

Monetary Trends



THE
FEDERAL
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BANK of
ST. LOUIS

The Funds Rate Target and Interest Rates

A conventional view holds that the Federal Reserve controls interest rates by setting a target for the federal funds rate and using open market operations to keep the funds rate close to the target level. The *expectations theory of the term structure*, which hypothesizes that longer-term yields are determined by the market's expectation for shorter-term rates, is presumed to account for the close relationship between the funds rate and other short-term interest rates, such as the 3-month T-bill rate.

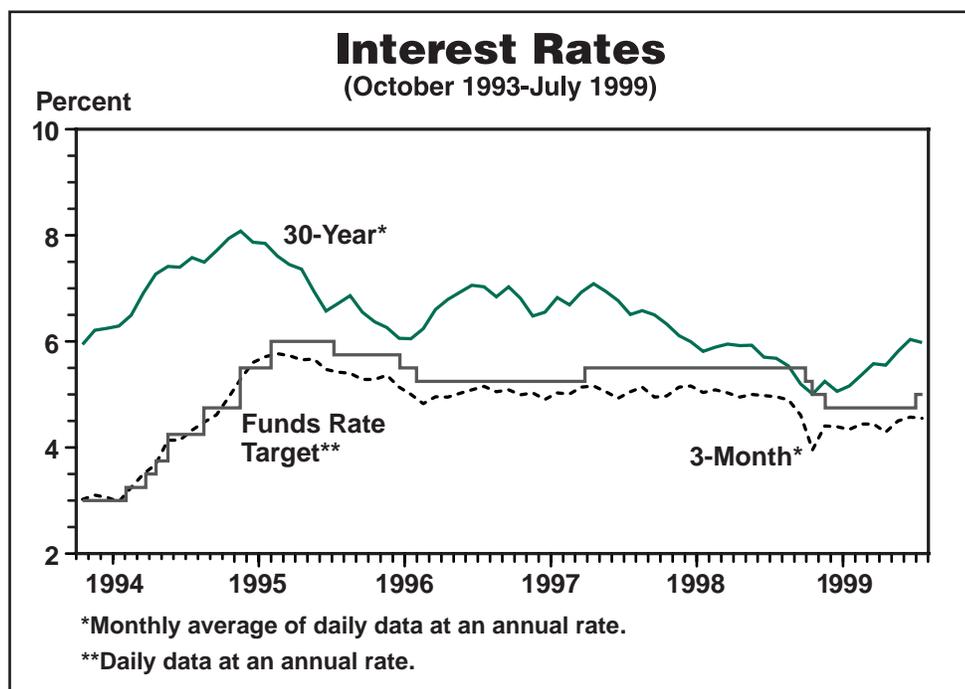
Despite the fact that empirical tests of the expectations theory nearly always reject it, the close relationship between short-term rates and the Federal Reserve's target for the funds rate has led many observers to conclude that the Federal Reserve has considerable ability to influence short-term rates. The close relationship is apparent in the accompanying figure, which shows the Fed's funds rate target, the 3-month T-bill rate and the 30-year Treasury bond yield from October 1993 through July 1999—the period over which the Fed has announced target changes. The average absolute difference between the federal funds rate target and the T-bill rate was just 34 basis points over this period.

Whatever the Federal Reserve's ability to influence short-term rates, its influence on long-term rates (other than through its effect on expectations for inflation) is questionable. Large changes in the long-term rate have often occurred when the funds rate target was unchanged. For example, the mid-August 1998 announcement that Russia would default on its sovereign debt sent

yields on default-risk-free securities dramatically lower. The 30-year bond yield fell by about 190 basis points from April 1997 to September 1998. More recently, the 30-year yield rose nearly 100 basis points prior to the 25 basis-point increase in the funds rate target on June 30, 1999.

In accordance with the expectations theory, some analysts have suggested that changes in long-term yields move in anticipation of future changes in the funds rate target. This seems unlikely, however. For one thing, short-term rates, which should reflect changing expectations for the funds rate target more strongly, do not appear to move in anticipation of policy actions. Moreover, changes in long-term yields are frequently large relative to subsequent movements in the funds rate. It is more likely that long-term yields reflect changing expectation for inflation than expectations of future funds rate target changes.

—Daniel L. Thornton



Views expressed do not necessarily reflect official positions of the Federal Reserve System.



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Conventions used in this publication:

1. Data presented in the charts and tables are through July 1999. Unless otherwise indicated, data are monthly.
2. Shaded areas indicate recessions, as dated by the National Bureau of Economic Research.
3. The *percent change at an annual rate* is the simple, not compounded, monthly percent change multiplied by 12. For example, using consecutive months, the percent change at an annual rate in x between month $t-1$ and the current month t is: $[(x_t / x_{t-1}) - 1] \times 1200$. Note that this differs from *National Economic Trends*. In that publication monthly percent changes are compounded and expressed as annual growth rates.
4. The *percent change from year ago* refers to the percent change from the same period in the previous year. For example, the percent change from year ago in x between month $t-12$ and the current month t is: $[(x_t / x_{t-12}) - 1] \times 100$.

We welcome your comments addressed to:

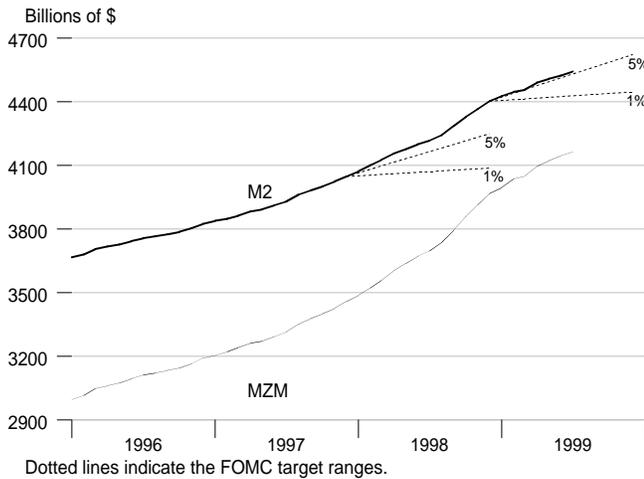
Editor, *Monetary Trends*
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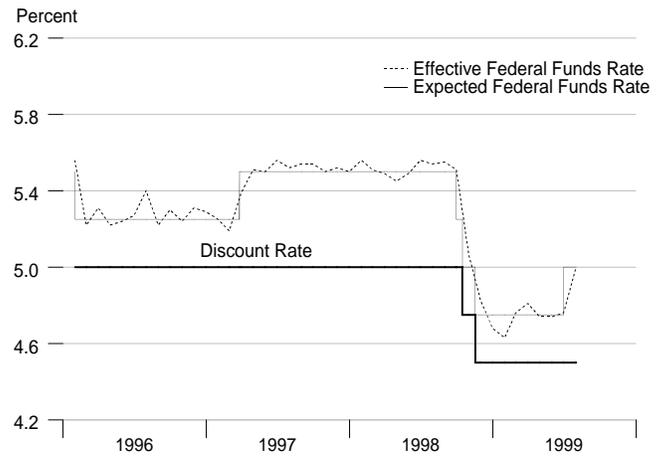
webmaster@stls.frb.org

Please Note: The Board of Governors of the Federal Reserve System has discontinued calculation of the L money stock data series. Therefore, the series will no longer be presented on pages 4, 6, 16 and 18. In addition to this change, MZM has been added to page 16.

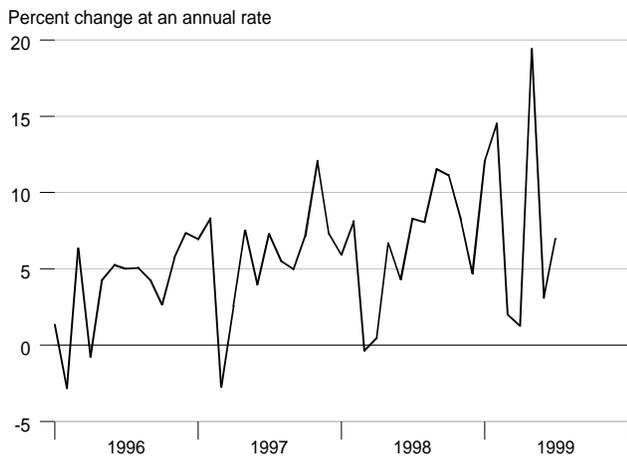
M2 and MZM



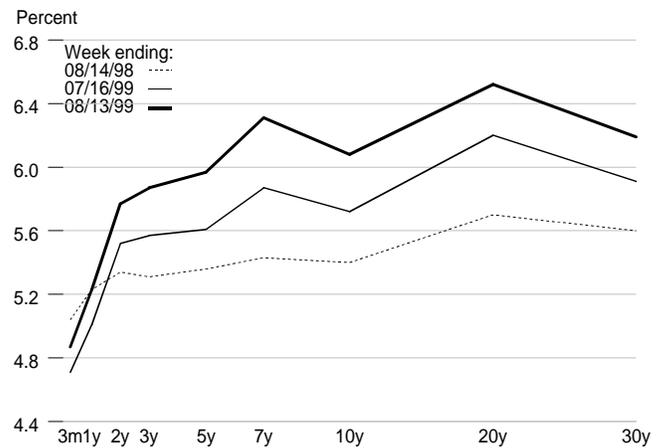
Reserve Market Rates



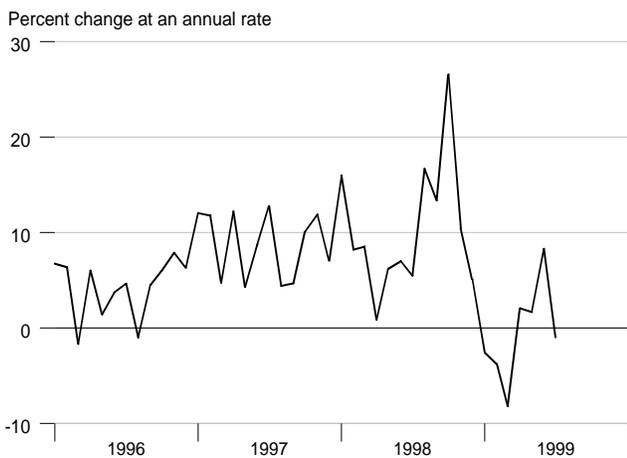
Adjusted Monetary Base



Treasury Yield Curve



Total Bank Credit

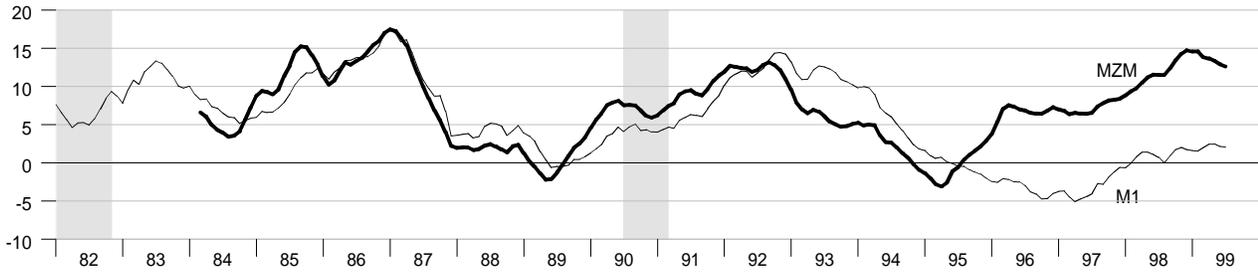


Interest Rates

	May 99	Jun 99	Jul 99
Federal Funds Rate	4.74	4.76	4.99
Discount Rate	4.50	4.50	4.50
Prime Rate	7.75	7.75	8.00
Conventional Mortgage Rate	7.15	7.55	7.63
Treasury Yields:			
3-month constant maturity	4.63	4.72	4.69
6-month constant maturity	4.75	5.03	4.75
1-year constant maturity	4.85	5.10	5.03
3-year constant maturity	5.33	5.70	5.62
5-year constant maturity	5.44	5.81	5.68
10-year constant maturity	5.54	5.90	5.79
30-year constant maturity	5.81	6.04	5.98

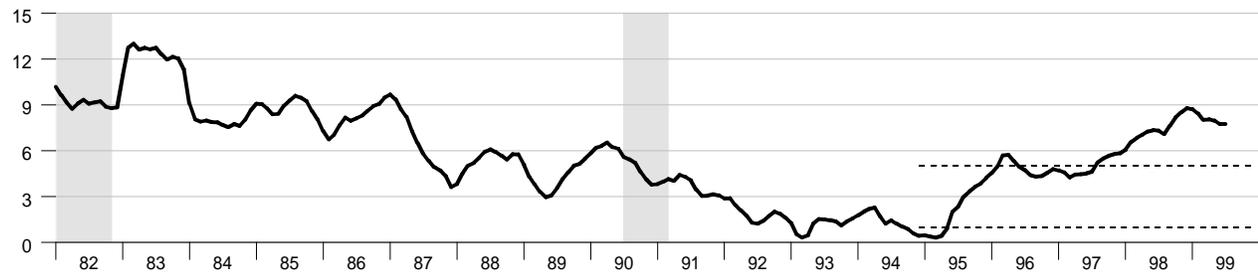
MZM and M1

Percent change from year ago



M2

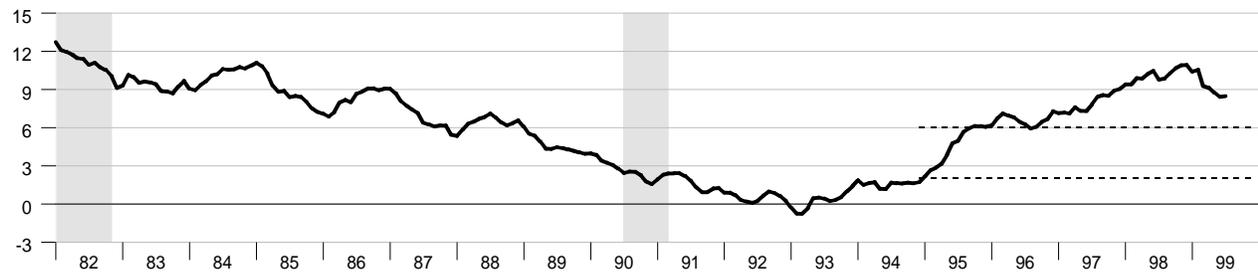
Percent change from year ago



Dotted lines indicate the FOMC target ranges.

M3

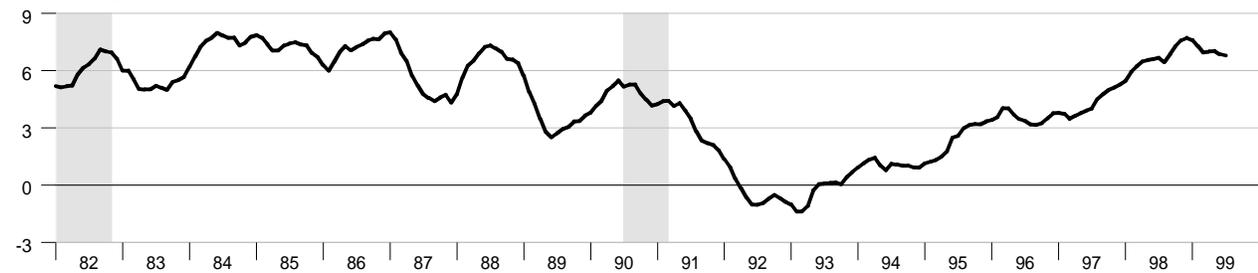
Percent change from year ago



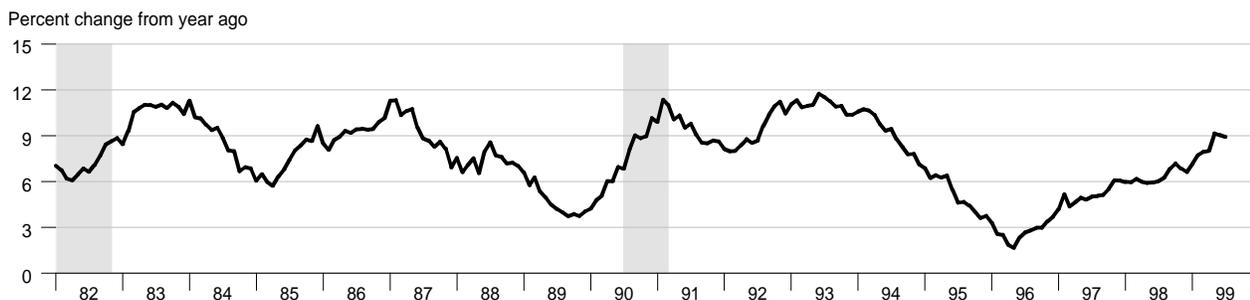
Dotted lines indicate the FOMC target ranges.

Monetary Services Index - M2

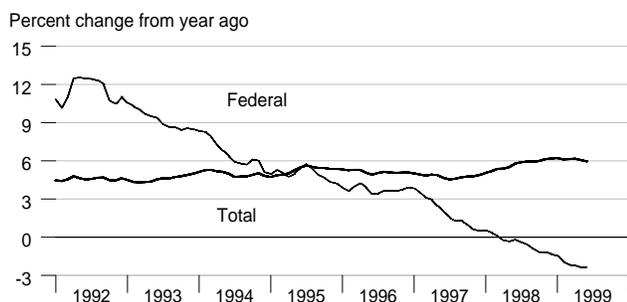
Percent change from year ago



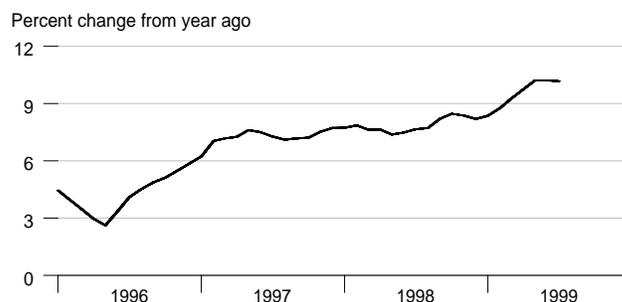
Adjusted Monetary Base



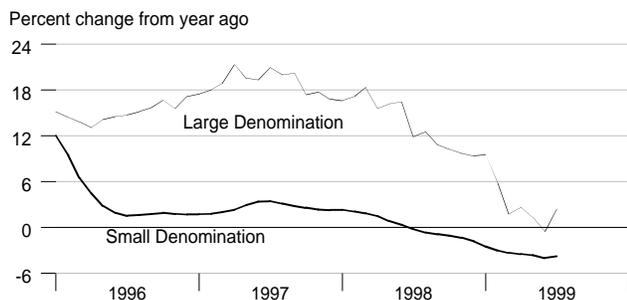
Domestic Nonfinancial Debt



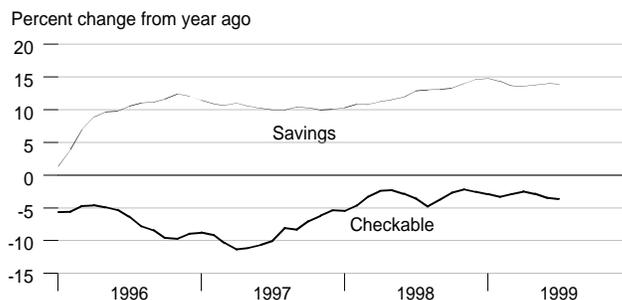
Currency Held by the Nonbank Public



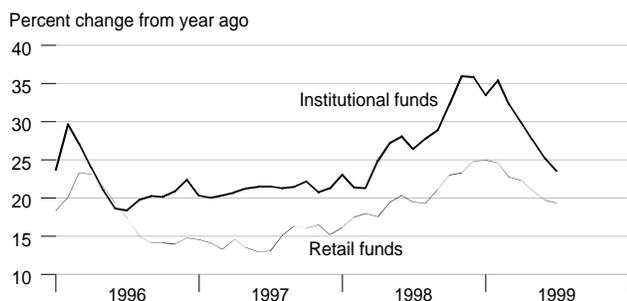
Time Deposits



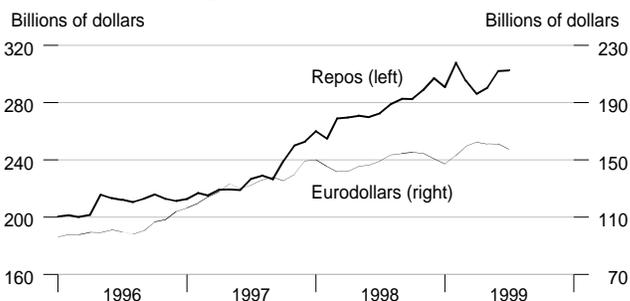
Checkable and Savings Deposits



Money Market Mutual Fund Shares

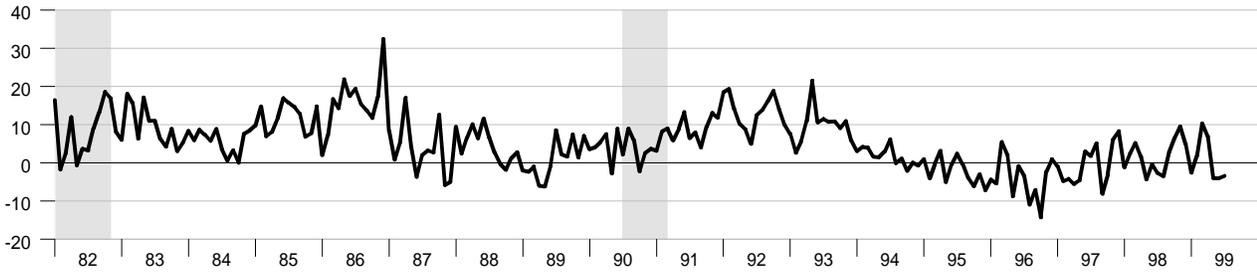


Repurchase Agreements and Eurodollars



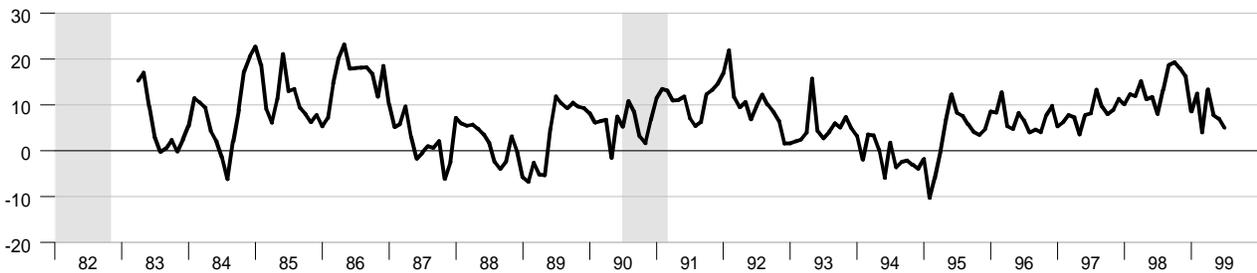
M1

Percent change at an annual rate



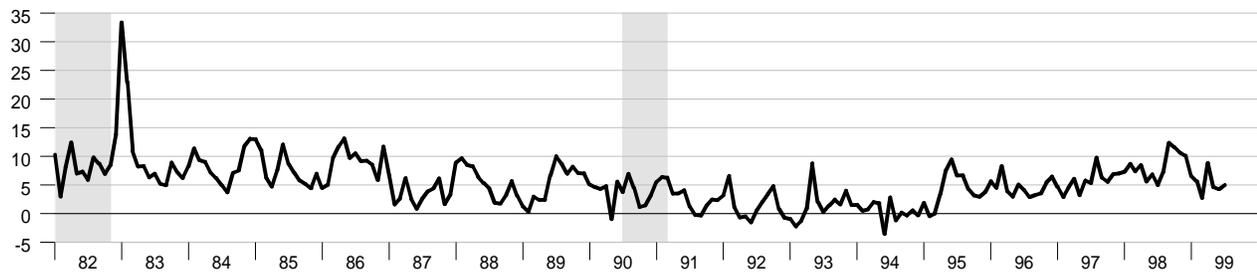
MZM

Percent change at an annual rate



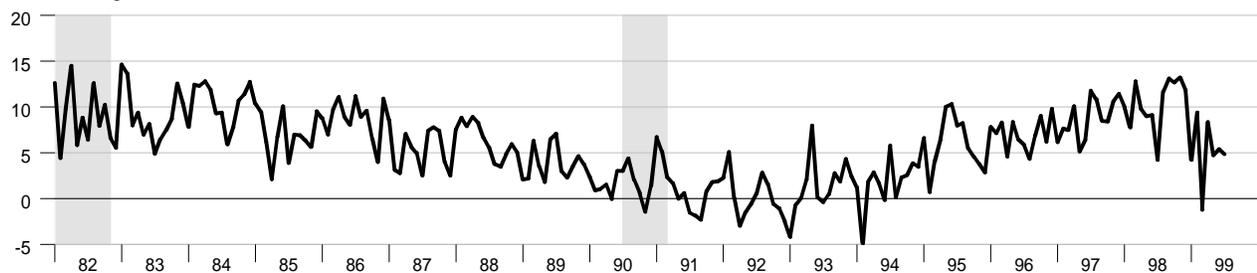
M2

Percent change at an annual rate

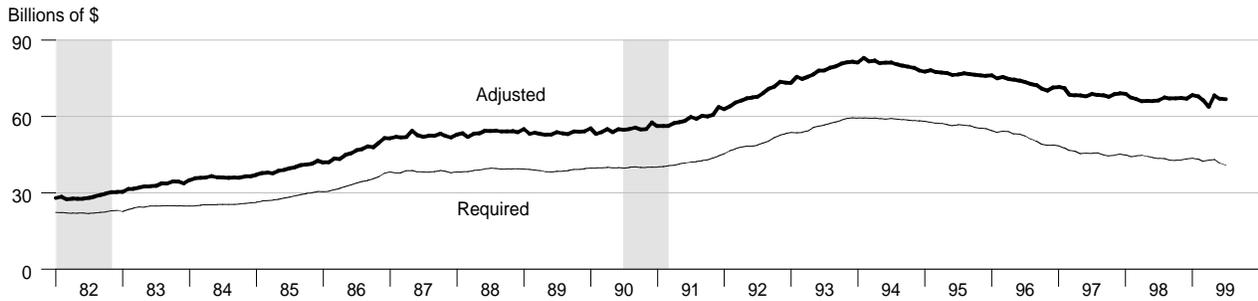


M3

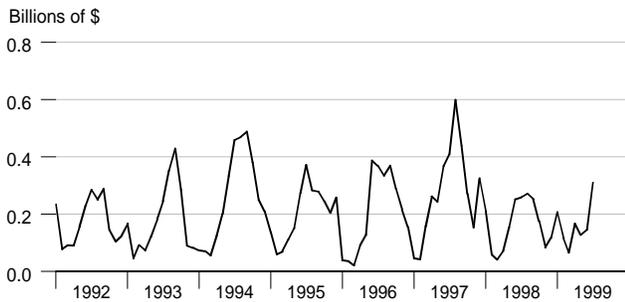
Percent change at an annual rate



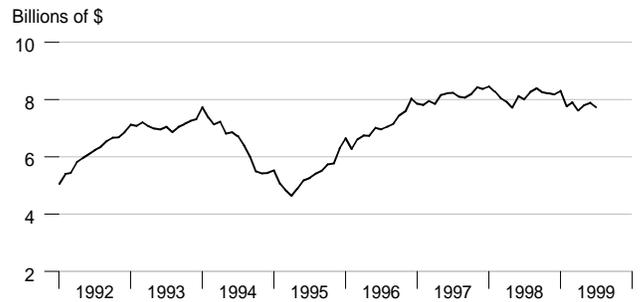
Adjusted and Required Reserves



Total Borrowings, nsa



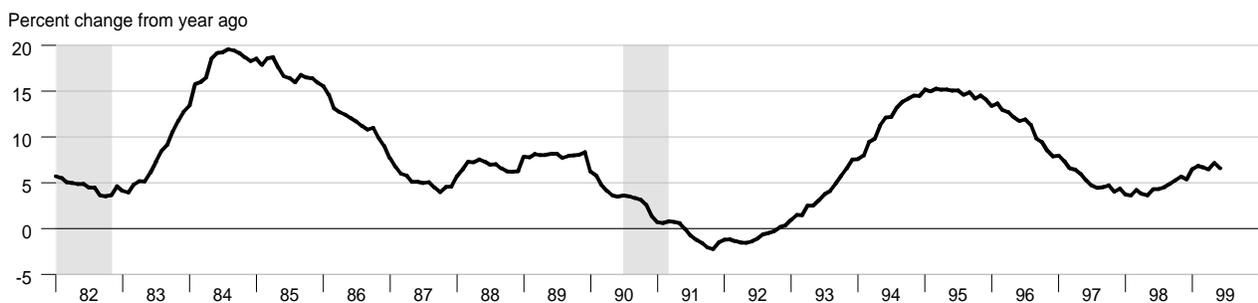
Excess Reserves plus RCB Contracts



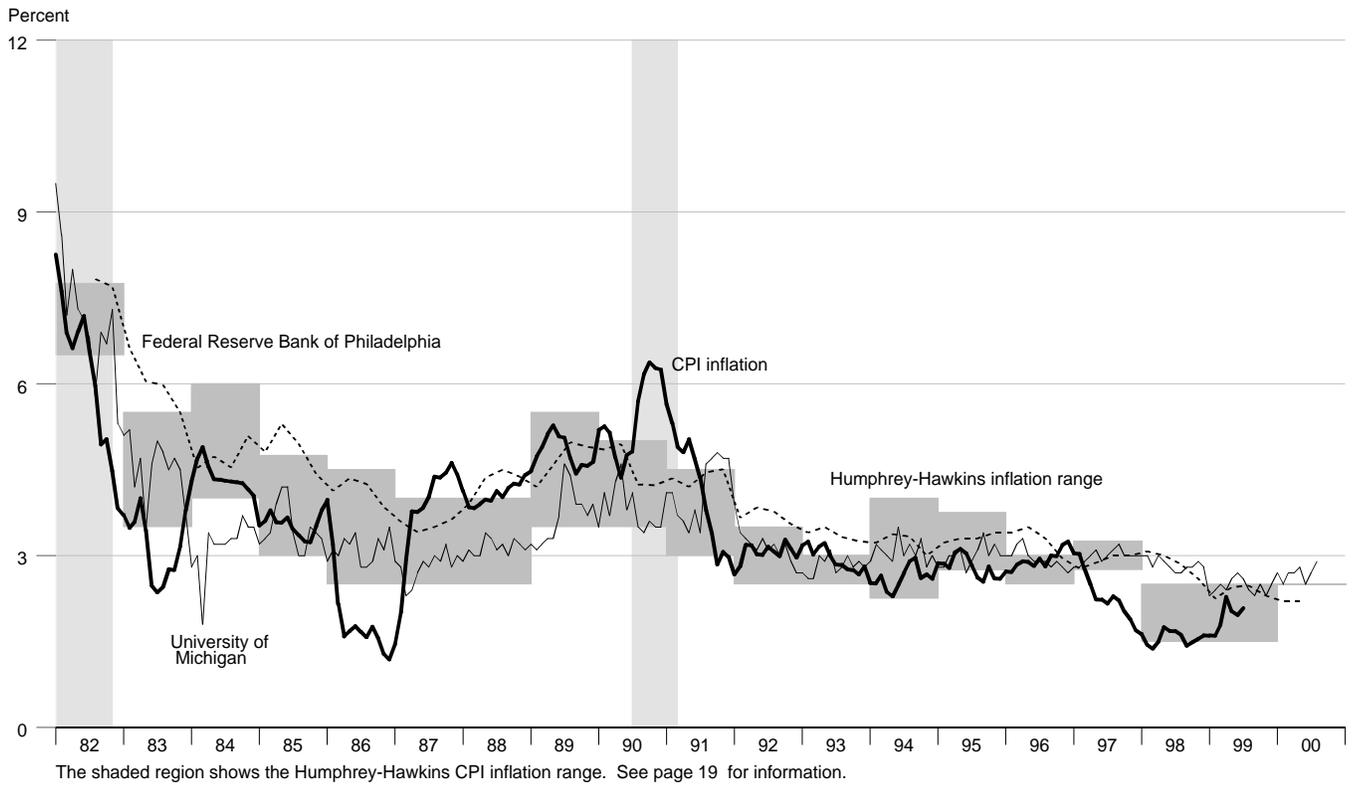
Nonfinancial Commercial Paper



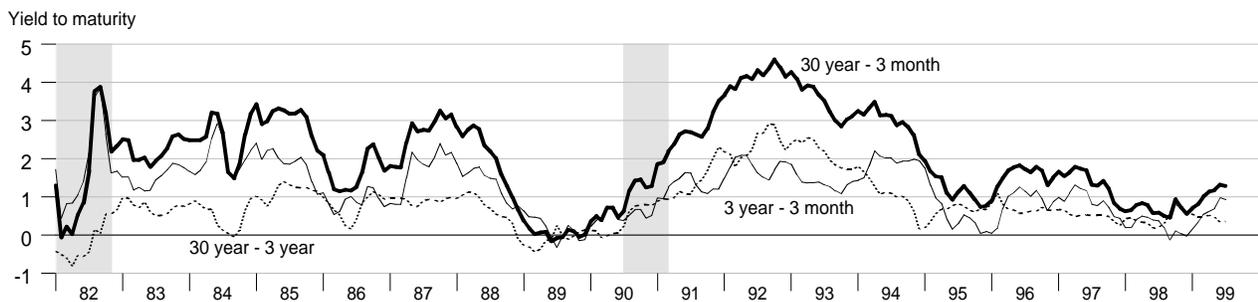
Consumer Credit



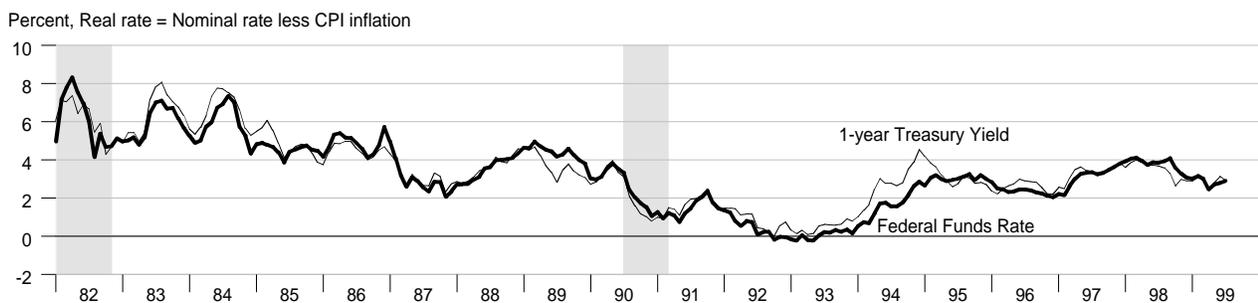
Inflation and Inflation Expectations



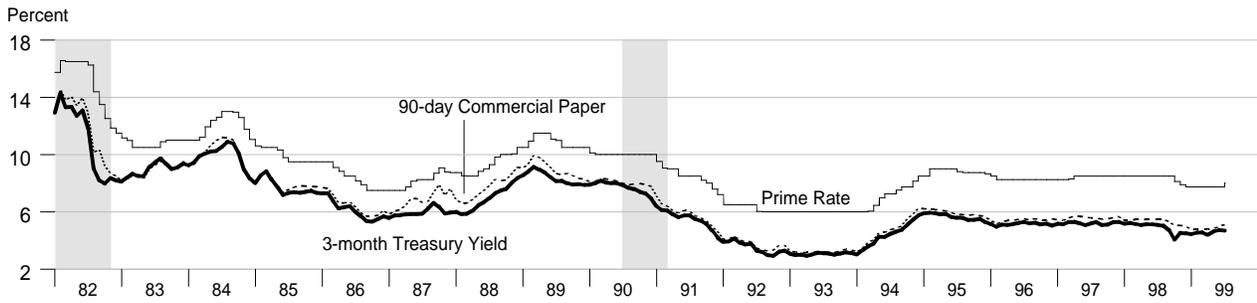
Treasury Security Yield Spreads



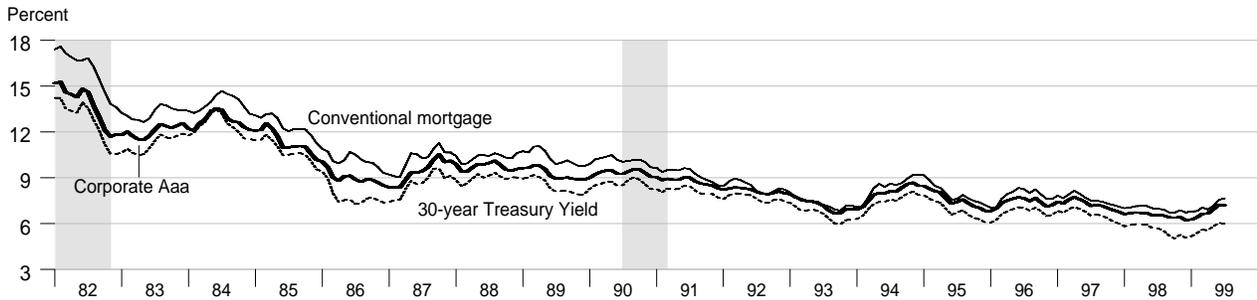
Real Interest Rates



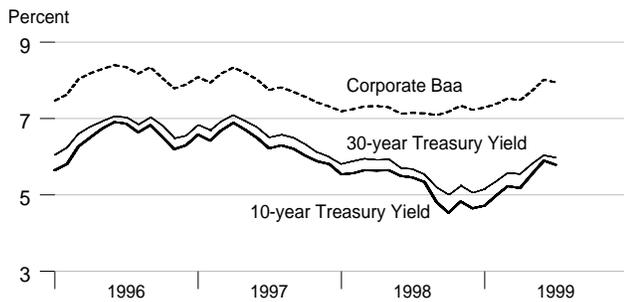
Short Term Interest Rates



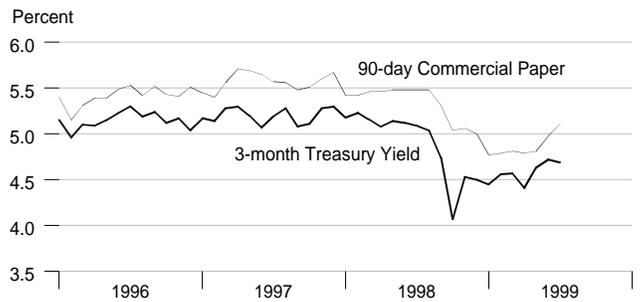
Long Term Interest Rates



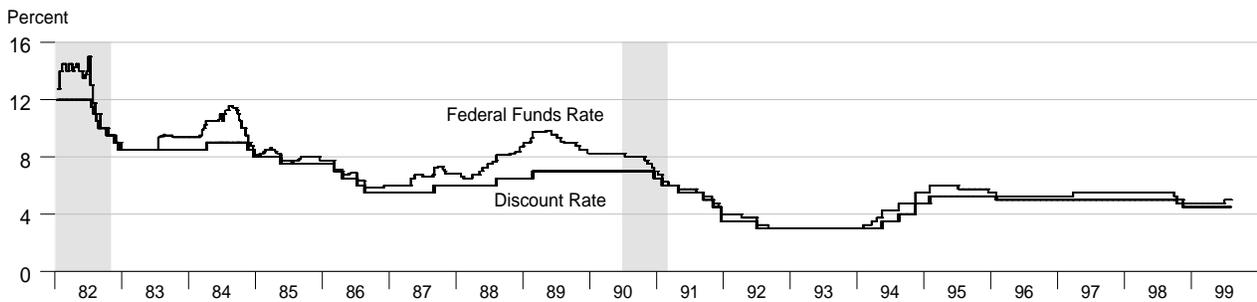
Long Term Interest Rates



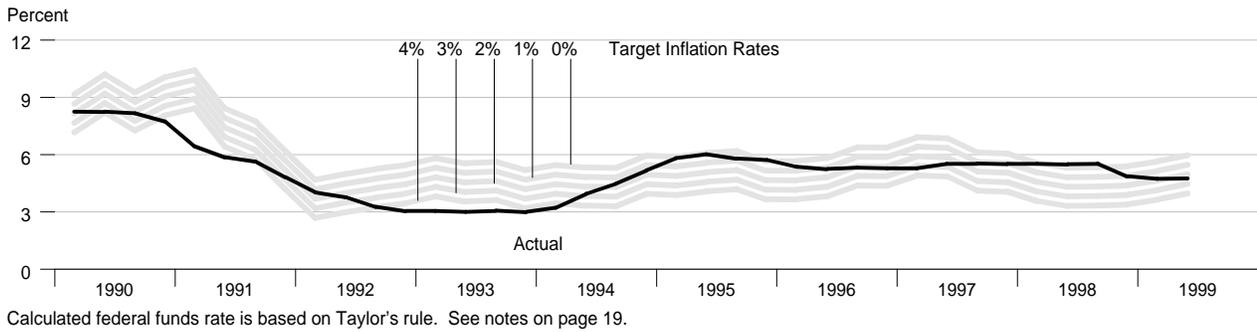
Short Term Interest Rates



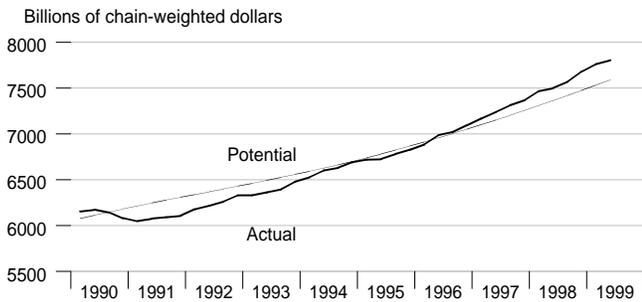
FOMC Expected Federal Funds Rate and Discount Rate



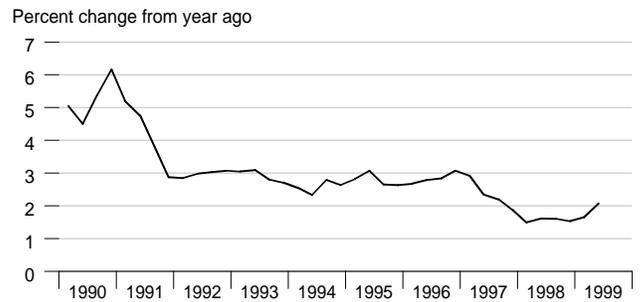
Federal Funds Rate and Inflation Targets



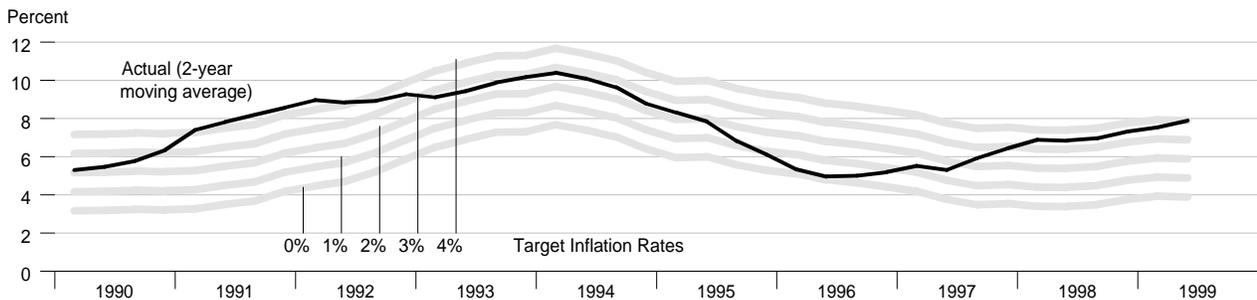
Actual and Potential Real GDP



Actual CPI Inflation

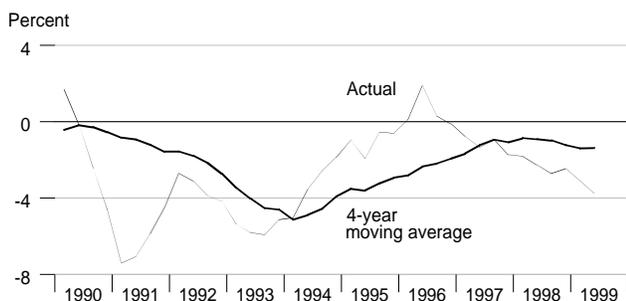


Monetary Base Growth* and Inflation Targets

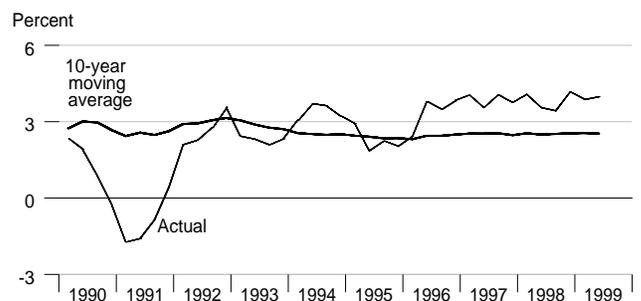


*Modified for the effects of sweeps programs on reserve demand.
Calculated base growth is based on McCallum's rule. See notes on page 19.

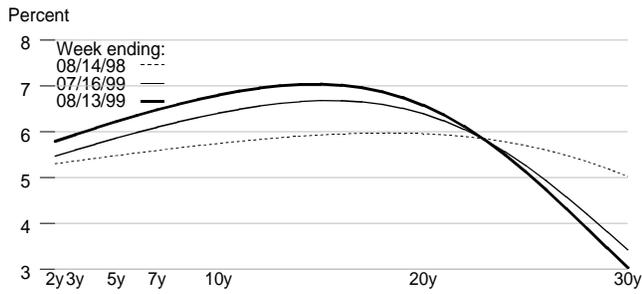
Monetary Base Velocity Growth



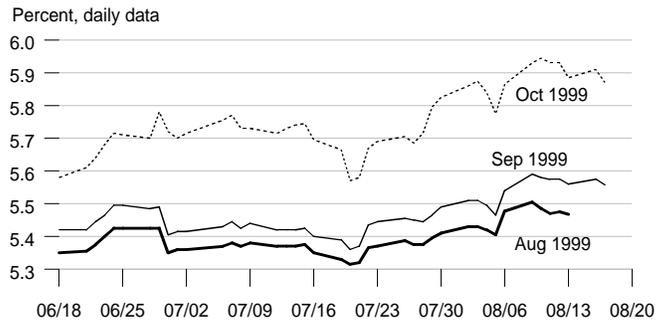
Real Output Growth



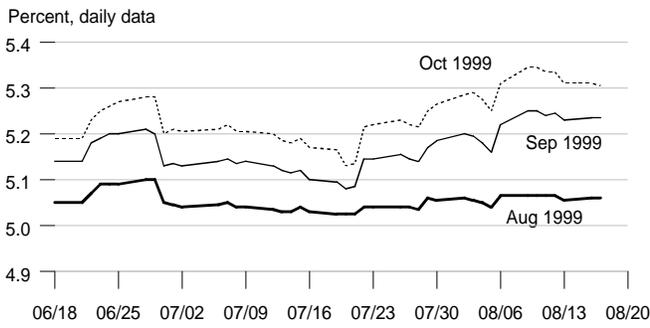
Implied One-Year Forward Rates



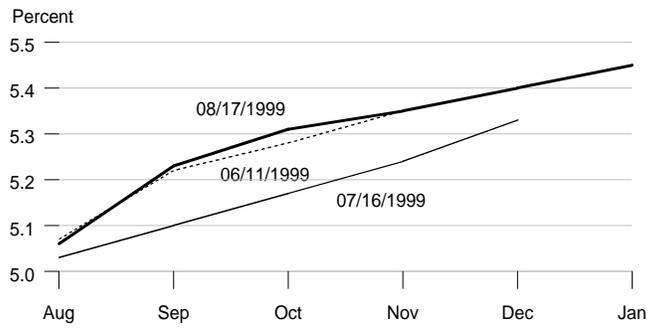
Rates on 3-Month Eurodollar Futures



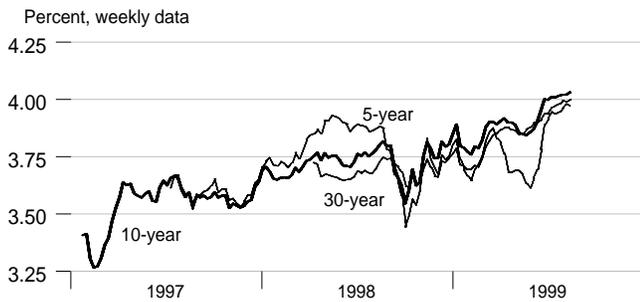
Rates on Selected Fed Funds Futures Contracts



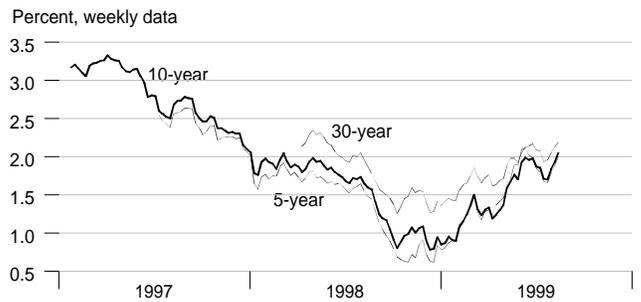
Implied Yields on Fed Funds Futures



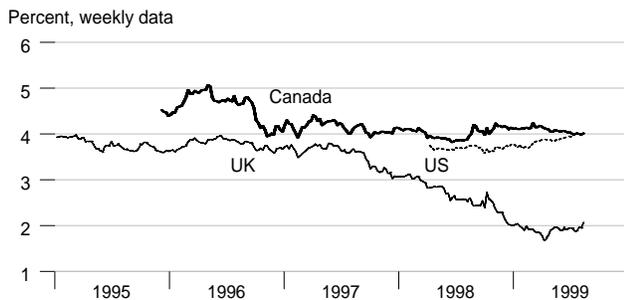
Inflation-Protected Treasury Yields



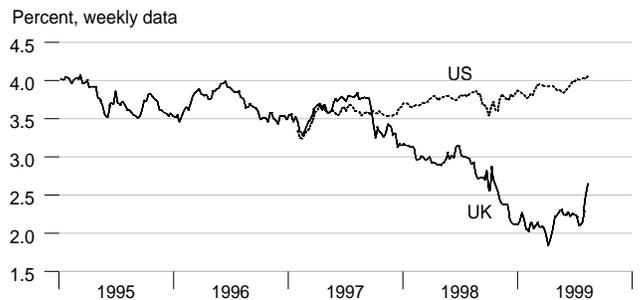
Inflation-Protected Treasury Yield Spreads



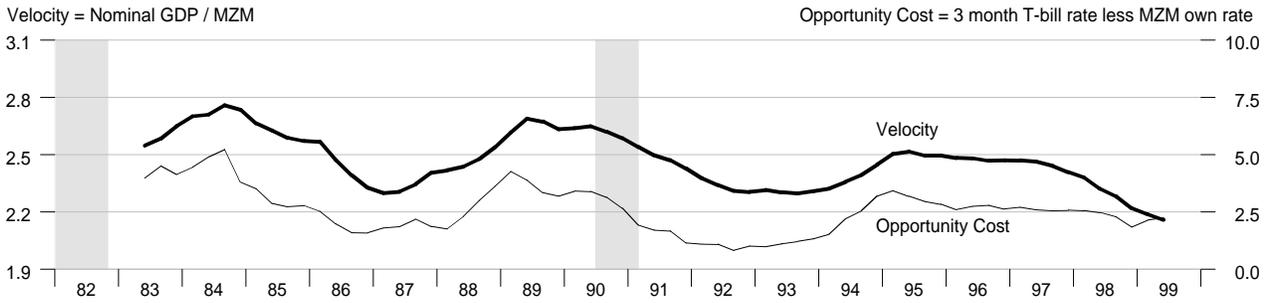
Inflation-Indexed 30-Year Bonds



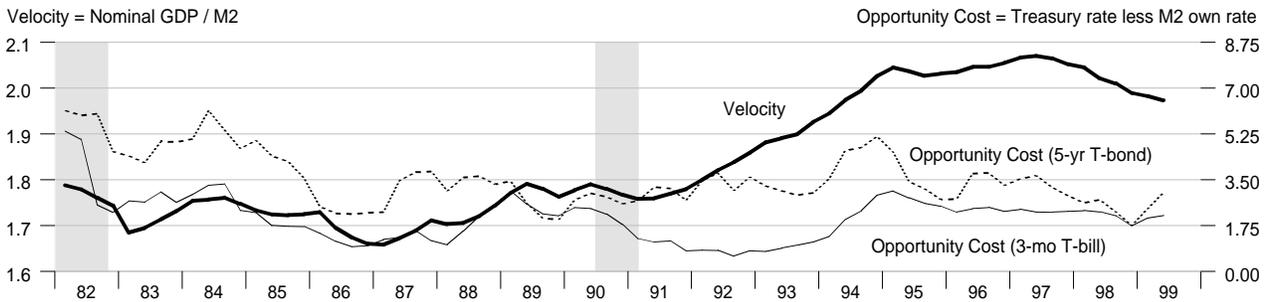
Inflation-Indexed 10-Year Bonds



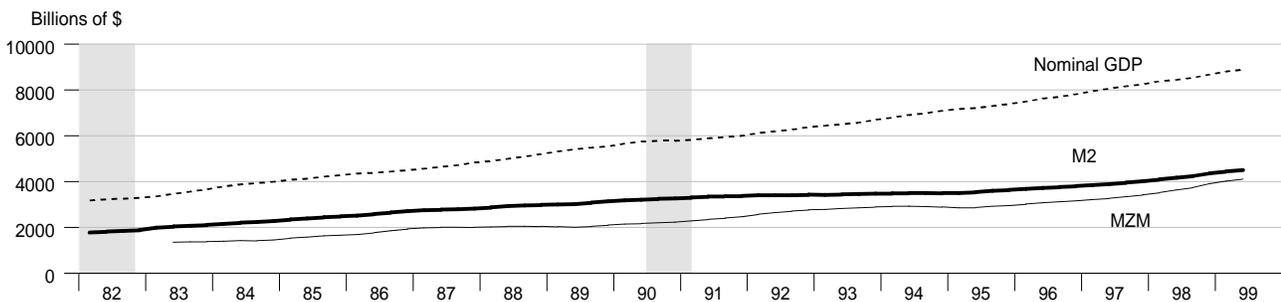
MZM Velocity and Opportunity Cost



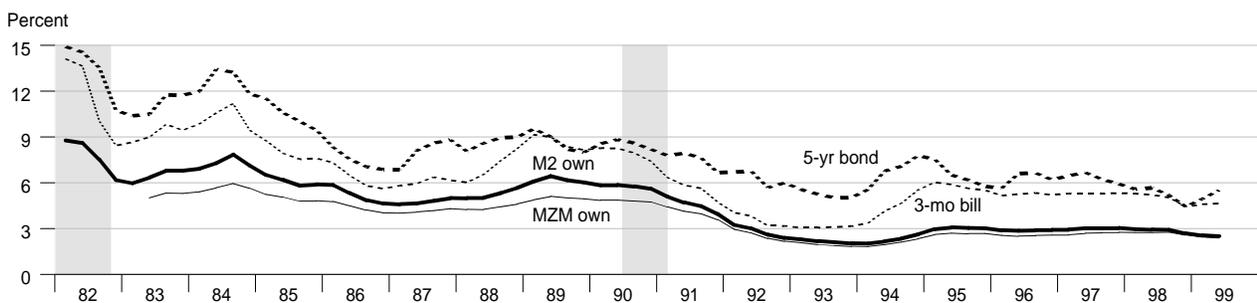
M2 Velocity and Opportunity Cost



M2, MZM and Nominal GDP

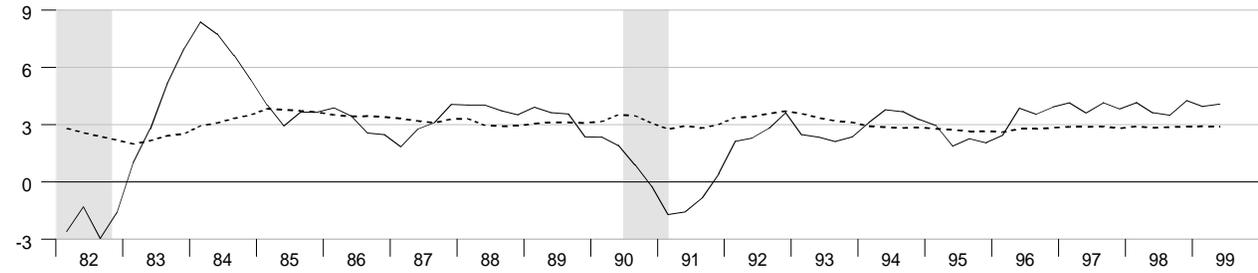


Interest Rates



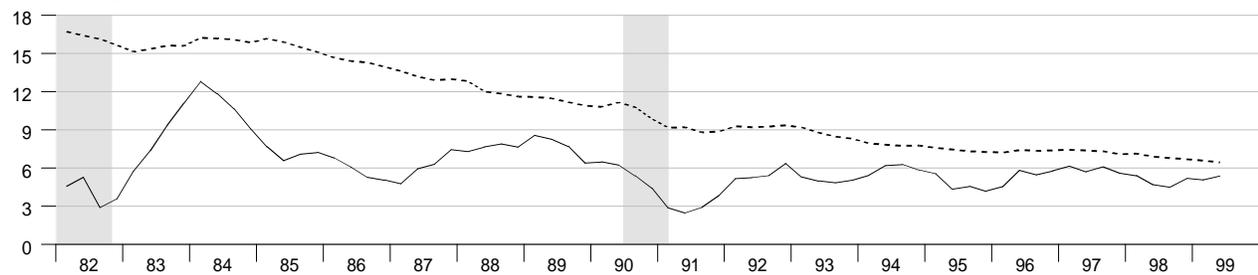
Real Gross Domestic Product

Percent change from year ago



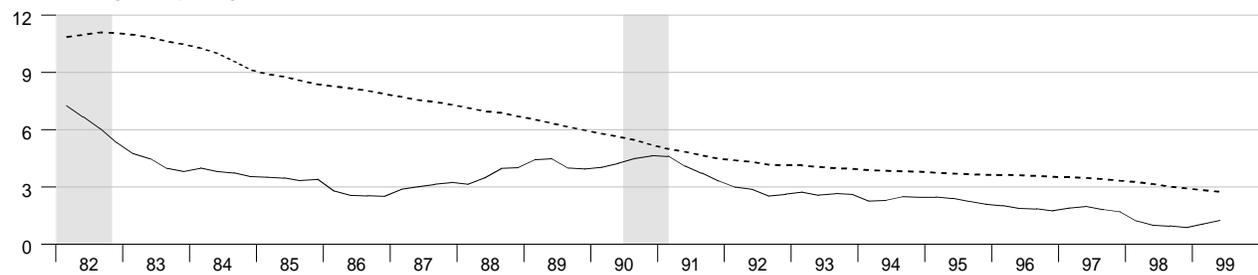
Gross Domestic Product

Percent change from year ago



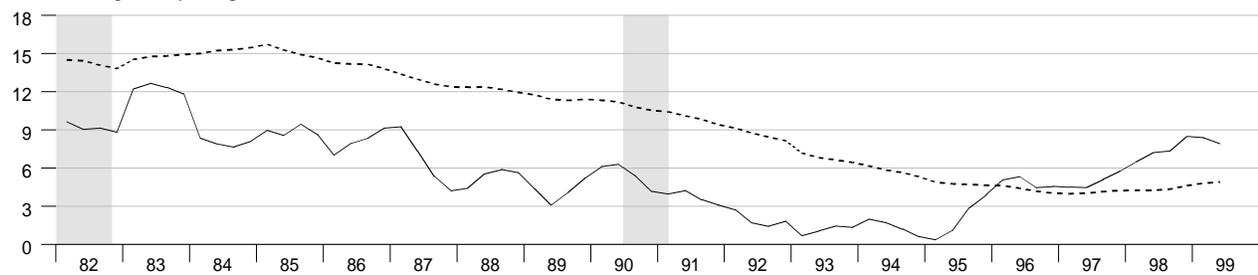
Gross Domestic Product Price Index

Percent change from year ago



M2

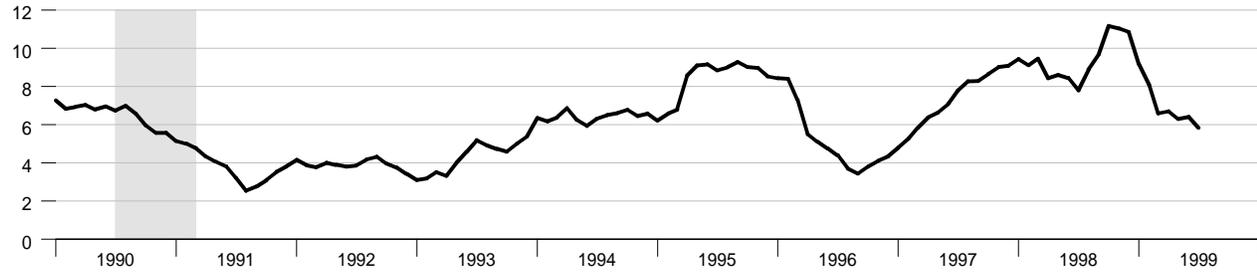
Percent change from year ago



Dashed lines indicate 10-year moving averages

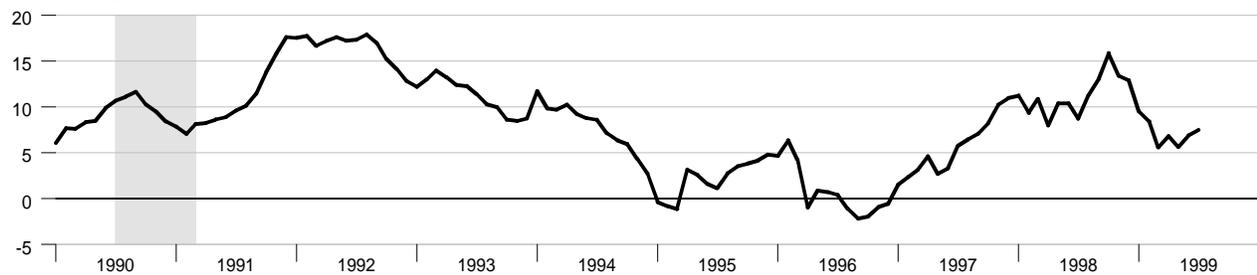
Bank Credit

Percent change from year ago



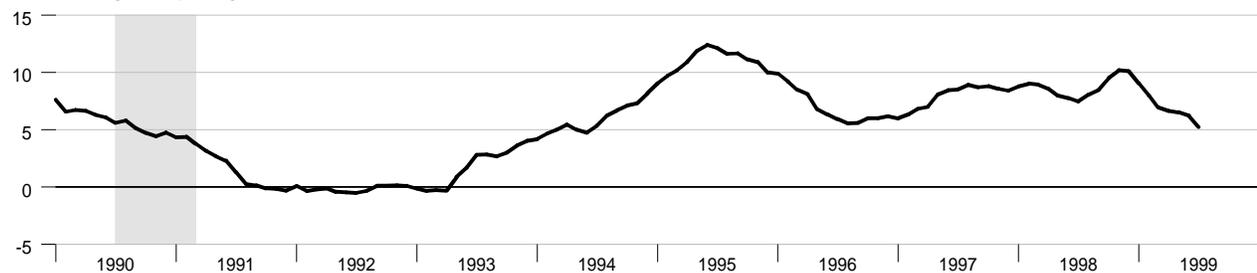
Investment Securities in Bank Credit at Commercial Banks

Percent change from year ago



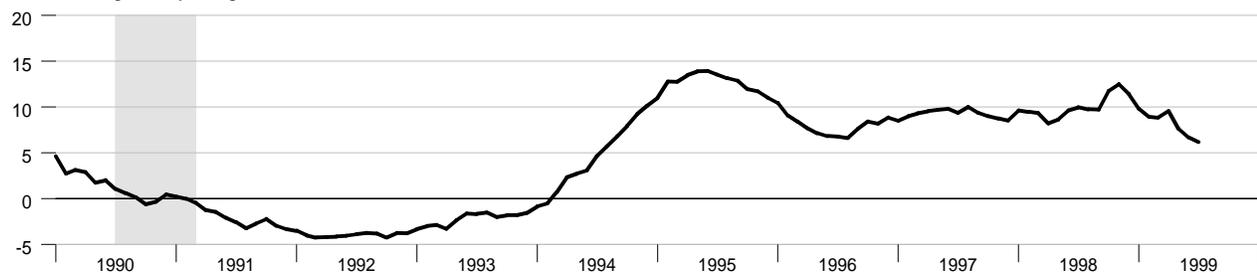
Total Loans and Leases in Bank Credit at Commercial Banks

Percent change from year ago

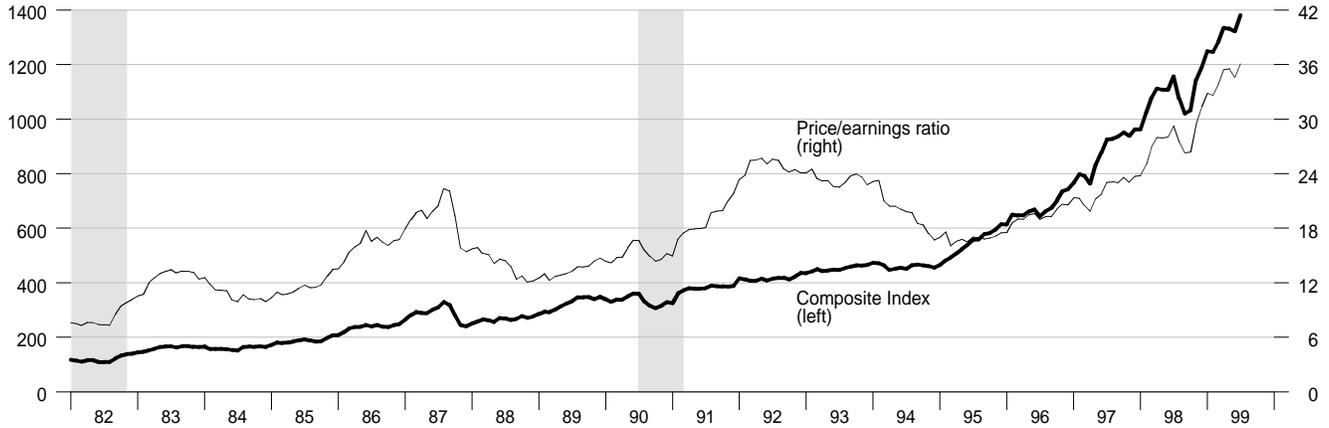


Commercial and Industrial Loans at Commercial Banks

Percent change from year ago



Standard and Poor's 500



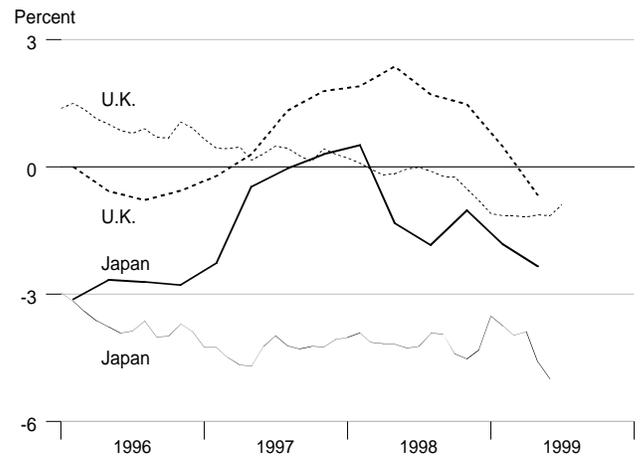
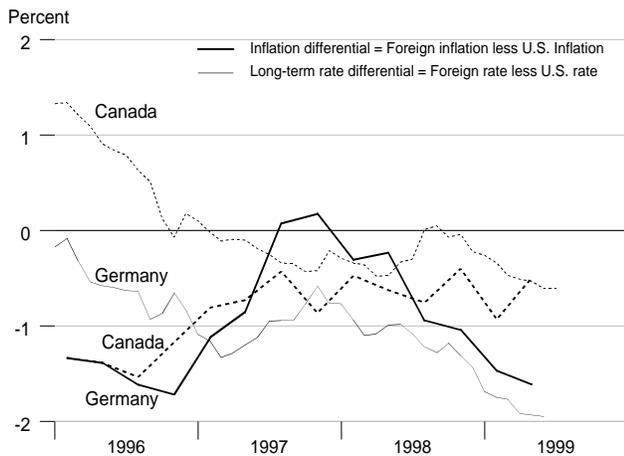
Inflation and Long-Term Interest Rates

Trend in Consumer Price Inflation Rates
Percent change from year ago

Recent Long-Term Government Bond Rates
Percent

	1998Q3	1998Q4	1999Q1	1999Q2	Apr99	May99	Jun99	Jul99
United States	1.62	1.48	1.73	2.09	5.77	6.04	6.31	6.22
Canada	0.86	1.08	0.80	1.59	5.26	5.51	5.70	5.61
France	0.73	0.37	0.26	0.36	4.25	4.45	4.94	5.02
Germany	0.67	0.44	0.26	0.48	3.85	4.01	4.36	.
Italy	2.06	1.75	1.38	.	4.11	4.28	4.62	4.95
Japan	-0.22	0.46	-0.10	-0.25	1.89	1.44	1.31	.
United Kingdom	3.32	2.96	2.20	1.42	4.59	4.91	5.16	5.33

Inflation and Long-Term Interest Rates Differentials



		Money Stock				Bank			
		M1	MZM	M2	M3	Credit	Monetary Base	Reserves	MSI M2
1994		1145.340	2919.235	3500.100	4303.777	3230.430	421.574	80.684	205.514
1995		1142.820	2905.387	3572.376	4499.721	3500.170	443.511	76.849	210.302
1996		1106.126	3095.474	3745.602	4796.153	3683.168	455.586	73.415	217.734
1997		1069.573	3317.708	3931.523	5176.835	3950.768	478.753	68.918	226.998
1998		1079.456	3703.036	4222.036	5702.628	4323.029	508.978	66.952	242.118
1997	1	1076.381	3221.769	3849.912	5012.702	3829.300	470.027	70.409	222.783
	2	1065.603	3274.316	3895.604	5110.126	3909.833	473.896	68.177	225.083
	3	1068.155	3347.362	3957.266	5229.471	3990.156	480.945	68.565	228.293
	4	1068.155	3427.385	4023.310	5355.042	4073.783	490.144	68.519	231.833
1998	1	1076.826	3521.904	4099.473	5492.696	4186.639	498.387	67.711	235.870
	2	1079.349	3636.248	4176.201	5630.852	4241.802	502.060	66.084	239.810
	3	1074.077	3742.218	4247.760	5751.281	4340.941	511.592	66.951	243.503
	4	1087.571	3911.774	4364.709	5935.681	4522.733	523.871	67.063	249.287
1999	1	1095.219	4026.648	4443.409	6046.677	4519.007	536.301	67.557	253.043
	2	1104.678	4120.056	4506.925	6125.703	4515.955	545.916	66.330	256.510
1997	Jul	1067.570	3313.992	3929.064	5185.887	3975.264	478.813	68.897	226.850
	Aug	1072.076	3350.655	3961.052	5232.806	3989.811	481.011	68.465	228.460
	Sep	1064.818	3377.440	3981.681	5269.719	4005.393	483.012	68.333	229.570
	Oct	1062.064	3399.840	4000.166	5306.738	4039.117	485.892	67.709	230.580
	Nov	1067.528	3425.069	4023.132	5353.685	4079.100	490.783	68.772	231.760
	Dec	1074.873	3457.246	4046.631	5404.702	4103.133	493.756	69.076	233.160
1998	Jan	1073.810	3486.418	4071.363	5449.660	4157.767	496.198	68.918	234.440
	Feb	1076.021	3522.145	4100.889	5484.968	4186.197	499.555	67.414	235.910
	Mar	1080.646	3557.148	4126.168	5543.459	4215.953	499.408	66.801	237.260
	Apr	1082.094	3601.996	4155.243	5588.629	4219.006	499.601	66.000	238.890
	May	1078.171	3635.664	4174.757	5630.568	4240.829	502.385	66.134	239.670
	Jun	1077.782	3671.084	4198.602	5673.360	4265.572	504.193	66.117	240.870
	Jul	1075.365	3695.548	4216.111	5693.359	4285.105	507.677	66.366	241.990
	Aug	1072.214	3736.456	4241.705	5748.843	4344.680	511.093	67.434	243.200
	Sep	1074.653	3794.651	4285.464	5811.642	4393.037	516.006	67.052	245.320
	Oct	1080.404	3855.670	4326.863	5873.100	4490.261	520.803	67.055	247.370
	Nov	1088.956	3913.333	4365.223	5937.765	4529.385	524.379	67.183	249.340
	Dec	1093.354	3966.319	4402.041	5996.177	4548.552	526.432	66.952	251.150
1999	Jan	1091.000	3994.574	4426.084	6017.316	4538.813	531.713	68.375	252.270
	Feb	1092.648	4035.963	4446.963	6064.401	4524.546	538.145	67.918	253.100
	Mar	1102.010	4049.407	4457.180	6058.314	4493.661	539.045	66.379	253.760
	Apr	1108.374	4094.416	4490.004	6100.469	4501.369	539.623	63.827	255.620
	May	1104.683	4120.904	4507.364	6124.562	4507.677	548.349	68.239	256.520
	Jun	1100.977	4144.849	4523.407	6152.079	4538.818	549.775	66.925	257.390
	Jul	1097.822	4162.106	4542.314	6176.928	4535.144	552.967	66.787	258.430

*All values are given in billions of dollars

		Federal	Discount	Prime	3-mo	Treasury Yields			Corporate	S & L	Conventional
		Funds	Rate	Rate		CDs	3 mo	3 yr	30 yr	Aaa Bonds	
1994		4.20	3.60	7.14	4.63	4.37	6.26	7.37	7.96	5.77	8.35
1995		5.84	5.21	8.83	5.92	5.66	6.26	6.88	7.59	5.80	7.95
1996		5.30	5.02	8.27	5.39	5.15	5.99	6.70	7.37	5.52	7.80
1997		5.46	5.00	8.44	5.62	5.20	6.10	6.61	7.26	5.32	7.60
1998		5.35	4.92	8.35	5.47	4.91	5.14	5.58	6.53	4.93	6.94
1997	1	5.28	5.00	8.27	5.44	5.20	6.19	6.82	7.43	5.44	7.79
	2	5.52	5.00	8.50	5.69	5.19	6.42	6.93	7.57	5.49	7.93
	3	5.53	5.00	8.50	5.60	5.18	6.01	6.53	7.17	5.23	7.47
	4	5.51	5.00	8.50	5.73	5.23	5.78	6.14	6.88	5.14	7.20
1998	1	5.52	5.00	8.50	5.55	5.19	5.46	5.88	6.67	4.94	7.05
	2	5.50	5.00	8.50	5.59	5.11	5.57	5.85	6.64	5.00	7.09
	3	5.53	5.00	8.50	5.53	4.96	5.11	5.47	6.49	4.95	6.87
	4	4.86	4.66	7.92	5.20	4.37	4.41	5.11	6.33	4.82	6.76
1999	1	4.73	4.50	7.75	4.90	4.53	4.87	5.37	6.42	4.87	6.88
	2	4.75	4.50	7.75	4.98	4.59	5.35	5.80	6.93	5.05	7.20
1997	Jul	5.52	5.00	8.50	5.60	5.19	6.00	6.51	7.14	5.24	7.50
	Aug	5.54	5.00	8.50	5.60	5.28	6.06	6.58	7.22	5.25	7.48
	Sep	5.54	5.00	8.50	5.60	5.08	5.98	6.50	7.15	5.19	7.43
	Oct	5.50	5.00	8.50	5.65	5.11	5.84	6.33	7.00	5.19	7.29
	Nov	5.52	5.00	8.50	5.74	5.28	5.76	6.11	6.87	5.19	7.21
	Dec	5.50	5.00	8.50	5.80	5.30	5.74	5.99	6.76	5.03	7.10
1998	Jan	5.56	5.00	8.50	5.54	5.18	5.38	5.81	6.61	4.88	6.99
	Feb	5.51	5.00	8.50	5.54	5.23	5.43	5.89	6.67	4.92	7.04
	Mar	5.49	5.00	8.50	5.58	5.16	5.57	5.95	6.72	5.03	7.13
	Apr	5.45	5.00	8.50	5.58	5.08	5.58	5.92	6.69	5.00	7.14
	May	5.49	5.00	8.50	5.59	5.14	5.61	5.93	6.69	5.04	7.14
	Jun	5.56	5.00	8.50	5.60	5.12	5.52	5.70	6.53	4.97	7.00
	Jul	5.54	5.00	8.50	5.59	5.09	5.47	5.68	6.55	5.01	6.95
	Aug	5.55	5.00	8.50	5.58	5.04	5.24	5.54	6.52	5.01	6.92
	Sep	5.51	5.00	8.49	5.41	4.74	4.62	5.20	6.40	4.84	6.72
	Oct	5.07	4.86	8.12	5.21	4.07	4.18	5.01	6.37	4.76	6.71
	Nov	4.83	4.63	7.89	5.24	4.53	4.57	5.25	6.41	4.87	6.87
	Dec	4.68	4.50	7.75	5.14	4.50	4.48	5.06	6.22	4.83	6.72
1999	Jan	4.63	4.50	7.75	4.89	4.45	4.61	5.16	6.24	4.85	6.79
	Feb	4.76	4.50	7.75	4.90	4.56	4.90	5.37	6.40	4.80	6.81
	Mar	4.81	4.50	7.75	4.91	4.57	5.11	5.58	6.62	4.96	7.04
	Apr	4.74	4.50	7.75	4.88	4.41	5.03	5.55	6.64	4.89	6.92
	May	4.74	4.50	7.75	4.92	4.63	5.33	5.81	6.93	5.05	7.15
	Jun	4.76	4.50	7.75	5.13	4.72	5.70	6.04	7.23	5.22	7.55
	Jul	4.99	4.50	8.00	5.24	4.69	5.62	5.98	7.19	5.24	7.63

*All values are given as a percent at an annual rate

		M1	MZM	M2	M3
Percent change from previous period					
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1994		6.17	2.61	1.38	1.60
1995		-0.22	-0.47	2.06	4.55
1996		-3.21	6.54	4.85	6.59
1997		-3.30	7.18	4.96	7.94
1998		0.92	11.61	7.39	10.16
<hr/>					
1997	1	-0.47	1.77	1.19	1.88
	2	-1.00	1.63	1.19	1.94
	3	0.24	2.23	1.58	2.34
	4	0.00	2.39	1.67	2.40
1998	1	0.81	2.76	1.89	2.57
	2	0.23	3.25	1.87	2.52
	3	-0.49	2.91	1.71	2.14
	4	1.26	4.53	2.75	3.21
1999	1	0.70	2.94	1.80	1.87
	2	0.86	2.32	1.43	1.31
<hr/>					
1997	Jul	0.15	0.68	0.45	0.98
	Aug	0.42	1.11	0.81	0.90
	Sep	-0.68	0.80	0.52	0.71
	Oct	-0.26	0.66	0.46	0.70
	Nov	0.51	0.74	0.57	0.88
	Dec	0.69	0.94	0.58	0.95
<hr/>					
1998	Jan	-0.10	0.84	0.61	0.83
	Feb	0.21	1.02	0.73	0.65
	Mar	0.43	0.99	0.62	1.07
	Apr	0.13	1.26	0.70	0.81
	May	-0.36	0.93	0.47	0.75
	Jun	-0.04	0.97	0.57	0.76
	Jul	-0.22	0.67	0.42	0.35
	Aug	-0.29	1.11	0.61	0.97
	Sep	0.23	1.56	1.03	1.09
	Oct	0.54	1.61	0.97	1.06
	Nov	0.79	1.50	0.89	1.10
	Dec	0.40	1.35	0.84	0.98
<hr/>					
1999	Jan	-0.22	0.71	0.55	0.35
	Feb	0.15	1.04	0.47	0.78
	Mar	0.86	0.33	0.23	-0.10
	Apr	0.58	1.11	0.74	0.70
	May	-0.33	0.65	0.39	0.39
	Jun	-0.34	0.58	0.36	0.45
	Jul	-0.29	0.42	0.42	0.40

Definitions

M1: the sum of: currency held outside the vaults of depository institutions, Federal Reserve Banks, and the U.S. Treasury; travelers checks; and demand and other checkable deposits issued by financial institutions, except demand deposits due to the Treasury and depository institutions, minus cash items in process of collection and Federal Reserve float.

MZM: M2 minus small denomination time deposits, plus institutional money market mutual funds. The label MZM was coined by William Poole (1991) for this aggregate, proposed earlier by Motley (1988). Due to distortions caused by regulatory changes, the largest of which the introduction of money market accounts, data for MZM begin March 1983 in this publication.

M2: M1 plus: savings deposits (including money market deposit accounts) and small denomination (less than \$100,000) time deposits issued by financial institutions; and shares in retail money market mutual funds (funds with initial investments of less than \$50,000), net of retirement accounts.

M3: M2 plus: large denomination (\$100,000 or more) time deposits; repurchase agreements issued by depository institutions; Eurodollar deposits, specifically, dollar-denominated deposits due to nonbank U.S. addresses held at foreign offices of U.S. banks worldwide and all banking offices in Canada and the United Kingdom; and institutional money market mutual funds (funds with initial investments of \$50,000 or more).

Bank Credit: all loans, leases and securities held by commercial banks.

Domestic Nonfinancial Debt: total credit market liabilities of the U.S. Treasury, federally sponsored agencies, state and local governments, households, and firms except depository institutions and money market mutual funds.

Adjusted Monetary Base: the sum of currency in circulation outside Federal Reserve Banks and the U.S. Treasury, deposits of depository financial institutions at Federal Reserve Banks, and an adjustment for the effects of changes in statutory reserve requirements on the quantity of base money held by depositories. This series is a spliced chain index; see Anderson and Rasche (1996a,b).

Adjusted Reserves: the sum of vault cash and Federal Reserve Bank deposits held by depository institutions, and an adjustment for the effects of changes in statutory reserve requirements on the quantity of base money held by depositories. This series, a spliced chain index, is numerically larger than the Board of Governors' measure which excludes vault cash not used to satisfy statutory reserve requirements and Federal Reserve Bank deposits used to satisfy required clearing balance contracts; see Anderson and Rasche (1996a) and <http://www.stls.frb.org/research/newbase.html>.

Monetary Services Index: an index which measures the flow of monetary services received by households and firms from their holdings of liquid assets; see Anderson, Jones and Nesmith (1997). Indexes are shown for the assets included in M2; additional data are available at <http://www.stls.frb.org/research/msi/index.html>.

Note: M1, M2, M3, Bank Credit and Domestic Nonfinancial Debt are constructed and published by the Board of Governors of the Federal Reserve System. For details, see *Federal Reserve Bulletin*, tables 1.21 and 1.26. MZM, Adjusted Monetary Base, Adjusted Reserves and Monetary Services Index are constructed and published by the Research Division of the Federal Reserve Bank of St. Louis.

Notes

Page 3: **MZM**, or "Money, Zero Maturity" includes the zero maturity, or immediately available, components of M3. MZM equals M2 minus small denomination time deposits, plus institutional money market mutual funds (that is, the money market mutual funds included in M3 but excluded from M2). Readers are cautioned that since early 1994 the level and growth of M1 have been depressed by retail sweep programs that reclassify transactions deposits (demand deposits and other checkable deposits) as savings deposits overnight, thereby reducing banks' required reserves; see <http://www.stls.frb.org/research/swdata.html>. For analytical purposes, MZM largely replaces M1. The **Discount Rate** and **Expected Federal Funds Rate** shown in the chart **Reserve Market Rates**, are plotted as of the date of the change, while the **Effective Federal Funds Rate** is plotted as of the end of the month. Interest rates in the table are monthly averages from the Board of Governors H.15 Statistical Release. **Treasury Yield Curve** shows constant maturity yields calculated by the U.S. Treasury Department for securities with 3 months and 1, 2, 3, 5, 7, 10, 20 and 30 years to maturity. Daily data and a description are available at <http://www.stls.frb.org/fred/data/wkly.html>. See also *Federal Reserve Bulletin*, table 1.35.

Page 5: **Total Checkable Deposits** is the sum of demand and other checkable deposits. **Total Savings Deposits** is the sum of money market deposit accounts (MMDA), and passbook and statement savings. **Time Deposits** have a minimum initial maturity of 7 days. **Large Time Deposits** are deposits of \$100,000 or more. **Retail and Institutional Money Market Mutual Funds** are as included in M2 and the non-M2 component of M3, respectively.

Page 7: **Excess Reserves plus RCB (Required Clearing Balance) Contracts** equals the amount of deposits at Federal Reserve Banks held by depository institutions but not applied to satisfy statutory reserve requirements. (This measure excludes the vault cash held by depository institutions that is not applied to satisfy statutory reserve requirements.) **Consumer credit** includes most short- and intermediate-term credit extended to individuals. See *Federal Reserve Bulletin*, table 1.55.

Page 8: **Inflation expectations** measures include the quarterly Federal Reserve Bank of Philadelphia *Survey of Professional Forecasters*, the monthly University of Michigan Survey Research Center's *Surveys of Consumers*, and the annual Federal Open Market Committee range as reported to the Congress in the February Humphrey-Hawkins Act testimony each year. **CPI Inflation** is the percentage change from a year ago in the CPI for all urban consumers. **Real Interest Rates** are ex post measures, equal to nominal rates minus CPI inflation.

Page 9: **FOMC Expected Federal Funds Rate** is the level (or midpoint of the range, if applicable) of the federal funds rate that the staff of the Federal Open Market Committee expected to be consistent with the desired degree of pressure on bank reserve positions.

Page 10: **Federal Funds Rate and Inflation Targets** shows the observed federal funds rate, quarterly, and the level of the funds rate implied by applying Taylor's (1993) equation

$$f_t^* = 2.0 + \pi_{t-1} + (\pi_{t-1} - \pi^*)/2 + 100 \times (y_{t-1} - y_{t-1}^P)/2$$

to five alternative target inflation rates $\pi^* = 0, 1, 2, 3, 4$ percent, where f_t^* is the implied federal funds rate, π_{t-1} is the previous period's inflation rate (CPI), y_{t-1} is the log of the previous period's level of real GDP, and y_{t-1}^P is the log of an estimate of the previous period's level of potential output. **Potential real output** is as estimated by the Congressional Budget Office.

Monetary Base Growth and Inflation Targets shows the quarterly growth of the adjusted monetary base (modified to include an estimate of the effect of sweep programs) implied by applying McCallum's (1988, 1993) equation

$$\Delta MB_t^* = \pi^* + (10\text{-year moving average growth of real GDP}) \\ - (4\text{-year moving average of base velocity growth})$$

to five alternative target inflation rates $\pi^* = 0, 1, 2, 3, 4$ percent, where ΔMB_t^* is the implied growth rate of the adjusted monetary base. The 10-year moving average growth of real GDP for a quarter "t" is calculated as the average quarterly growth during the previous 40 quarters, at

an annual rate, by the formula $((y_t - y_{t-40})/40) \times 4 \times 100$, where y_t is the log of real GDP. The four-year moving average of base velocity growth is calculated similarly. To adjust the monetary base for the effect of retail-deposit sweep programs, we add to the monetary base an amount equal to 10 percent of the total amount swept, as estimated by the Federal Reserve Board staff. These estimates are imprecise, at best. Sweep program data are available at

<http://www.stls.frb.org/research/swdata.html>.

Page 11: Implied One-Year Forward Rates are calculated by this Bank from Treasury constant maturity yields. Yields to maturity, $R(m)$, for securities with $m = 1, \dots, 30$ years to maturity are obtained by linear interpolation between reported yields. These yields are smoothed by fitting the regression suggested by Nelson and Siegel (1987)

$$R(m) = a_0 + (a_1 + a_2)(1 - e^{-m/50})/(m/50) - a_2 \times e^{-m/50},$$

and forward rates are calculated from these smoothed yields using equation (a) in Table 13.1 of Shiller (1990)

$$f(m) = [D(m)R(m) - D(m-1)] / [D(m) - D(m-1)]$$

where duration is approximated as $D(m) = (1 - e^{-R(m) \times m}) / R(m)$. These rates are linear approximations to the true instantaneous forward rates; see Shiller. For a discussion of the use of forward rates as indicators of inflation expectations, see Sharpe (1997). **Rates on 3-Month Euro-dollar Futures** and **Rates on Selected Fed Funds Futures Contracts** each trace through time the yield on three specific contracts. **Implied Yields on Fed Funds Futures** displays a single day's snapshot of yields for contracts expiring in the months shown on the horizontal axis. **Inflation-Protected Treasury Yield Spreads** equal, for 5, 10, and 30 year maturities, the difference between the Treasury constant maturity yield and the yield on the most recently issued inflation-protected security. **Inflation-Indexed Bonds** for Canada are the 31-year bond with a maturity date of 12/01/2026; for the U.K., the 37.5-year bond with a maturity date of 07/17/2024 and the 12.1-year bond with a maturity date of 10/21/2004; and, for the U.S., the 30-year bond with a maturity date of 04/15/2028 and the 10-year bond with a maturity date of 01/15/2007.

Page 12: Velocity (for MZM and M2) equals the ratio of GDP, measured in current dollars, to the level of the monetary aggregate. **MZM** and **M2 Own Rates** are weighted averages of the rates received by households and firms on the assets included in the aggregates. Two alternative opportunity costs are shown, one relative to the 3-month Treasury constant-maturity yield, the other to the 5-year constant-maturity yield.

Page 13: Real Gross Domestic Product is GDP as measured in chained 1992 dollars. The **Gross Domestic Product Price Index** is the implicit price deflator for GDP, which is defined by the Bureau of Economic Analysis, U.S. Department of Commerce, as the ratio of GDP measured in current dollars to GDP measured in chained 1992 dollars.

Page 14: Investment Securities are all securities held by commercial banks in both investment and trading accounts.

Sources

Bank of Canada

Canadian inflation-linked bond yields.

Bank of England

U.K. inflation-linked bond yields.

Board of Governors of the Federal Reserve System

Monetary aggregates and components, nonfinancial debt: H.6 release; bank credit and components: H.8 release; consumer credit: G.19 release; required reserves, excess reserves, clearing balance contracts and discount window borrowing: H.4.1 and H.3 releases; interest rates: H.15 and G.13 releases; nonfinancial commercial paper: Board of Governors web site; M2 and MZM own rates.

Bureau of Economic Analysis

Gross domestic product.

Bureau of Labor Statistics

Consumer price index.

Federal Reserve Bank of Philadelphia

Survey of Professional Forecasters inflation expectations.

Federal Reserve Bank of St. Louis

Adjusted monetary base and adjusted total reserves, monetary services index, one-year forward rates.

Organization for Economic Cooperation and Development

International interest and inflation rates.

University of Michigan Survey Research Center

Median expected price change.

Congressional Budget Office

Potential real GDP.

Dow Jones and Co. (Wall Street Journal)

Federal funds futures contracts, Eurodollar futures.

Standard and Poors Inc.

Stock price-earnings ratio, stock price composite index.

U.S. Department of the Treasury

U.S. inflation-protected security yields.

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Note: Articles from this Bank's *Review* are available on the Internet at www.stls.frb.org/research/reviewdat.html.