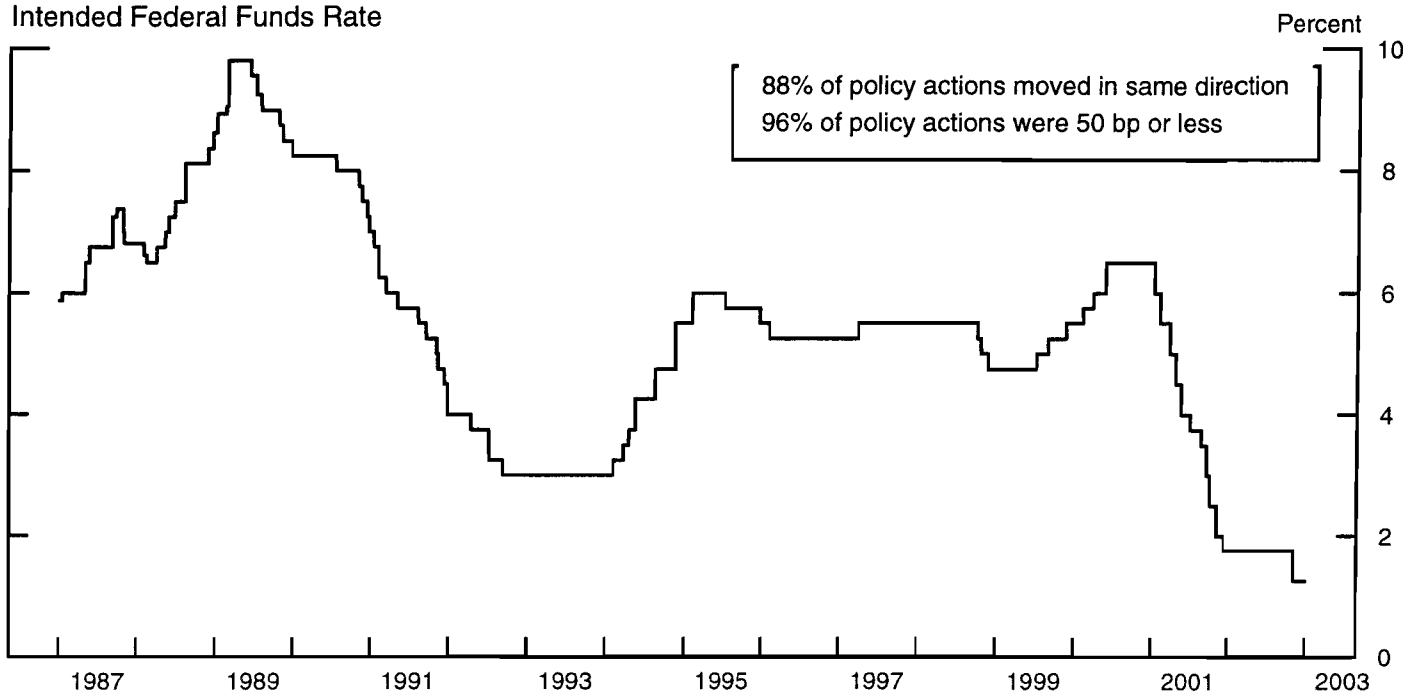
Appendix 1: Materials used by Messrs. Sack, Tetlow, Croushore, and Rudebusch

Exhibit 1
The Smoothness of the Federal Funds Rate



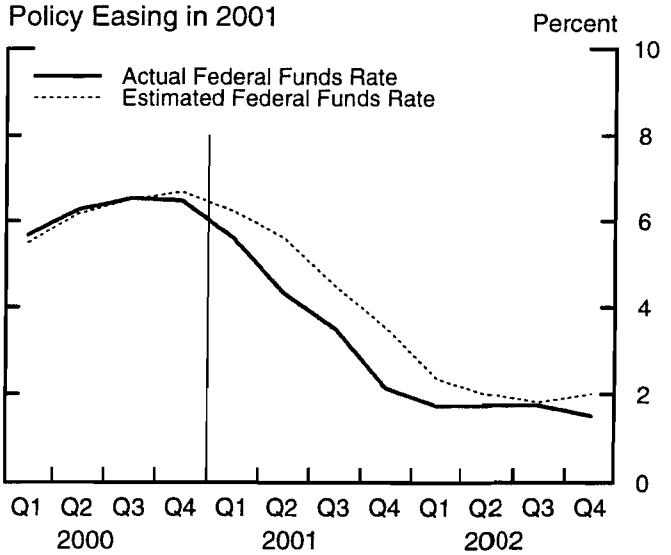
Estimated Monetary Policy Rule

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

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

Estimated using real-time data from 1987 to 2000

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



Vertical line denotes end of sample period.

Exhibit 2
Optimal Monetary Policy: A First Pass

Defining "Optimal" Policy

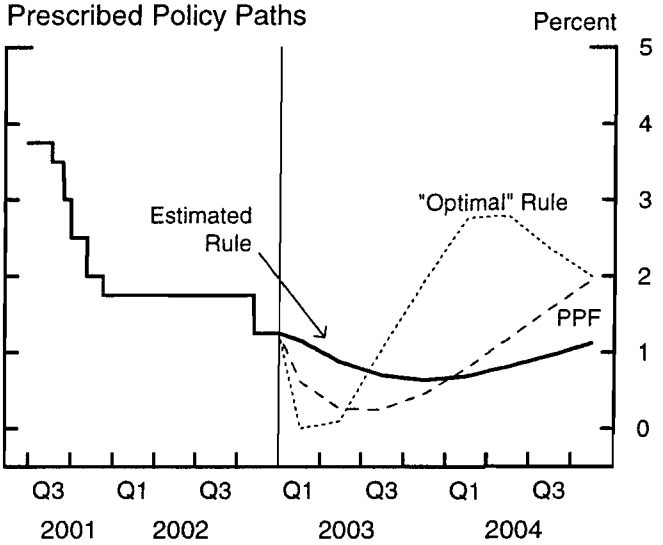
- FOMC desires to limit squared deviations of:
  - inflation from a target level
  - unemployment rate from its equilibrium level
- FRB/US is the correct characterization of the economy.
- The "optimal" policy is conditional on the model and the objectives assumed.

"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.

Prescribed Policy Paths



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

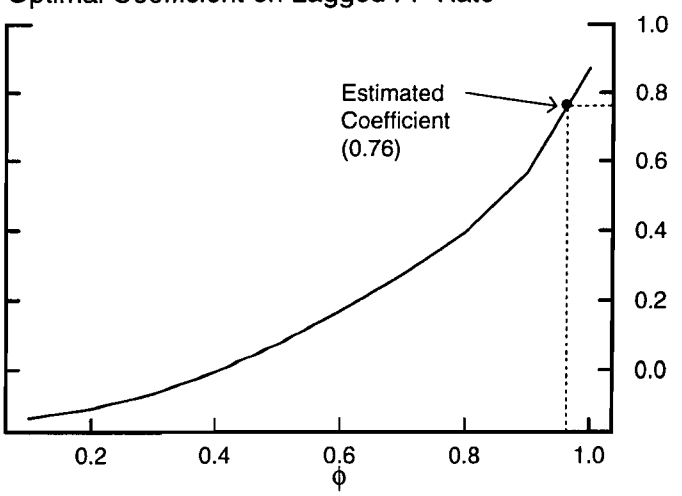
Implications of Forward-Looking Behavior

- 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.

Varying the Degree of Forward-Looking Behavior

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

Optimal Coefficient on Lagged FF Rate



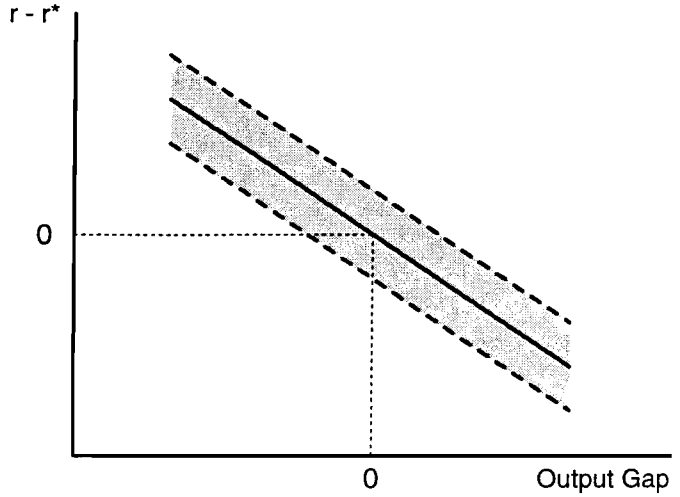
Impact of Forward-Looking Behavior

	Coefficient on:		
	Inflation	Output Gap	Lagged FF Rate
ϕ = 0	3.30	2.43	-0.15
ϕ = 0.5	3.51	2.42	0.08
ϕ = 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

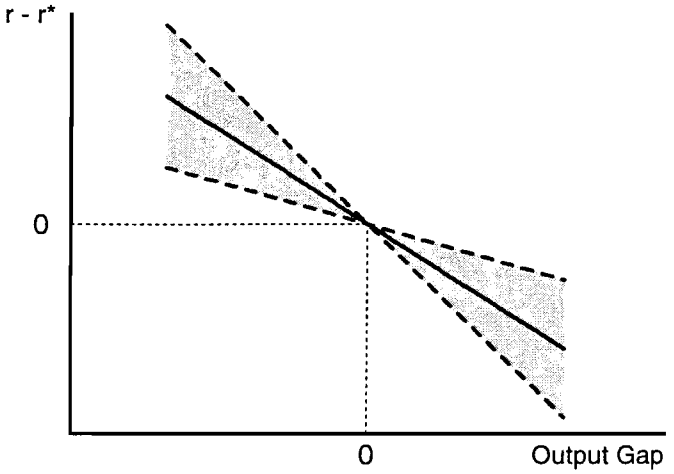
Effects of Additive Uncertainty



Implications of Additive Uncertainty

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

Effects of Parameter Uncertainty



Implications of Parameter Uncertainty

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

Parameter Uncertainty in a VAR

- VAR captures dynamics of key macroeconomic variables.
- Parameter uncertainty measured by var.-cov. matrix of coefficients.
- Use VAR to assess effect on "optimal" policy rule.

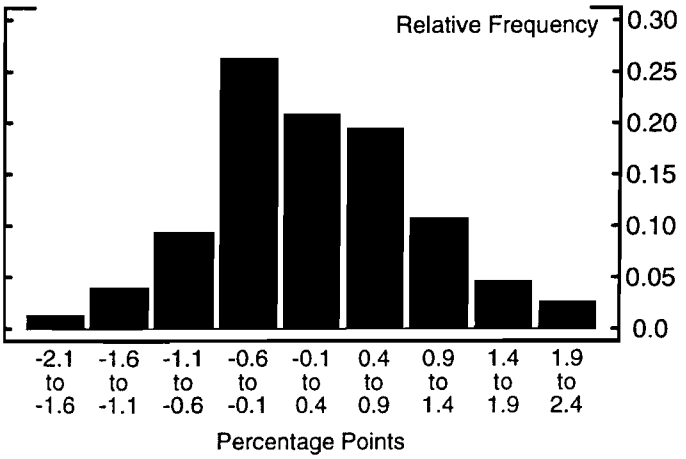
Impact of Parameter Uncertainty

	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

Revisions to Real Output Growth Rate*



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

Revisions to Real Output Growth Rate*

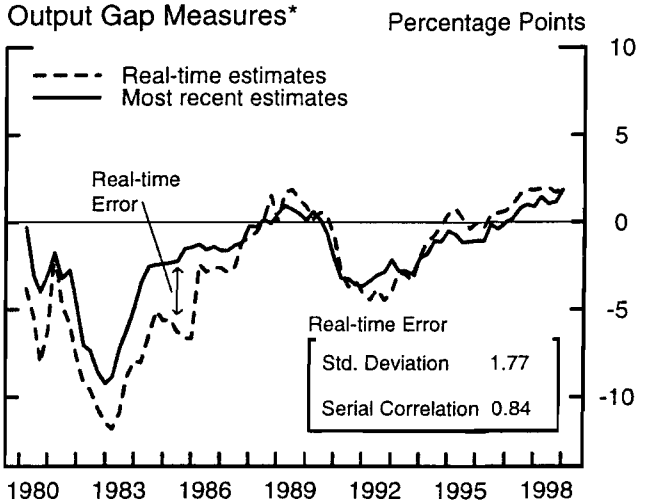
Time Since Initial Release	Average Absolute Revision (percentage points)
Release to 1 quarter	0.65
1 quarter to 1 year	0.61
1 year to 3 years	0.87
3 years to latest	1.39

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

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.

Output Gap Measures*



*Staff estimates taken from Greenbooks.

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.

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

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.

Other Considerations

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

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.

Monetary Policy Inertia

Material for a presentation to the FOMC
January 28, 2003

Glenn Rudebusch
Federal Reserve Bank of San Francisco

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.

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 ρ—which indicates the amount of inertia—is the weight on last quarter's funds rate level:

$$\textit{funds rate}_t = \rho \times \textit{funds rate}_{t-1} + (1 - \rho) \times \textit{desired funds rate}_t .$$

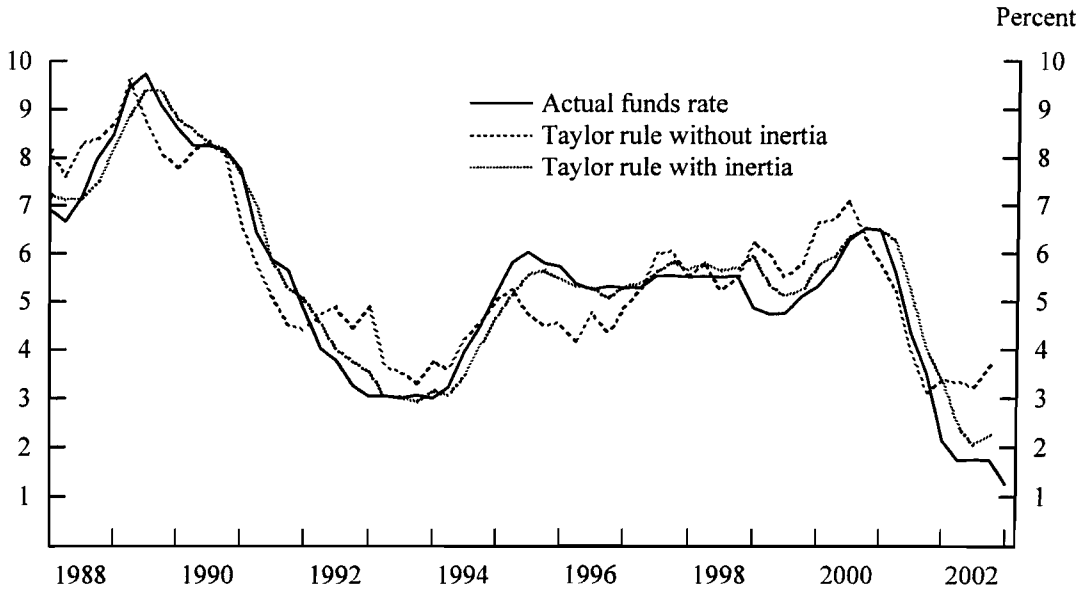
- With quarterly data, many estimates put about a ¾ weight on the lagged funds rate ($\rho = .75$) and a ¼ weight on the desired rate. The usual interpretation of this partial adjustment is that the Fed adjusts the funds rate only 25 percent toward its desired level in each quarter—a very sluggish policy 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:

$$\textit{desired funds rate}_t = \alpha \times \textit{output gap}_t + \beta \times \textit{inflation}_t .$$

- 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.



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.

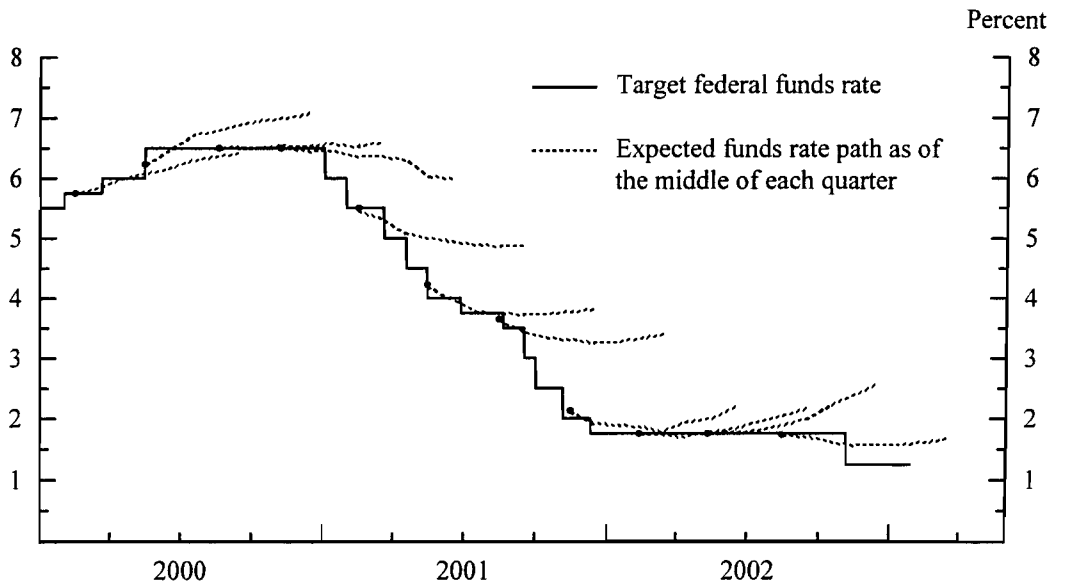
- Therefore, a significant amount of policy inertia implies a significant amount of predictive information in financial markets about the future path of the funds rate.

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.



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."

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.

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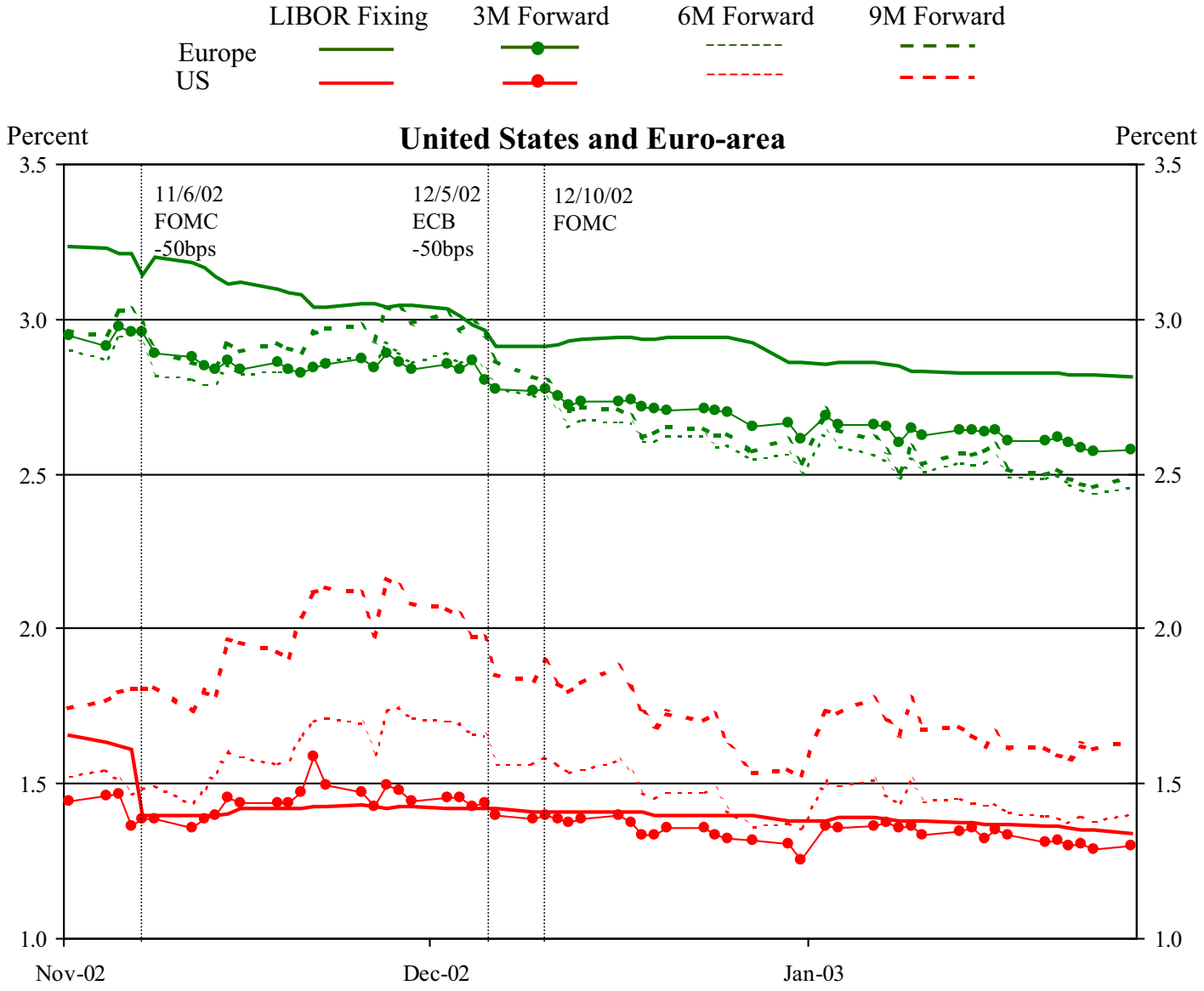
Rudebusch, Glenn D. 2002. "Assessing Nominal Income Rules for Monetary Policy with Model and Data Uncertainty," *Economic Journal* 112, pp. 402-432.

Woodford, Michael. 1999. "Optimal Monetary Policy Inertia." *The Manchester School Supplement*, pp. 1-35.

Appendix 2: Materials used by Mr. Kos

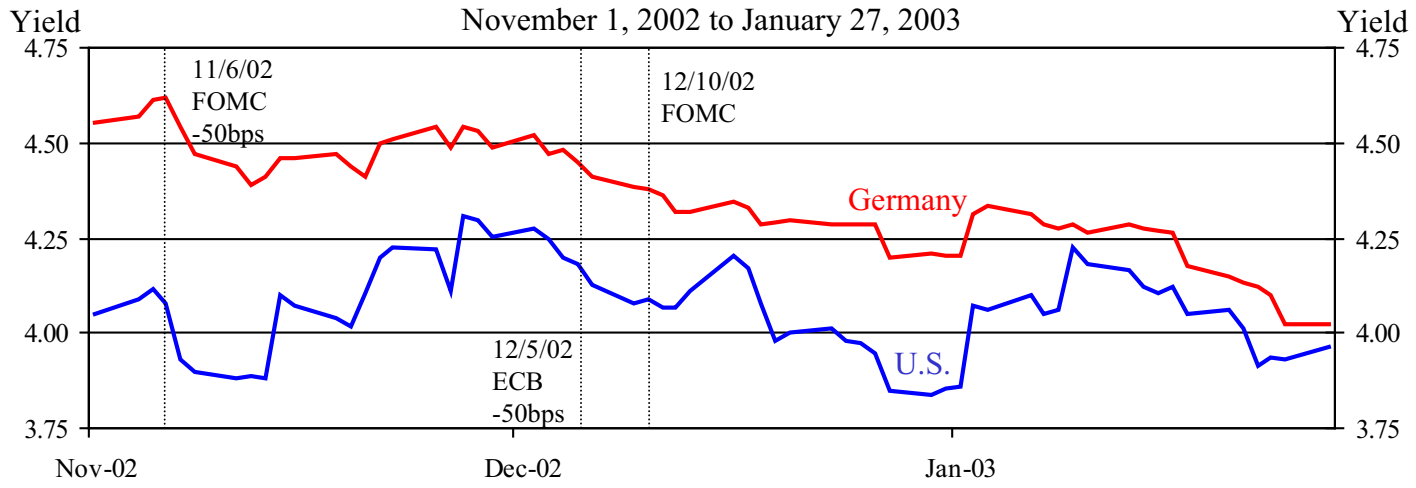
Current 3-Month Deposit Rates and Rates Implied by Traded Forward Rate Agreements

November 1, 2002 to January 27, 2003



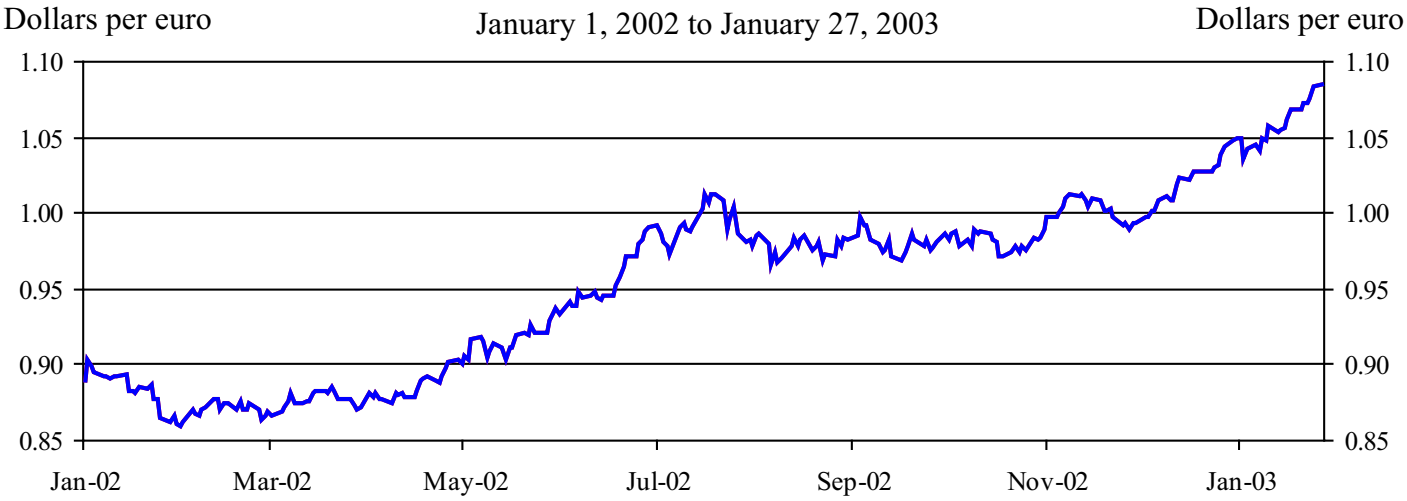
10-Year U.S. Treasury and German Bund Yields

November 1, 2002 to January 27, 2003



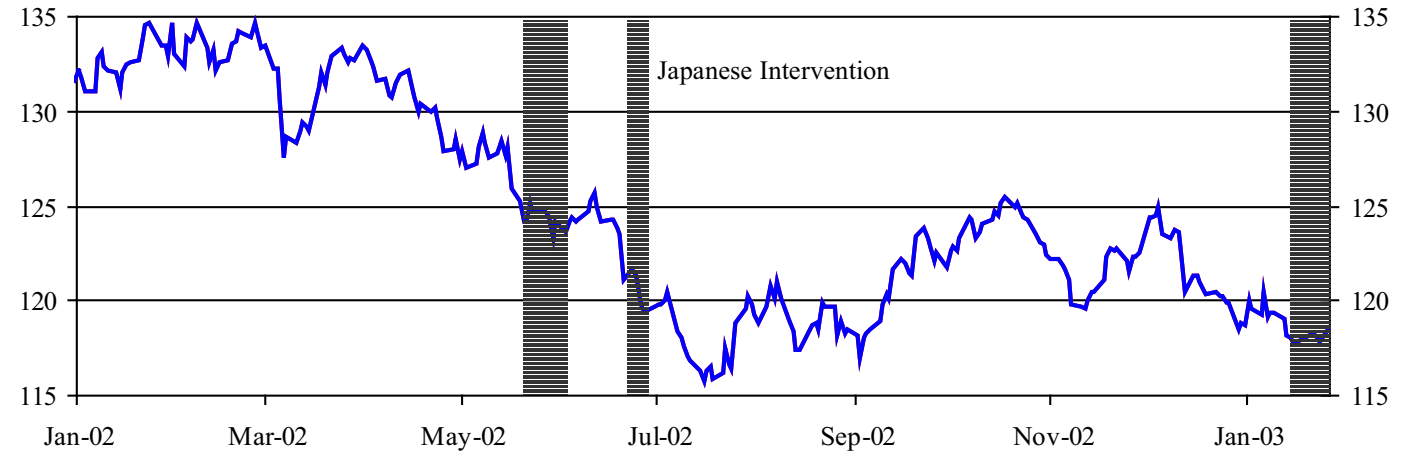
Euro-Dollar Exchange Rate

January 1, 2002 to January 27, 2003



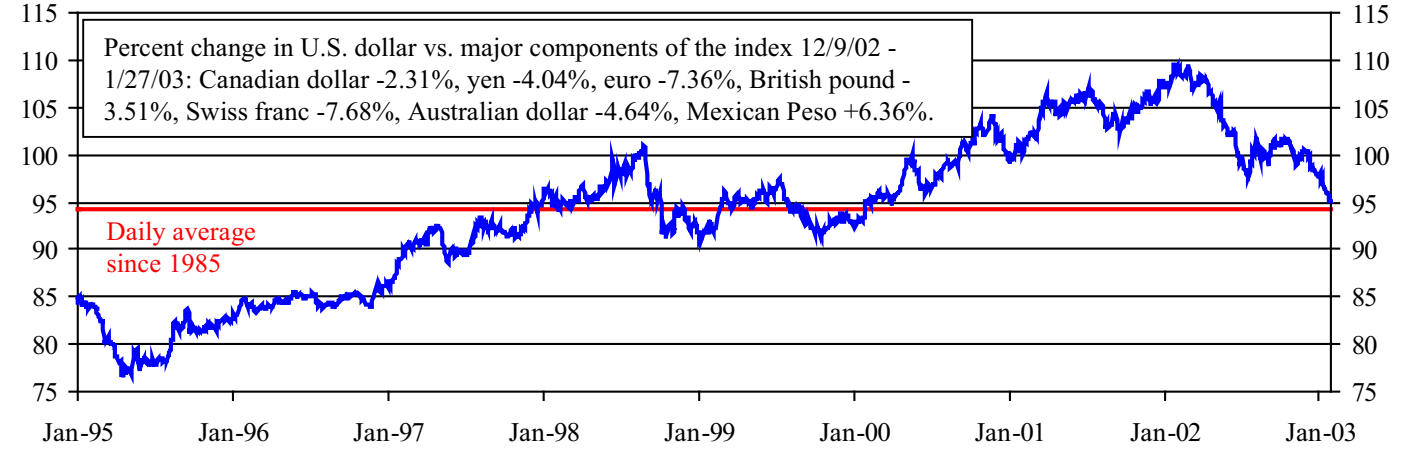
Dollar-Yen Exchange Rate

January 1, 2002 to January 27, 2003



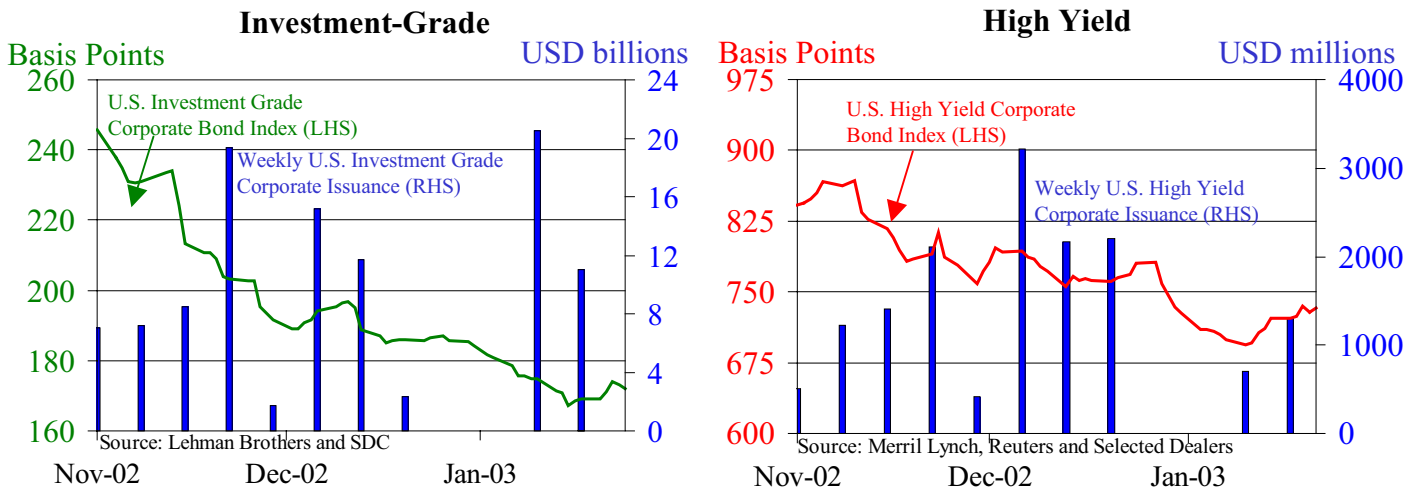
Trade Weighted U.S. Dollar

January 1, 1995 to January 27, 2003



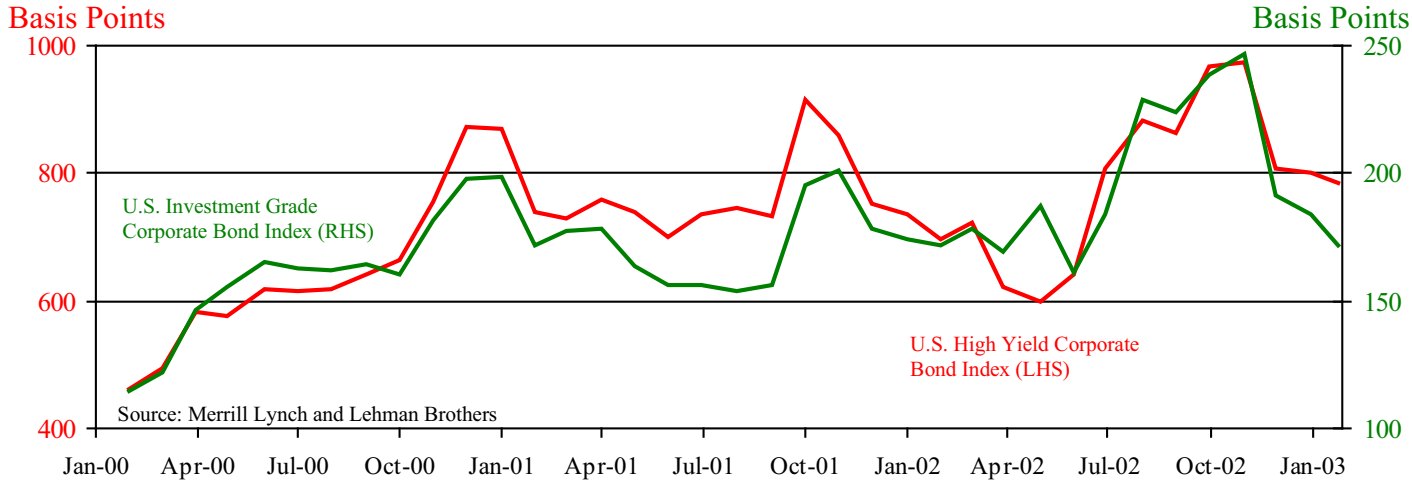
Corporate Spreads to U.S. Treasuries and Corporate Issuance Data

November 1, 2002 to January 24, 2002



Monthly Corporate Bond Spreads to U.S. Treasuries

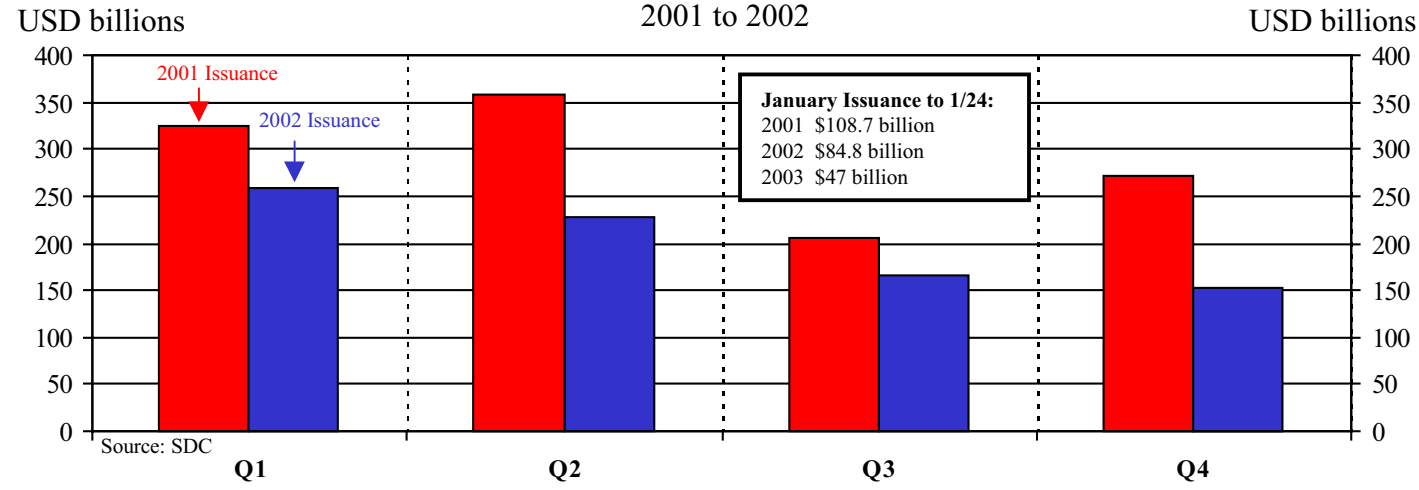
September 3, 2002 to January 24, 2003



Total U.S. Corporate Debt Issuance

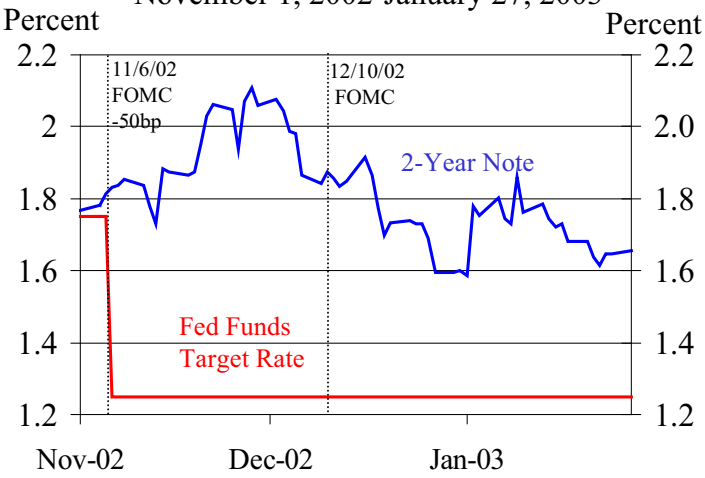
(Investment Grade and High Yield)

2001 to 2002



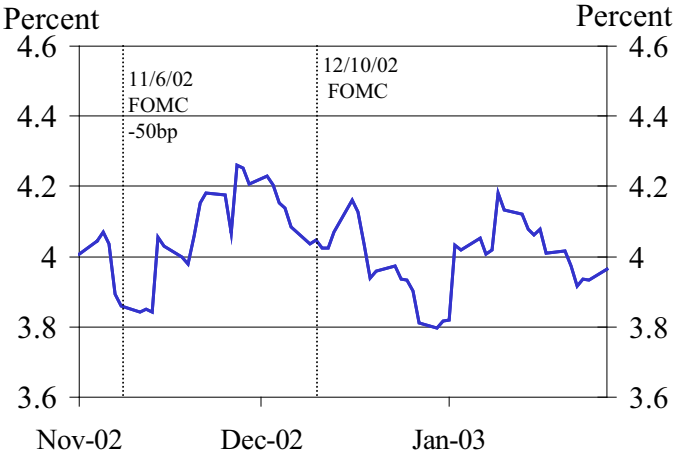
2-Year U.S. Treasury Note and Fed Funds Target Rate

November 1, 2002-January 27, 2003



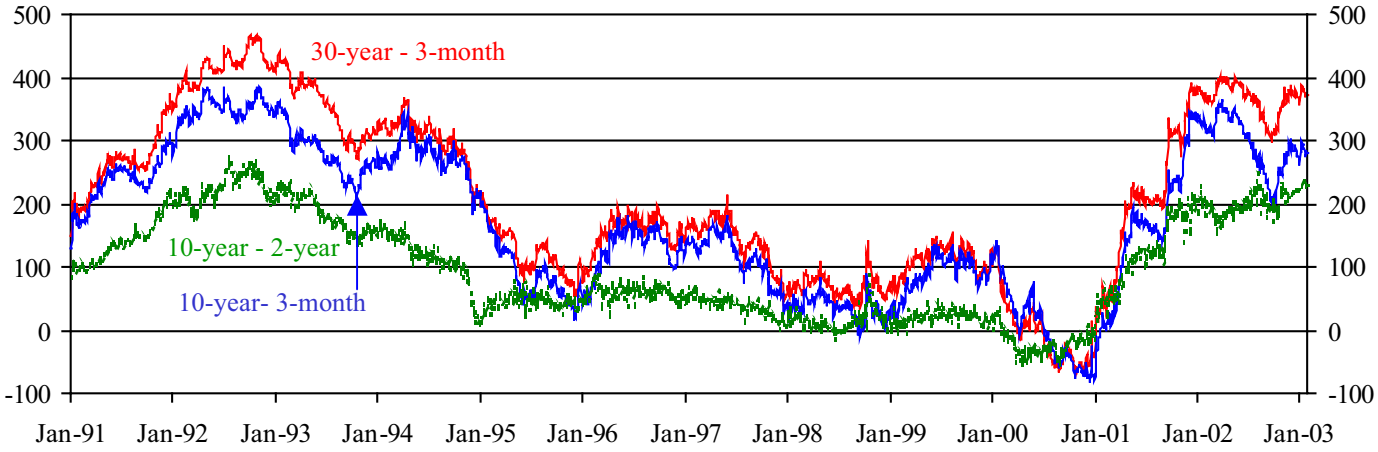
10-Year U.S. Treasury Note

November 1, 2002-January 27, 2003



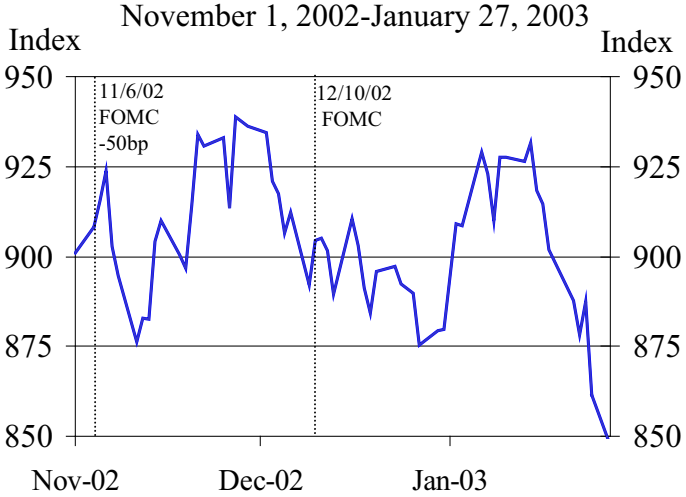
U.S. Treasury Yield Curve Spreads

January 1, 1991 to January 27, 2003



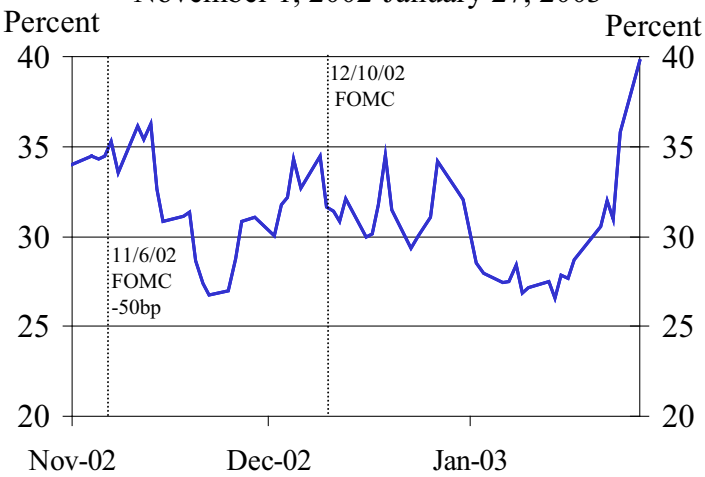
S&P 500 Index

November 1, 2002-January 27, 2003



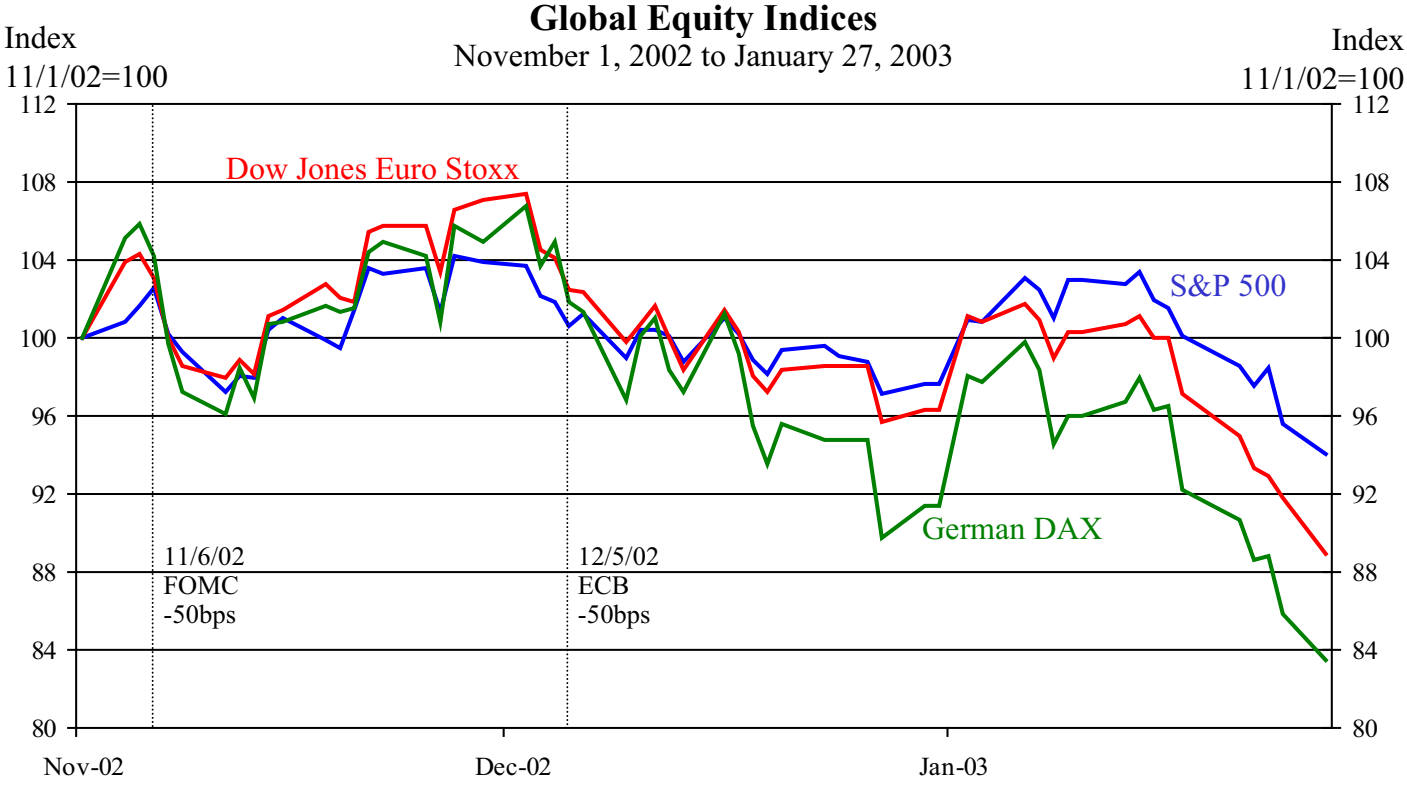
S&P 100 Volatility Index (VIX)

November 1, 2002-January 27, 2003



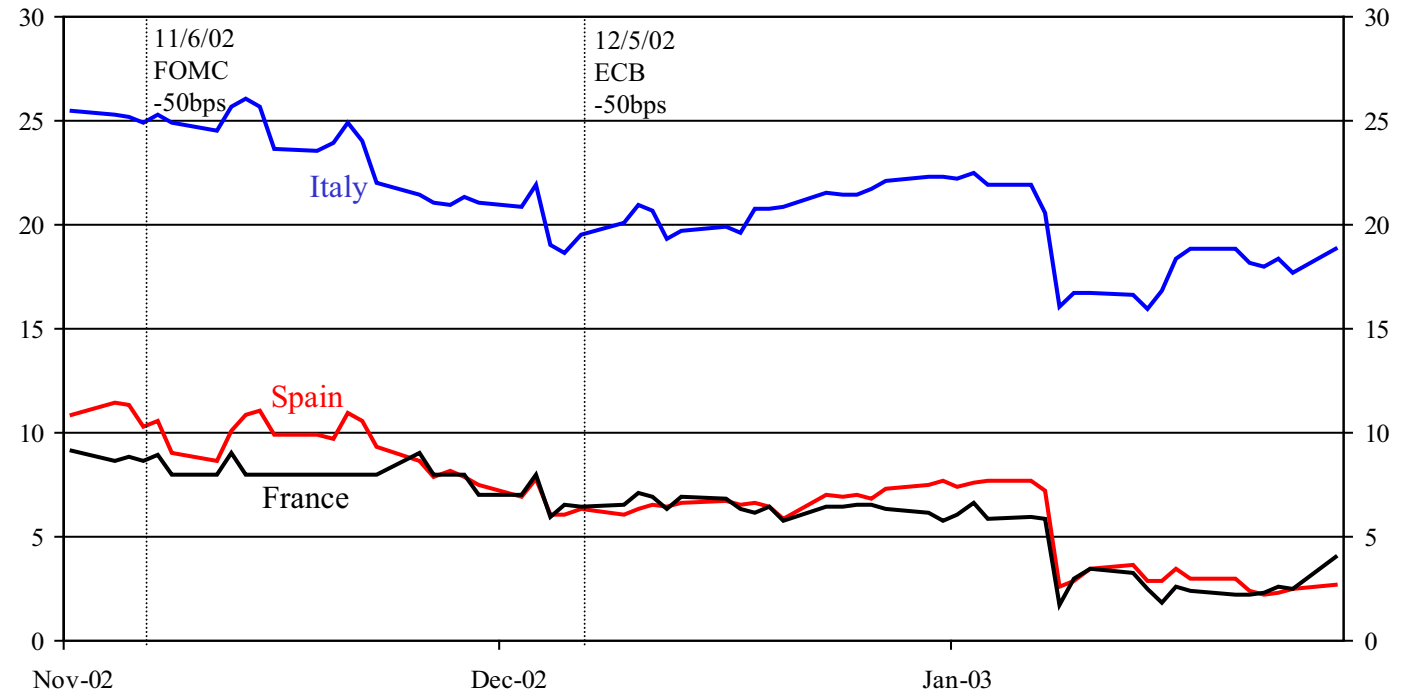
Global Equity Indices

November 1, 2002 to January 27, 2003



10-Year European Sovereign Debt Spreads over German Bunds

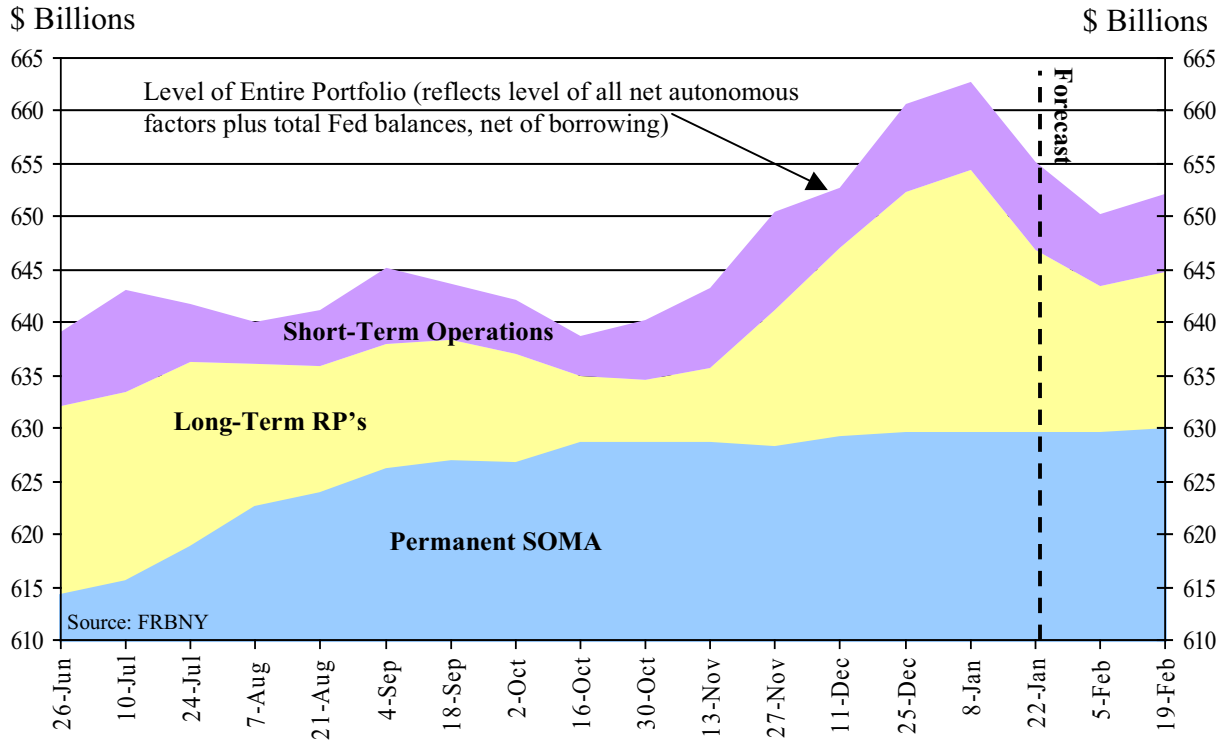
November 1, 2002 to January 27, 2003



10-Year European Sovereign Debt Spreads over German Bunds		
	1993-99	1997-99
France	26bps	0.13bps
Italy	288	73
Spain	247	49

Domestic Portfolio: Permanent SOMA Holdings, Long-Term RPs, & Net Short-Term Operations

(July 2002 to February 2003. Maintenance-Period Average Values, billions of dollars)



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

STRICTLY CONFIDENTIAL (FR) CLASS I-FOMC*

Material for

Staff Presentation on the Economic Outlook

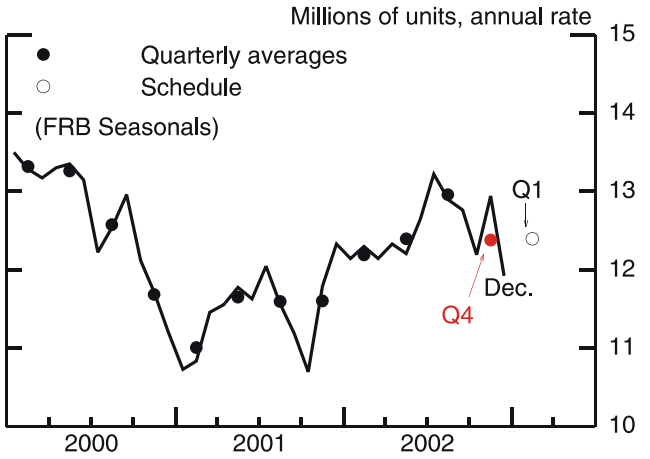
January 28, 2003

*Downgraded to Class II upon release of the February 2003 Monetary Policy Report.

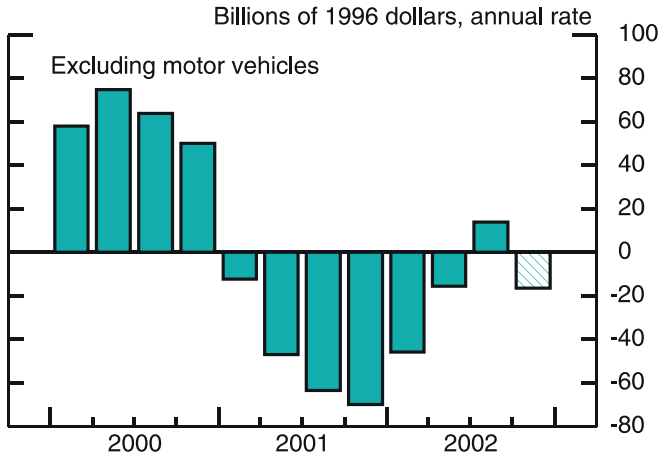
Chart 1

Near Term Outlook

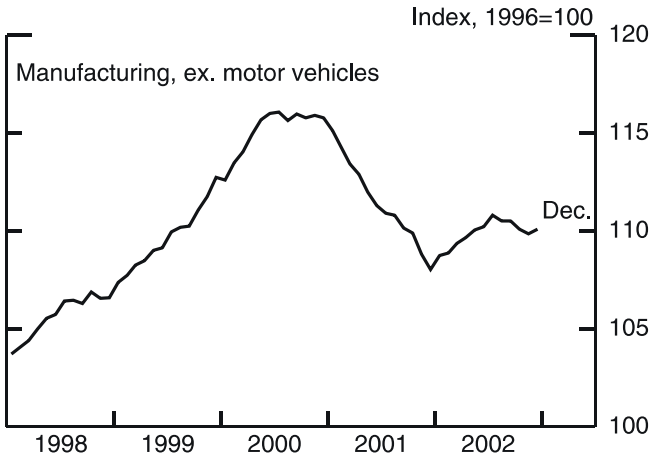
Production of Motor Vehicles



Change in Nonfarm Inventories



Industrial Production

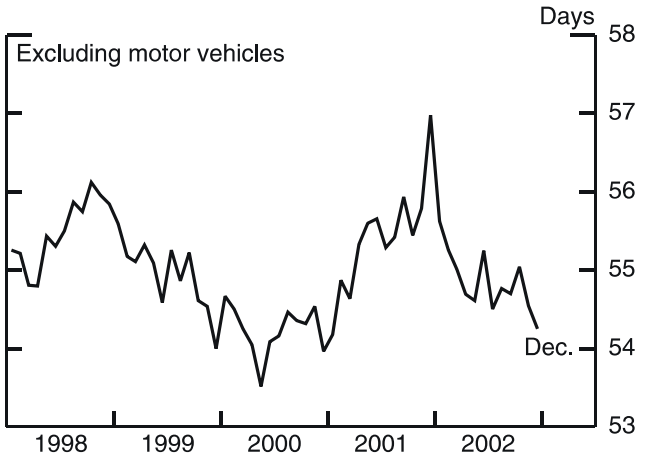


Demand Indicators

	Q3	Oct.	Nov.	Dec.
1. Real PCE ex. motor vehicles*	.1	.4	.3	.3[p]
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

Days' Supply of Inventories*



*IP-based flow of goods system

Customer Inventories

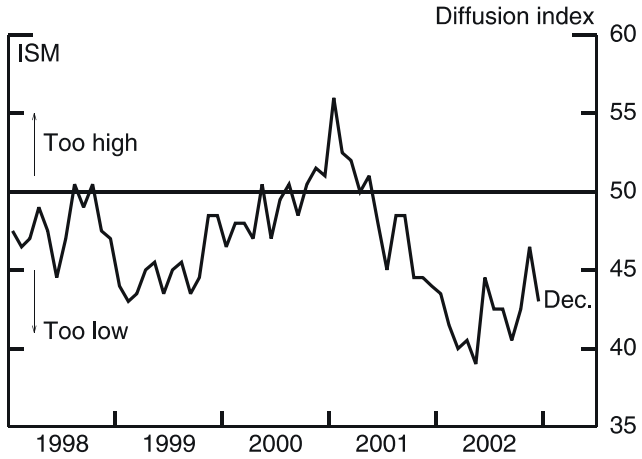


Chart 2

Forecast Summary

(Percent change, annual rate*)

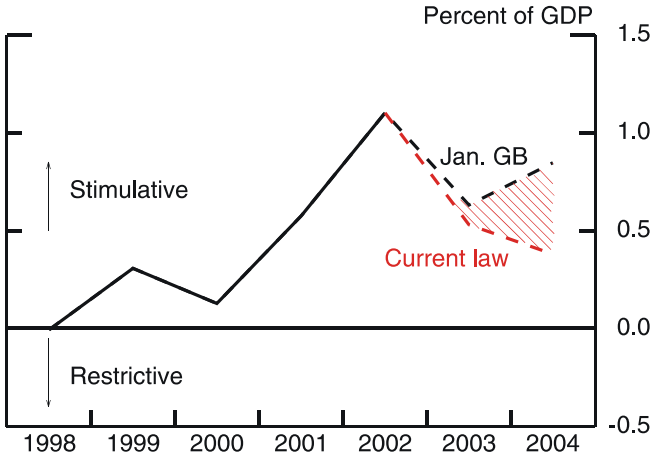
	2002		2003		2004
	H1	H2	H1	H2	
			projection		
Real GDP	3.1	2.1	2.7	4.5	4.7
Unemployment rate**	5.9	5.9	6.2	6.1	5.4
PCE price index	1.9	1.8	1.7	1.0	1.2

*Years are Q4/Q4; half years are either Q2/Q4 or Q4/Q2.
**Percent, end of period.

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.

Fiscal Impetus



Real GDP

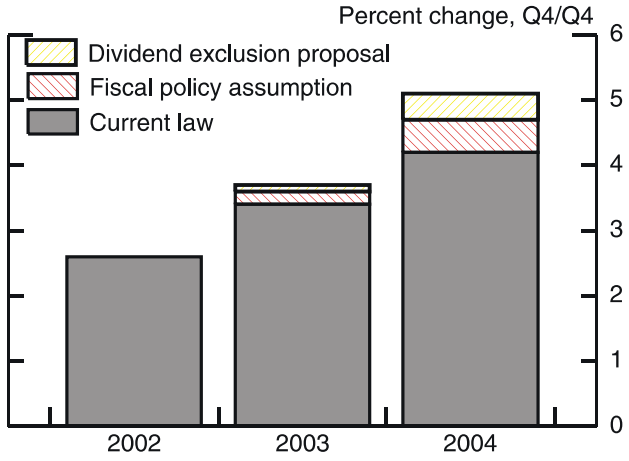
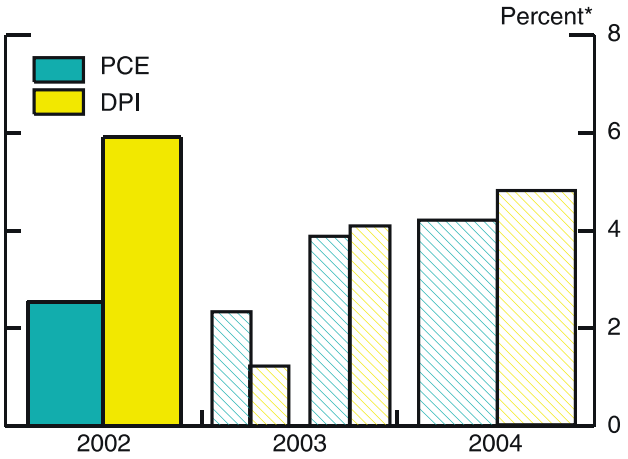


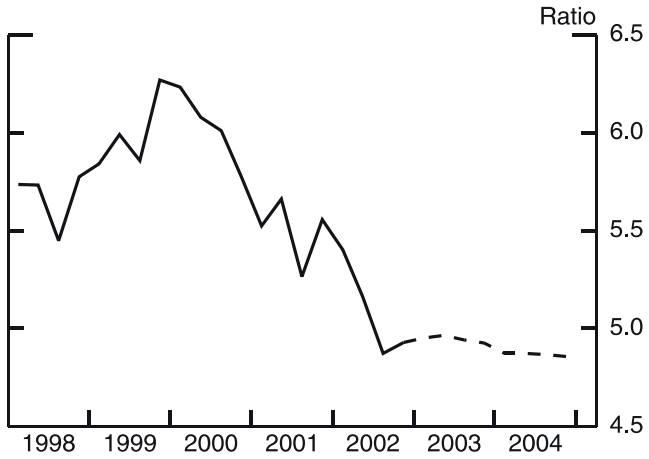
Chart 3
Household Sector

Real DPI and PCE Growth



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

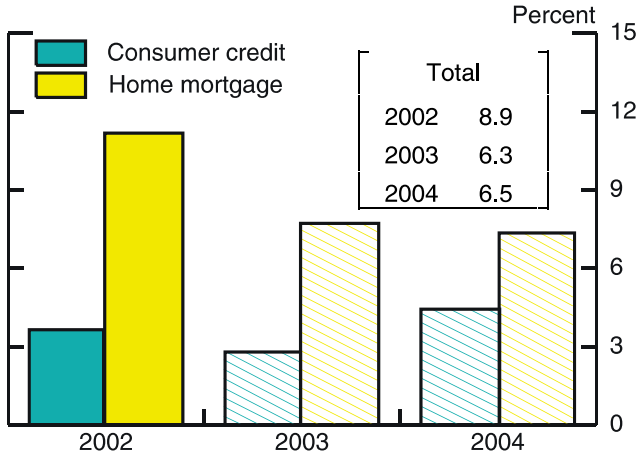
Ratio of Household Net Worth to Total DPI



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

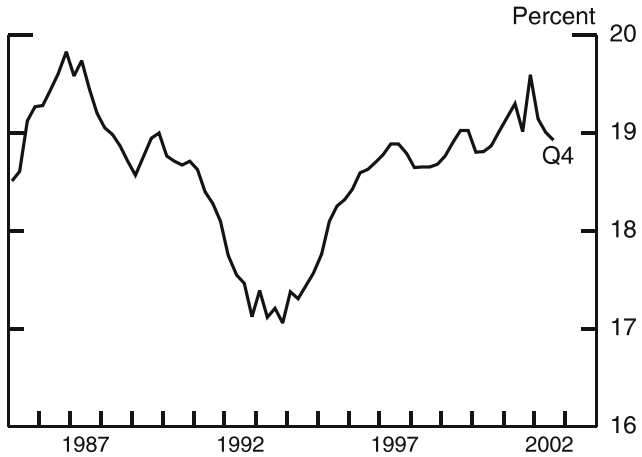
Household Debt Growth



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

Ratio of Consumer Payments* to Total DPI



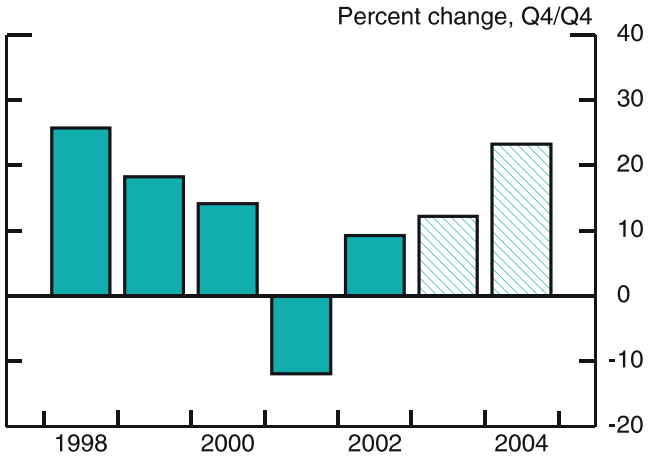
*Consumer payments include mortgage service, rental payments, motor vehicle leasing and consumer credit payments.

Chart 4

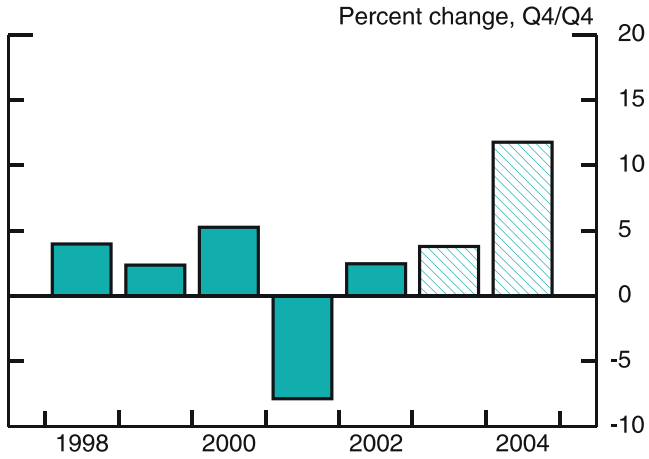
Business Sector

Real Investment

High-tech Equipment and Software



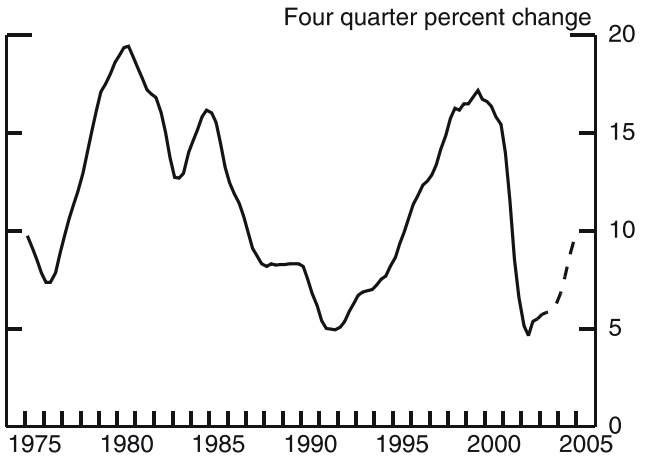
Other Equipment*



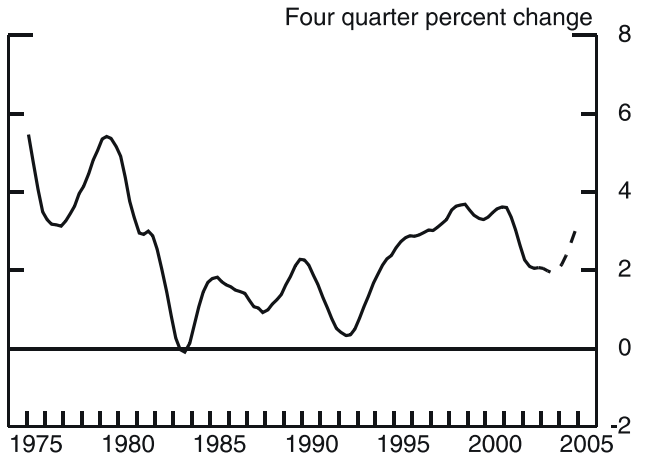
*Excluding high-tech and transportation

Real Net Capital Stock

High-tech Equipment and Software

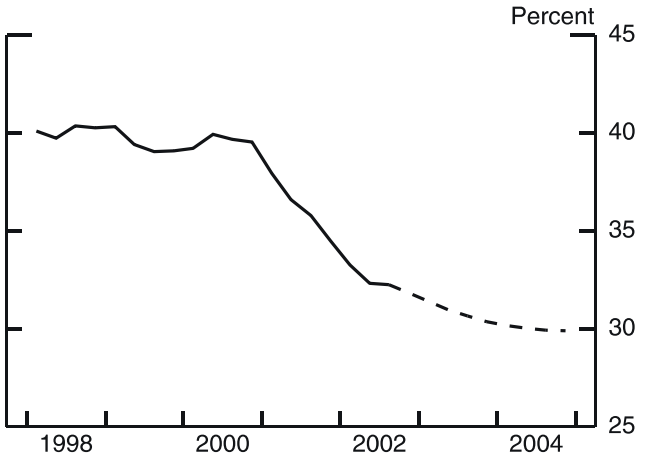


Other Equipment*

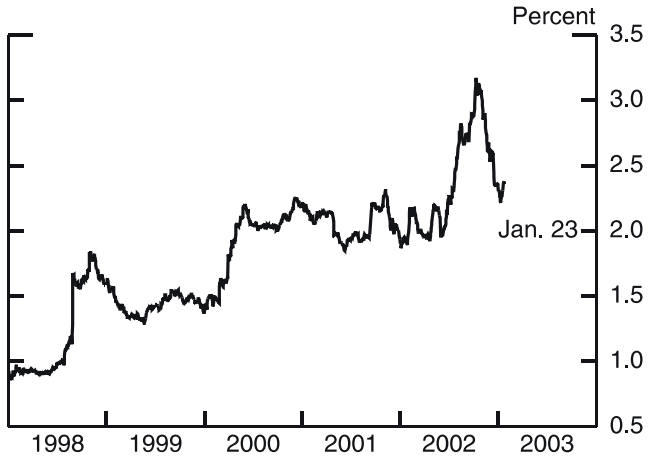


*Excluding high-tech and transportation

Short-term Debt Relative to Total Debt



Interest Rate Spread*

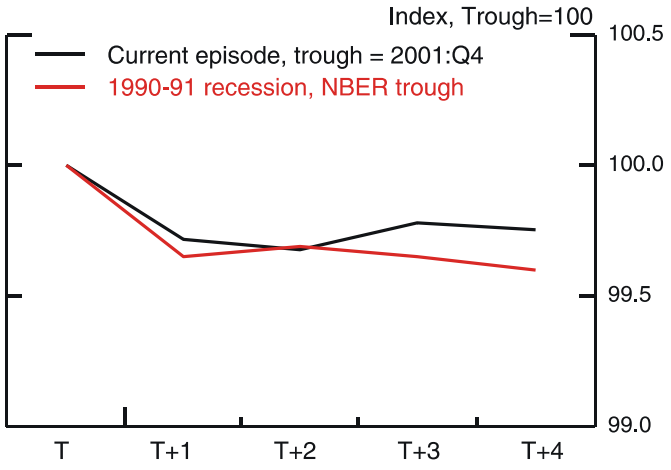


*Ten-year BBB corporate yield less 10-year Treasury

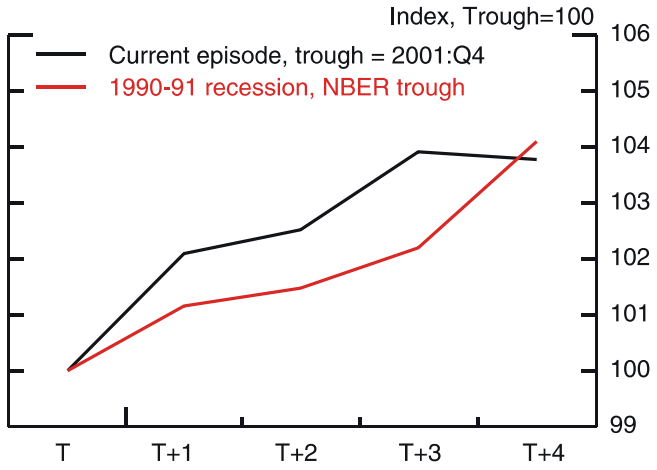
Chart 5

Productivity

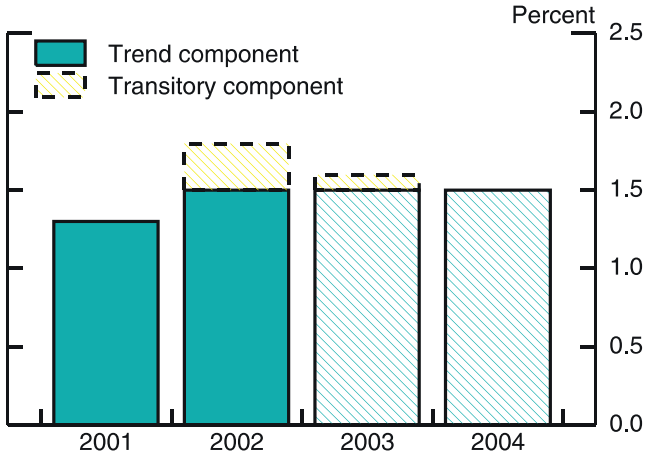
Nonfarm Payroll Employment



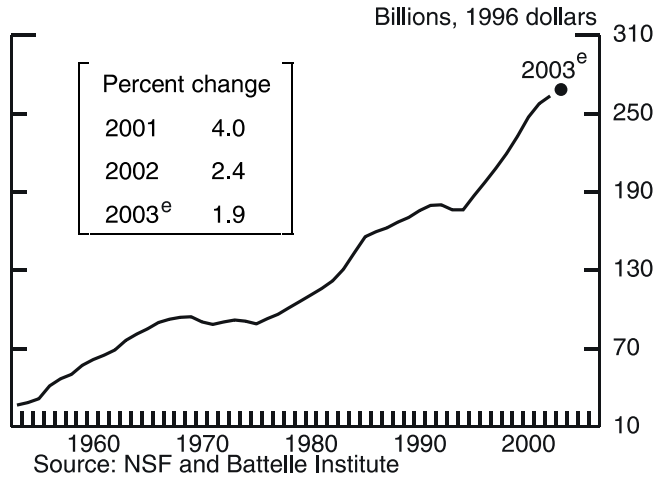
Labor Productivity



Structural Multifactor Productivity Growth



Research and Development Expenditures



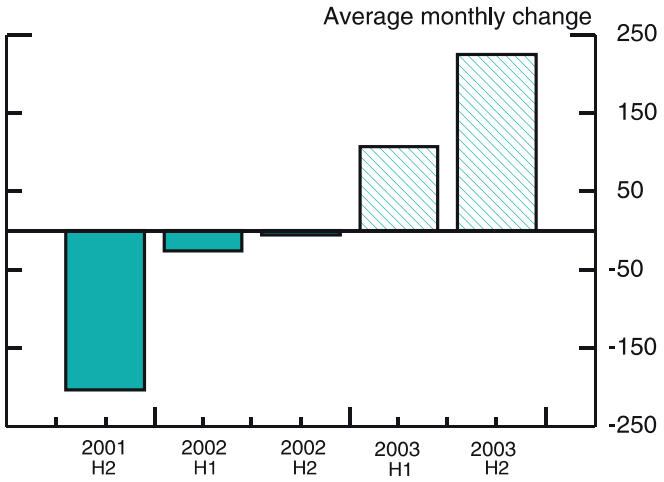
Source: NSF and Battelle Institute

Structural Productivity and Potential Output Growth
(percent change)

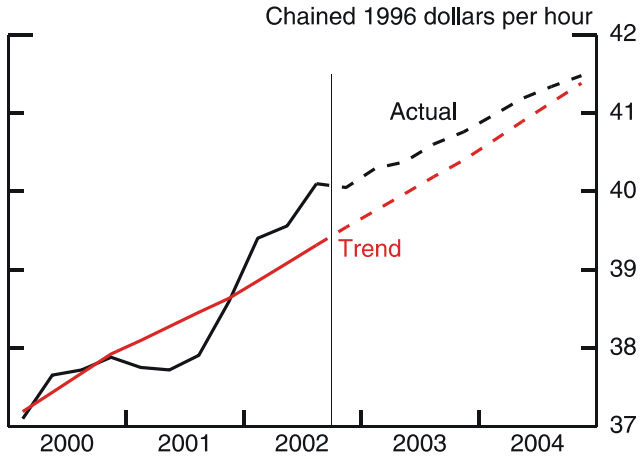
	2001	2002	2003	2004
1. Structural Productivity	1.9	2.3	2.2	2.4
Previous	*1.9*	*1.9*	*2.0*	*2.3*
Contributions of:				
2. Capital Deepening	.4	.3	.3	.7
3. Labor Composition	.3	.3	.3	.3
4. Multifactor Productivity	1.3	1.8	1.6	1.5
Memo:				
5. Potential Output	2.9	3.3	3.2	3.4
Previous	*2.9*	*2.9*	*3.0*	*3.3*

Chart 6
Labor Markets

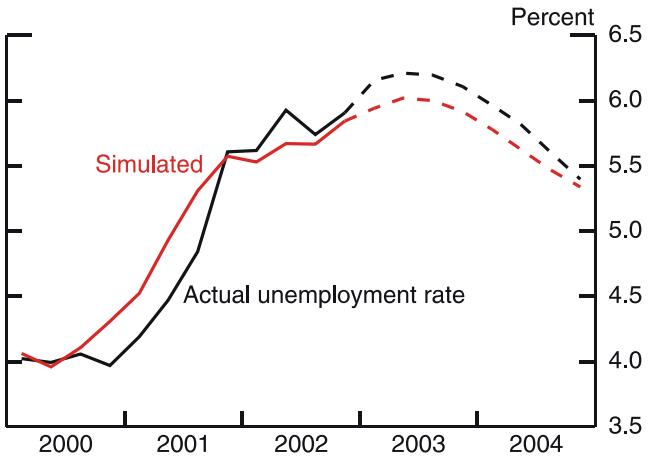
Nonfarm Payrolls



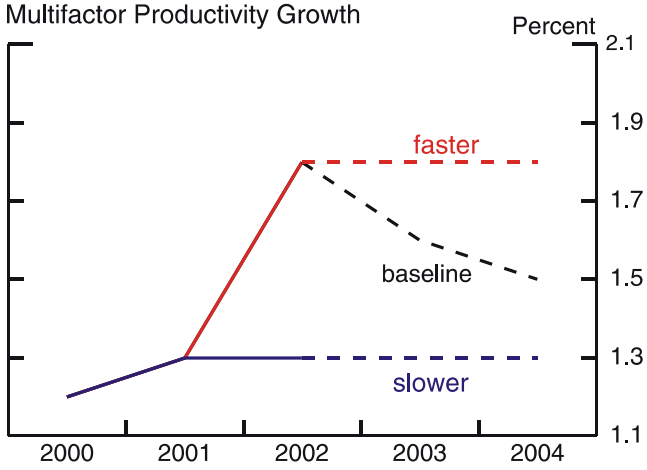
Actual Labor Productivity



Okun's Law



Alternative Paths for Structural Multifactor Productivity Growth



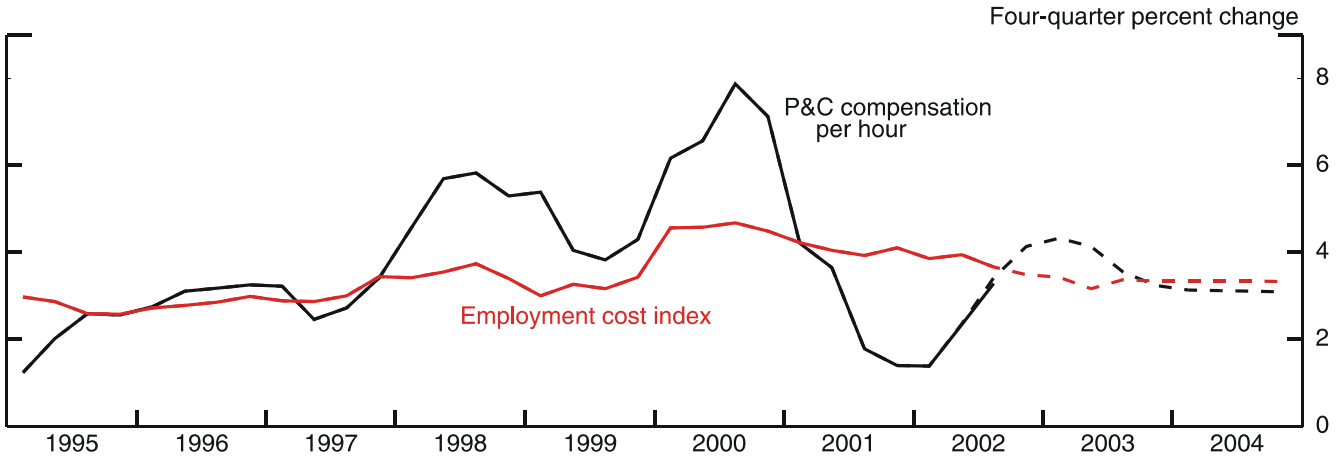
Alternative Structural MFP Scenarios
(Deviations from baseline)

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

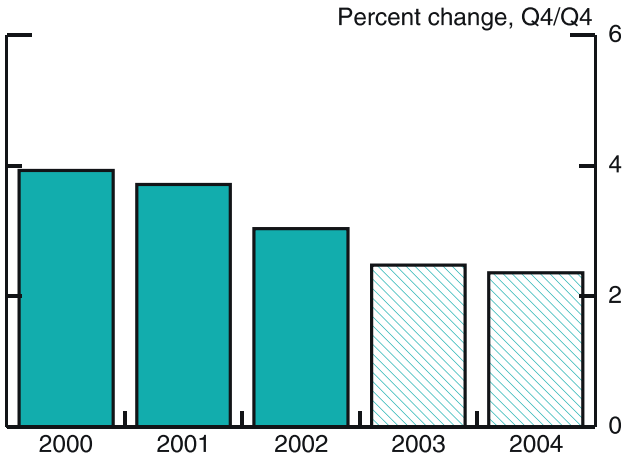
Chart 7

Compensation

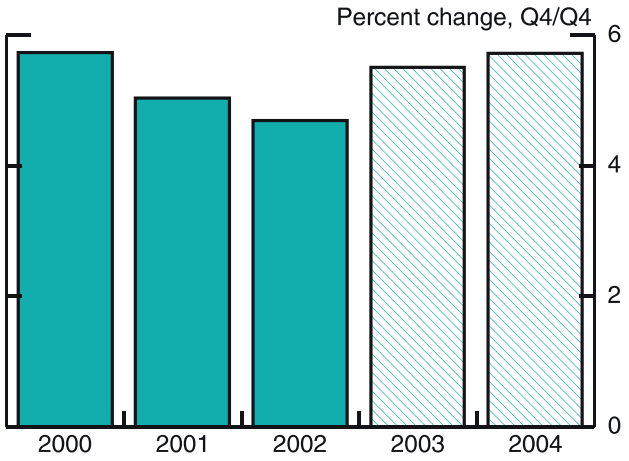
Hourly Labor Compensation



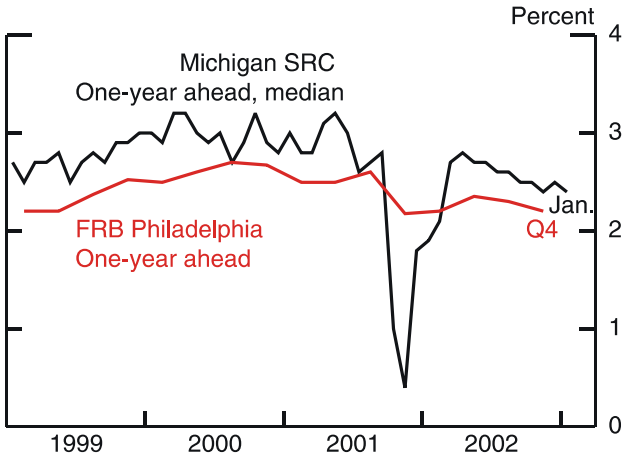
ECI Wages and Salaries



ECI Benefits



Inflation Expectations



Unemployment Gap

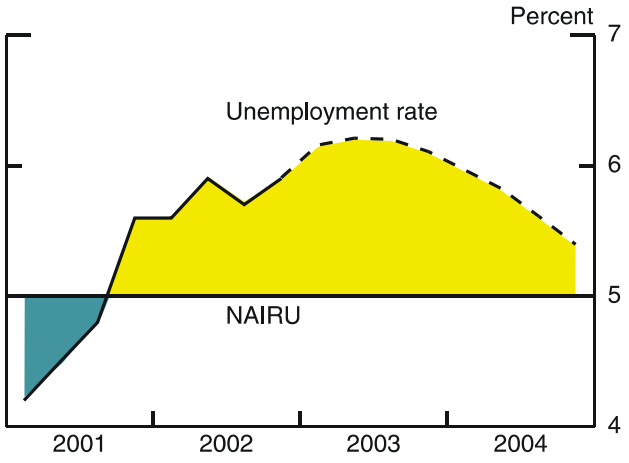
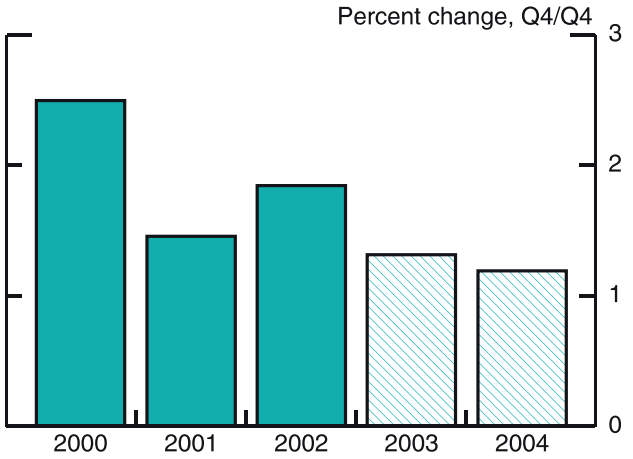


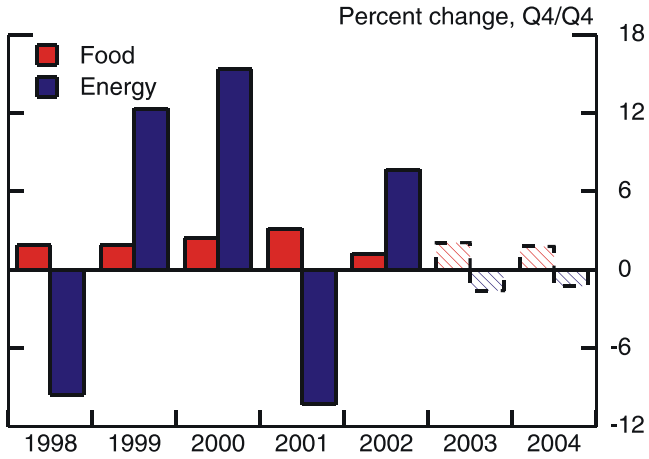
Chart 8

Prices

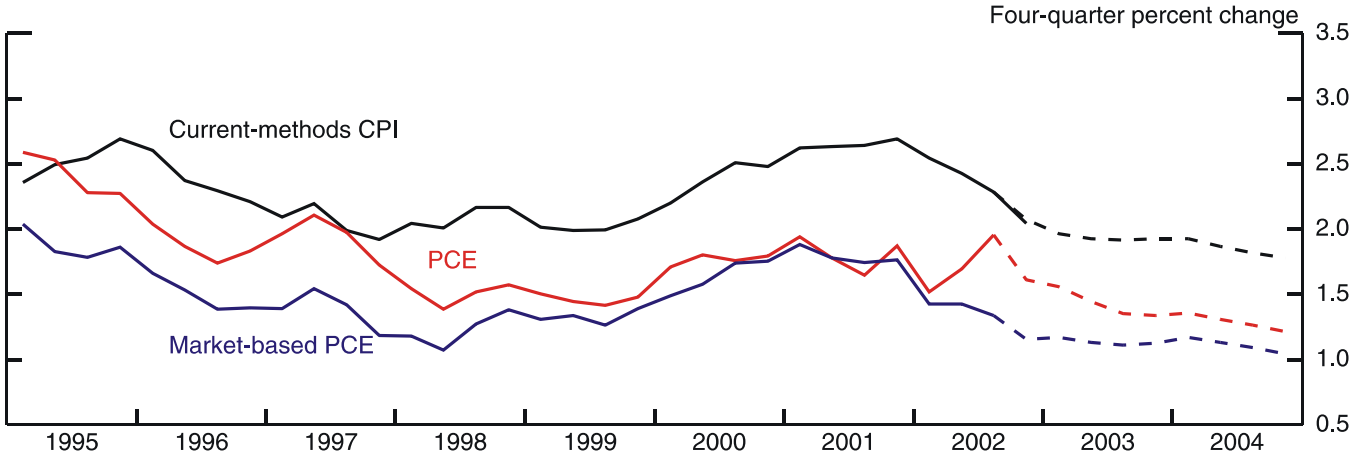
PCE Prices



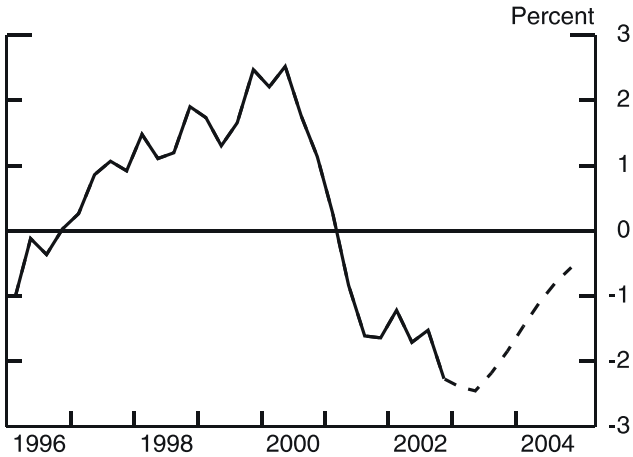
PCE Food and Energy Prices



Core Consumer Prices

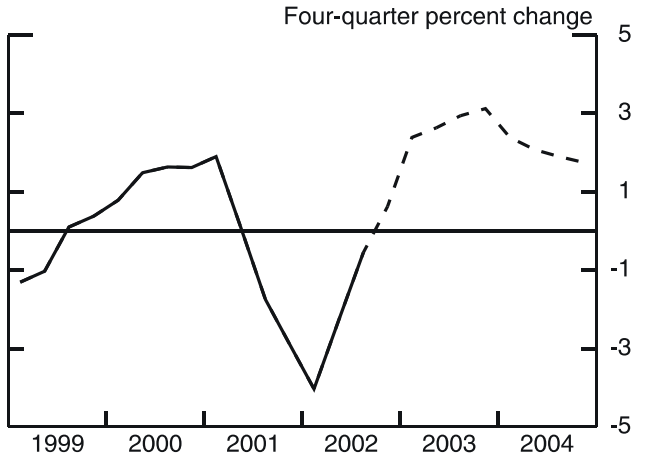


GDP Gap*



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

Core Non-oil Import Prices*



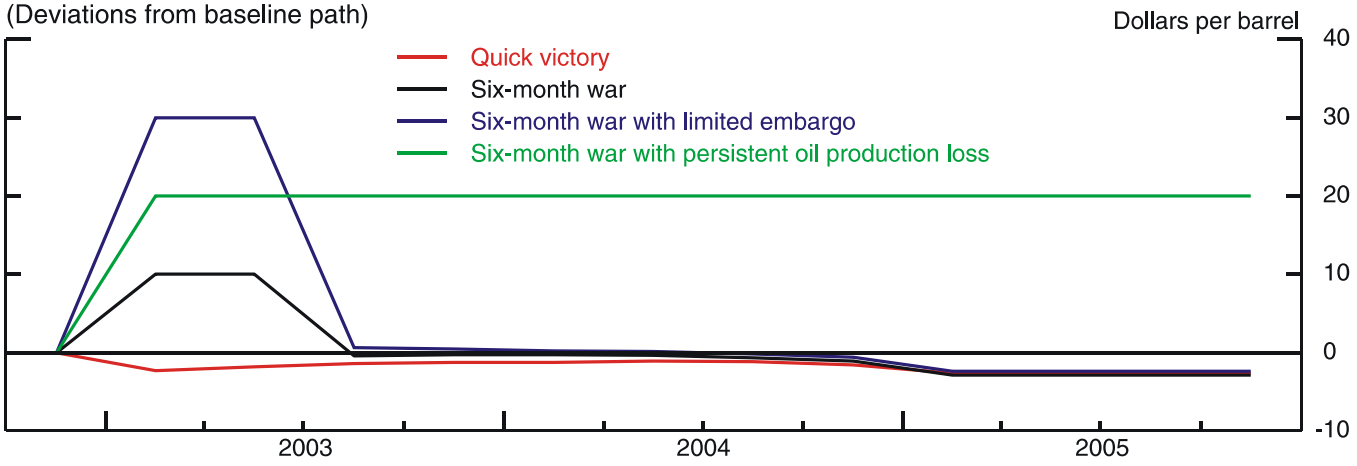
*Excludes semiconductors and computers

Chart 9

Scenarios on Potential Iraq War

- 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

Oil Price Scenarios
(Deviations from baseline path)



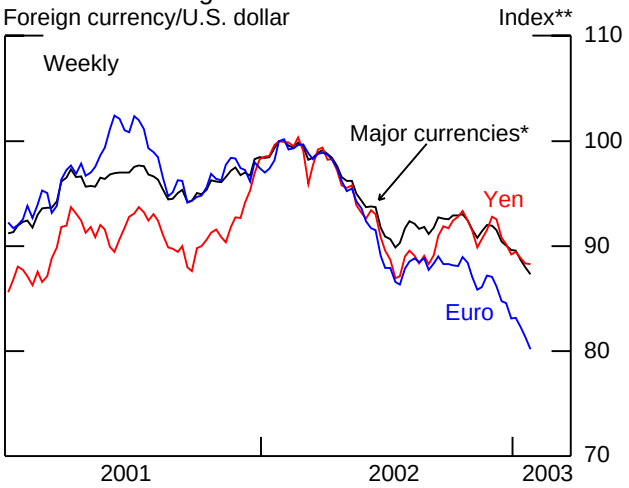
Macroeconomic Implications of Alternative War Scenarios
(Deviation from baseline)

	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

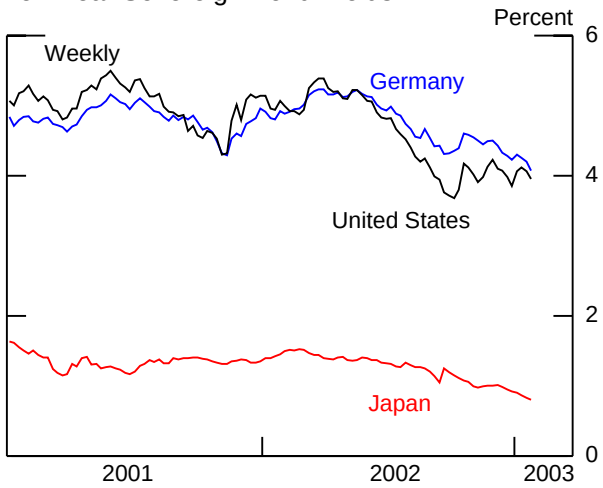
Financial Developments

Nominal Exchange Rates

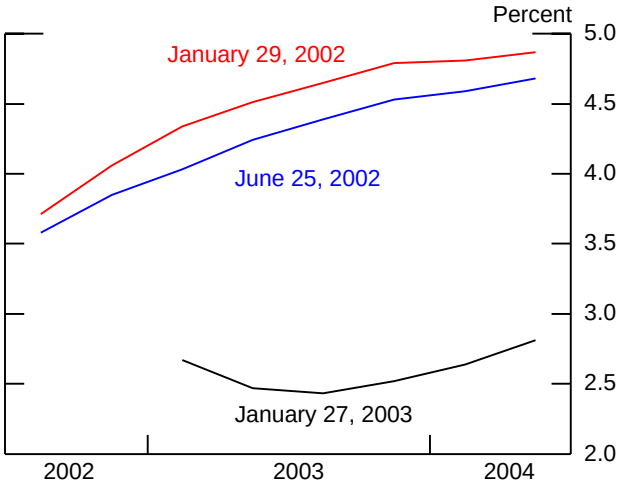


* Trade-weighted average against major foreign currencies.
**Week of January 28, 2002 = 100.

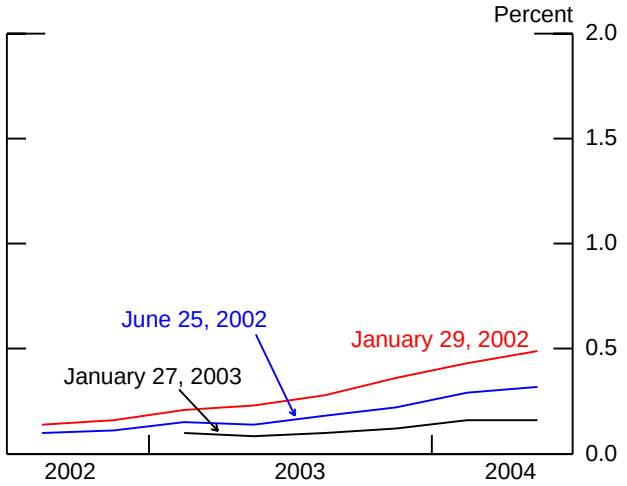
Ten-Year Sovereign Bond Yields



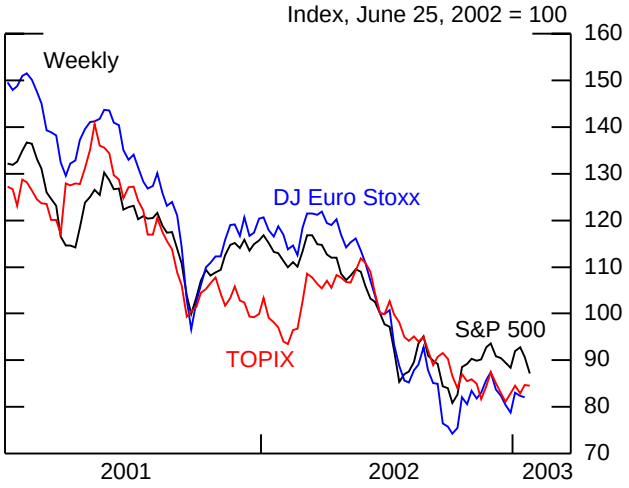
Three-Month Euro Futures Rates



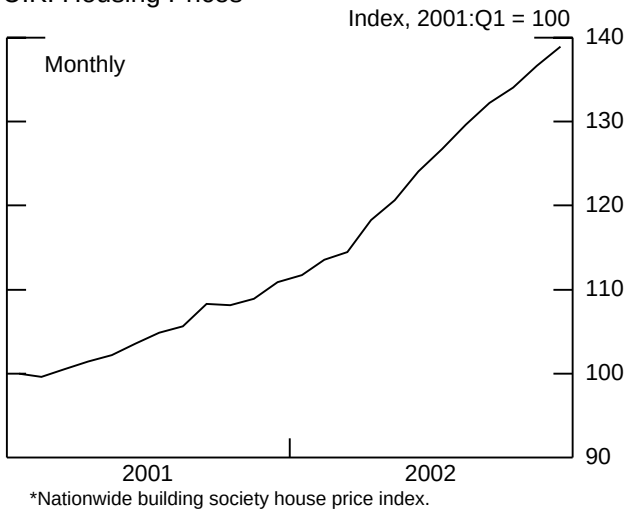
Three-Month Yen Futures Rates



Stock Prices



U.K. Housing Prices*

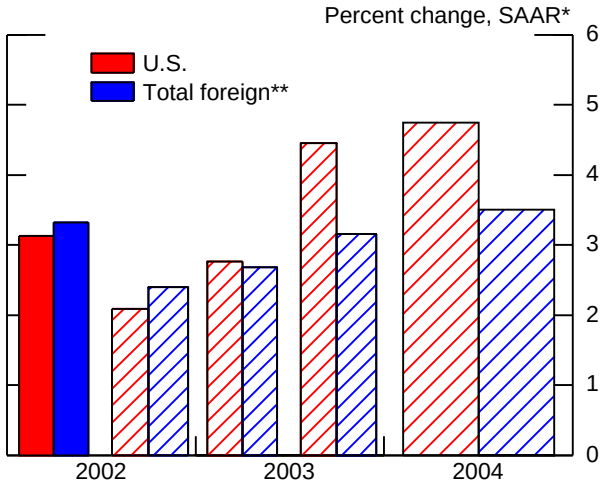


*Nationwide building society house price index.

Chart 11

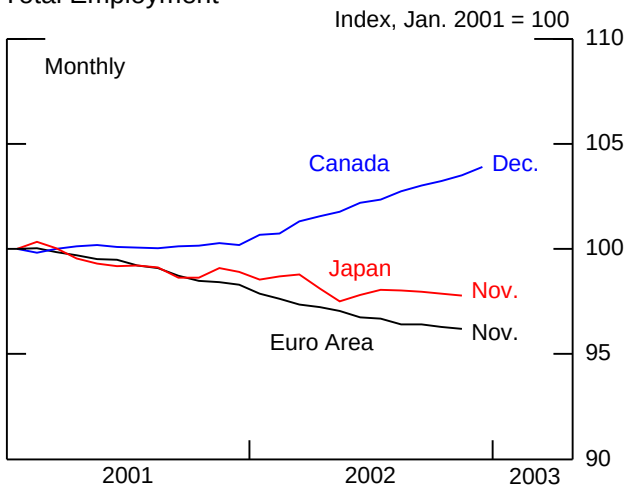
Foreign Outlook

Real GDP

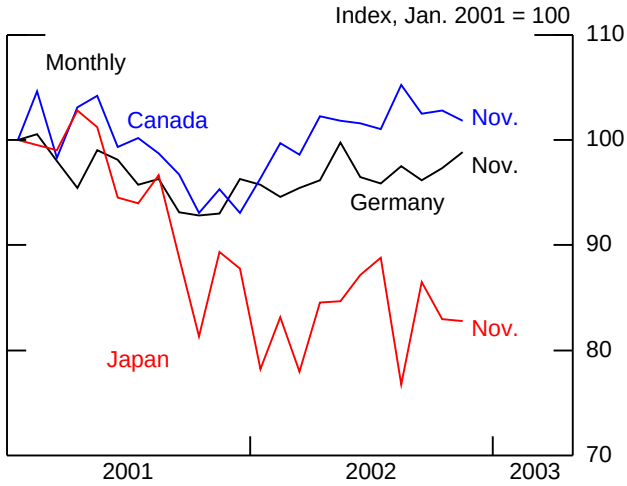


*Years are Q4/Q4; half years are either Q2/Q4 or Q4/Q2.
**U.S. total export weights.

Total Employment

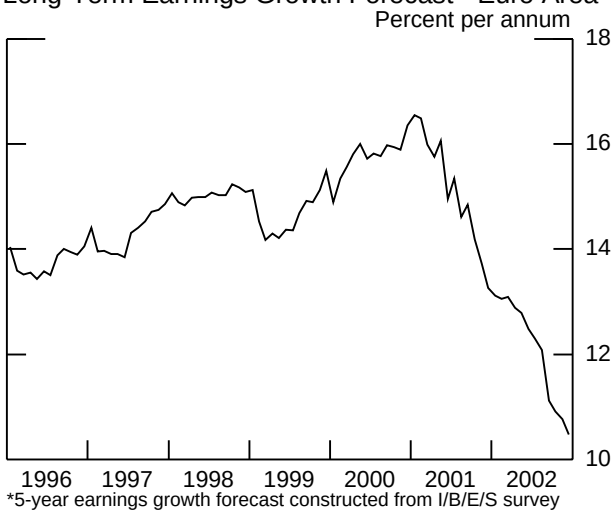


Orders*



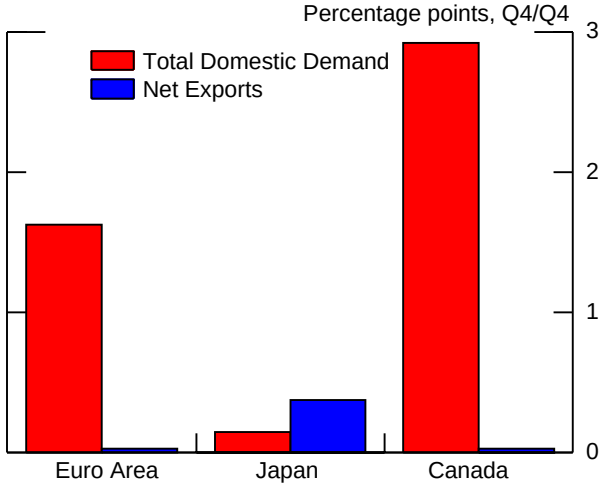
*Manufacturing orders for Canada and Germany, private core machinery orders for Japan.

Long-Term Earnings Growth Forecast - Euro Area*



*5-year earnings growth forecast constructed from I/B/E/S survey of analysts.

2003 Real GDP Contributions



Real GDP Growth

Percent, SAAR*

	2002 H2	2003 H1	2003 H2	2004
1. Indust. 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.
**U.S. total export weights.

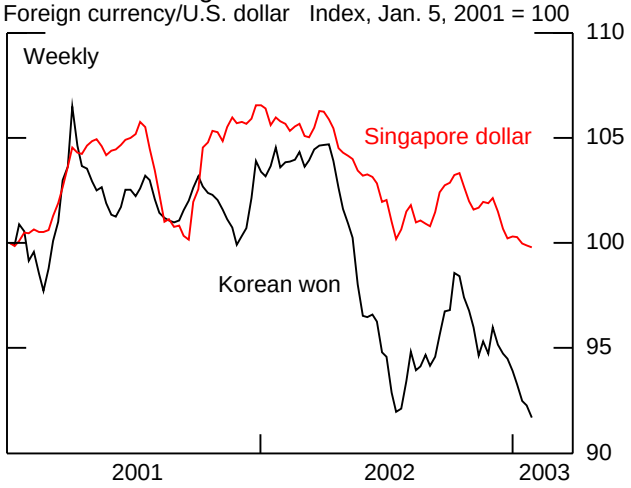
Chart 12

Emerging Market Countries

Asia

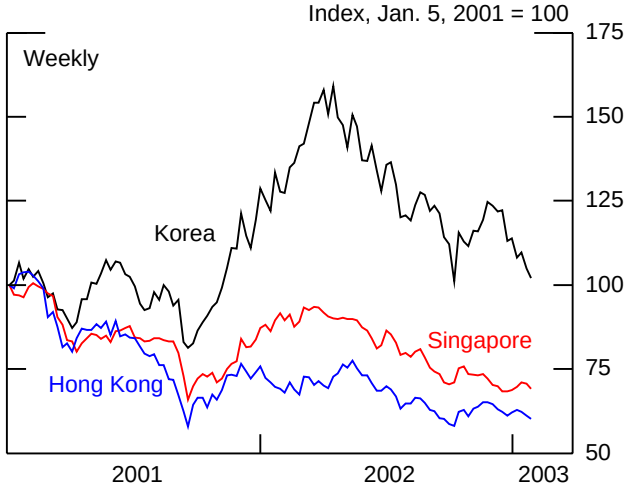
Nominal Exchange Rates

Foreign currency/U.S. dollar Index, Jan. 5, 2001 = 100



Stock Market Indexes

Index, Jan. 5, 2001 = 100



CPI Inflation

Percent, SAAR*

	2002 H2	2003 H1	2003 H2	2004
1. Developing Asia**	0.5	1.7	1.8	1.8
of which:				
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.
**U.S. total export weights.

Real GDP Growth

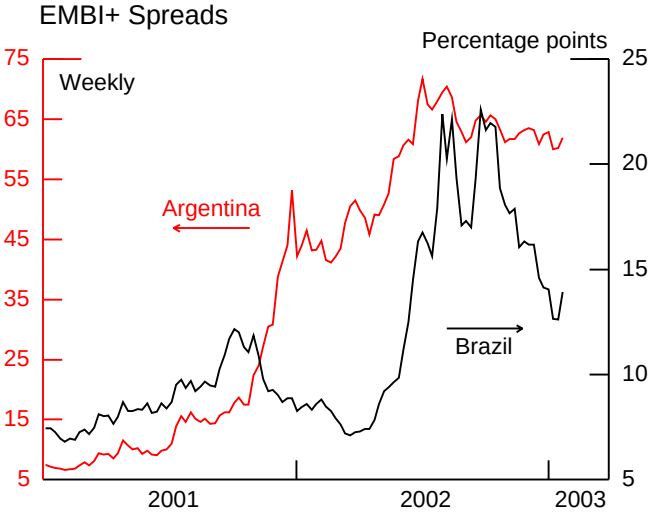
Percent, SAAR*

	2002 H2	2003 H1	2003 H2	2004
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.
**U.S. total export weights.

Latin America

EMBI+ Spreads



Real GDP Growth

Percent, SAAR*

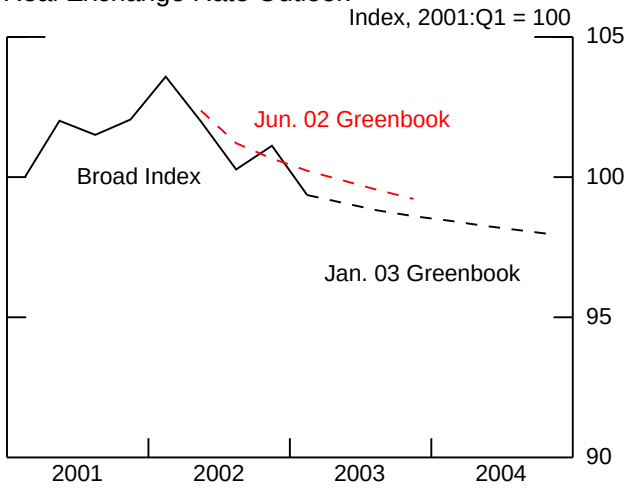
	2002 H2	2003 H1	2003 H2	2004
1. Latin America**	2.5	2.7	3.7	4.3
of which:				
2. Mexico	2.8	3.7	4.3	5.0
3. Brazil	2.4	1.5	2.0	2.0
4. Argentina	0.5	1.2	1.2	1.9

*Years are Q4/Q4; half years are Q2/Q4 or Q4/Q2.
**U.S. total export weights.

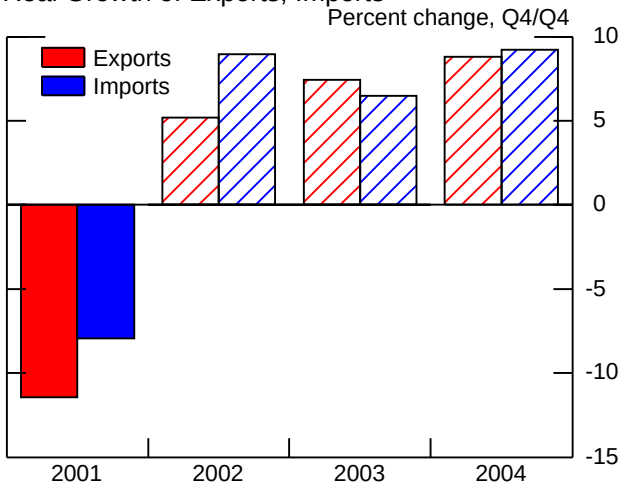
Chart 13

External Sector

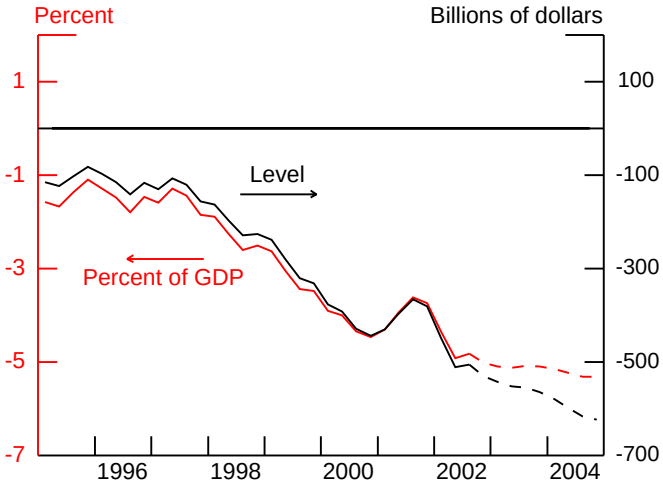
Real Exchange Rate Outlook



Real Growth of Exports, Imports



Current Account



Financial Flows

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.

Simulation Results

(Real GDP Growth, Deviation from Baseline; Percent change, Q4/Q4)

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.

Greenbook Alternative*

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

Chart 14

1/28/03

ECONOMIC PROJECTIONS FOR 2003

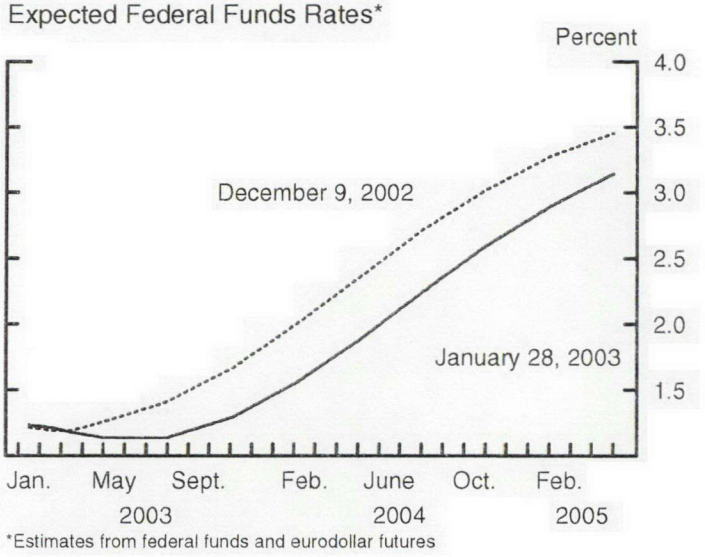
	FOMC		
	Range	Central Tendency	Staff
	----------Percentage change, Q4 to Q4----------		
Nominal GDP	4½ to 5½	4¾ to 5	4.8
(July 2002)	(4½ to 6)	(5 to 5¾)	(5.6)
Real GDP		3¼ to 3½	3.6
(July 2002)	3 to 3¾	(3½ to 4)	(4.1)
	(3¼ to 4¼)		
PCE Prices		1¼ to 1½	1.3
(July 2002)	1¼ to 1¾	(1½ to 1¾)	(1.4)
	(1 to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

Expected Federal Funds Rates*

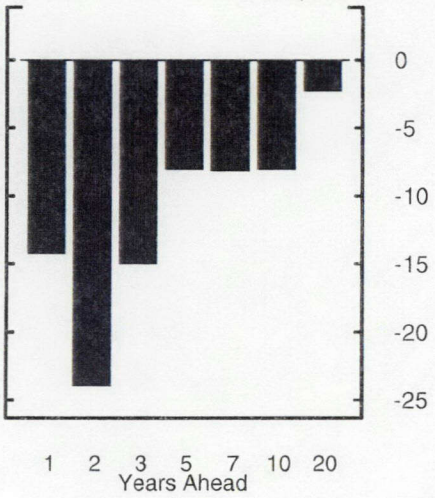


*Estimates from federal funds and eurodollar futures

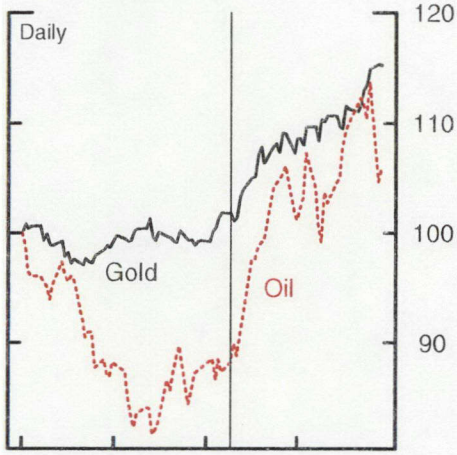
MMS Survey
(Percentage of Respondents)

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

Treasury Forward Rates
(Change Since Last FOMC Meeting)

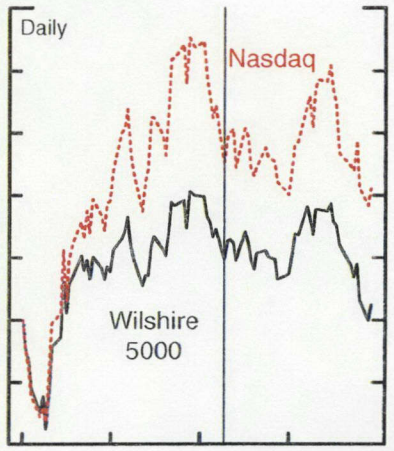


Commodity Prices*



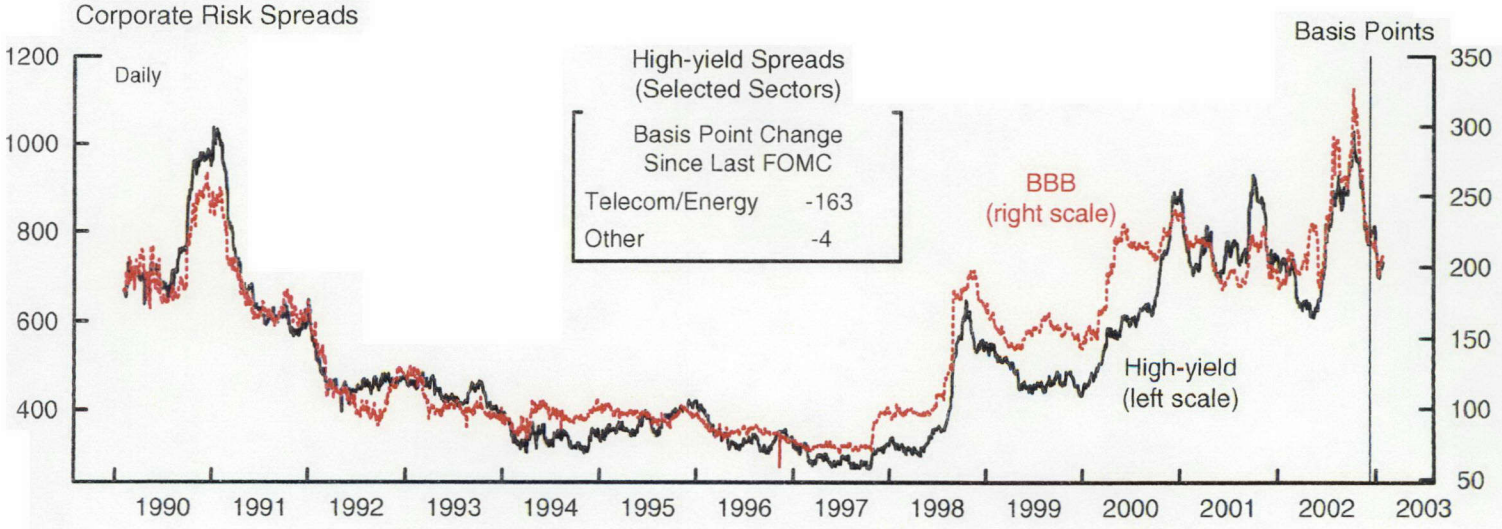
*October 1, 2002 = 100.

Stock Prices*



*October 1, 2002 = 100.

Corporate Risk Spreads



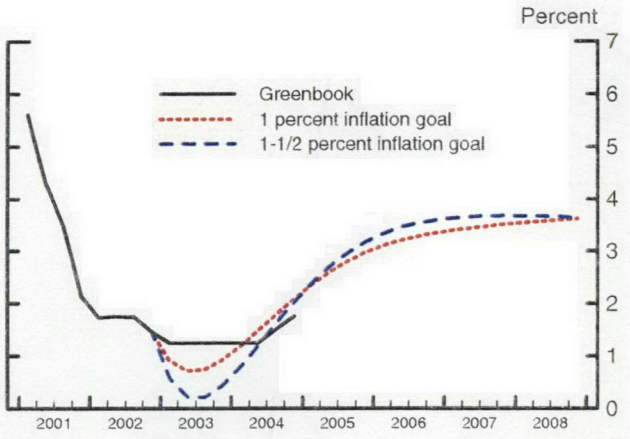
High-yield Spreads
(Selected Sectors)

	Basis Point Change Since Last FOMC
Telecom/Energy	-163
Other	-4

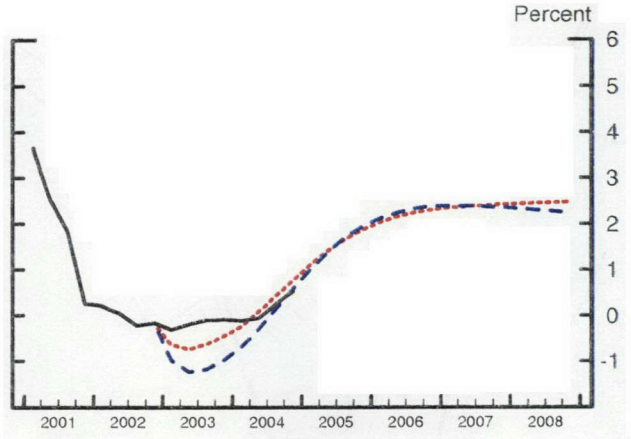
Note: Solid vertical lines indicate December 9, 2002.

Exhibit 2
Policymaker Perfect Foresight Strategy for Monetary Policy

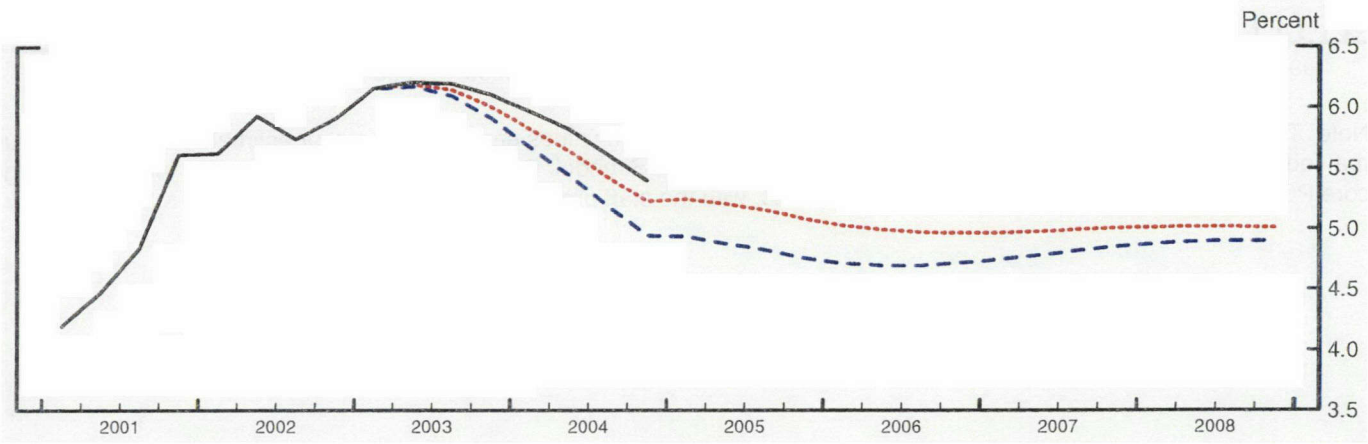
Nominal Federal Funds Rate



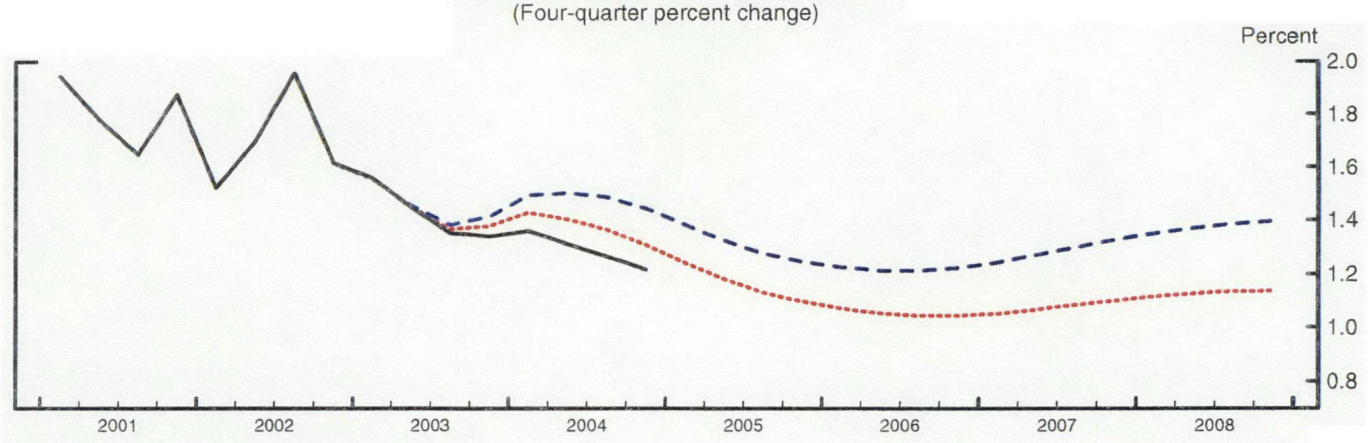
Real Federal Funds Rate [1]



Civilian Unemployment Rate



PCE Inflation (ex. food and energy)
(Four-quarter percent change)

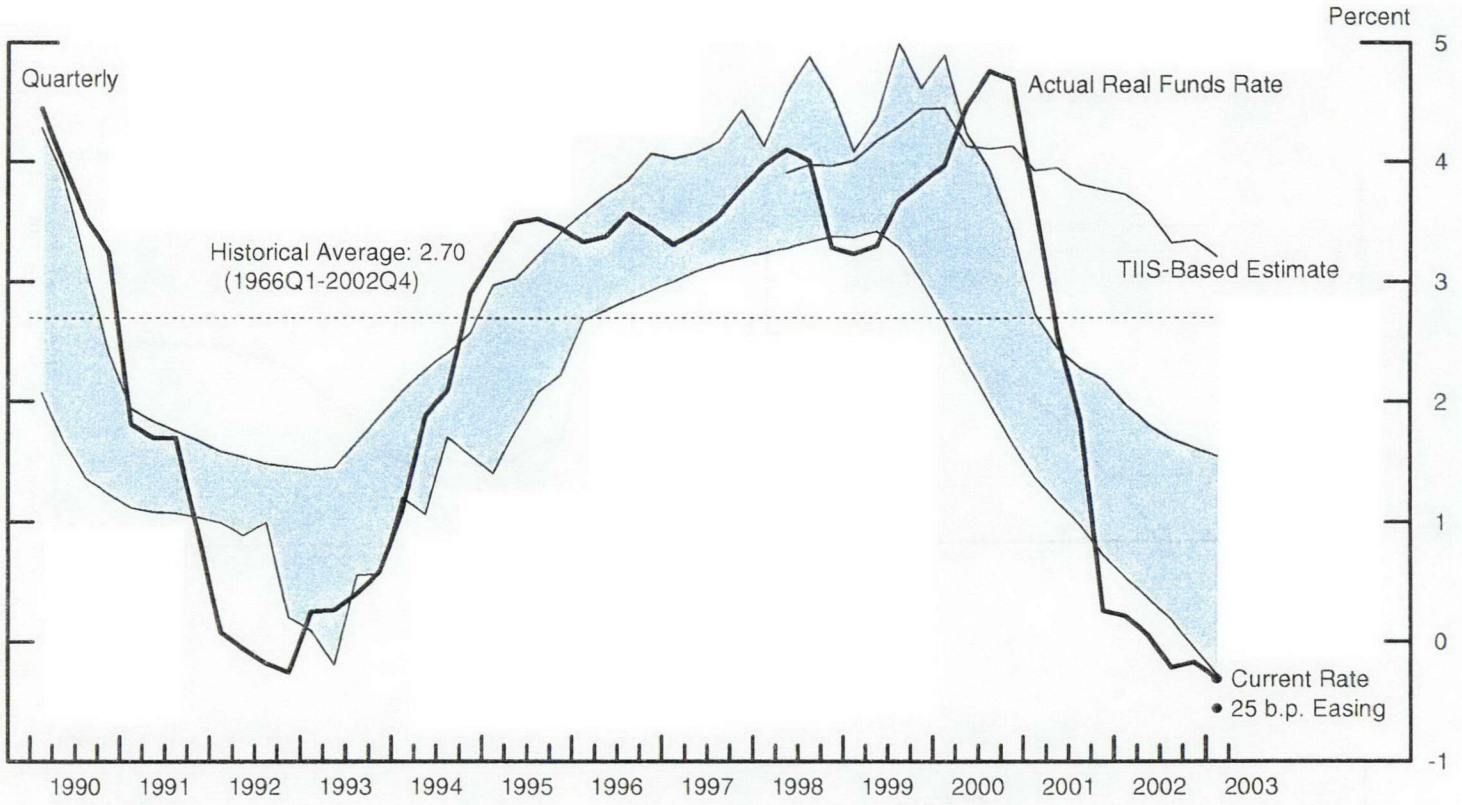


The perfect foresight simulations extend the key assumptions of the staff outlook (other than the path for monetary policy) through 2008:

- 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

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.

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



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.