the Singapore dollar rises to about 105 within a few months, fluctuates around that level through mid-2001, declines to about 100 by late 2001, rises again to around 105 and fluctuates around that level through early 2002, then declines to about 100 by mid-2002, rises to about 103 by late 2002, and then declines to just below 100 by the end of the period. The index for the Korean won dips to about 97½ within a few months, rises to about 107 in early 2001, immediately declines slightly, ranges from about 100-104 through early 2002, and then falls to about 92 by mid-2002, rises to about 98 in late 2002, and then drops to about 92 by the end of the period.

Top-right panel
Stock Market Indexes

Stock Market Indexes, on a weekly basis for Korea, Singapore, and Hong Kong for 2001 through early 2003. The range of the y-axis is [50, 175]; index, Jan. 5, 2001 = 100. The indexes for all the countries start at 100 at the beginning of 2001. With some volatility, the index for Korea declines to about 80 by late 2001, rises to about 160 by early 2002, and then falls to just over 100 by early 2003. With some volatility, the index for Singapore declines to about 70 by late 2001, rises to about 90 by early 2002, and then falls to about 70 by early 2003. With some volatility, the index for Hong Kong declines to about 60 by late 2001, rises to about 70 by end-2001 and fluctuates around that level until mid-2002, and then falls to about 60 by early 2003.

Middle-left panel
CPI Inflation

CPI Inflation (Percent, SAAR) for 2002:H2 (actual), 2003:H1 (forecast), 2003:H2 (forecast), and 2004 (forecast).

Percent, SAAR*

	2002	2003		2004
	H2	H1	H2	
1. Developing Asia**	0.5	1.7	1.8	1.8
of which:				

	2002	2003		2004
	H2	H1	H2	
2. China	-0.9	-0.8	1.0	1.2
3. Korea	3.0	4.3	3.0	3.0
4. Taiwan	-1.0	1.9	1.8	1.8
5. Singapore	0.1	1.6	1.3	1.2

* Years are Q4/Q4; half years are Q2/Q4 or Q4/Q2. Return to table

** Calculations use U.S. total export weights. Return to table

Middle-right panel
Real GDP Growth

Real GDP Growth (Percent, SAAR) for 2002:H2 (actual), 2003:H1 (forecast), 2003:H2 (forecast), and 2004 (forecast).

Percent, SAAR*

	2002	2003		2004
	H2	H1	H2	
1. Developing Asia**	3.4	5.1	5.4	5.8
of which:				
2. China	7.3	7.5	7.5	7.7
3. Korea	5.1	5.1	5.4	5.5
4. Taiwan	1.2	3.9	4.8	5.3
5. Singapore	-4.5	5.2	5.8	6.8

* Years are Q4/Q4; half years are Q2/Q4 or Q4/Q2. Return to table

** Calculations use U.S. total export weights. Return to table

Latin America

Bottom-left panel
EMBI+ Spreads

EMBI+ Spreads, on a weekly basis for 2001 through early 2003 for Argentina and Brazil. For Argentina, the range of the left y-axis is [5, 75]. For Brazil, the range of the right y-axis is [5, 25]. Unit is percentage points. The spreads for Argentina start at about 7 percentage points at the beginning of the period, rise steeply to about 70 percentage points by mid-2002, then decline to about 60 percentage points by the end of the period. The spreads for Brazil start at about 8 percentage points, rise to about 12 percentage points by late 2001, decline to about 7 percentage points by early 2002, rise sharply to about 22 percentage points by mid-2002, drop briefly to about 17 percentage points, rise again to about 22 percentage points by late 2002, and then drop to about 14 percentage points at the end of the period.

Bottom-right panel
Real GDP Growth

Real GDP Growth (Percent, SAAR) for 2002:H2 (actual), 2003:H1 (forecast), 2003:H2 (forecast),

and 2004 (forecast).

Percent, SAAR*

	2002	2003		2004
	H2	H1	H2	
1. Latin America**	2.5	2.7	3.7	4.3
of which:				
2. Mexico	2.8	3.7	4.3	5.0
3. Brazil	2.4	1.5	2.0	2.0
4. Argentina	0.5	1.2	1.2	1.9

* Years are Q4/Q4; half years are Q2/Q4 or Q4/Q2. Return to table

** Calculations use U.S. total export weights. Return to table

Chart 13
External Sector

Chart 13 is a three-by-two array of panels including graphs of the real exchange rate outlook, real growth of exports and imports, and the current account, and a table on financial flows. The bottom two panels are titled "Simulation Results (Real GDP Growth, Deviation from Baseline; Percent change, Q4/Q4)" and include tables on the potential Iraq war and on the Greenbook alternative.

Top-left panel
Real Exchange Rate Outlook

Real Exchange Rate Outlook, for 2001 through early 2003 (actual), along with the June 2002 Greenbook forecast for mid-2002 through 2003 and the January 2003 Greenbook forecast from early 2003 through 2004. The range of the y-axis is [90, 105]; index, 2001:Q1 = 100. The actual real exchange rate starts at 100 at the beginning of the period, rises to about 103 by early 2002, and then declines to about 99 by early 2003. The June 2002 Greenbook forecast starts at about 102 in mid-2002 and declines to about 99 by the end of 2003. The January 2003 Greenbook forecast starts at about 99 in early 2003 and declines to about 98 by the end of 2004.

Top-right panel
Real Growth of Exports, Imports

Real Growth of Exports, Imports, as a bar chart for 2001 (actual), 2002 (projected), 2003 (projected), and 2004 (projected). The range of the y-axis is [-15, 10]. Approximate values for the four periods are as follows.

Percent change, Q4/Q4

	2001	2002	2003	2004
Exports (red)	-12.0	5.0	7.0	8.5
Imports (blue)	-7.5	9.0	6.0	9.0

Middle-left panel
Current Account

Current Account, in terms of percent of GDP and in terms of level (billions of dollars) for 1995 through late 2002 (actual) and for late 2002 through 2004 (forecast). The range of the left y-axis, measured in terms of percent of GDP, is [-7, 1]. The range of the right y-axis, measured in terms of level or billions of dollars, is [-700, 100]. The graph shows the current account to be in deficit for the entire period, and the two series track closely for the entire period. The current account in terms of level starts at a deficit of about $100 billion, which widens to about $550 billion by late 2002. The forecast shows the deficit widening further, to about $625 billion by end-2004. The current account in terms of percent of GDP starts at a deficit of about 1½ percent of GDP, which widens to a deficit of about 5 percent of GDP by late 2002. The forecast shows the deficit widening further, to around 5¼ percent of GDP by end-2004.

Middle-right panel
Financial Flows

Financial Flows, Billions of dollars. The table shows data for 2001 in Column 1, for projected 2002 in Column 2, and the change from 2001 to 2002 in Column 3.

Billions of dollars

	2001	2002p	Chng
1. Current account	-393	-499	-104
Selected financial flows:[*]			
2. Foreign official	7	97	90
3. For. purch. U.S. sec.	404	361	-43
4. U.S. purch. for. sec.	-95	0	95
5. Net direct investment	3	-74	-77

* Projections for lines 2 through 4 incorporate TIC data through November, and, for line 2, FRBNY data for December.
Return to table

Bottom panel
Simulation Results (Real GDP Growth, Deviation from Baseline; Percent change, Q4/Q4)

Bottom-left panel
Potential Iraq War[*]

	2003	2004
1. Euro Area	-0.3	0.2
2. Japan	-0.7	0.4
3. Canada	-0.7	0.4
4. Mexico	-0.5	0.1
5. Taiwan	-0.1	0.6
6. Korea	0.5	0.9

* Limited embargo case. Return to text

Bottom-right panel
Greenbook Alternative[*]

	2003	2004
1. Euro Area	-1.3	1.0
2. Japan	-2.2	0.8

	2003	2004
3. Canada	0.1	-0.7
4. Mexico	0.9	-1.9
5. Taiwan	-2.7	2.3
6. Korea	-4.5	5.8

* With confidence effects. Return to text

Chart 14

Top panel
ECONOMIC PROJECTIONS FOR 2003

1/28/03

	FOMC		Staff
	Range	Central Tendency	
Percentage change, Q4 to Q4			
Nominal GDP	**4½ to 5½**	**4¾ to 5**	**4.8**
(July 2002)	(4½ to 6)	(5 to 5¾)	(5.6)
Real GDP	**3 to 3¾**	**3¼ to 3½**	**3.6**
(July 2002)	(3¼ to 4¼)	(3½ to 4)	(4.1)
PCE Prices	**1¼ to 1¾**	**1¼ to 1½**	**1.3**
(July 2002)	(1 to 2¼)	(1½ to 1¾)	(1.4)
Average level, Q4, percent			
Unemployment rate	**5¾ to 6**	**5¾ to 6**	**6.1**
(July 2002)	(5 to 6)	(5¼ to 5½)	(5.5)

Central tendencies calculated by dropping high and low three from ranges.

Appendix 4: Materials used by Mr. Reinhart

Exhibit 1

Exhibit 1 outlines the movements of key asset prices over the intermeeting period, using 6 panels.

Top-left panel
Expected Federal Funds Rates*

The line graph in the top-left panel shows the expected federal funds rate inferred from future quotes for December 9, 2002 (dotted line) and January 28, 2003 (solid line). The January 28, 2003 line is flat for most of 2003, which indicates that market participants are not expecting a policy change, and then rises steadily to about 3.2 percent in 2005, which indicates expected policy firming starting

year-end.

* Estimates from federal funds and eurodollar futures Return to text

Top-right panel
MMS Survey

The table in the top-right panel displays market expectations about balance of risks for the next three meetings.

(Percentage of Respondents)

Balance of Risks	FOMC Meeting		
	January	March	May
Weakness	14	14	16
Neutral	**86**	**83**	**74**
Inflation	0	3	10

Middle-left panel
Treasury Forward Rates (Change Since Last FOMC Meeting)

The bar chart in the middle-left shows the change in Treasury forward rates since the last FOMC meeting. Forward rates 1 to 3 years ahead declined 15 to 25 basis points, possibly owing to a sense that policy will be on hold for longer than previously expected, while forward rates 5 to 20 years ahead moved down only 7 to 2 basis points.

Middle-center and middle-right panels
Commodity Prices and Stock Prices

The middle-center and middle-right panels reveal further evidence of market skittishness with prices of oil and gold rising over the intermeeting period and equity indexes, such as the Nasdaq and Wilshire 5000, decreasing 3 to 5 percent.

Bottom panel
Corporate Risk Spreads

Finally, the panel at the bottom shows risk spreads on BBB-rate and high-yield corporate bonds continuing to reverse their recent spike. Even so, the spreads remained elevated relative to their levels of the preceding dozen years. The inset in this graph points out that most of this improvement in the high-yield sector is due to Telecom and Energy firms.

High-yield Spreads (Selected Sectors)

Basis Point Change Since Last FOMC

Telecom/Energy	-163
Other	-4

Exhibit 2
Policymaker Perfect Foresight Strategy for Monetary Policy

Exhibit 2 is comprised of four panels which focus on the nominal federal funds rate, the real federal funds rate, the unemployment rate, and PCE inflation. Each of these panels contain 3 lines: the

Greenbook history and forecast (black solid line), the path under optimal policy based rules based on a policymaker perfect foresight with a 1-percent inflation goal (red dotted line), and the path under optimal policy with a 1-1/2 percent inflation goal (blue dashed line). The Greenbook history and forecast extends from 2001 to 2004 while the paths under the optimal policy assumptions start in 2003, where the historic data ends, and extend to 2008. The optimal policy paths extend key assumptions of staff simulations (other than the path of monetary policy).*

Top-left panel
Nominal Federal Funds Rate

The top-left panel shows nominal federal funds rate. All the forecasts point to near-term policy easing. The Greenbook forecast is for the funds rate to move to 1-1/4 percent and hold there for most of 2003 and 2004 before inching up to 1-3/4 percent at the end of 2004. The optimal path under a 1 percent inflation goal prescribes a decline in the nominal federal funds rate by about 50 basis points to around 1/2 percent by mid-2003 and the optimal path with a 1-1/2 percent inflation goal points to a 100 basis points drop in the funds rate to about zero, also by mid-2003. After this trough, the two optimal policy paths recover steadily, and both hit a value of about 3.75 percent in 2006 after which they remain flat.

Top-right panel
Real Federal Funds Rate[1]

The top-right panel shows the path for the real federal funds rate, which exhibits the same pattern, only shifted slightly lower. The Greenbook forecast indicates a flat path at about zero percent before ticking up to about 1/2 percent. The path under a 1 percent inflation goal drops to -1/2 percent while the path under a 1-1/2 percent inflation goal drops to about -1 percent in mid-2003. Both optimal paths recover to about 2.5 percent by early 2006 and then remain flat until the end of 2008.

Middle panel
Civilian Unemployment Rate

In the middle panel, civilian unemployment rate peaks within a quarter or two of the current meeting before decreasing. The rate of decline varies in the different forecasts. In the Greenbook path, the unemployment rate reaches a maximum of 6-1/4 percent in mid-2003 and then drops gradually to about 5-1/4 percent by the end of 2004. The unemployment rates under the 1 percent inflation goal and the 1-1/2 percent inflation goal peak at about the same level and time as in the Greenbook but show steeper declines; they fall to 5 percent and to 4-3/4 percent, respectively, by the third quarter of 2004 and remain about flat until the end of 2008.

Bottom panel
PCE Inflation (ex. food and energy)

The final panel shows PCE inflation (excluding food and energy) as a four-quarter percent change. The Greenbook path shows inflation staying flat for a few quarters at 1.3 percent before slipping to 1.2 percent by the end of 2004. Under the 1 percent inflation goal, inflation ticks up slightly in the near term before moving down to 1.1 percent by the end of 2005, after which it holds steady. Under the 1-1/2 percent inflation goal, inflation rises a bit more than in the other cases, to 1.4 percent, after which it fluctuates in a modest range.

* The perfect foresight simulations extend the key assumptions of the staff outlook (other than the path for monetary policy) through 2008:

- potential output grows at about 3-3/4 percent per year
- the relative price of oil stabilizes at its end of 2004 level

- the exchange value of dollar measured in real terms falls at a 3 percent clip
- federal budget deficit relative to GDP declines moderately

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1. The real federal funds rate is calculated as the quarterly average nominal funds rate minus the four-quarter lagged core PCE inflation rate as a proxy for inflation expectations. Return to text

Exhibit 3
Actual Real Federal Funds Rate and Range of Estimated Equilibrium Real Rates

Exhibit 3 shows a line graph which provides information on the equilibrium real federal funds rate and long-run inflation expectations.

Top panel

The panel depicts the actual real federal funds rate starting in the first quarter of 1990, together with market-based and staff estimates of the equilibrium real funds rate and an historical average calculated over the 1966-2002 period. The historical average is plotted as a horizontal line at 2.70 percent, while the actual real funds rate and the market-based estimate are plotted as declining lines. The staff estimates consist of a shaded region bound by the maximum and minimum values for each quarter. The market-based estimate is currently slightly above 3 percent, while the staff estimates range between roughly 1-1/2 percent and -1/4 percent. Two points correspond to alternative values of the actual real funds rate based on two possible monetary policy decisions--i.e., no change in the target federal funds rate, and a 25 basis point cut.

Note: The shaded range represents the maximum and the minimum values each quarter of four estimates of the equilibrium real federal funds rate based on a statistical filter and the FRB/US model. Real federal funds rates employ four-quarter lagged core PCE inflation as a proxy for inflation expectations, with the staff projection used for 2002Q4 - 2003Q1.

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