May 1999

MonetaryTrends

THE FEDERAL RESERVE BANK of ST. LOUIS

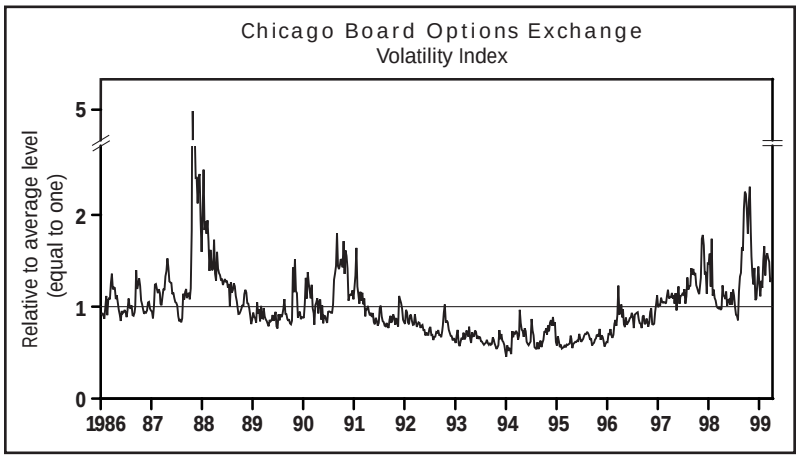
A Barometer of Financial Market Uncertainty

The financial market disturbance last summer and autumn had numerous symptoms and effects. Stock prices (as measured by the Dow Jones industrial average) fell almost 20 percent between July 17th and the end of August. Prices and issuance of quality commercial paper temporarily dropped. Bonds from emerging markets in Latin America and Asia tumbled in value, and debt rollover temporarily came to a near standstill. A panicky flight to quality led to a large increase in the prices of on-the-run Treasury securities, even relative to previous issues of like Treasury securities. The same shift in investor preferences toward safe assets led to increases in quality spreads among corporate bonds. While each of these facets was important and telling, an indicator based on stock market volatility would perhaps provide a more general barometer of financial market uncertainty. Large quality spreads and flights to quality reflect heightened repayment risks, which are signs of more acute (or idiosyncratic) trouble than increased uncertainty regarding the earnings potential of large corporations as a group.

The implied volatility from options contracts on the Standard and Poor's 100 (S&P 100) index, which includes the country's largest companies, is one barometer of stock market volatility. According to standard options-pricing theory, every determinant of an option's price is observable except the expected volatility of the price of the underlying asset over the option's life. From options prices and the other observable factors, one can infer the market's implied volatility of the price of the underlying asset. Using the trading prices of options on the S&P 100, the Chicago Board Options Exchange (CBOE) estimates the implied volatility corresponding to a hypothetical at-the-money option with one month to expiration. (An at-the-money option has a strike price equal to the current price of the underlying asset.) The CBOE calls this estimate the volatility index (VIX). VIX is a forecast of how turbulent the S&P 100 index will be in the coming month. When expected volatility rises, put options, which give the holder the right to sell stocks at a prespecified strike price, become more expensive. Thus, when VIX is high, portfolio managers must pay a premium to hedge the values of their investments with options. In other words, the price of portfolio insurance rises.

The accompanying chart shows how VIX reflects financial market uncertainty across time. The stock market crash of October 1987, the Gulf War buildup of 1990-91, the Russian debt default in August 1998, and Brazil's recent currency devaluation in January 1999 all increased expected stock market volatility. The highest volatility in the 1986-98 period occurred right after the October 1987 crash. The chart indicates how infrequently the VIX is more than 50 percent higher than its average level. Thus, the financial market disturbance in autumn 1998 created a very tumultuous degree of uncertainty by historical standards, even if it did not match the titanic event of 1987.

—Michael J. Dueker



Table*of*Contents

Conventions used in this publication:

1. 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: $[(x_t / x_{t-12}) - 1] \times 100$.

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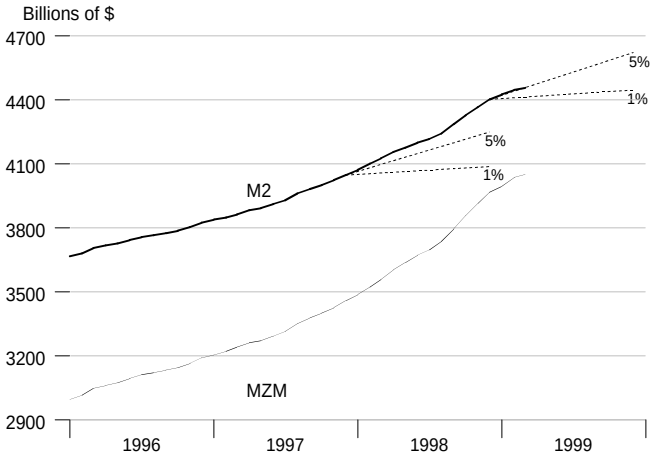
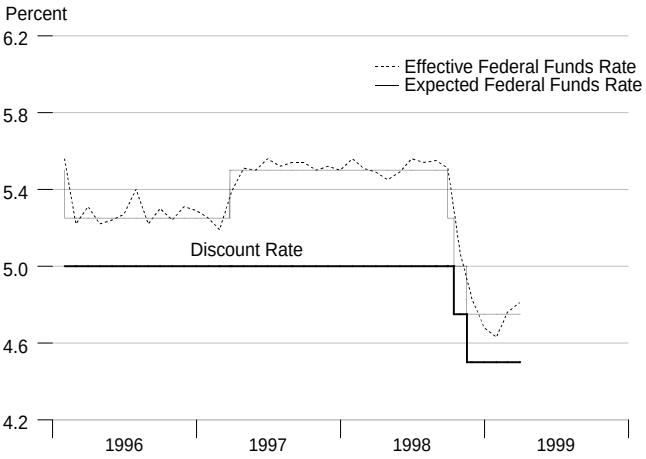
M2 and MZM

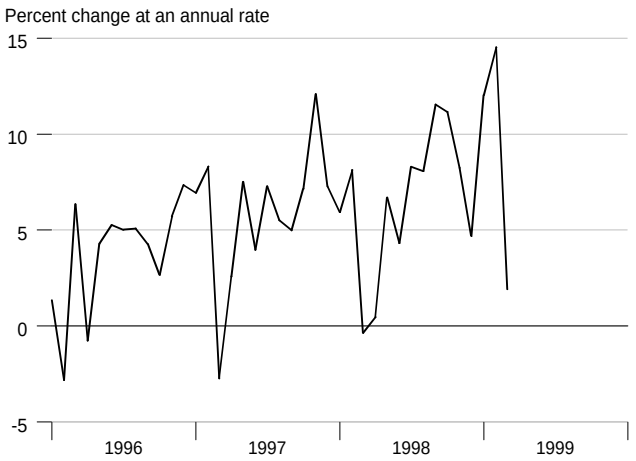


Dotted lines indicate the FOMC target ranges.

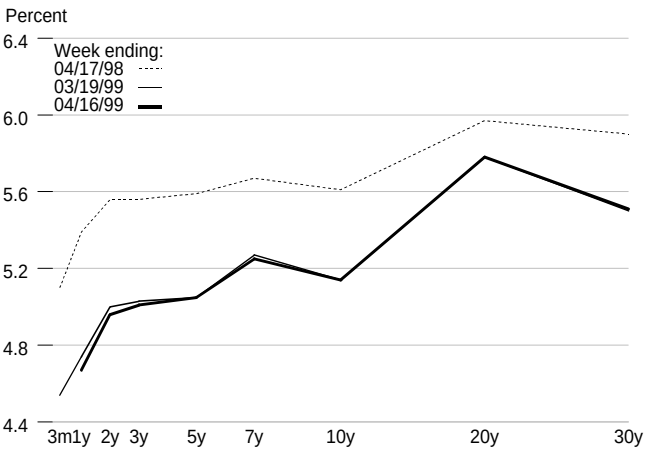
Reserve Market Rates



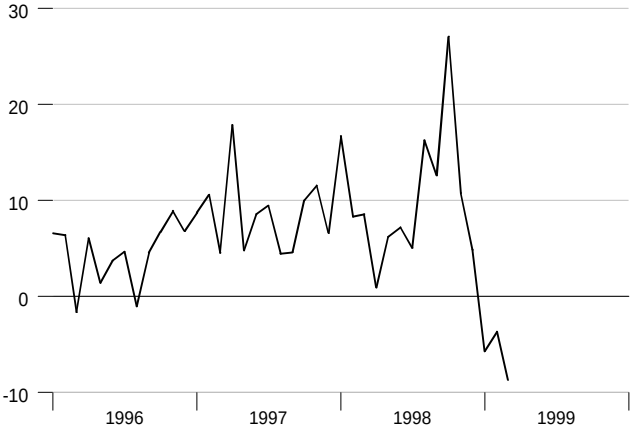
Adjusted Monetary Base



Treasury Yield Curve



Total Bank Credit

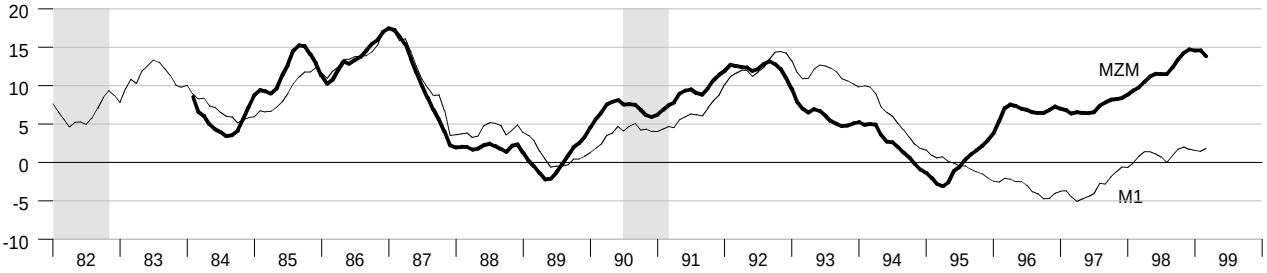


Interest Rates

	Jan 99	Feb 99	Mar 99
Federal Funds Rate	4.63	4.76	4.81
Discount Rate	4.50	4.50	4.50
Prime Rate	7.75	7.75	7.75
Conventional Mortgage Rate	6.79	6.81	7.04
Treasury Yields:			
3-month constant maturity	4.45	4.56	4.57
6-month constant maturity	4.49	4.61	4.65
1-year constant maturity	4.51	4.70	4.78
3-year constant maturity	4.61	4.90	5.11
5-year constant maturity	4.60	4.91	5.14
10-year constant maturity	4.72	5.00	5.23
30-year constant maturity	5.16	5.37	5.58

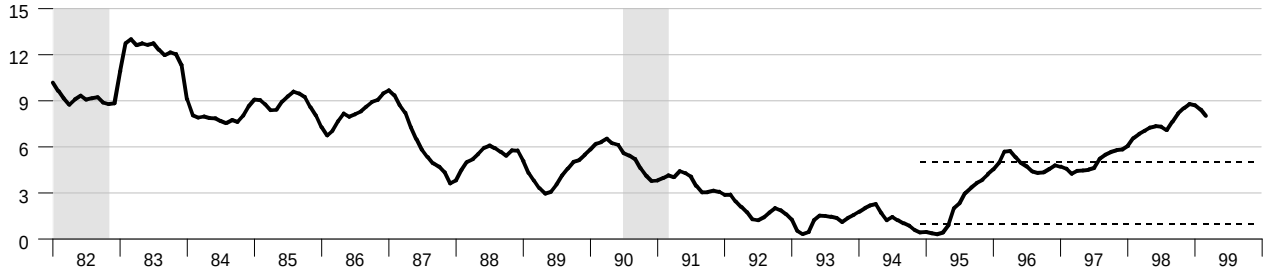
MZM and M1

Percent change from year ago



M2

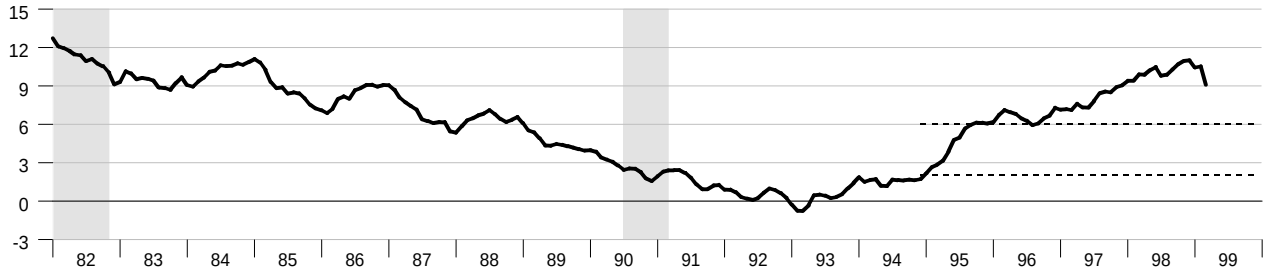
Percent change from year ago



Dotted lines indicate the FOMC target ranges.

M3

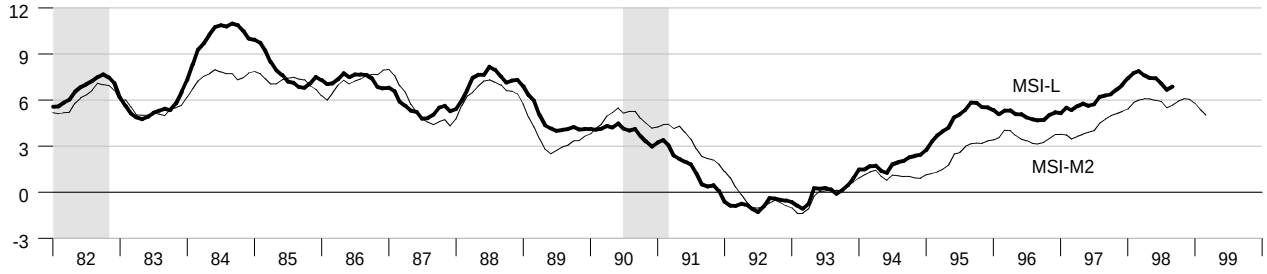
Percent change from year ago



Dotted lines indicate the FOMC target ranges.

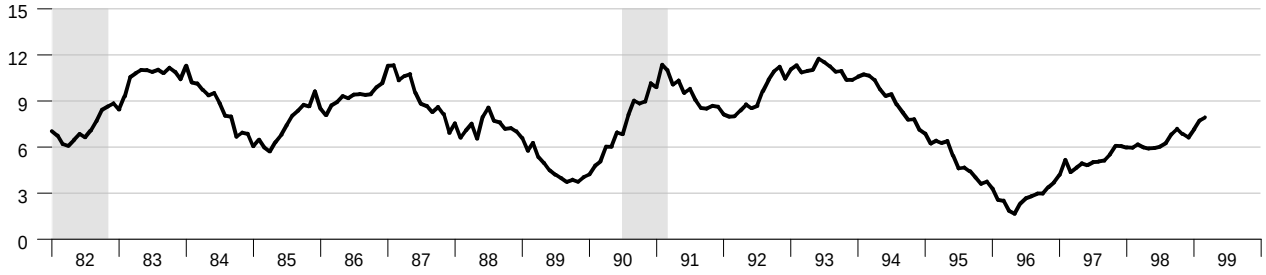
Monetary Services Indexes - M2 and L

Percent change from year ago



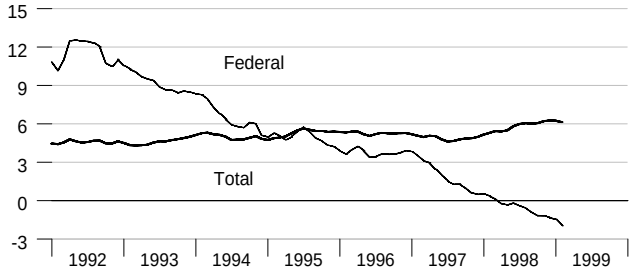
Adjusted Monetary Base

Percent change from year ago



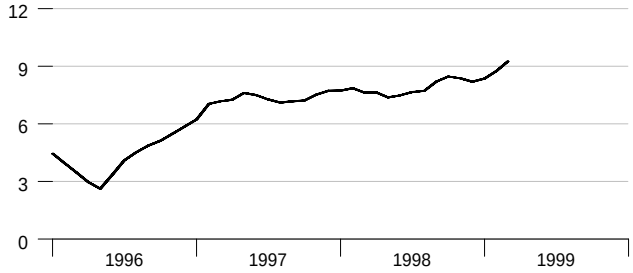
Domestic Nonfinancial Debt

Percent change from year ago



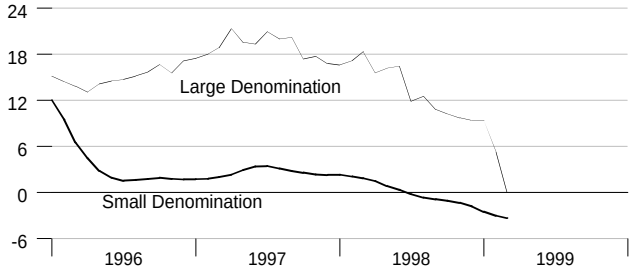
Currency Held by the Nonbank Public

Percent change from year ago



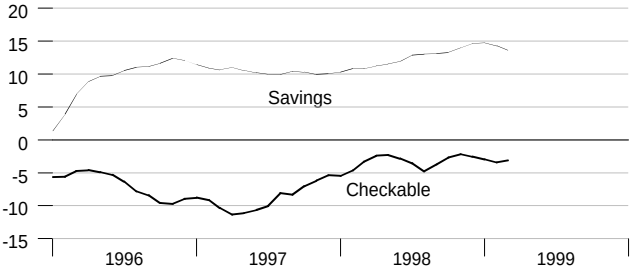
Time Deposits

Percent change from year ago



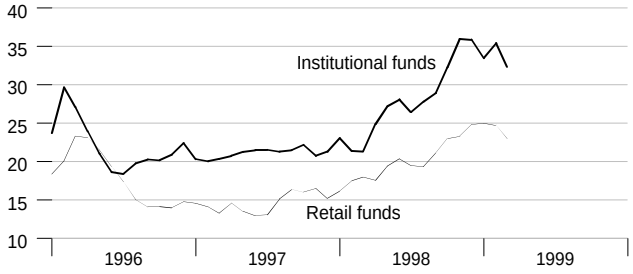
Checkable and Savings Deposits

Percent change from year ago

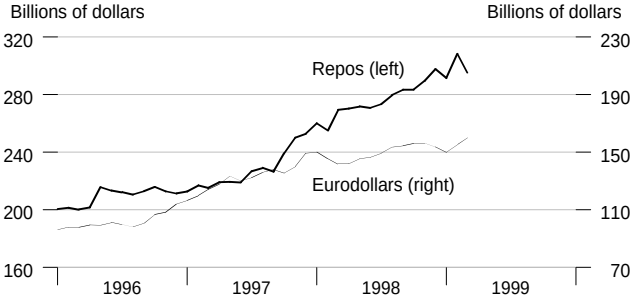


Money Market Mutual Fund Shares

Percent change from year ago

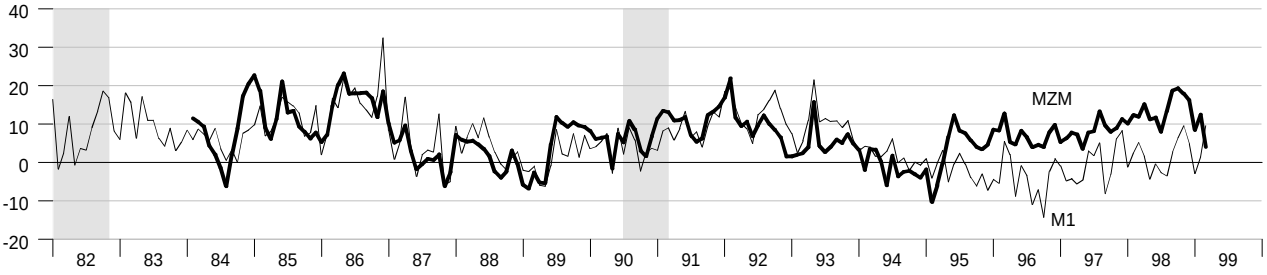


Repurchase Agreements and Eurodollars



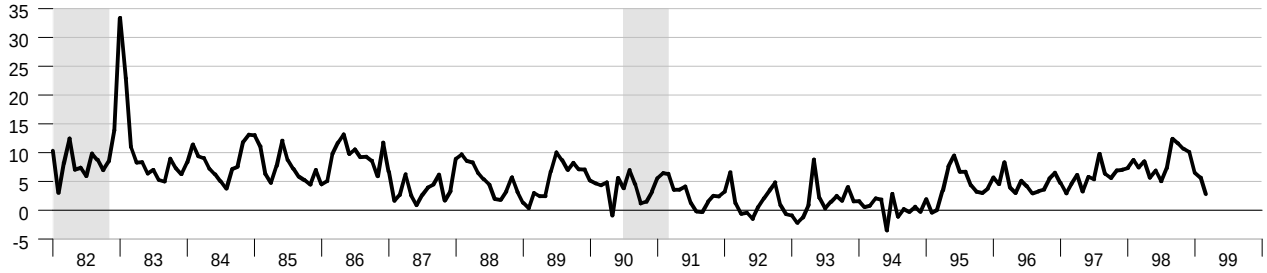
MZM and M1

Percent change at an annual rate



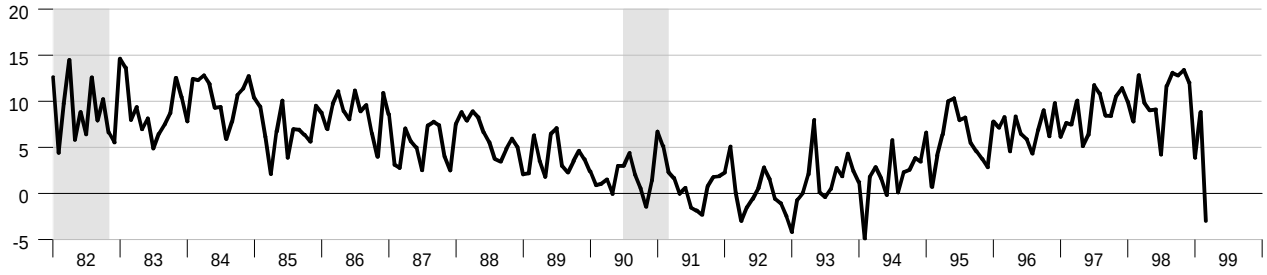
M2

Percent change at an annual rate



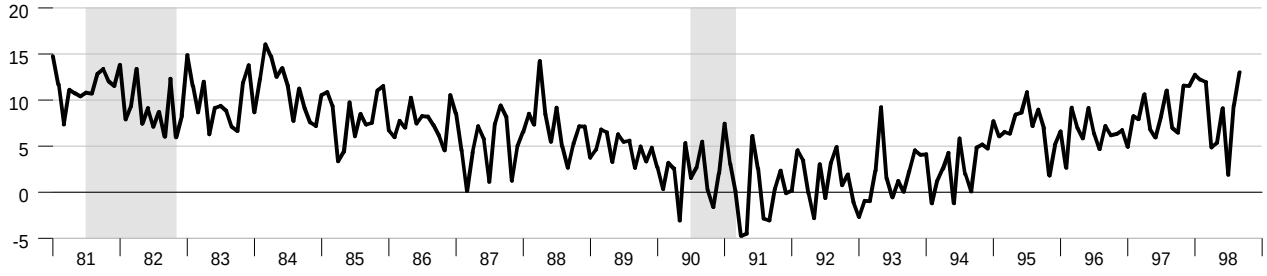
M3

Percent change at an annual rate

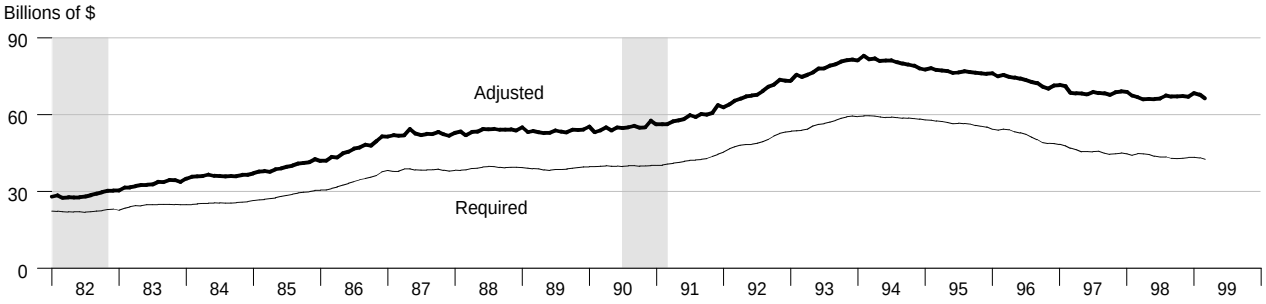


L

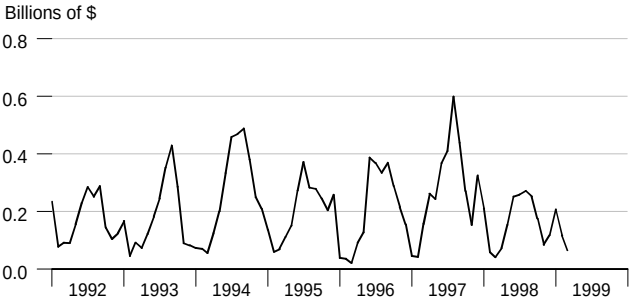
Percent change at an annual rate



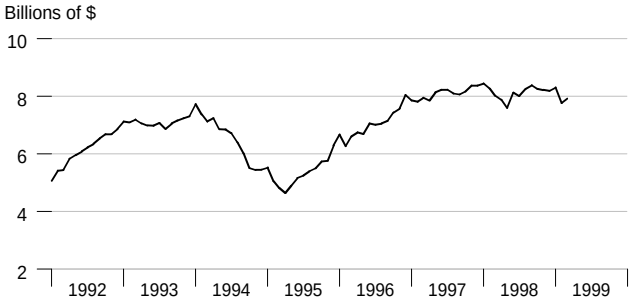
Adjusted and Required Reserves



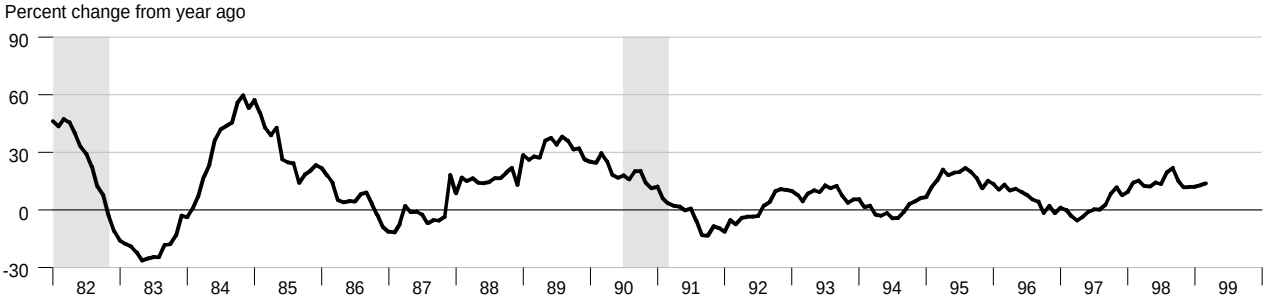
Total Borrowings, nsa



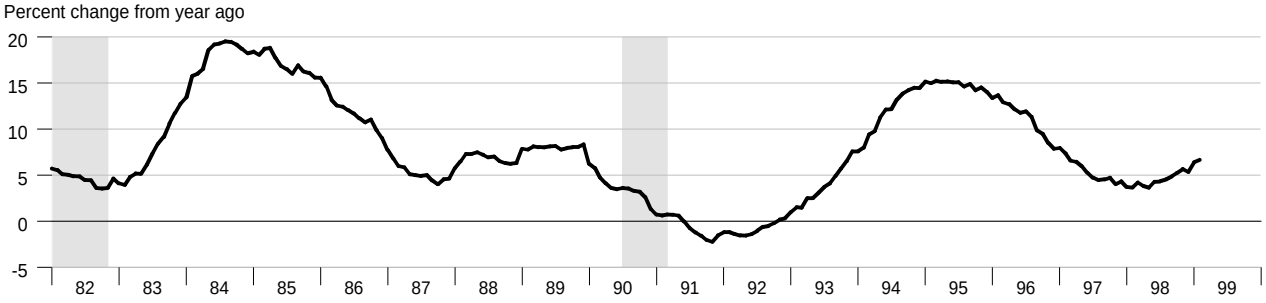
Excess Reserves plus RCB Contracts



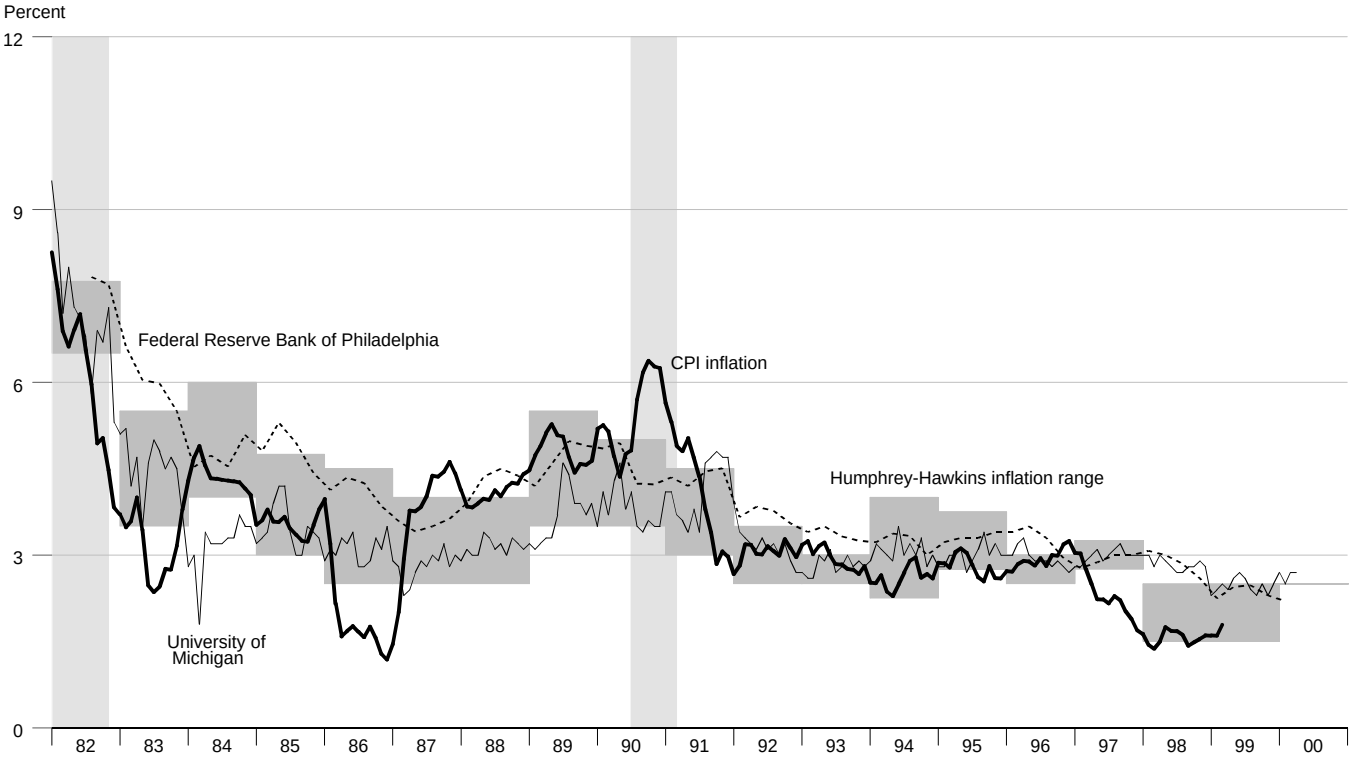
Nonfinancial Commercial Paper



Consumer Credit

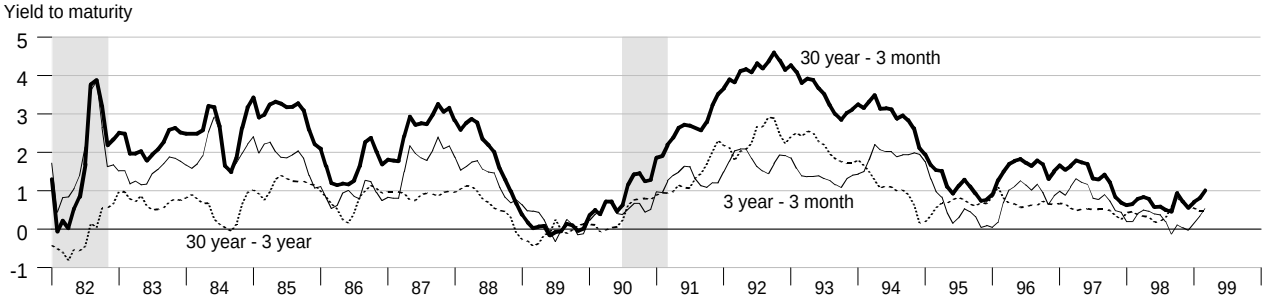


Inflation and Inflation Expectations

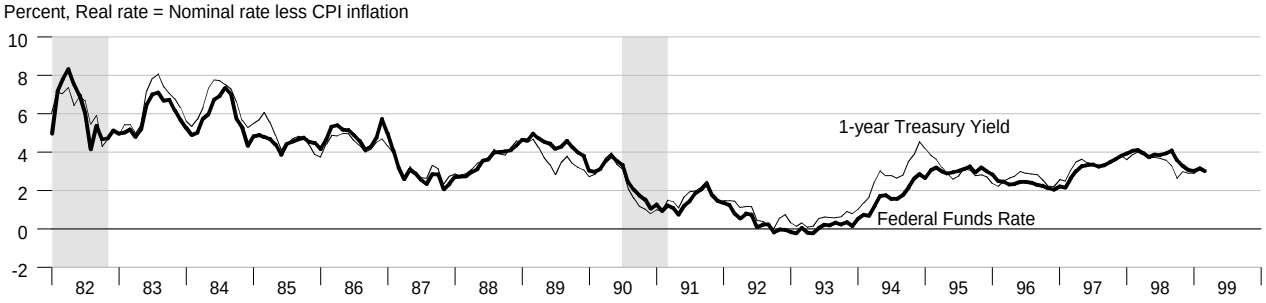


The shaded region shows the Humphrey-Hawkins CPI inflation range. See page 19 for information.

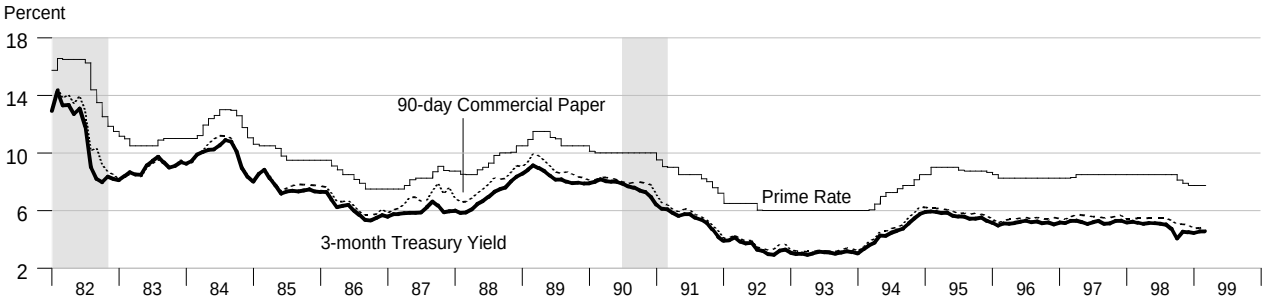
Treasury Security Yield Spreads



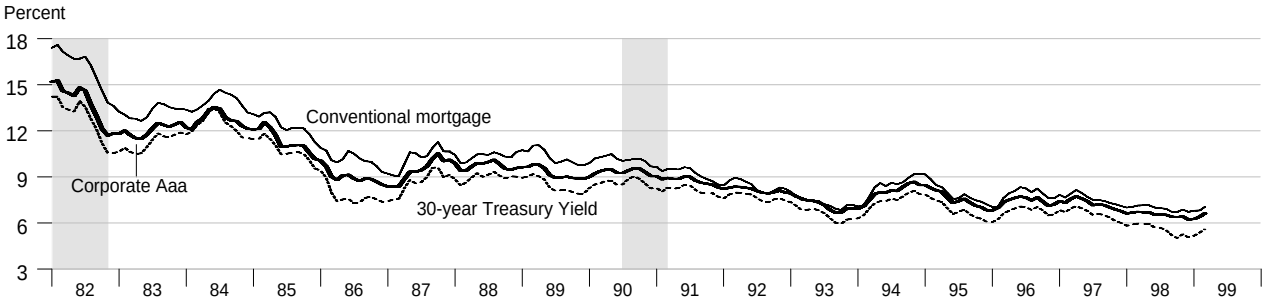
Real Interest Rates



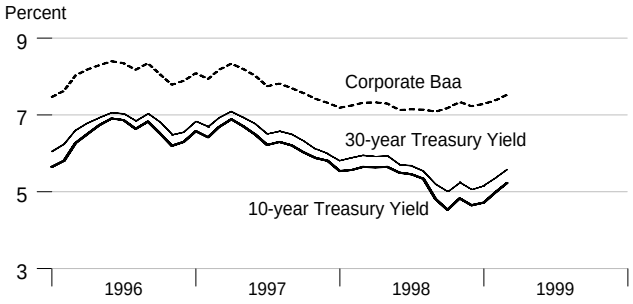
Short Term Interest Rates



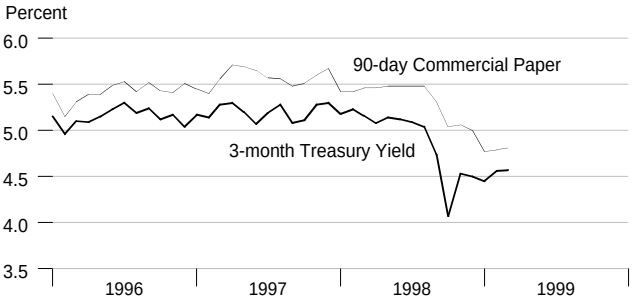
Long Term Interest Rates



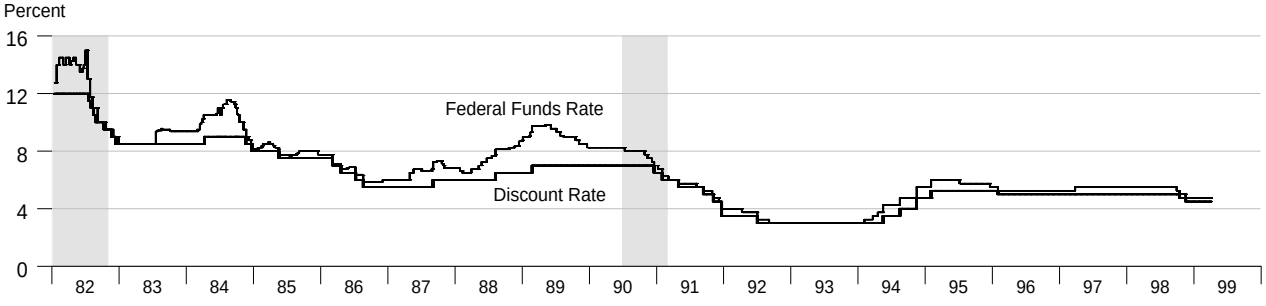
Long Term Interest Rates



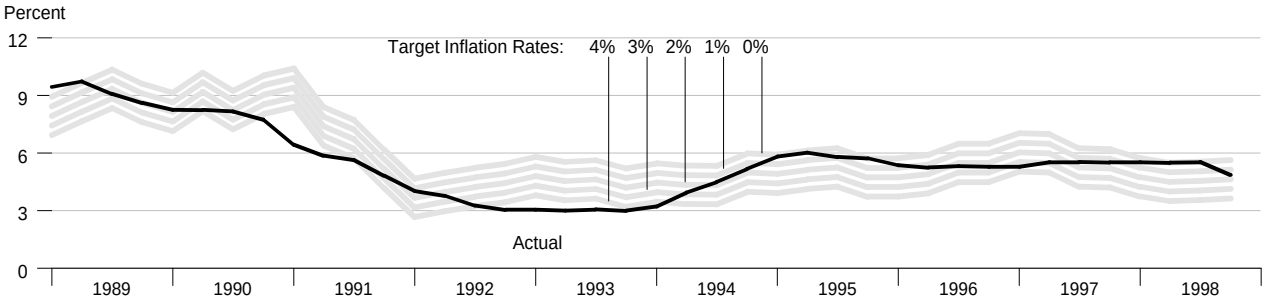
Short Term Interest Rates



FOMC Expected Federal Funds Rate and Discount Rate

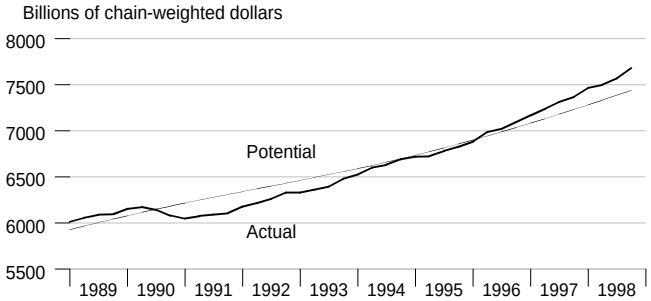


Federal Funds Rate and Inflation Targets

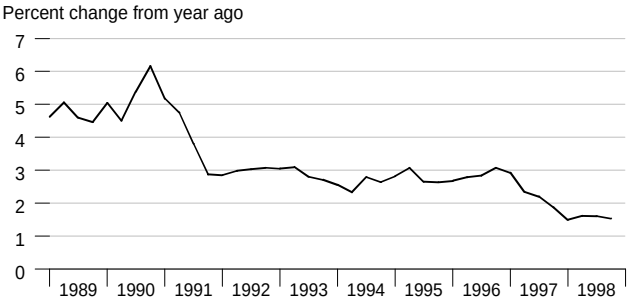


Calculated federal funds rate is based on Taylor's rule. See notes on page 19.

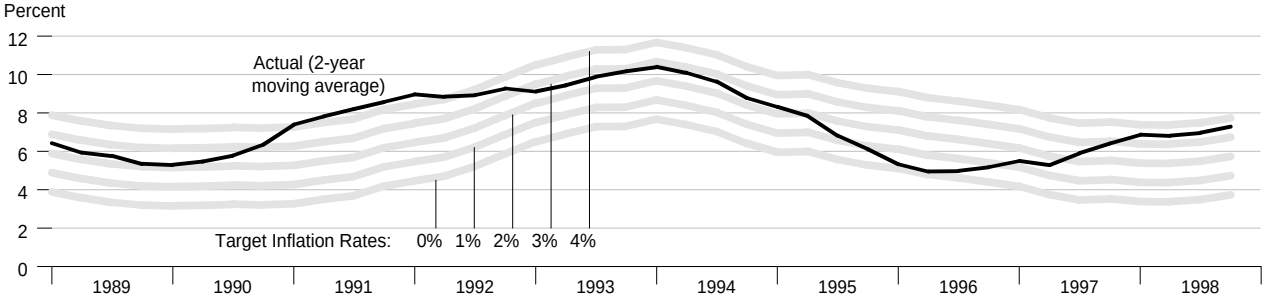
Actual and Potential Real GDP



Actual CPI Inflation

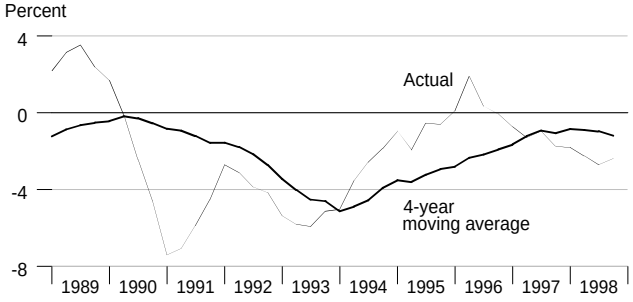


Monetary Base Growth* and Inflation Targets

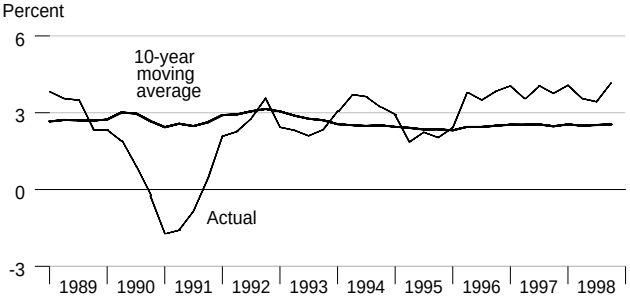


*Modified for the effects of sweeps programs on reserve demand.
Calculated base growth is based on McCallum's rule. See notes on page 19.

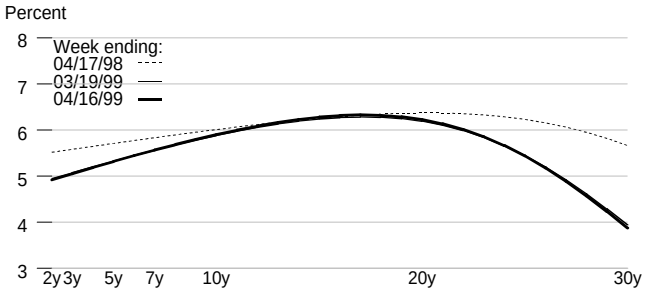
Monetary Base Velocity Growth



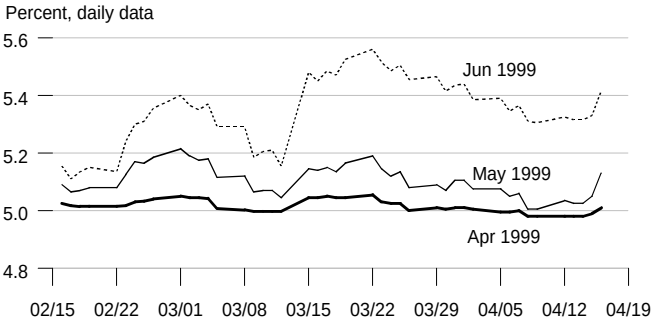
Real Output Growth



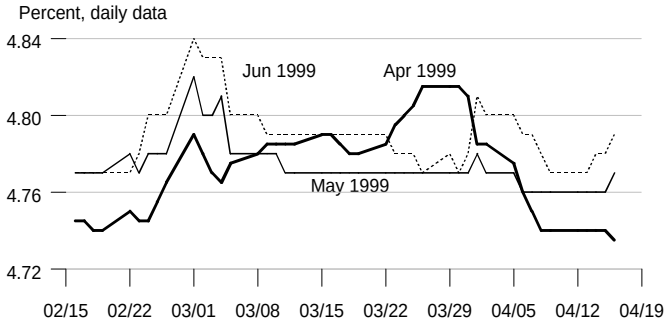
Implied One-Year Forward Rates



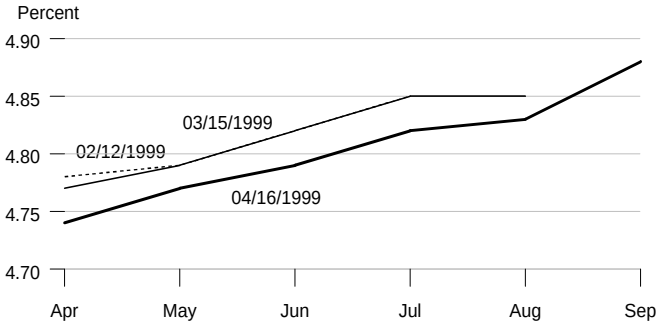
Rates on 3-Month Eurodollar Futures



Rates on Selected Fed Funds Futures Contracts



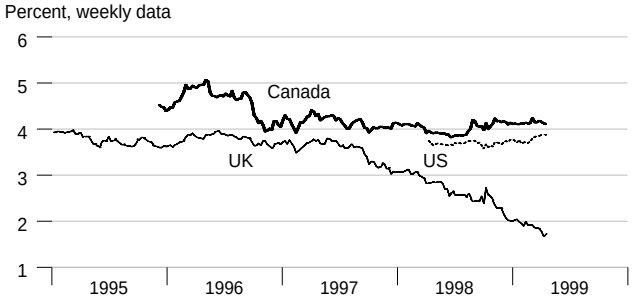
Implied Yields on Fed Funds Futures



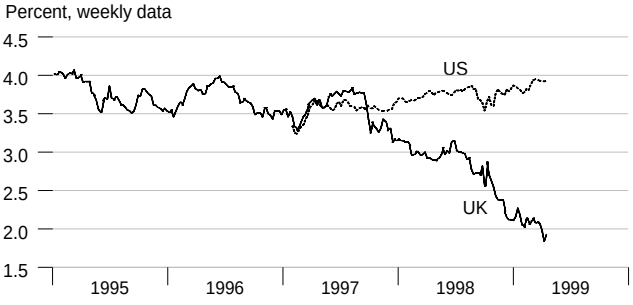
Inflation-Protected Treasury Yields

Inflation-Protected Treasury Yield Spreads

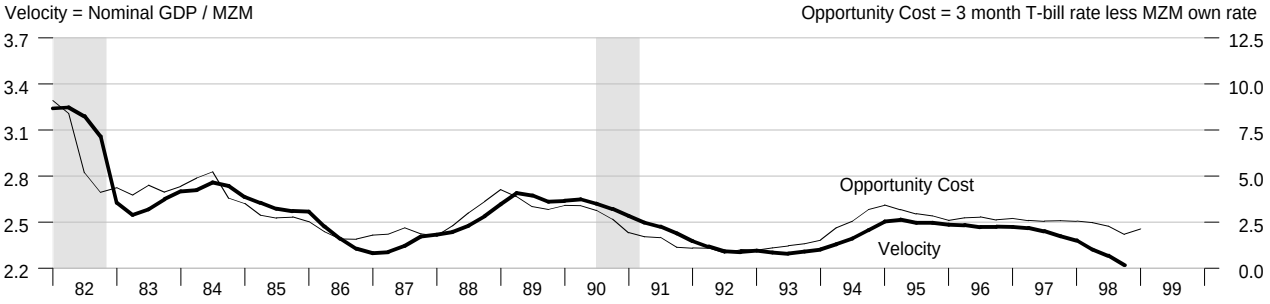
Inflation-Indexed 30-Year Bonds



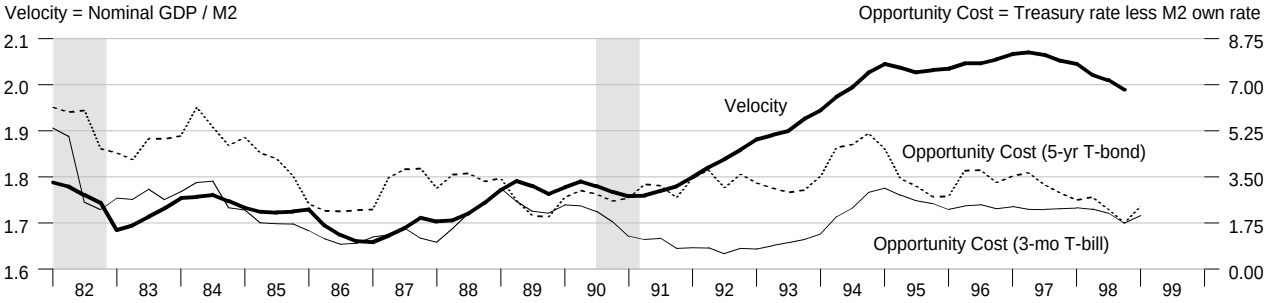
Inflation-Indexed 10-Year Bonds



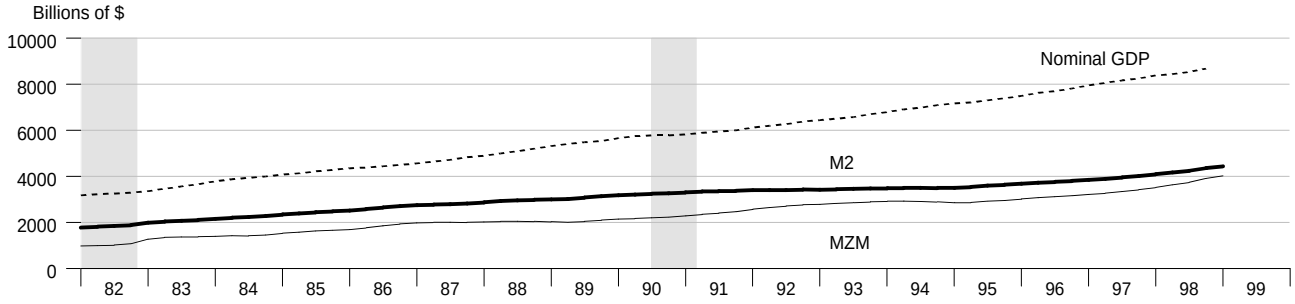
MZM Velocity and Opportunity Cost



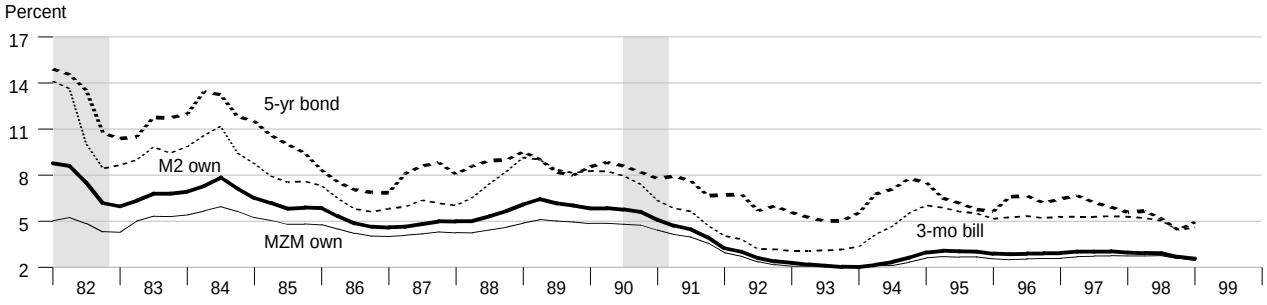
M2 Velocity and Opportunity Cost



M2, MZM and Nominal GDP

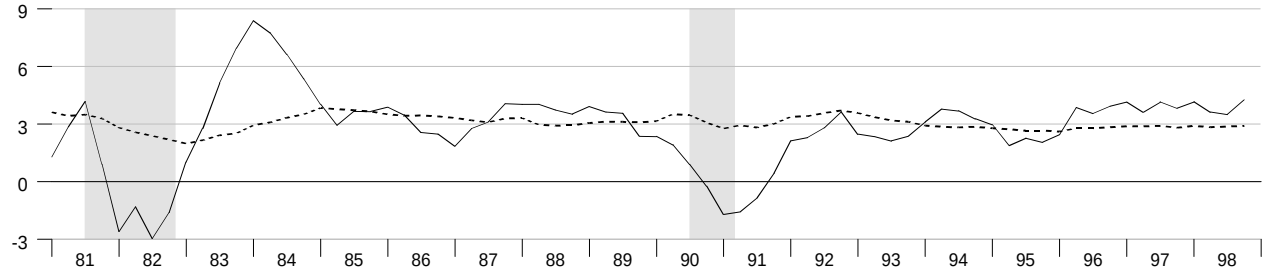


Interest Rates



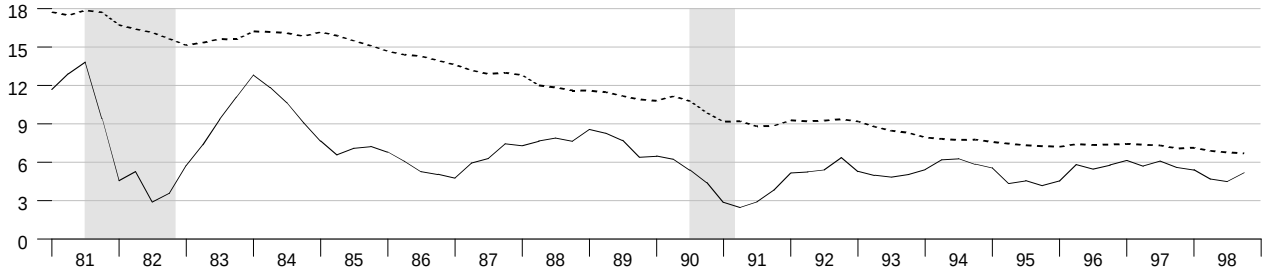
Real Gross Domestic Product

Percent change from year ago



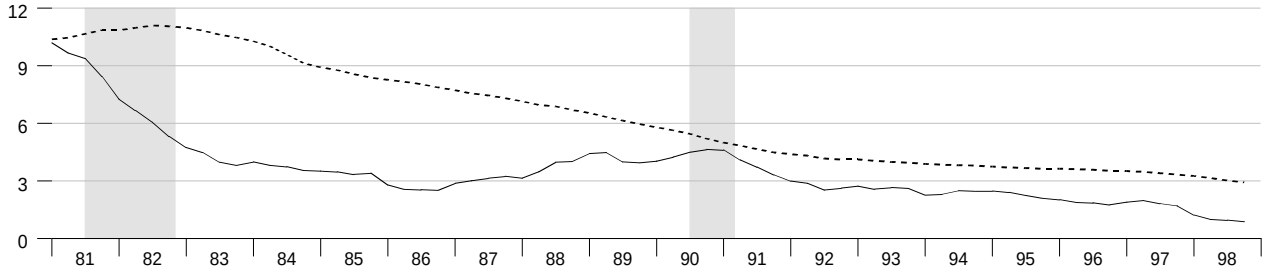
Gross Domestic Product

Percent change from year ago



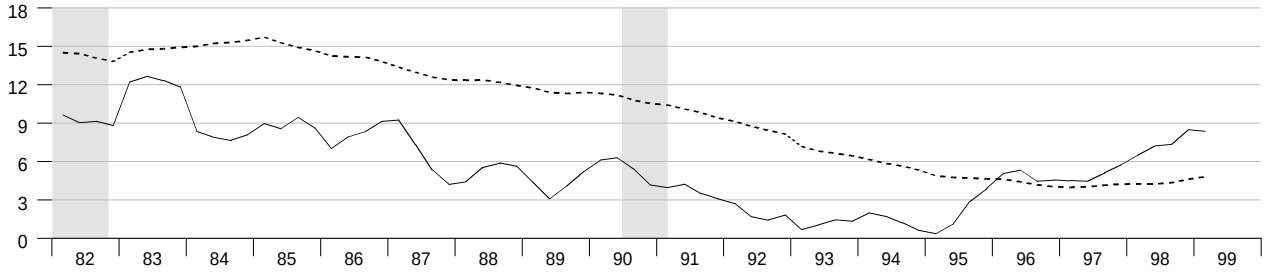
Gross Domestic Product Price Index

Percent change from year ago



M2

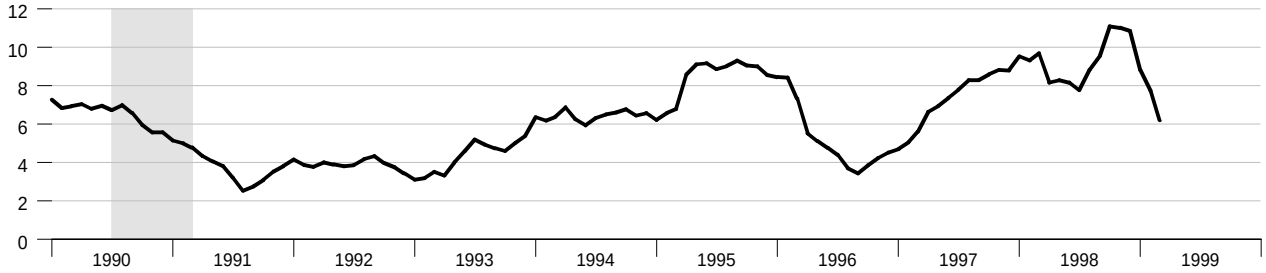
Percent change from year ago



Dashed lines indicate 10-year moving averages

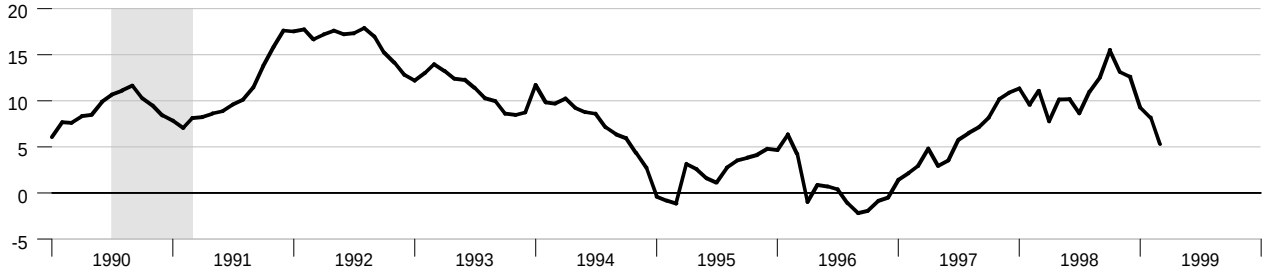
Bank Credit

Percent change from year ago



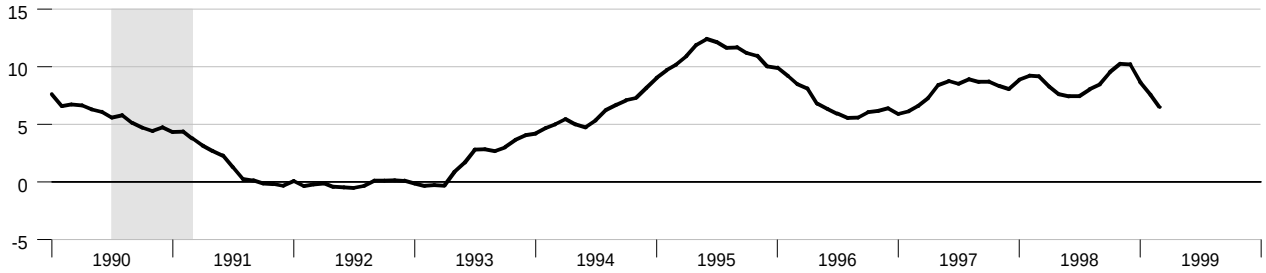
Investment Securities in Bank Credit at Commercial Banks

Percent change from year ago



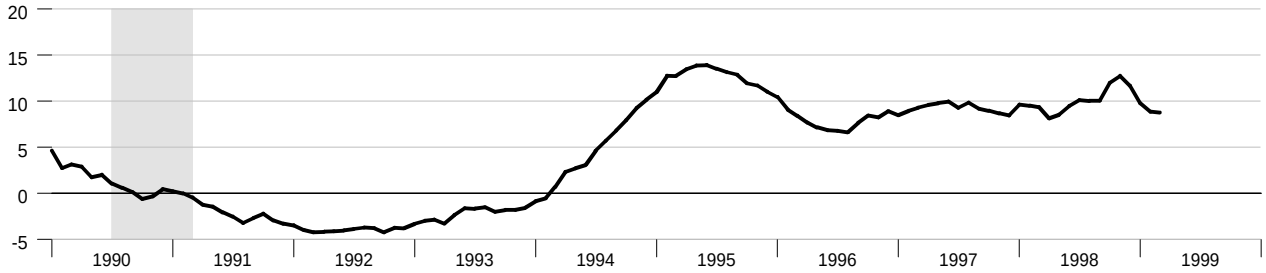
Total Loans and Leases in Bank Credit at Commercial Banks

Percent change from year ago

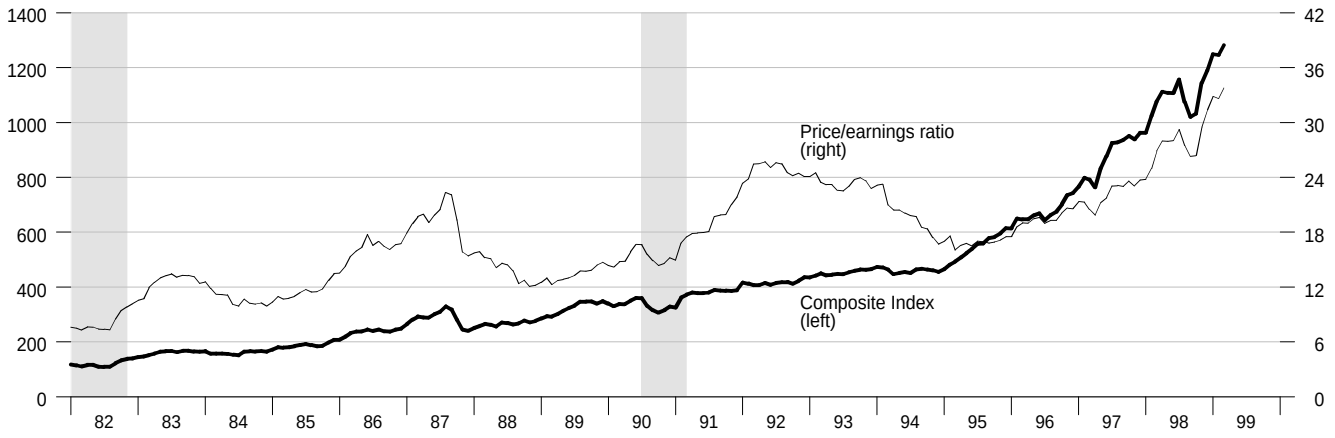


Commercial and Industrial Loans at Commercial Banks

Percent change from year ago



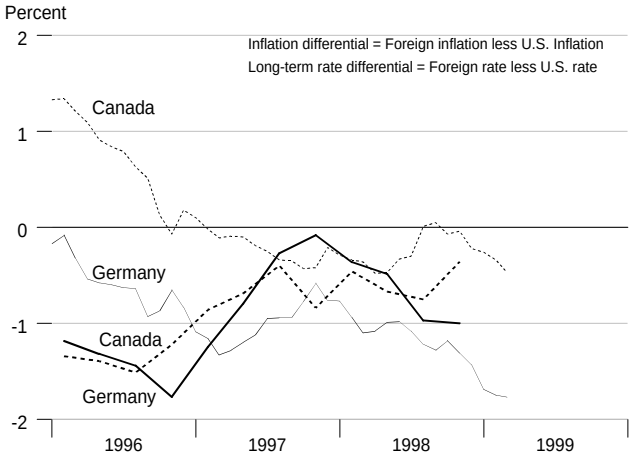
Standard and Poor's 500

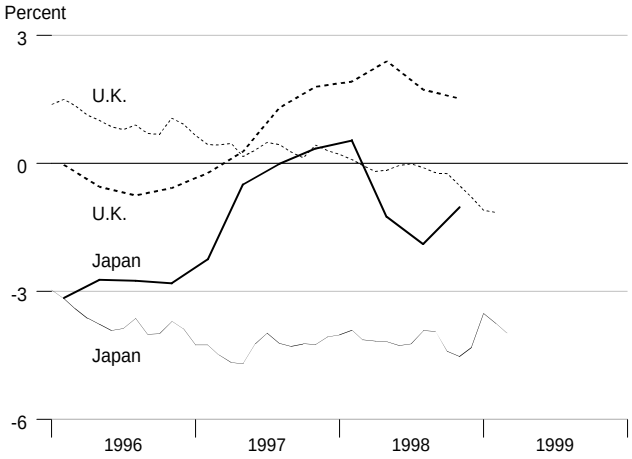


Inflation and Long-Term Interest Rates

	Trend in Consumer Price Inflation Rates Percent change from year ago				Recent Long-Term Government Bond Rates Percent			
	1998Q2	1998Q3	1998Q4	1999Q1	Dec98	Jan99	Feb99	Mar99
United States	1.62	1.62	1.48	1.73	5.29	5.39	5.60	5.81
Canada	0.95	0.87	1.13	.	5.07	5.13	5.26	5.34
France	1.13	0.69	0.43	.	4.41	4.13	4.42	.
Germany	1.14	0.65	0.48	.	3.86	3.70	3.85	4.04
Italy	2.06	2.06	1.75	.	4.04	3.93	4.06	4.28
Japan	0.37	-0.27	0.46	.	0.97	1.87	1.85	1.84
United Kingdom	4.02	3.34	3.00	.	4.50	4.29	4.45	.

Inflation and Long-Term Interest Rates Differentials





		Money Stock				Bank			
		M1	M2	M3	L	Credit	Monetary Base	Reserves	MSI M2
	1994	1145.340	3500.100	4303.777	5256.565	3230.144	421.574	80.684	205.514
	1995	1142.820	3572.376	4499.721	5554.661	3500.257	443.511	76.849	210.302
	1996	1106.126	3745.602	4796.153	5928.839	3684.468	455.586	73.415	217.734
	1997	1069.573	3931.523	5176.818	6372.580	3951.599	478.753	68.918	226.998
	1998	1079.452	4222.021	5703.654		4321.547	508.978	66.952	240.359
1997	1	1076.381	3849.912	5012.702	6175.039	3823.009	470.027	70.409	222.783
	2	1065.603	3895.604	5110.126	6305.709	3920.669	473.896	68.177	225.083
	3	1068.155	3957.266	5229.446	6433.613	3990.405	480.945	68.565	228.293
	4	1068.155	4023.310	5354.997	6575.958	4072.311	490.144	68.519	231.833
1998	1	1076.826	4099.473	5492.880	6777.671	4186.347	498.387	67.711	235.607
	2	1079.349	4176.201	5631.574	6911.227	4242.066	502.060	66.084	238.710
	3	1074.077	4247.762	5752.079	7029.485	4338.101	511.592	66.951	241.310
	4	1087.555	4364.647	5938.081		4519.676	523.871	67.063	245.810
1999	1	1094.418	4442.922	6043.568		4503.449	536.288	67.510	248.323
1997	Mar	1072.417	3862.737	5044.162	6216.335	3843.829	470.394	68.520	223.380
	Apr	1067.451	3882.376	5086.521	6271.354	3900.976	471.405	68.336	224.360
	May	1063.367	3892.846	5108.331	6307.238	3916.564	474.355	68.255	224.940
	Jun	1065.992	3911.589	5135.525	6338.534	3944.468	475.927	67.939	225.950
	Jul	1067.570	3929.064	5185.878	6382.073	3975.468	478.813	68.897	226.850
	Aug	1072.076	3961.052	5232.781	6440.734	3990.206	481.011	68.465	228.460
	Sep	1064.818	3981.681	5269.679	6478.031	4005.540	483.012	68.333	229.570
	Oct	1062.064	4000.166	5306.691	6512.975	4038.957	485.892	67.709	230.580
	Nov	1067.528	4023.132	5353.640	6575.756	4077.762	490.783	68.772	231.760
	Dec	1074.873	4046.631	5404.660	6639.142	4100.214	493.756	69.076	233.160
1998	Jan	1073.810	4071.363	5449.626	6709.659	4157.236	496.198	68.918	234.340
	Feb	1076.021	4100.889	5485.171	6777.906	4185.991	499.555	67.414	235.700
	Mar	1080.646	4126.168	5543.843	6845.448	4215.813	499.408	66.801	236.780
	Apr	1082.094	4155.243	5589.265	6873.231	4219.073	499.601	66.000	238.030
	May	1078.171	4174.757	5631.330	6904.051	4240.877	502.385	66.134	238.610
	Jun	1077.782	4198.602	5674.127	6956.399	4266.247	504.193	66.117	239.490
	Jul	1075.365	4216.112	5694.154	6967.444	4284.217	507.677	66.366	240.270
	Aug	1072.214	4241.707	5749.666	7022.407	4342.224	511.093	67.434	241.030
	Sep	1074.653	4285.467	5812.418	7098.604	4387.863	516.006	67.052	242.630
	Oct	1080.404	4326.861	5874.544		4486.790	520.803	67.055	244.270
	Nov	1088.956	4365.202	5940.151		4526.949	524.379	67.183	245.870
	Dec	1093.306	4401.878	5999.549		4545.288	526.432	66.952	247.290
1999	Jan	1090.654	4425.598	6019.036		4523.634	531.713	68.375	247.920
	Feb	1091.940	4446.441	6063.327		4509.722	538.145	67.816	248.350
	Mar	1100.659	4456.726	6048.341		4476.991	539.007	66.340	248.700

*All values are given in billions of dollars

		Federal Funds	Discount Rate	Prime Rate	3-mo CDs	Treasury Yields 3 mo	3 yr	30 yr	Corporate Aaa Bonds	S & L Aaa Bonds	Conventional Mortgage
	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
1997	Mar	5.39	5.00	8.30	5.53	5.28	6.38	6.93	7.55	5.55	7.90
	Apr	5.51	5.00	8.50	5.71	5.30	6.61	7.09	7.73	5.66	8.14
	May	5.50	5.00	8.50	5.70	5.20	6.42	6.94	7.58	5.48	7.94
	Jun	5.56	5.00	8.50	5.66	5.07	6.24	6.77	7.41	5.33	7.69
	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

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

		M1	M2	MZM	M3	L
Percent change from previous period						
	1994	6.17	1.38	2.61	1.60	2.37
	1995	-0.22	2.06	-0.47	4.55	5.67
	1996	-3.21	4.85	6.54	6.59	6.74
	1997	-3.30	4.96	7.18	7.94	7.48
	1998	0.92	7.39	11.61	10.18	
1996	1	-1.00	1.25	1.90	1.55	1.30
	2	-0.19	1.22	1.88	1.69	1.76
	3	-1.38	0.97	1.49	1.52	1.67
	4	-1.99	1.05	1.41	1.89	1.59
1997	1	-0.47	1.19	1.77	1.88	1.65
	2	-1.00	1.19	1.63	1.94	2.12
	3	0.24	1.58	2.23	2.33	2.03
	4	0.00	1.67	2.39	2.40	2.21
1998	1	0.81	1.89	2.76	2.57	3.07
	2	0.23	1.87	3.25	2.52	1.97
	3	-0.49	1.71	2.91	2.14	1.71
	4	1.25	2.75	4.53	3.23	
1999	1	0.63	1.79	2.93	1.78	
1997	Mar	-0.35	0.38	0.65	0.62	0.66
	Apr	-0.46	0.51	0.61	0.84	0.89
	May	-0.38	0.27	0.29	0.43	0.57
	Jun	0.25	0.48	0.65	0.53	0.50
	Jul	0.15	0.45	0.68	0.98	0.69
	Aug	0.42	0.81	1.11	0.90	0.92
	Sep	-0.68	0.52	0.80	0.71	0.58
	Oct	-0.26	0.46	0.66	0.70	0.54
	Nov	0.51	0.57	0.74	0.88	0.96
	Dec	0.69	0.58	0.94	0.95	0.96
1998	Jan	-0.10	0.61	0.84	0.83	1.06
	Feb	0.21	0.73	1.02	0.65	1.02
	Mar	0.43	0.62	0.99	1.07	1.00
	Apr	0.13	0.70	1.26	0.82	0.41
	May	-0.36	0.47	0.93	0.75	0.45
	Jun	-0.04	0.57	0.97	0.76	0.76
	Jul	-0.22	0.42	0.67	0.35	0.16
	Aug	-0.29	0.61	1.11	0.97	0.79
	Sep	0.23	1.03	1.56	1.09	1.09
	Oct	0.54	0.97	1.61	1.07	
	Nov	0.79	0.89	1.49	1.12	
	Dec	0.40	0.84	1.35	1.00	
1999	Jan	-0.24	0.54	0.71	0.32	
	Feb	0.12	0.47	1.03	0.74	
	Mar	0.80	0.23	0.34	-0.25	

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.

M2: M1 plus: savings 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).

L: M3 plus: U.S. savings bonds, short-term Treasury securities, commercial paper, and bankers acceptances held by households and by firms other than depository institutions and money market mutual funds.

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.

Note: The above 6 series are constructed and published by the Board of Governors of the Federal Reserve System, Washington, D.C. For details, see *Federal Reserve Bulletin*, tables 1.21 and 1.26.

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). On pages 4 and 6, MZM prior to January 1984 is not shown due to distortions caused by regulatory changes, including the introduction of liquid deposit accounts not subject to binding interest rate ceilings.

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 and L; additional data are available at http://www.stls.frb.org/research/msi/index.html.

Note: The above 4 series are constructed and published by the Research Division of the Federal Reserve Bank of St. Louis, St. Louis MO.

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 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

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

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 $m = 1,...,$ 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)

$$f(m) = [D(m)R(m) - D(m\text{-}1)] / [D(m) - D(m\text{-}1)]$$

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 Eurodollar 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.