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WEALTH ADVISORS

TRUST MATTERS.

February 2023

Point of View – Economy – Markets

Important Information

The views and opinions expressed are those of the speaker and are subject to change based on factors such as market and economic conditions. These views and opinions are not an offer to buy a particular security and should not be relied upon as investment advice. Past performance cannot guarantee comparable future results.

Important Information

Performance quoted is past performance and cannot guarantee comparable future results; current performance may be higher or lower.

Results shown assume the reinvestment of dividends.

An investment cannot be made directly in an index.

Investments with higher return potential carry greater risk for loss.

Investing in small companies involves greater risks not associated with investing in more established companies, such as business risk, significant stock price fluctuations and illiquidity.

Foreign securities have additional risks, including exchange rate changes, political and economic upheaval, the relative lack of information about these companies, relatively low market liquidity and the potential lack of strict financial and accounting controls and standards.

Investing in emerging markets involves greater risk than investing in more established markets such as risks relating to the relatively smaller size and lesser liquidity of these markets, high inflation rates, adverse political developments and lack of timely information.

Fluctuations in the price of gold and precious metals often dramatically affect the profitability of the companies in the gold and precious metals sector. Changes in political or economic climate for the two largest gold producers, South Africa and the former Soviet Union, may have a direct effect on the price of gold worldwide.

The Split-Personality Economy

Bad news

- LEI down again
- Inverted yield curve
- Weak December retail sales
- Weak manufacturing PMI
- Weak housing starts

Good news

- Strong hiring data
- Snap-back in the services PMI
- Strong Q4 GDP
- Strong January car sales
- Oil down
- Consumers still have cash
- Strong corporate balance sheets
- Strong bank capital
- Inflation is moderating

Bad news

- LEI down again
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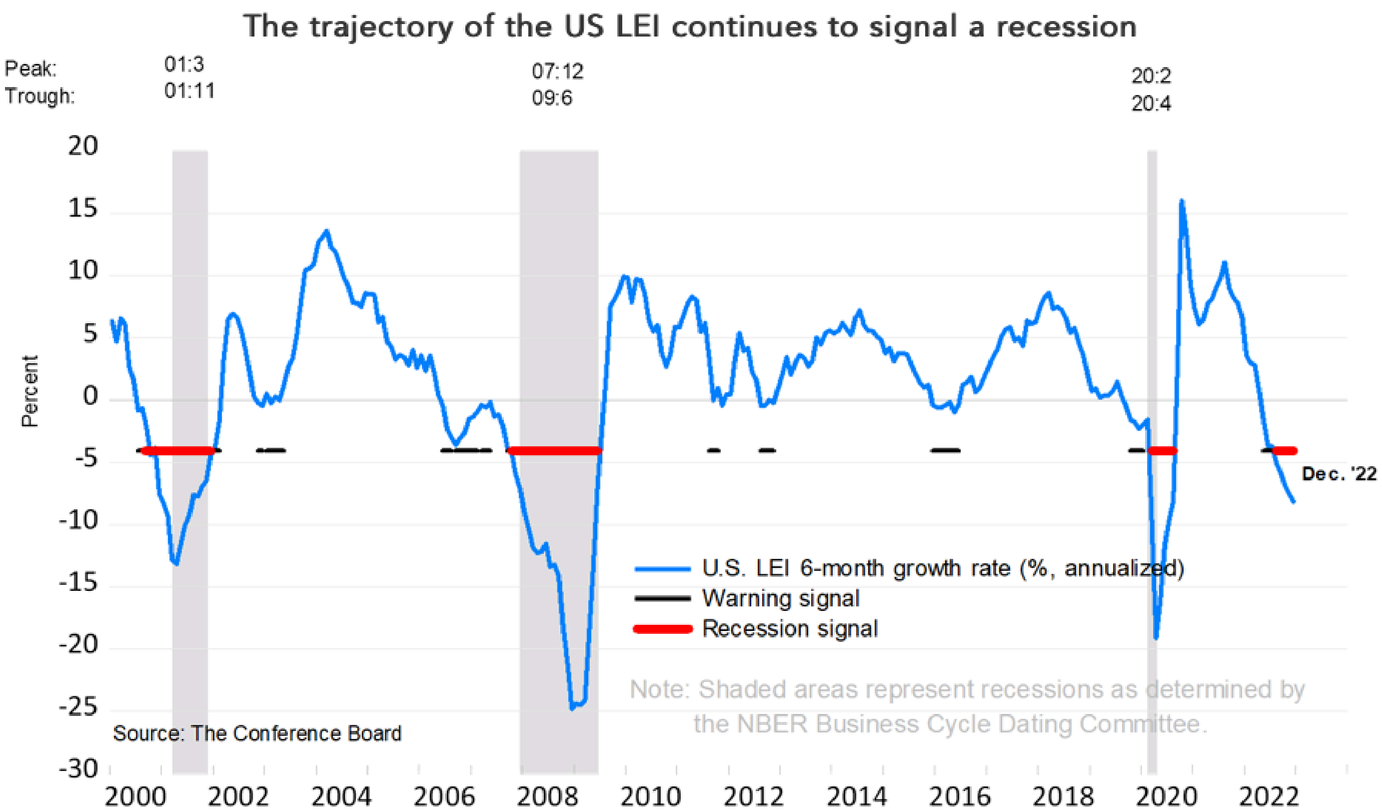
- Weak housing starts

U.S. index of leading economic indicators – signaling recession



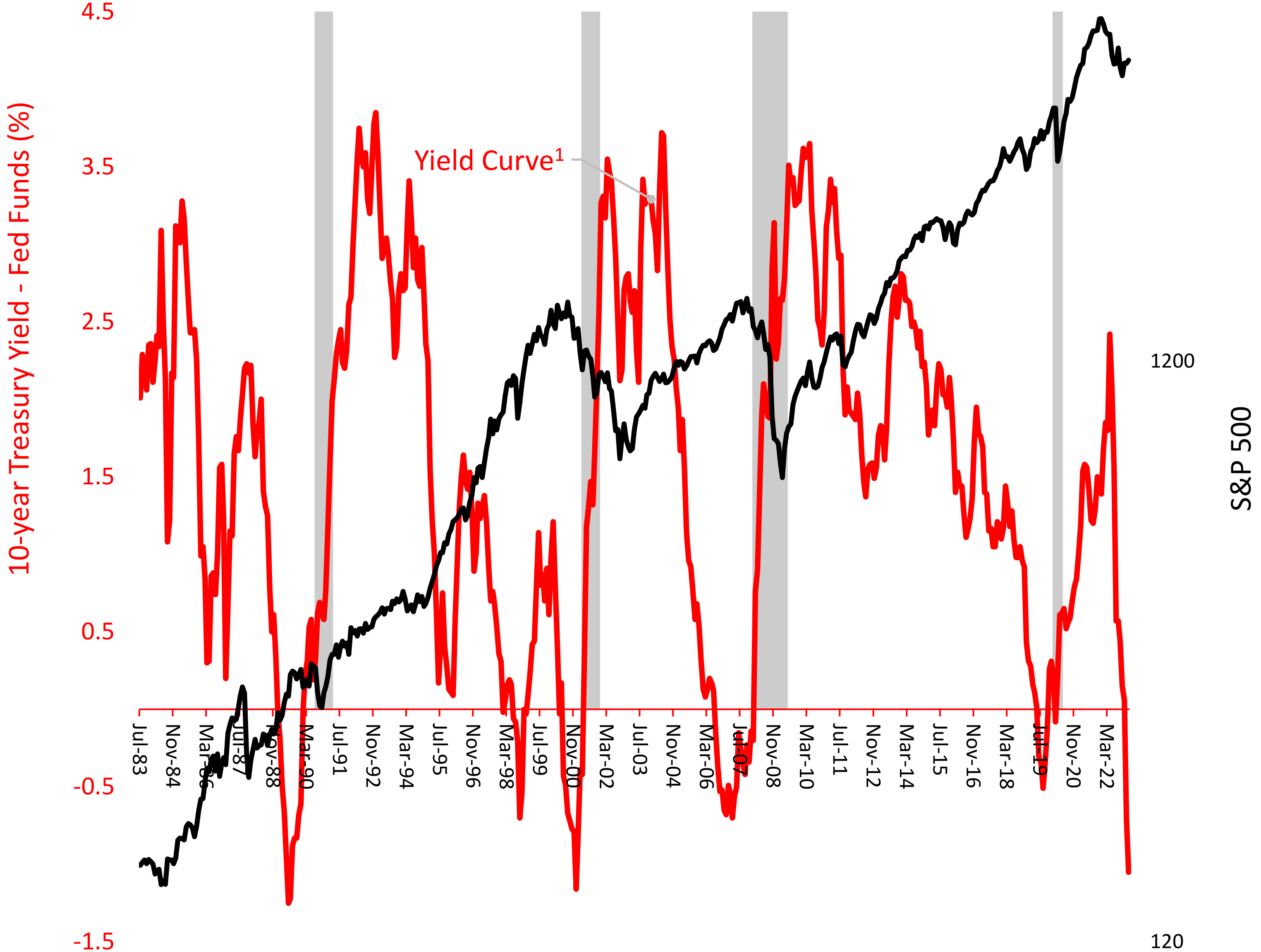
"The US LEI fell sharply again in December—continuing to signal recession for the US economy in the near term."

This chart shows how the LEI has definitively rolled over well in advance of the last recessions.

The Conference Board Leading Economic Index® (LEI) components: 1) average weekly hours worked, manufacturing; 2) average weekly initial unemployment claims; 3) manufacturers' new orders – consumer goods and materials; 4) ISM index of new orders; 5) manufacturers' new orders, nondefense capital goods; 6) building permits – new private housing units; 7) stock prices, S&P 500; 8) Leading Credit Index™; 9) interest rate spread; 10-year Treasury minus fed funds; 10) index of consumer expectations.
Source: ©The Conference Board. Data through December released January 23, 2023.

Federal Reserve policy

Yield curve vs. the S&P 500



When the yield curve has inverted the economy has usually turned down into recession with a lag of a year or more.

Today, <u>the yield curve is inverted</u>.

Sources: NBER, Federal Reserve and Standard & Poor's. Data through January 2023.
[1]The interest rate on the 10-year Treasury bond (long term) minus the fed funds rate (short term).

THE WALL STREET JOURNAL.

Retail Sales Post Biggest Drop of 2022

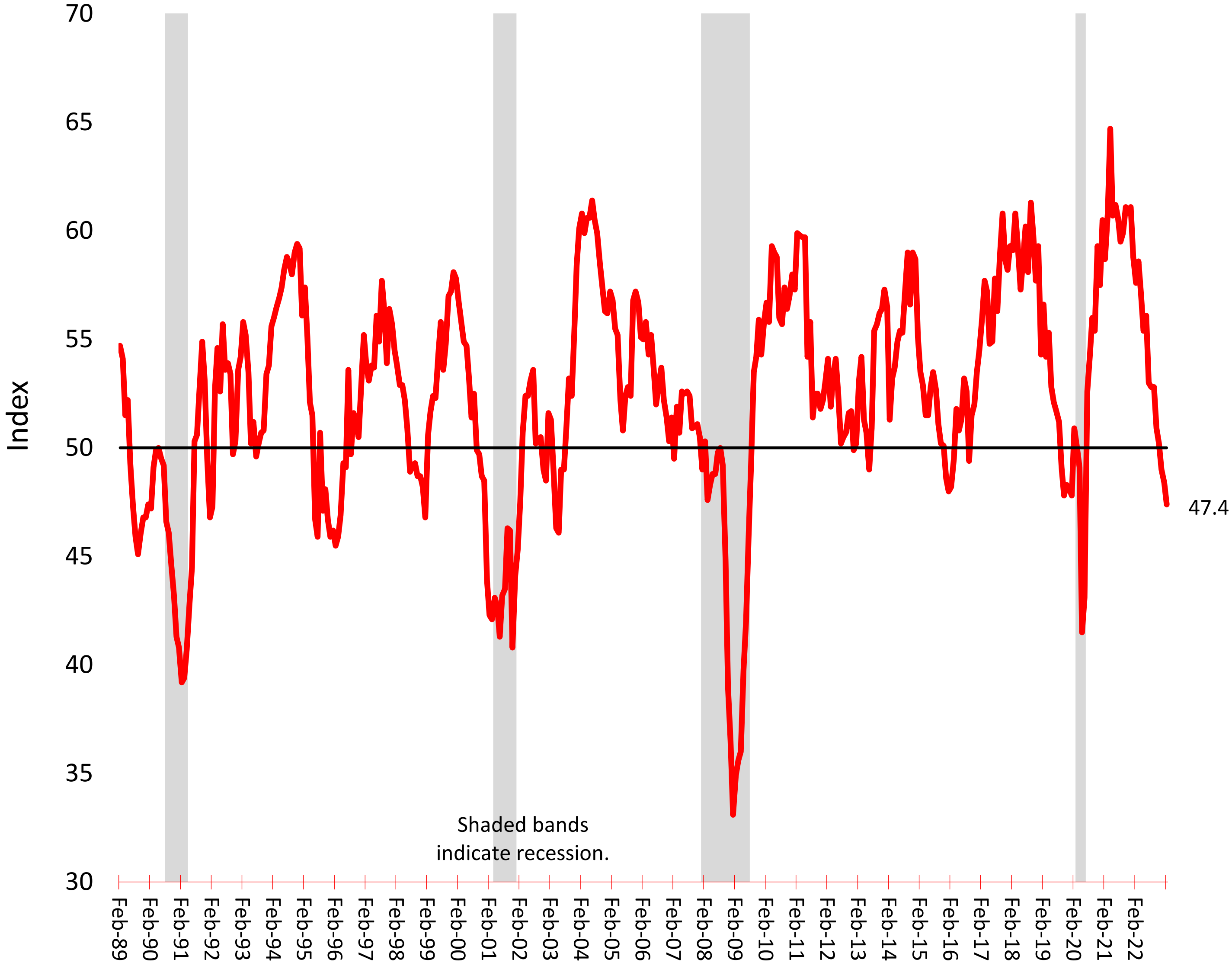
U.S. retail spending fell in December at the sharpest pace of 2022, marking a dismal end to the holiday shopping season as rising interest rates, still-high inflation and concerns about a slowing economy pinched consumers.

Purchases at stores, restaurants and online, declined a seasonally adjusted 1.1% in December from the prior month, the Commerce Department said Wednesday. Sales were also revised lower in November and have fallen three of the past four months.

Meanwhile, a Federal Reserve report on Wednesday found economic activity was relatively flat at the start of the year and businesses are pessimistic about growth in the months ahead. A separate Fed report showed U.S. industrial production slumped in December, led by weakness in manufacturing.

Source: *The Wall Street Journal.* “Retail Sales Post Biggest Drop of 2022”, by Harriet Torry and Sarah Nassauer. January 19, 2023.

ISM manufacturing PMI



January at 47.4.

January new orders 42.5.

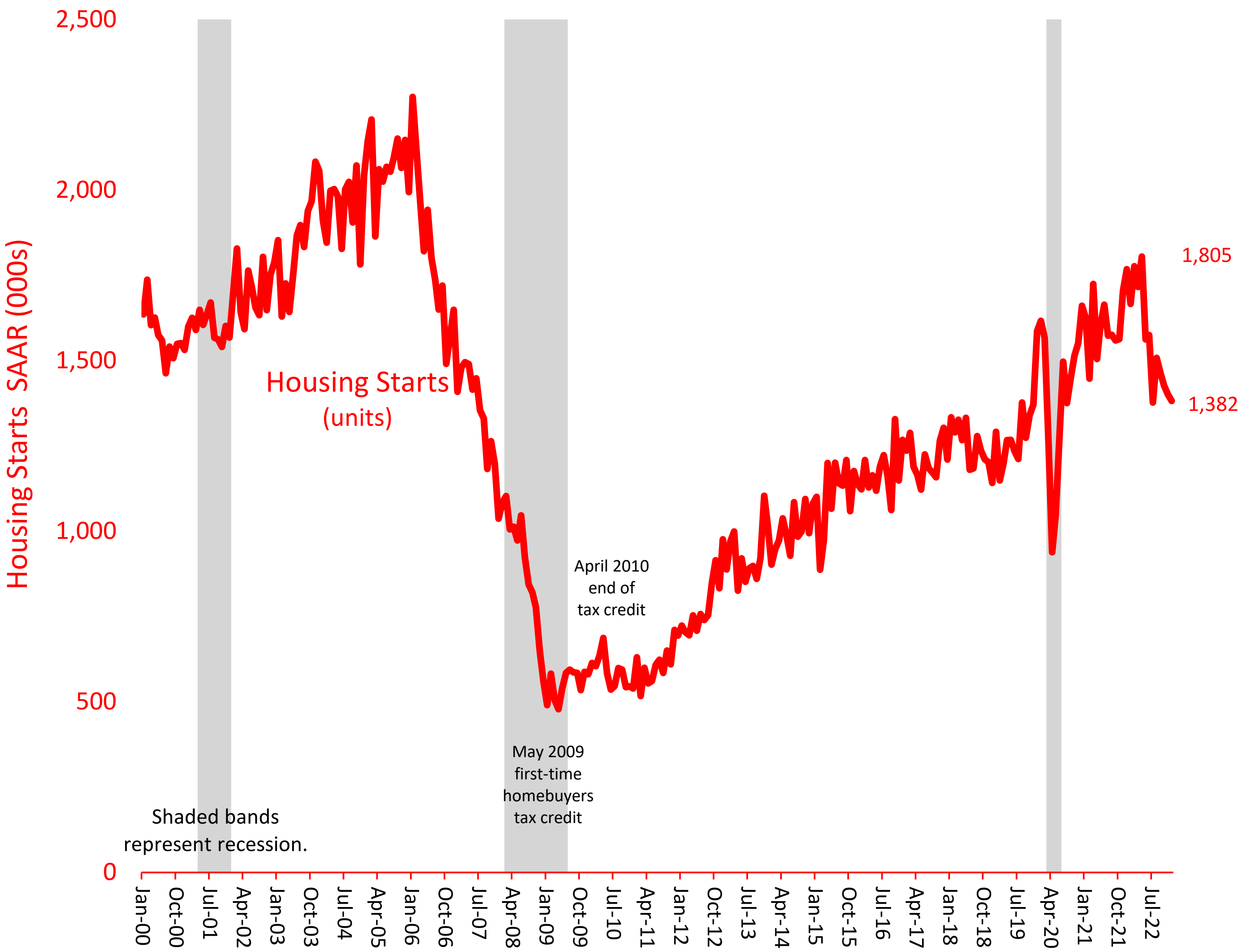
Note the historic volatility in the manufacturing PMI.

Note how this indicator has slumped well below 50 even during periods of strong economic expansion, eg. 1995, 1999, 2003, 2013, 2016.

Source: Copyright 2023, Institute for Supply Management. Data through January 2023.

ISM: "A reading above 50 percent indicates that the manufacturing economy is generally expanding; below 50 percent indicates that it is generally contracting. A Manufacturing PMI® above 48.7 percent, over a period of time, generally indicates an expansion of the overall economy."

Housing starts



1.382 million in December.

December permits at 1.330 million.

"Housing starts also remain(ed) well below the projected rate of 1.6 to 1.8 million that is consistent with long-term demographics and the replacement of the existing housing stock (Herbert, McCue, and Spader 2016)." [1]

Sources: BEA and U.S. Census Bureau. Data through December 2022.

[1] *Economic Report of the President*, Council of Economic Advisors, February 2018

Good news

- Strong hiring data
- Snap-back in the services PMI
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- Strong January car sales
- Oil down
- Consumers still have cash
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No Landing?

THE WALL STREET JOURNAL.

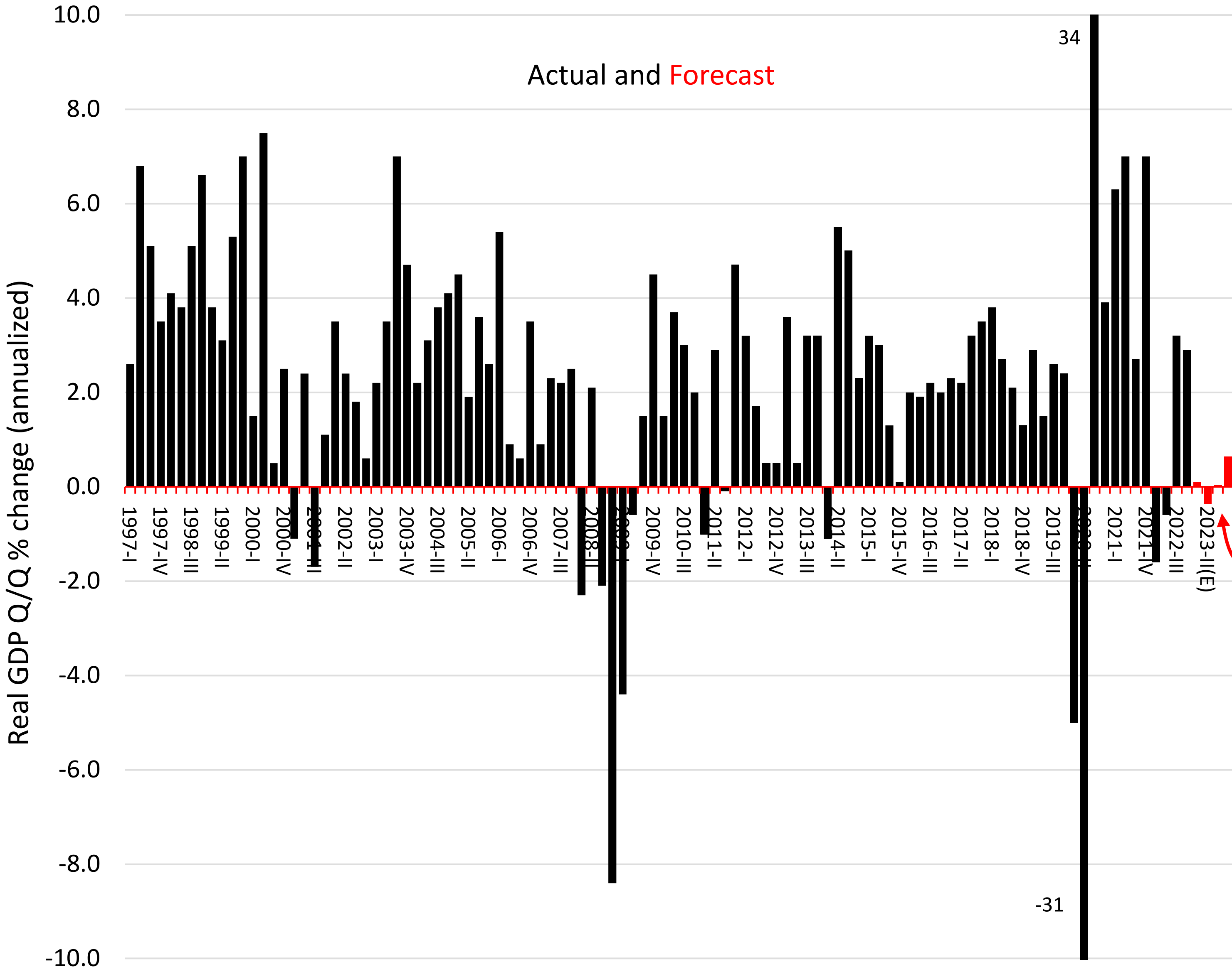
Hard or Soft Landing? Some Economists Now Predict Neither

Economists at Goldman Sachs said last week that they now see a 25% probability of a recession over the next 12 months, down from an earlier estimate of 35%. The bank expects inflation to fall to 3% this year, with the unemployment rate rising modestly to 4% as long as the economy grows at a pace below its long-run trend of around 2%.

Source: *The Wall Street Journal.* "Hard or Soft Landing? Some Economists Now Predict Neither", by Nick Timiraos. February 13, 2023.

Consensus GDP forecast

GDP

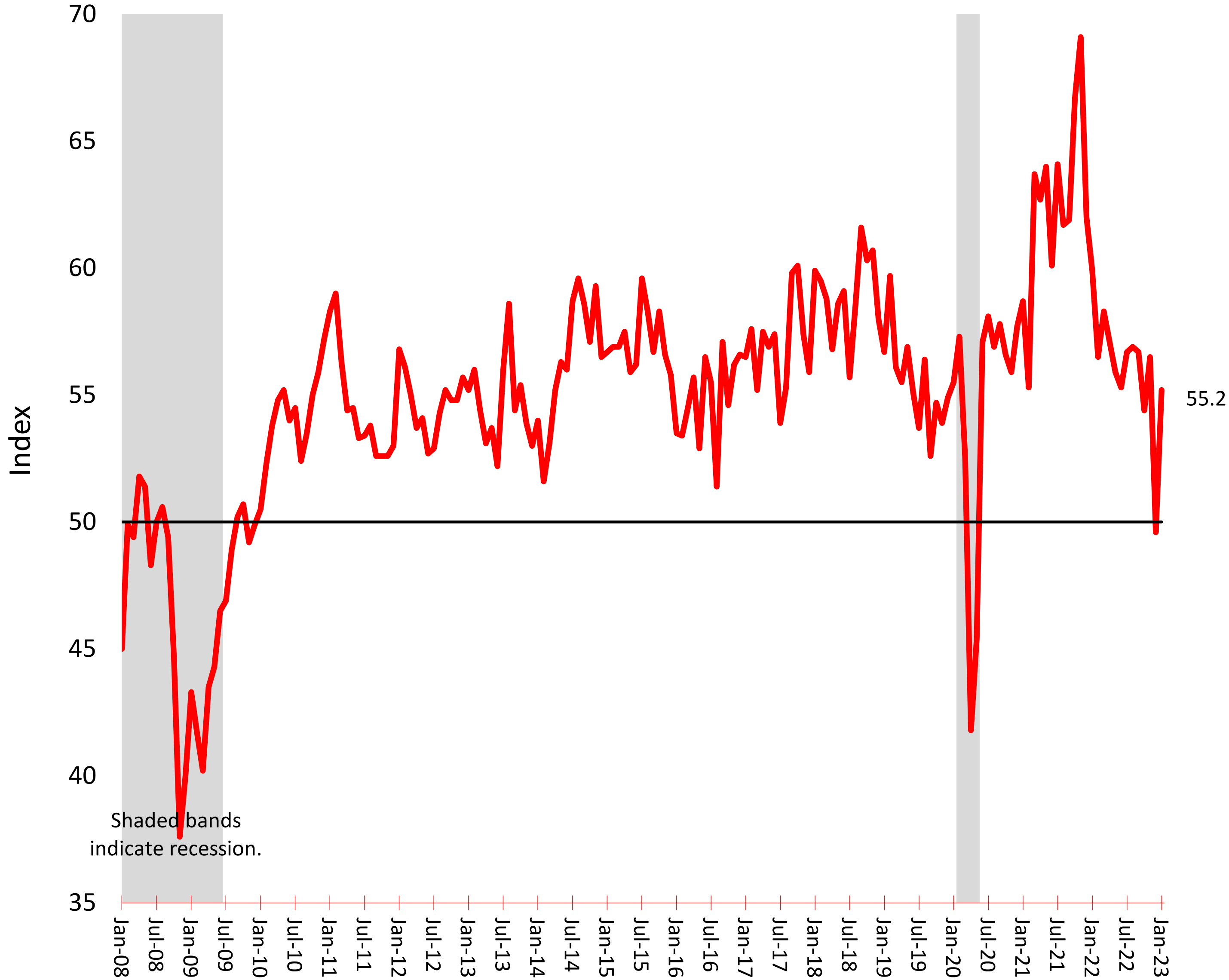


The 60 economists surveyed in January <u>see mild contraction ahead,</u> but no recession.

Mild contraction forecasted in second quarter of 2023.

Sources: Bureau of Economic Analysis, actual quarterly data through December 2022. *The Wall Street Journal* survey released January 2023.

ISM services PMI



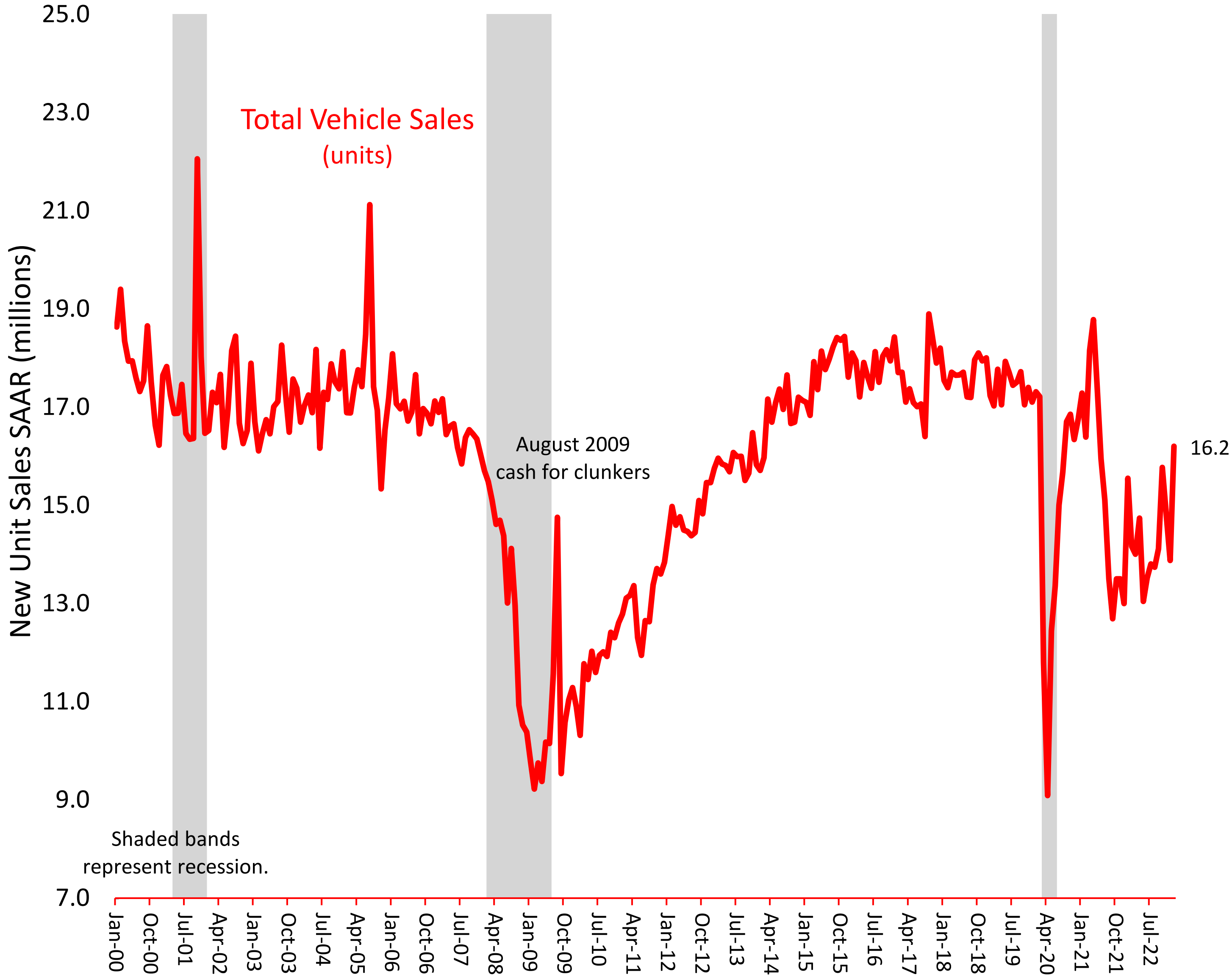
January at 55.2.

January new orders 60.4.

Services comprise 89% of the U.S. economy[1] and 91% of total nonfarm jobs.

Source: Copyright 2023, Institute for Supply Management; data through January 2023. This data series was created in 2008. ISM: “A reading above 50 percent indicates that the services sector economy is generally expanding; below 50 percent indicates that it is generally contracting.” “A Services PMI® above 50.1 percent, over time, generally indicates an expansion of the overall economy.” [1]Value added as a percent of GDP.

Vehicle sales



Car sales jump in January.

Sources: BEA. Data through January 2023.

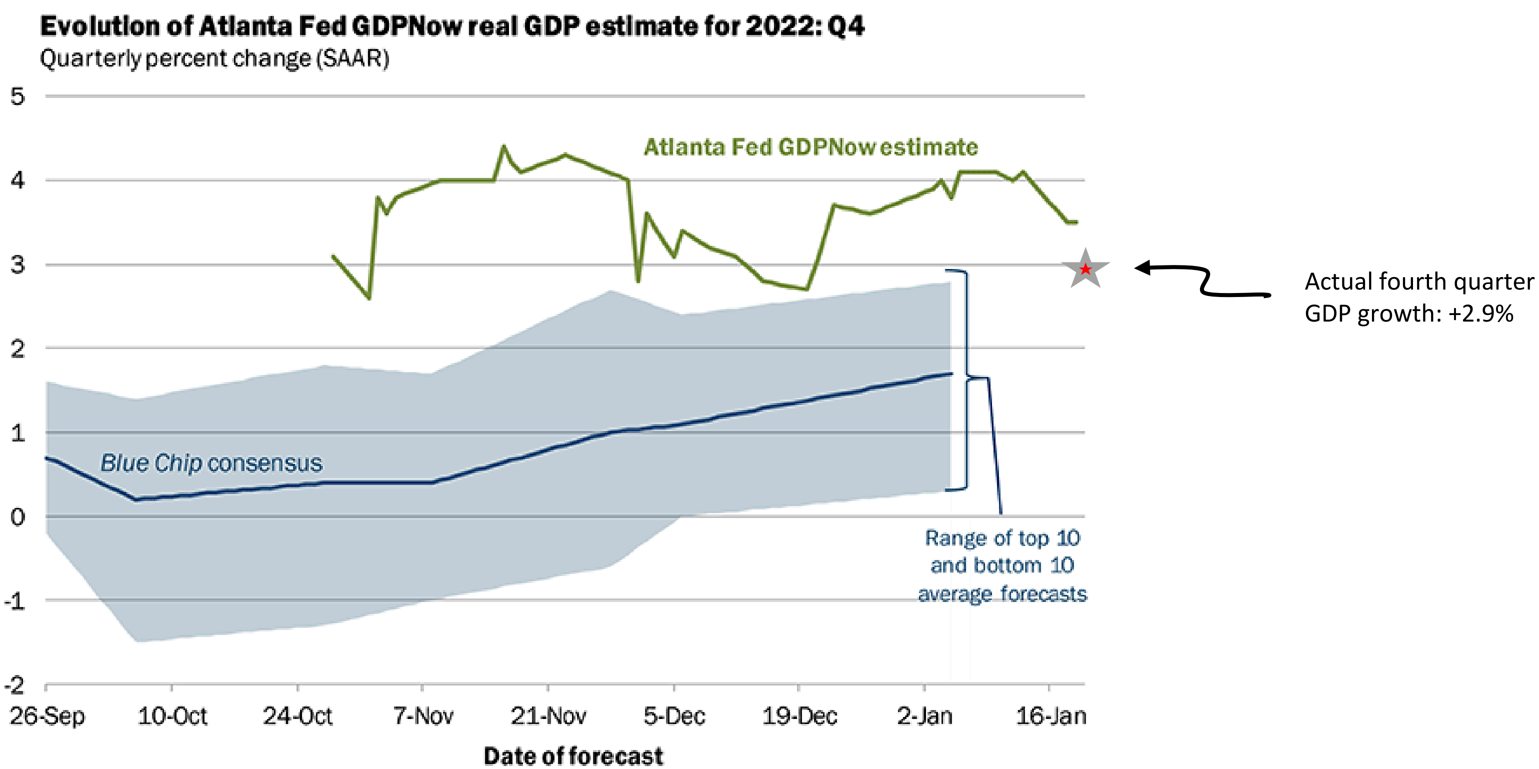
Atlanta Fed's GDPNow forecast

Latest estimate: 3.5 percent — January 20, 2023

The GDPNow model estimate for real GDP growth (seasonally adjusted annual rate) in the fourth quarter of 2022 remains **3.5 percent** on January 20. The nowcast was unchanged after rounding following this morning's report from the National Association of Realtors.

This is the last GDPNow forecast for the fourth quarter. The first GDPNow forecast for the first quarter of 2023 will be on ***Friday, January 27****. Please see the "Release Dates" tab below for a list of upcoming releases.*

GDPNow was much higher than Blue Chip consensus.

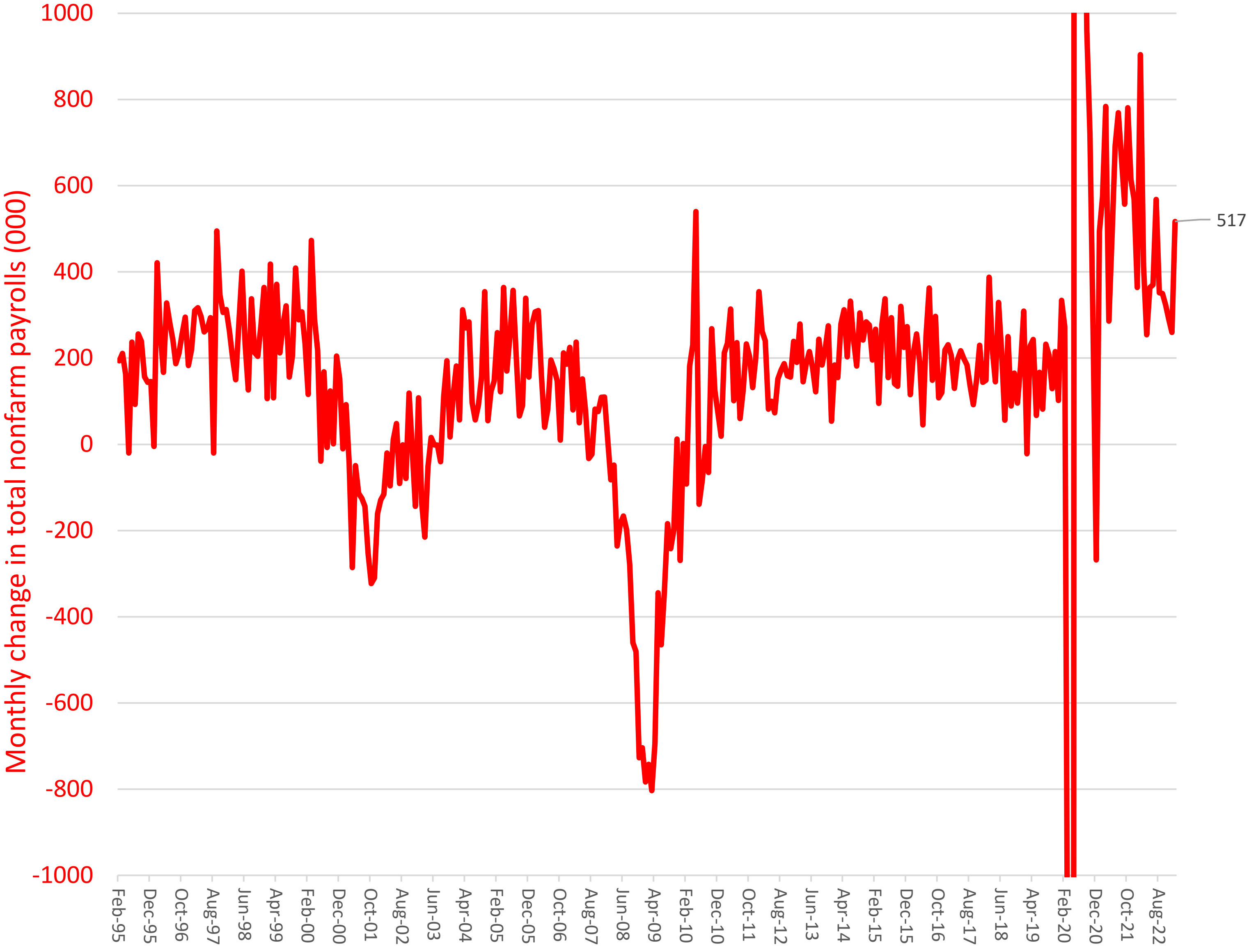


Sources: *Blue Chip Economic Indicators* and *Blue Chip Financial Forecasts*
Note: The top (bottom) 10 average forecast is an average of the highest (lowest) 10 forecasts in the *Blue Chip* survey.

Source: Federal Reserve Bank of Atlanta, January 20, 2023.

Economic data

Net new job formation



517,000 jobs gained in January on the establishment survey.

Source: Bureau of Labor Statistics. Data through January 2023.

Net new job formation

THE WALL STREET JOURNAL.

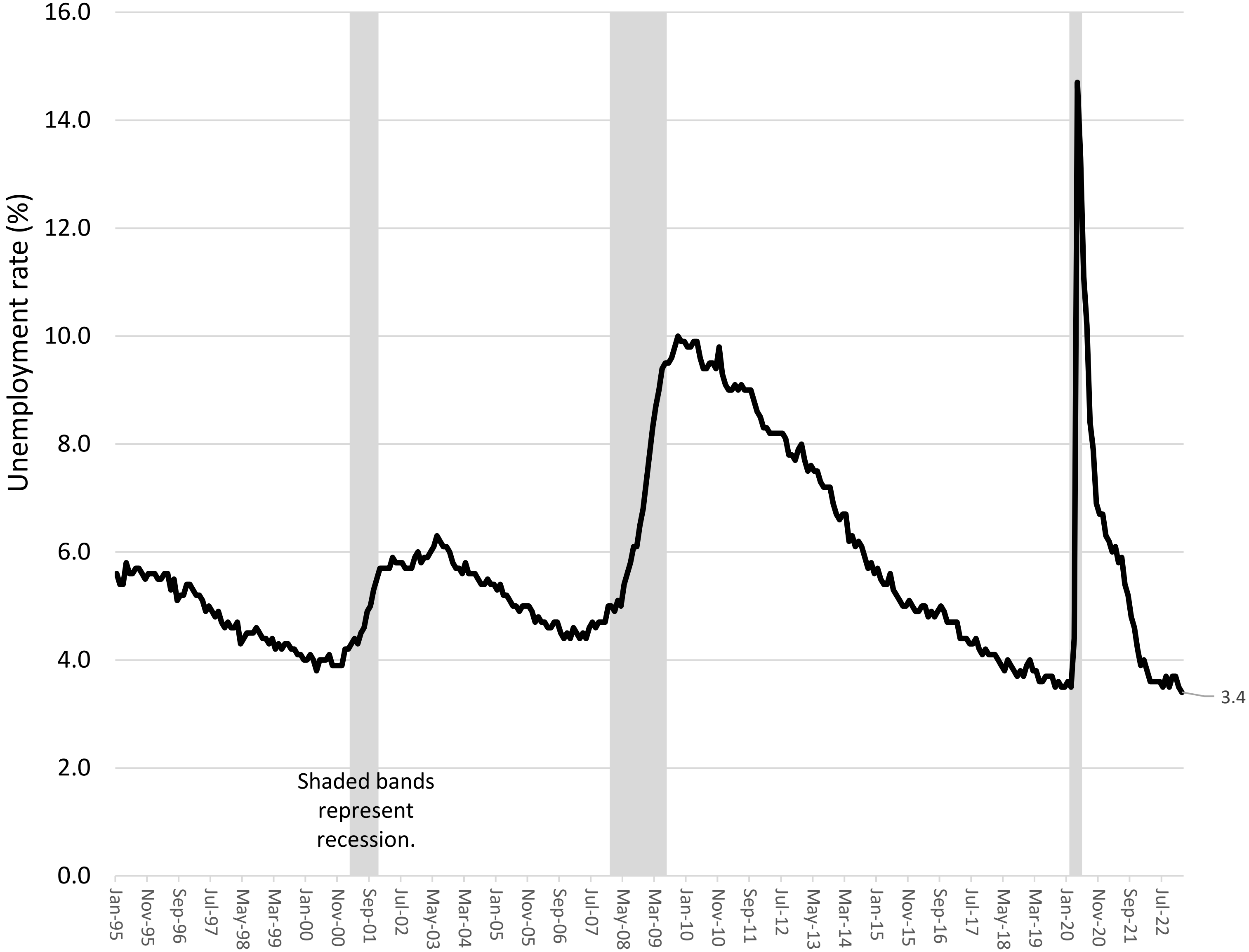
The Incredible Expanding Job Market

There's no hint of recession in January's employment report.

Source: *The Wall Street Journal.* "The Incredible Expanding Job Market", Review and Outlook. February 4-5, 2023.

Economic data

Unemployment rate

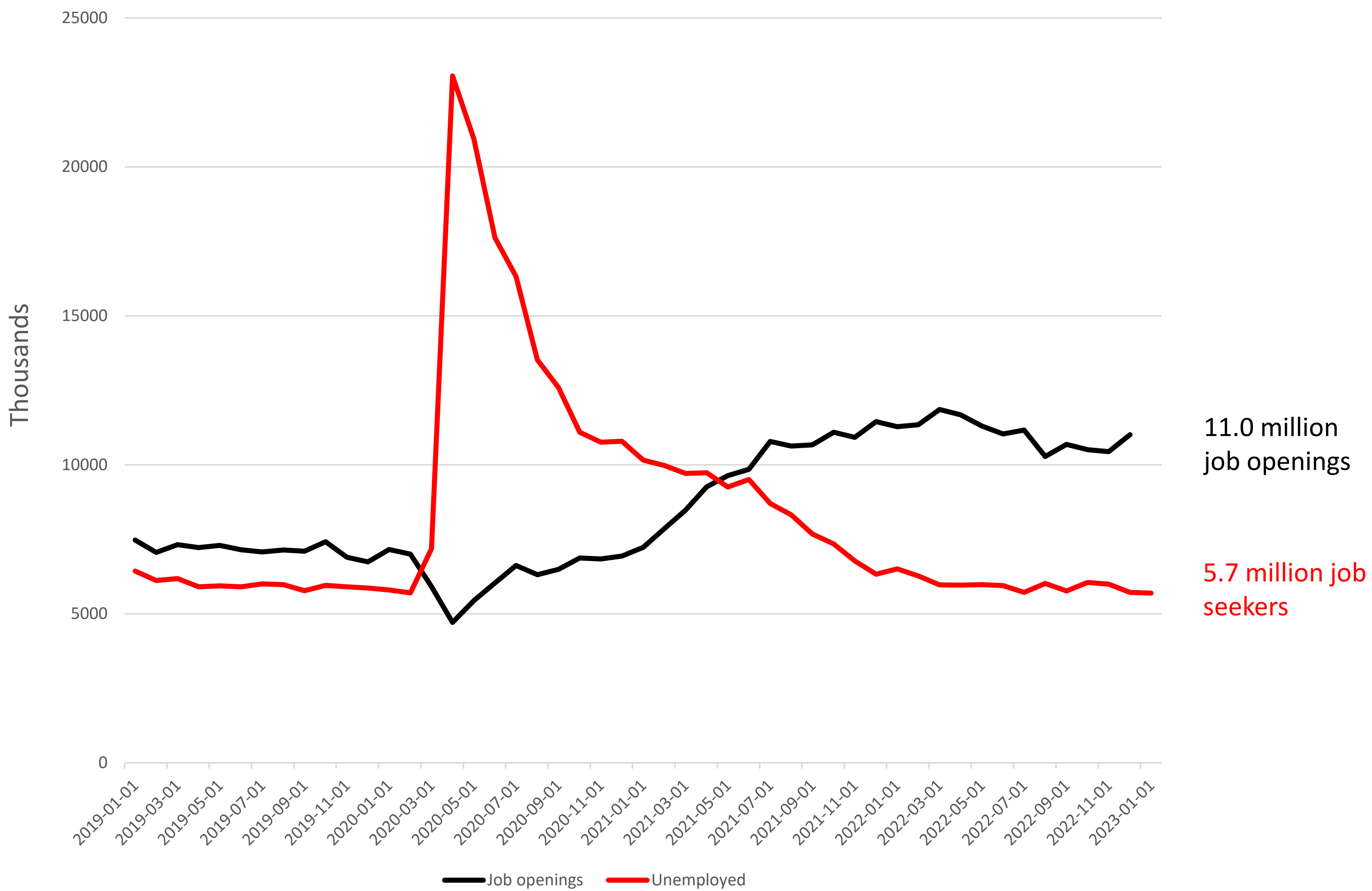


3.4% in January.

Source: Bureau of Labor Statistics. Data through January 2023.

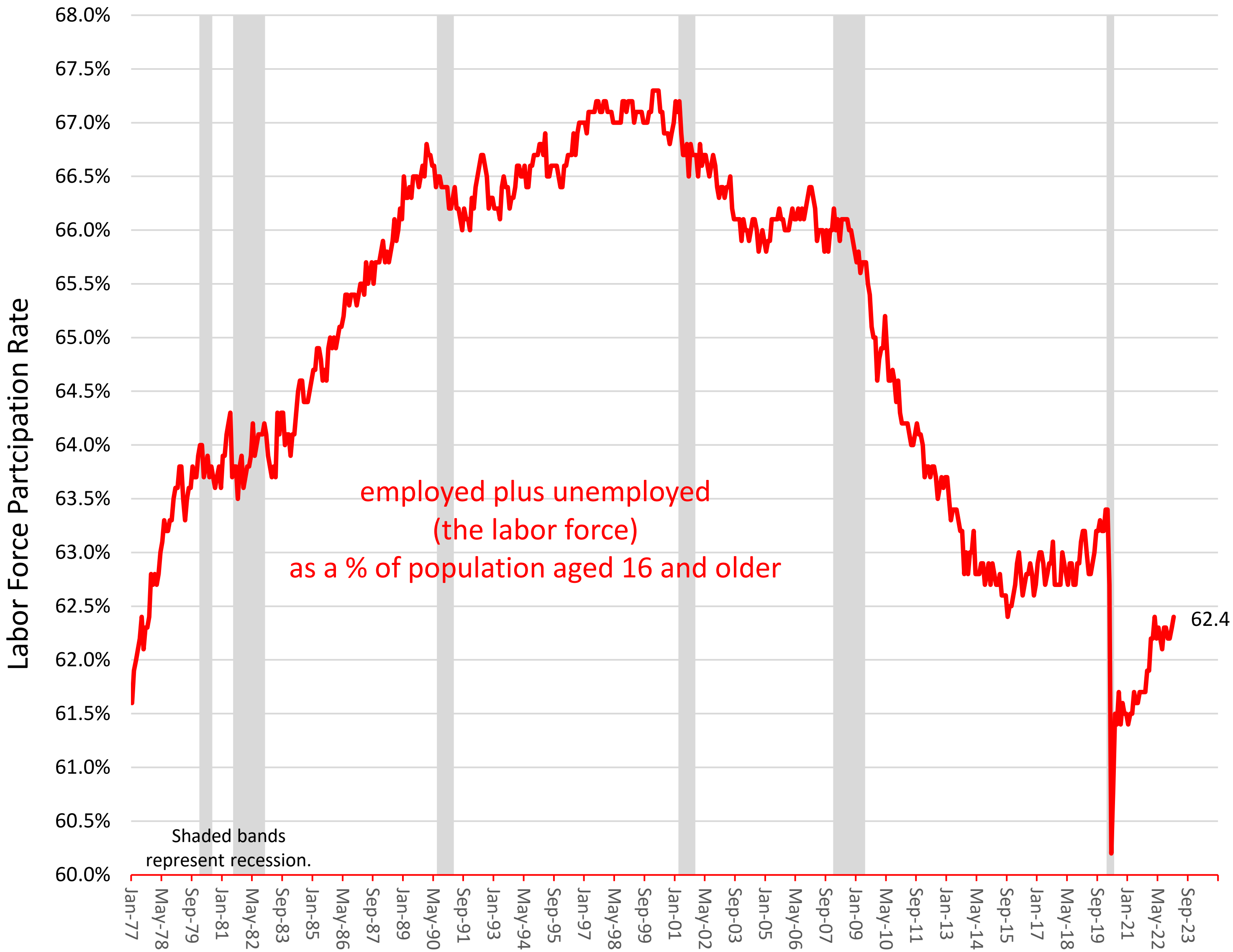
Economic data

Job openings vs. unemployed job seekers



Source: Bureau of Labor Statistics. Data through December 2022 for job openings, January 2023 for unemployed.

Labor force participation rate[1] – hit by Covid



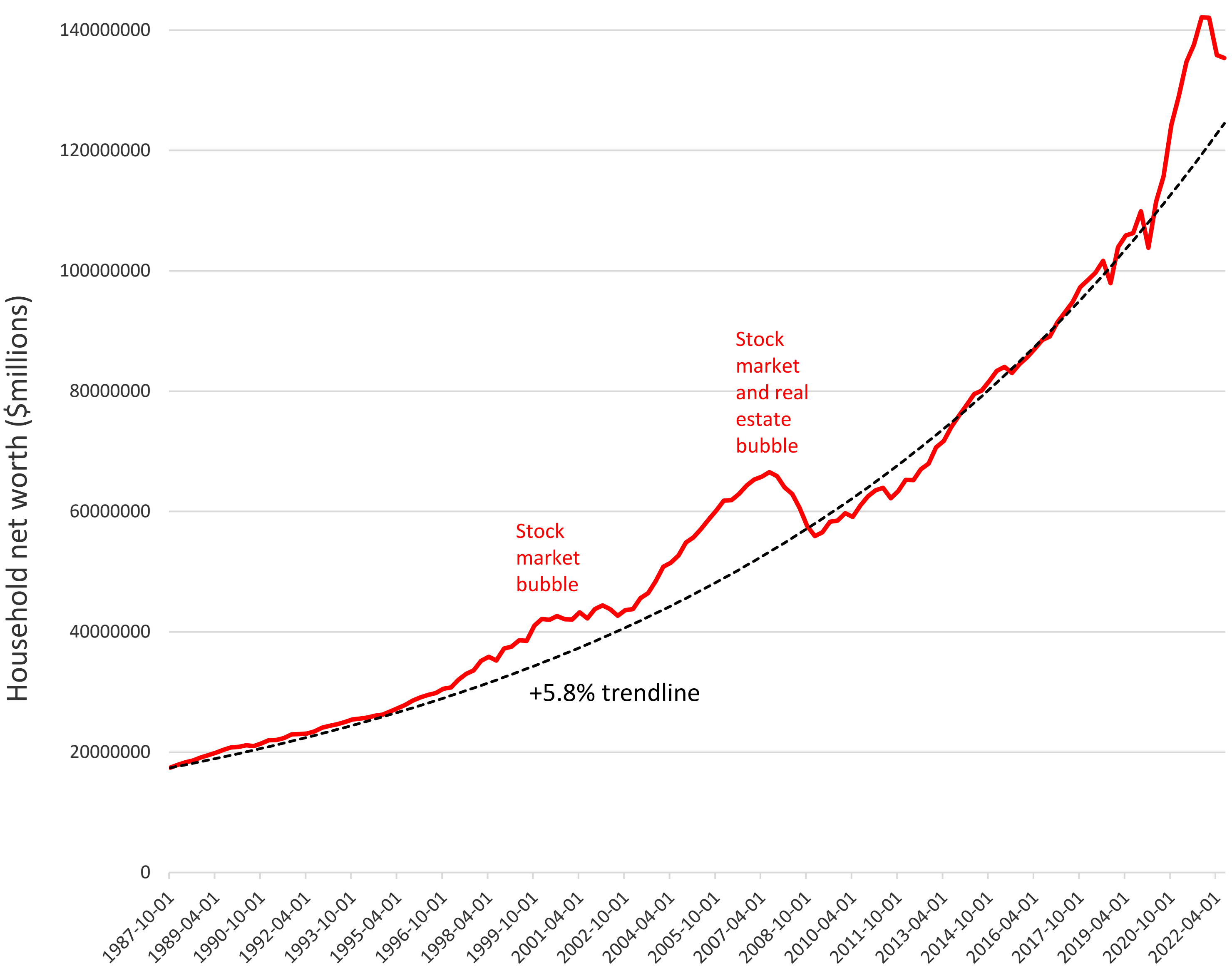
Americans were joining and staying in the labor force in increasing numbers … until Covid-19.

A reduction in immigration and a surge in retirements have subtracted from the labor force.

Source: BLS. Data through January 2023.

[1]Labor force participation rate: the proportion of the civilian noninstitutional population 16 years of age and older either at work or actively seeking work.

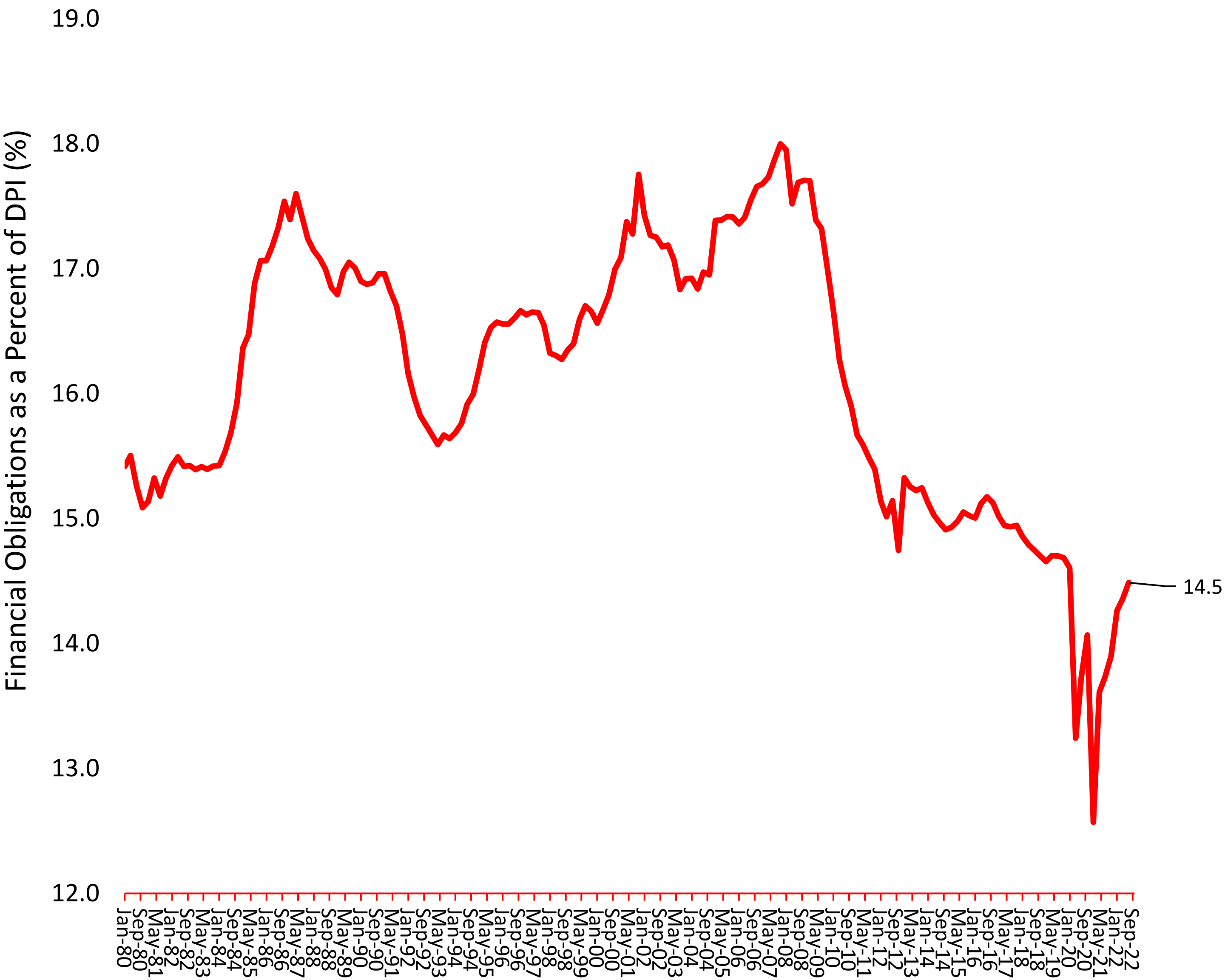
Household net worth – the wealth effect



Household net worth surged, then pulled back.

Source: Federal Reserve, FRBSL. Quarterly data through September 2022, released December 9, 2022.

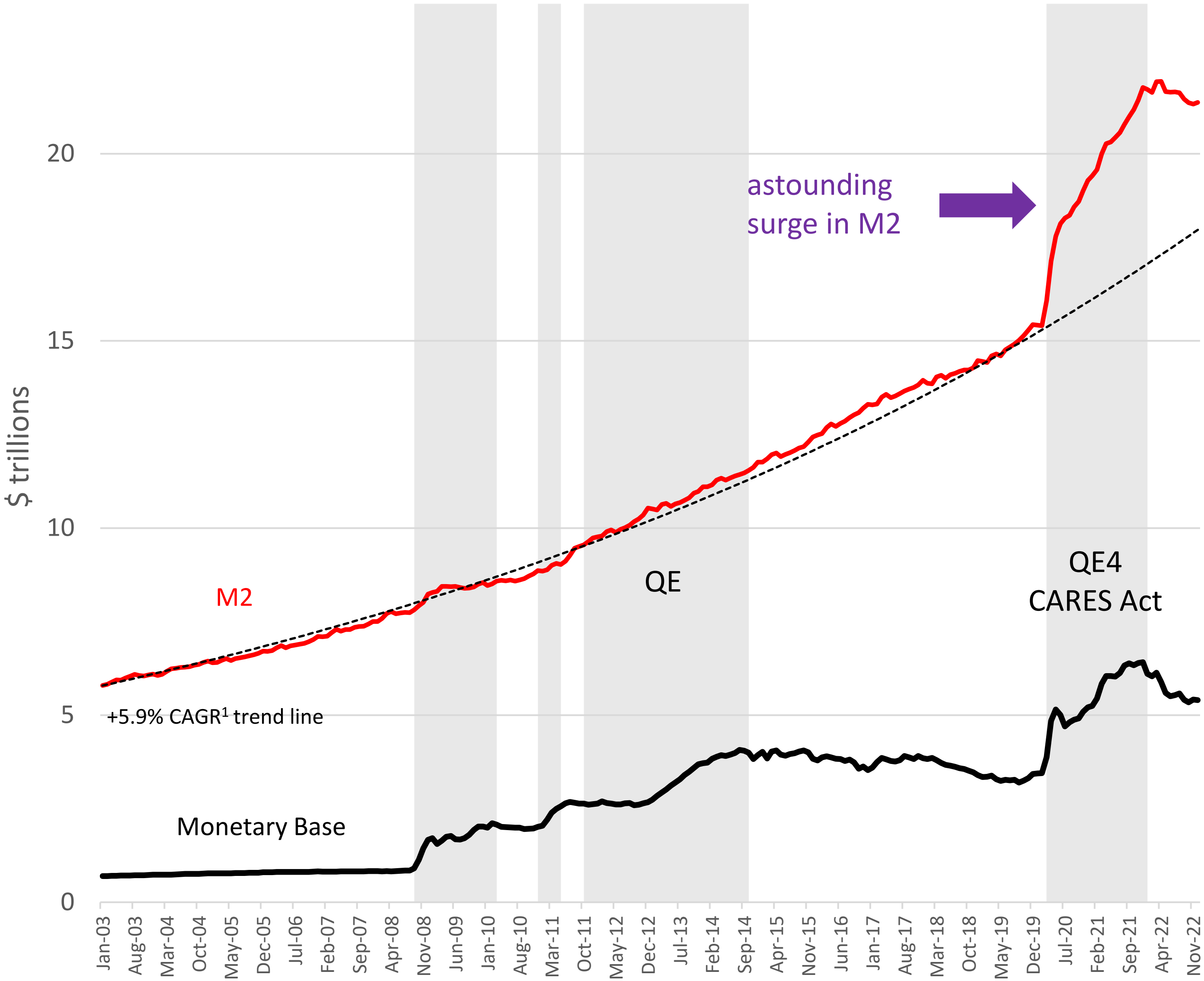
Financial obligations ratio



This measure shows that percent of monthly after-tax income that the average household pays for fixed recurring monthly obligations, such as a mortgage, car payment, utilities, real estate taxes, etc.

Source: Federal Reserve. Quarterly data through September 2022.

The monetary base and the money supply



M2: currency held by the public plus checking, savings and money market accounts.

A quadrupling of the monetary base with QE did not affect M2 growth. <u>The CARES Act and subsequent stimulus did </u>… by putting money directly into consumers' and businesses' accounts.

Monetary base: currency in circulation plus reserve balances (deposits held by banks in their accounts at the Federal reserve).

Source: Federal Reserve, statistical release H.6. Data through December 2022.
[1]CAGR = compound annual growth rate.

Consumers' cash balances declining

THE WALL STREET JOURNAL.

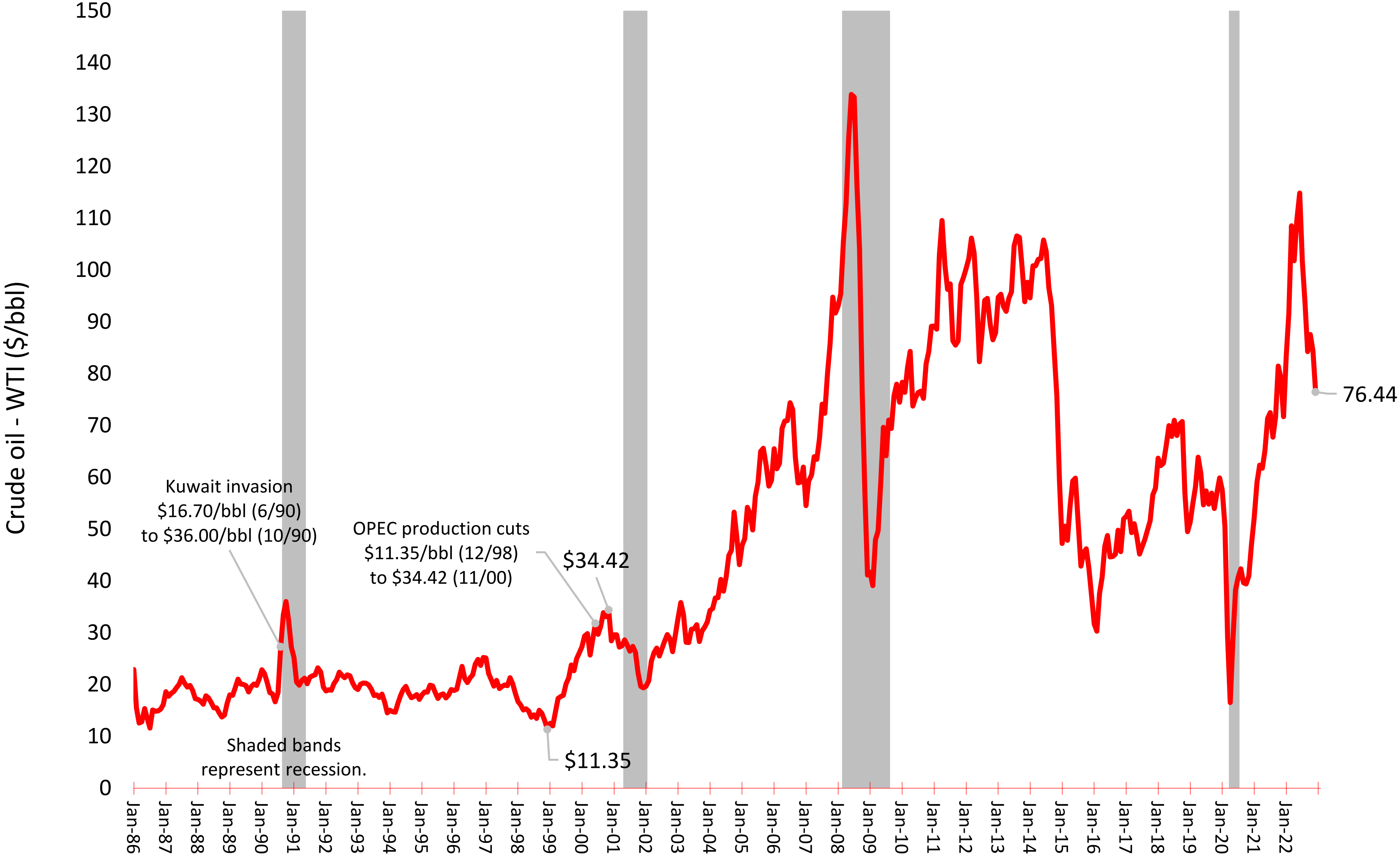
As Savings Shrink, Spending at Risk

It is the $1.7 trillion question for the U.S. economy: How long can the savings consumers built up during the pandemic keep their spending going?
The answer: about nine to 12 more months.

Economists estimate that headed into the third quarter of this year, households still had about $1.2 trillion to $1.8 trillion in "excess savings"—the amount above what they would have saved had there been no pandemic.

Source: *The Wall Street Journal*, "As Savings Shrink, Spending at Risk", Harriet Torry. November 21, 2022.

WTI spot crude oil prices



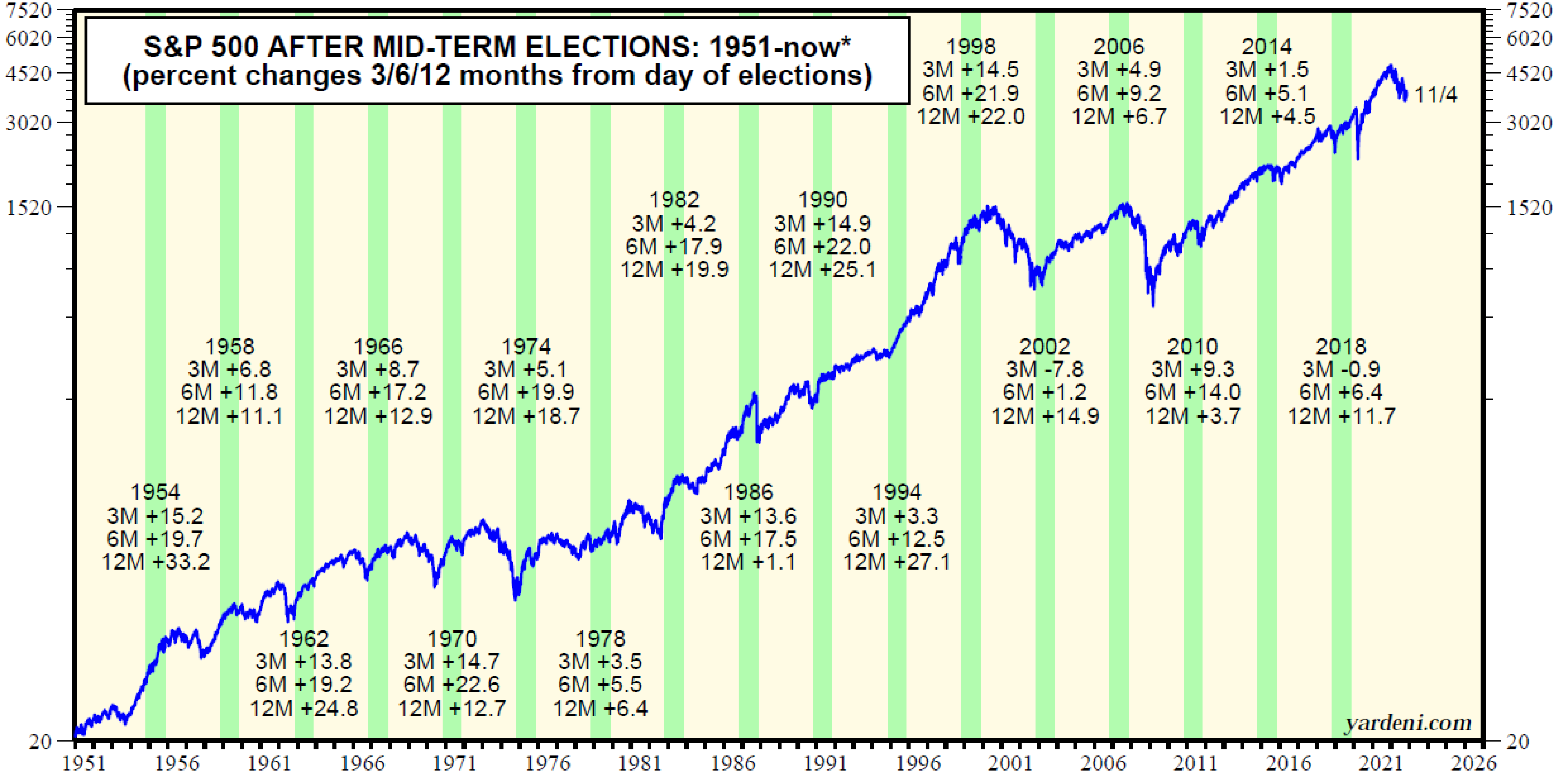
Source: U.S. Energy Information Agency. Data through December 2022.

Stock Market

- mid-term election years
- bear market
- stocks vs. recessions
- “parabolic” is normal
- 2023/2024 earnings estimates
- What is the right P/E multiple?

S&P 500 and mid-term elections

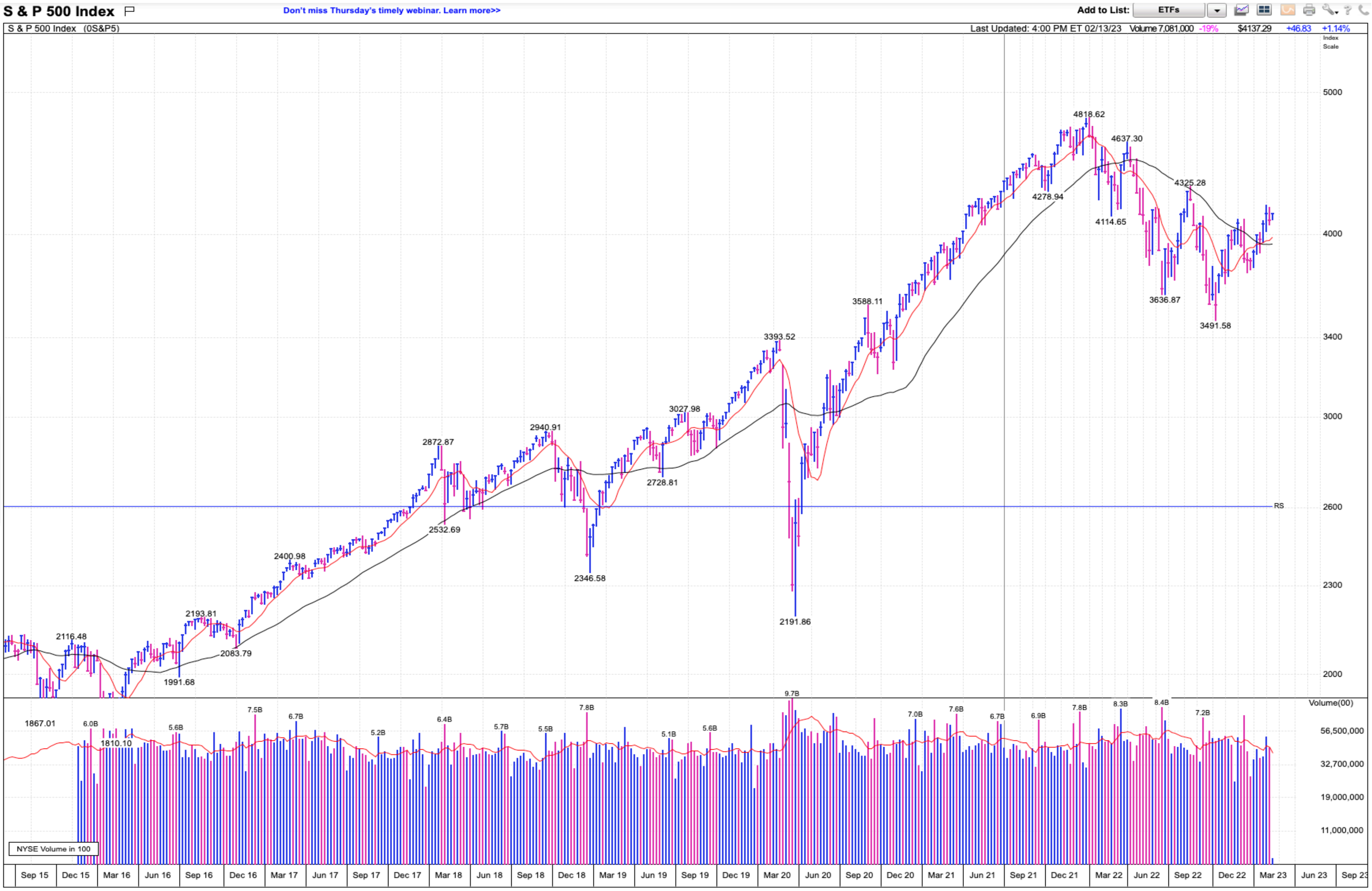
Figure 3.



* S&P 500 up (down) during 12-month span following election day in green (red) shaded area. Prior to 1969, markets were closed on election day, therefore used "latest close" for those dates.
Source: Haver Analytics, Standard & Poor's, YRI calculations.

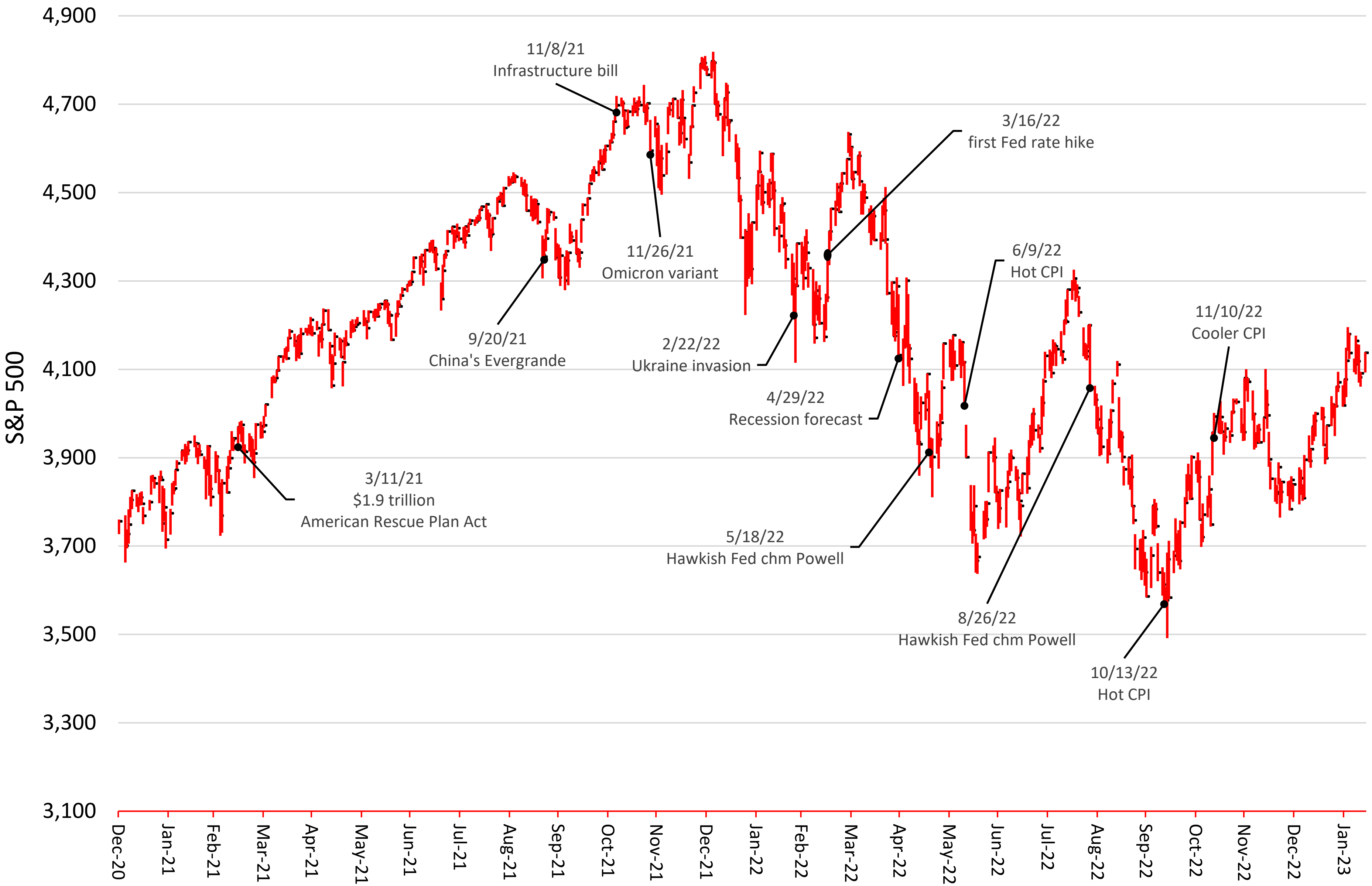
Source: Yardeni Research, Inc., with permission. November 6, 2022.

S&P 500



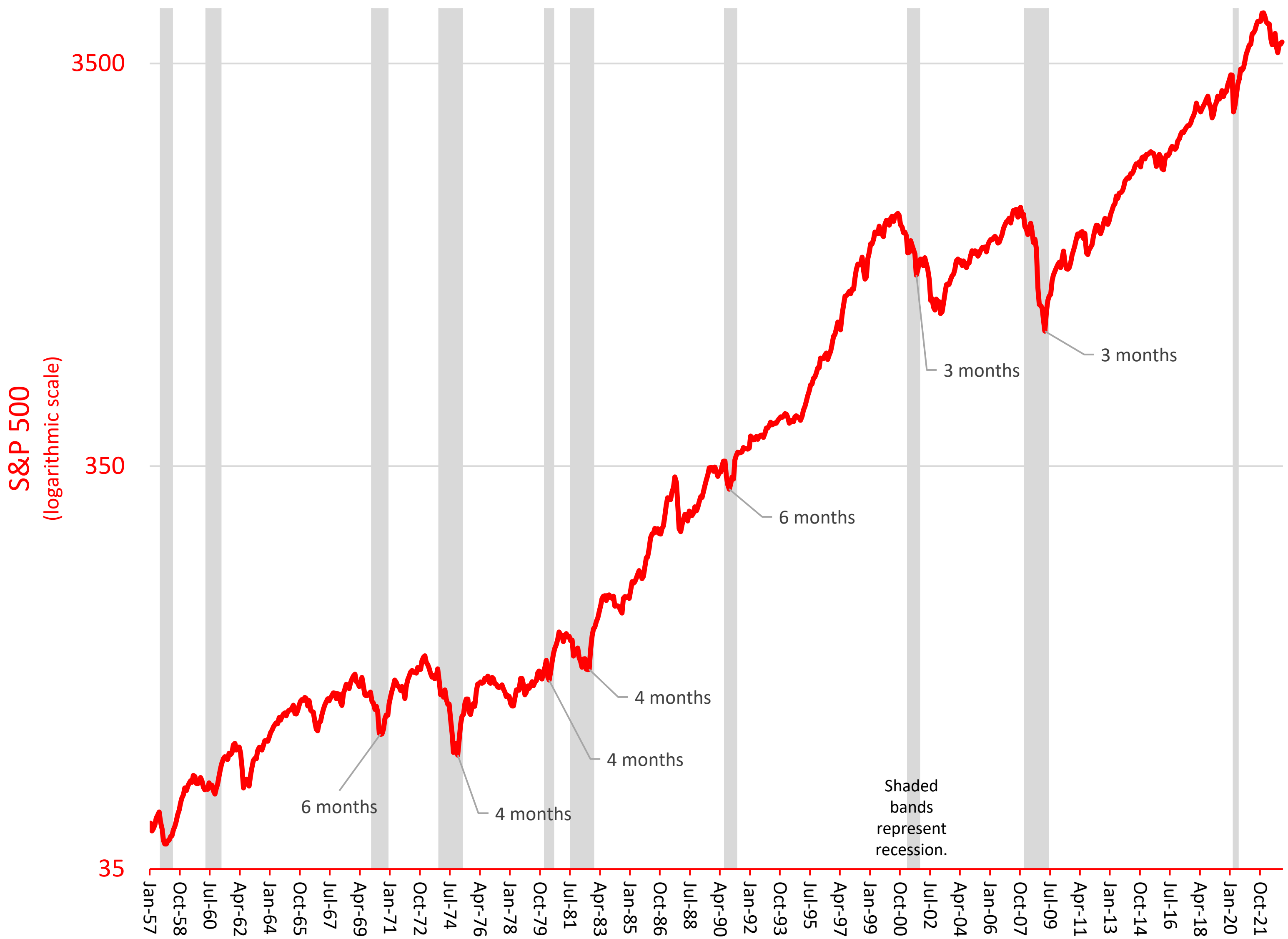
Source: Standard & Poor's and MarketSmith, Inc. Data through February 13, 2023.

Stock market
S&P 500



Source: Standard & Poor’s. Data through February 13, 2023.

S&P 500 vs. recessions

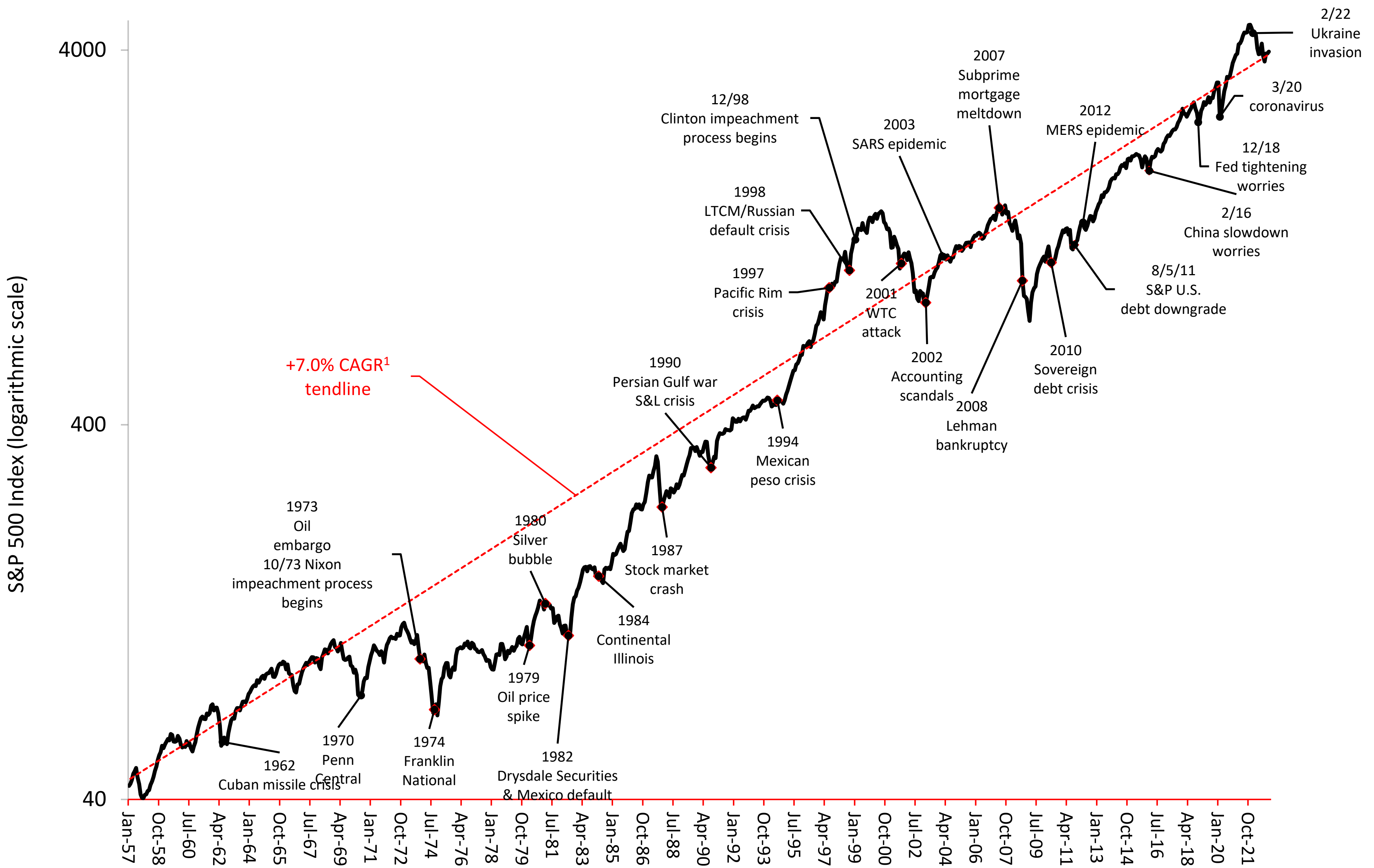


Big declines are associated with recessions.

Stocks often bottom months before recession-end.

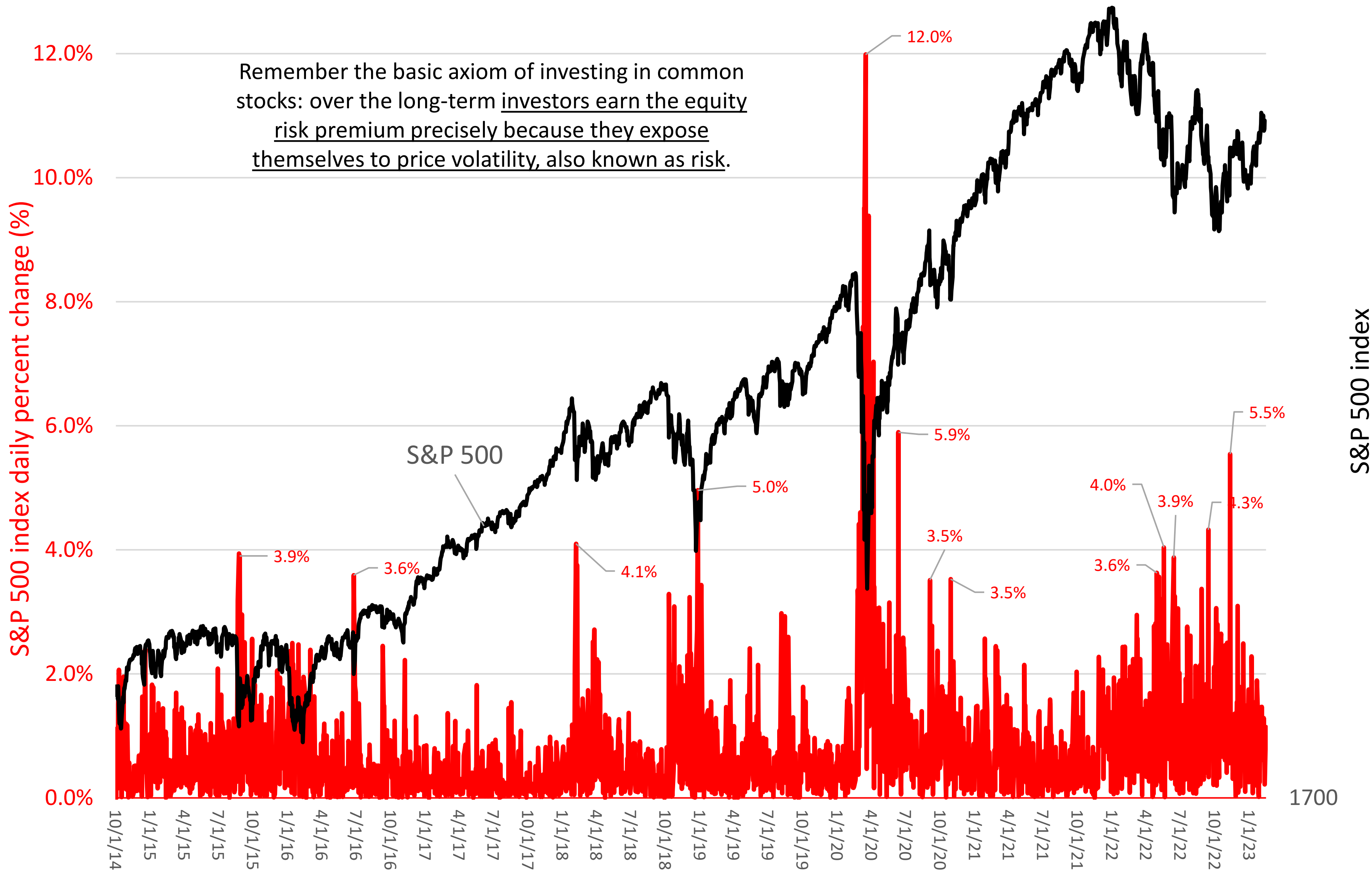
Source: Standard and Poor's Corporation, National Bureau of Economic Research. Data through December 2022.

S&P 500 and crises



Source: Standard and Poor's. Data through January 2023. [1] Compound annual growth rate.

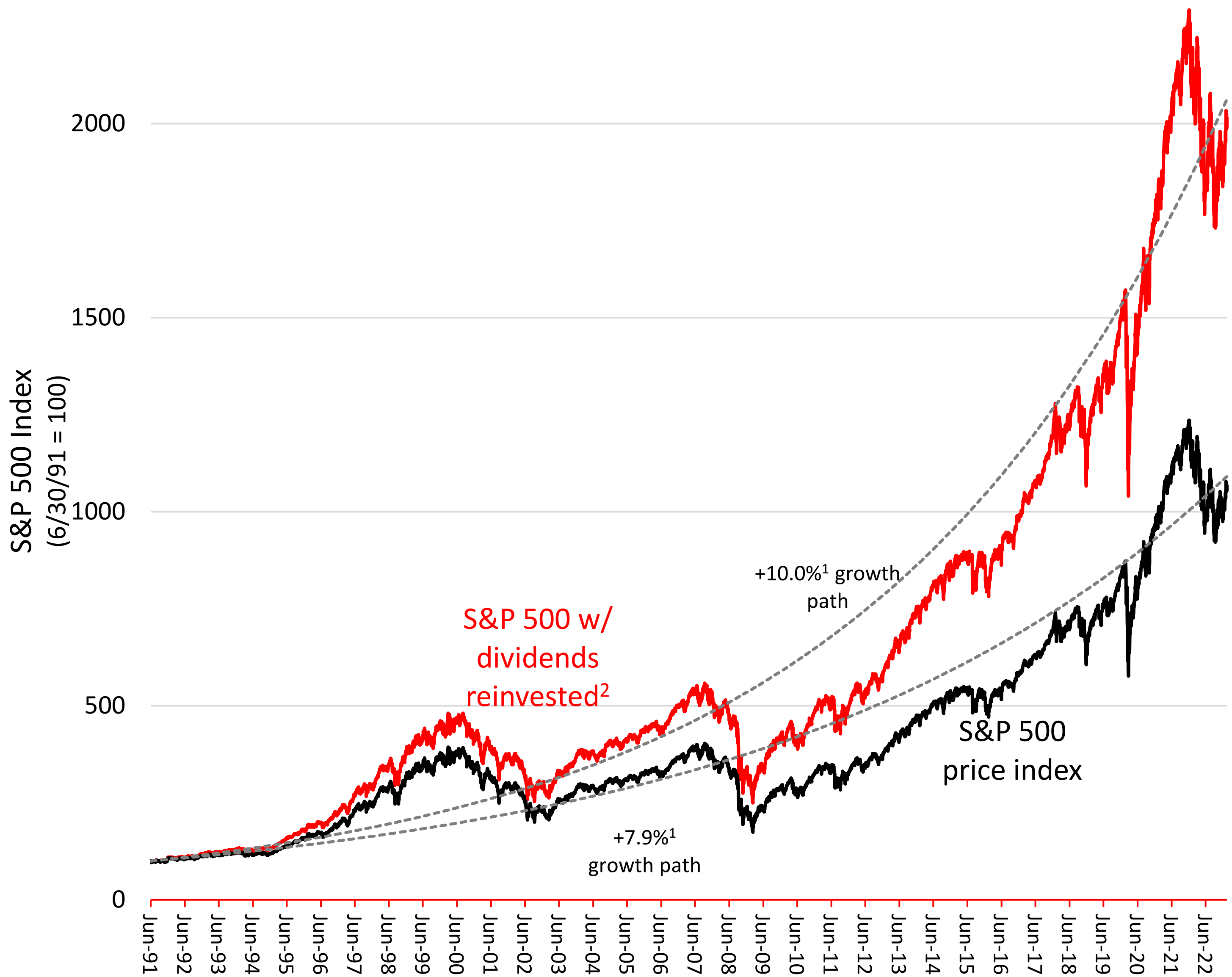
S&P 500 volatility



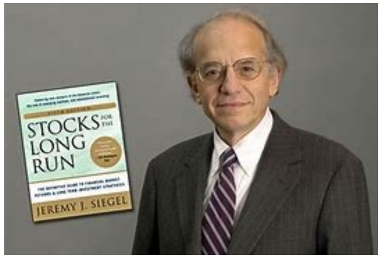
Source: Standard & Poor's, data through February 13, 2023.

Stock market arithmetic

Total return = 7.9% earnings-driven price + 2.1% dividends reinvested



+10% per year S&P 500 total return over the last 30 years is in line with the stock market's long-term returns going back to 1926, or back even further to 1871.[3]



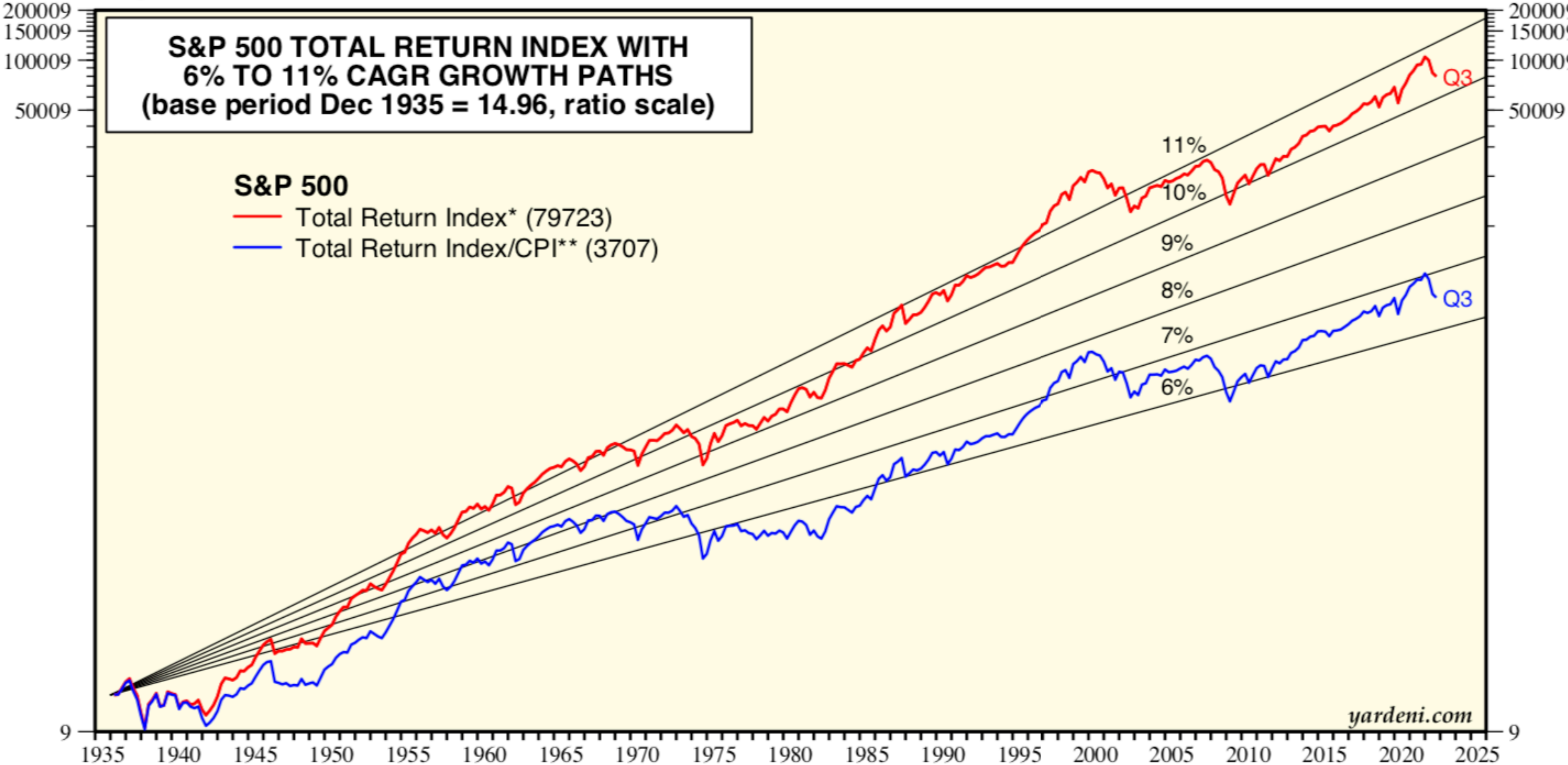
Source: Standard and Poor's. Data through February 13, 2023.[1] Compound annual growth rate. [2] S&P 500 total return index.
[3] per Professor Jeremy Siegel's seminal *Stocks for the Long Run*, first published in 1994.

Total return = 7.9% earnings-driven price + 2.1% dividends reinvested

Source: Standard and Poor's. Data through February 13, 2023. [1] Compound annual growth rate. [2] S&P 500 total return index.

Total return and real total return

Figure 6.

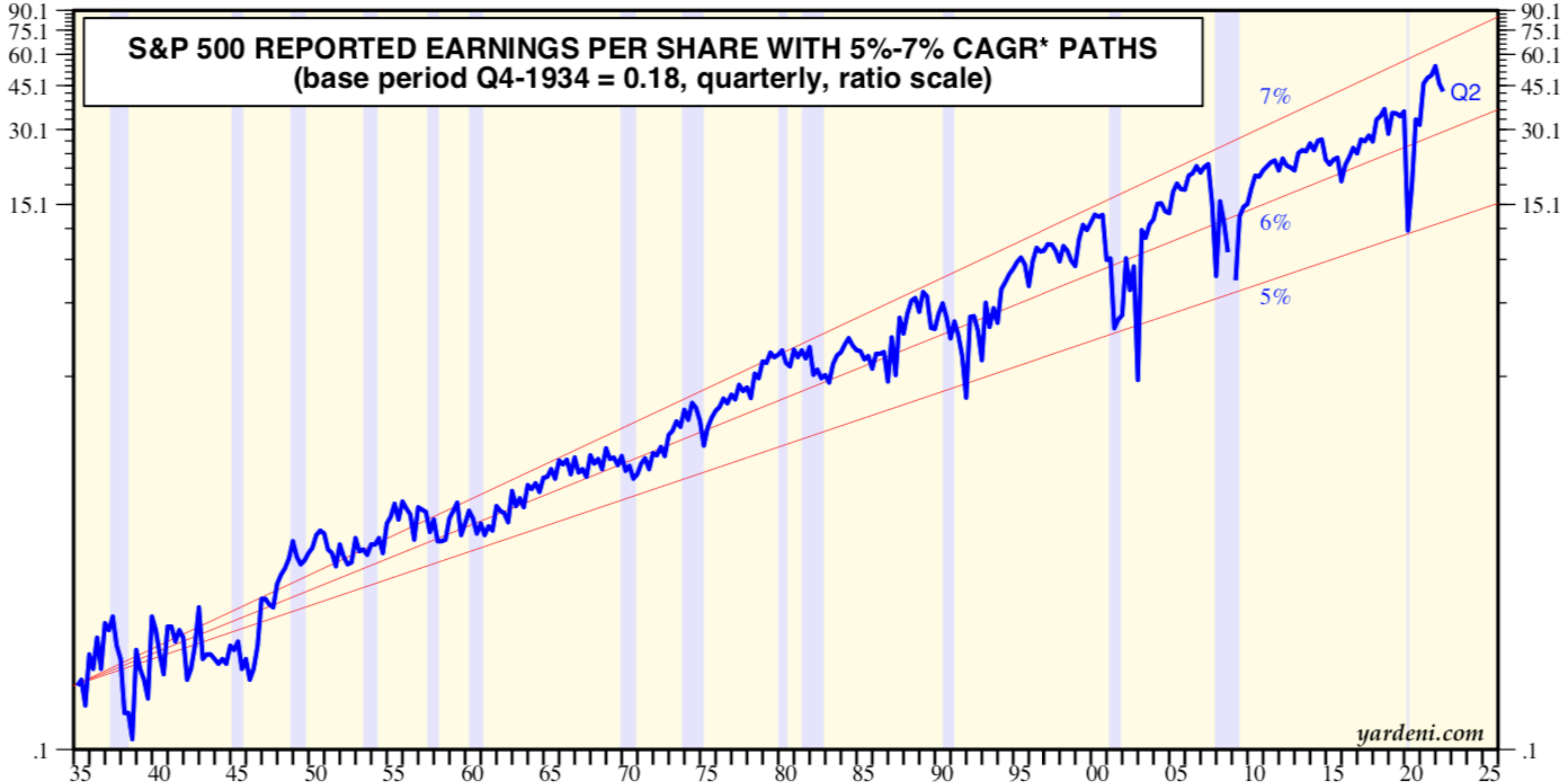


* Includes reinvested dividends.
** Using last month of quarter CPI. Compounded monthly using base value.
Source: Standard & Poor's.

Source: Yardeni Research, Inc., with permission.

85 years of S&P 500 earnings growth

Figure 9.

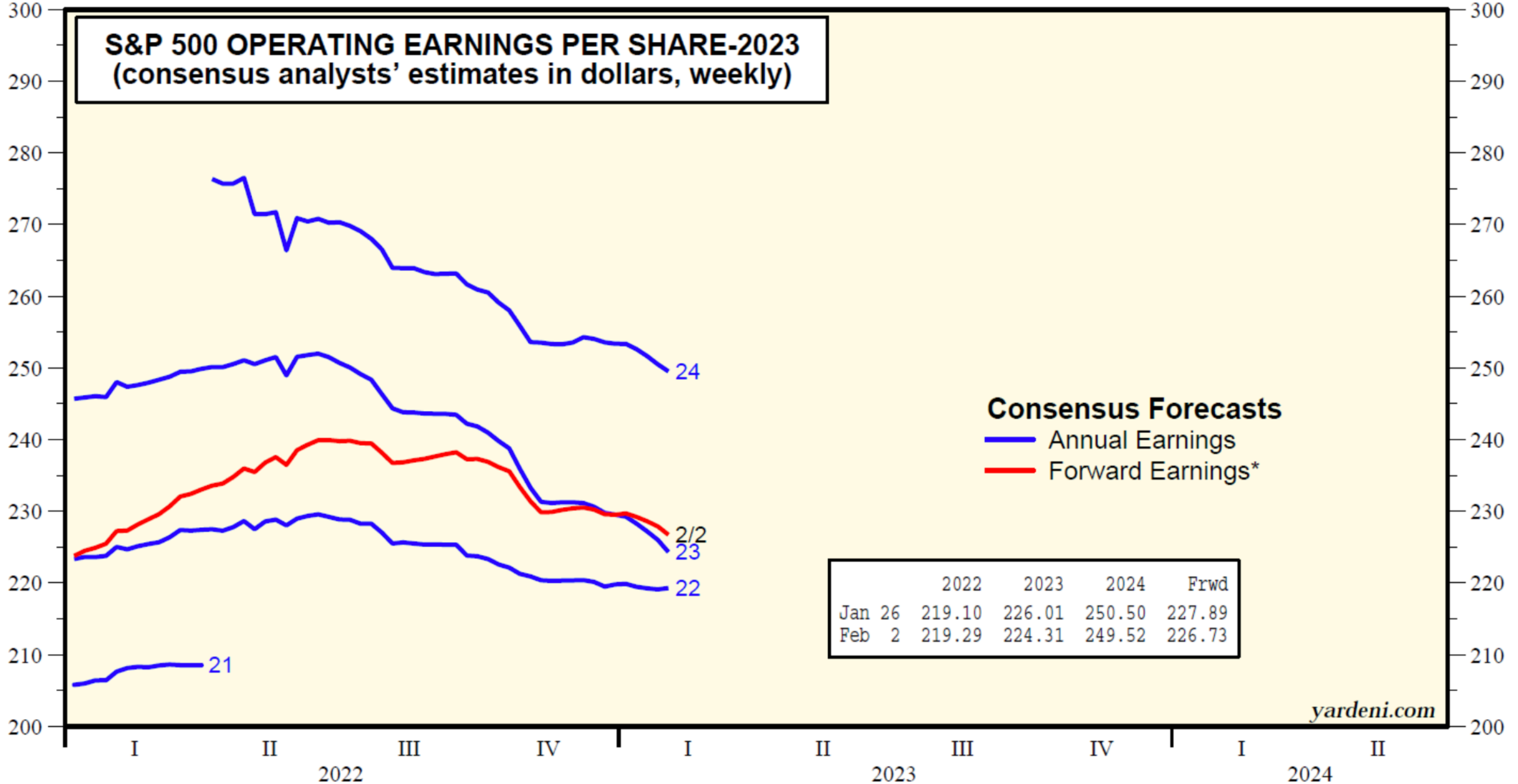


* Compounded annual growth rate from base value using monthly data. Q4-2008 not shown because of large negative value.
Note: Shaded areas denote recessions according to the National Bureau of Economic Research.
Source: Standard & Poor's.

Source: Yardeni Research, Inc. with permission.

S&P earnings estimates

Figure 11.

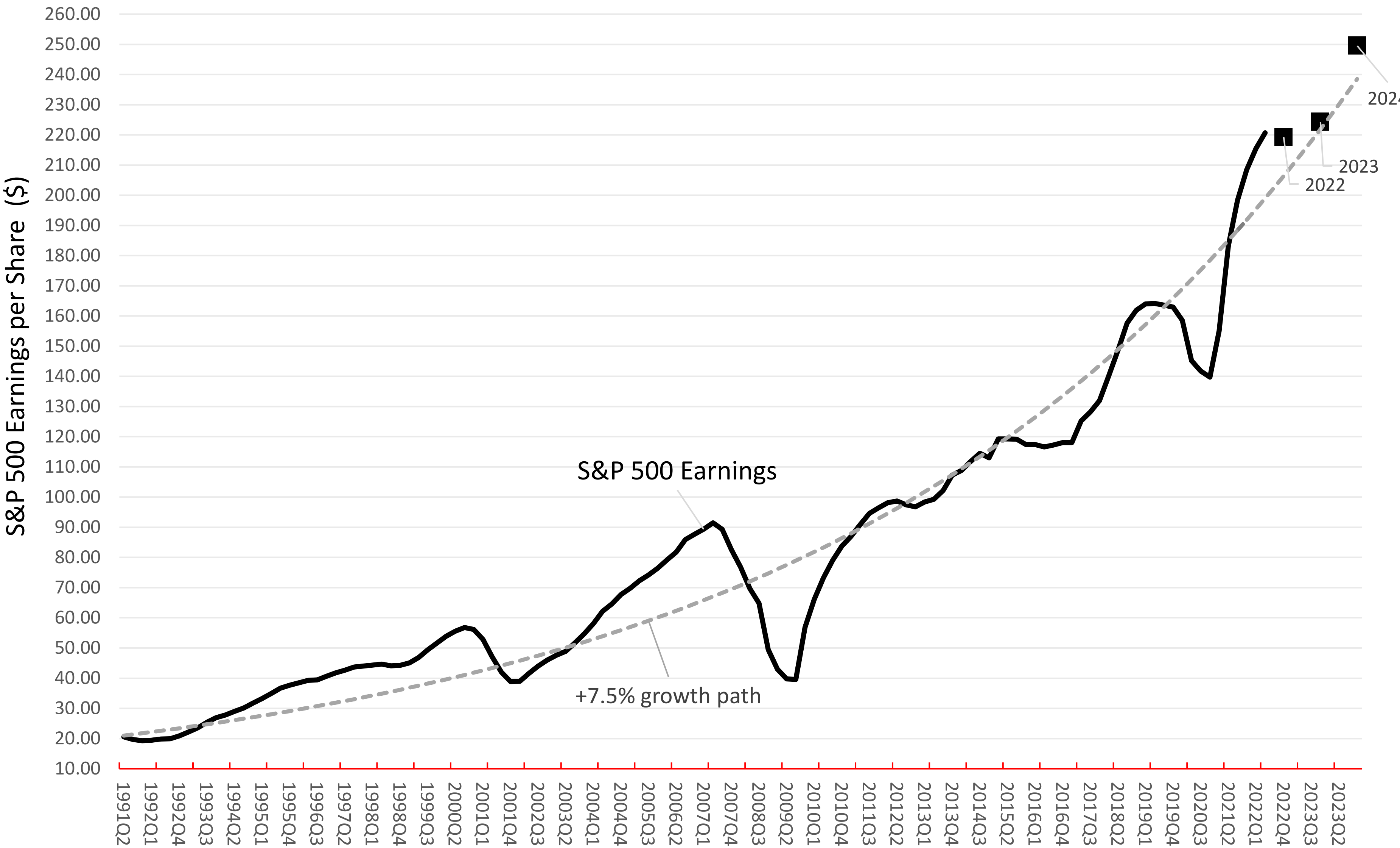


	2022	2023	2024	Frwd
Jan 26	219.10	226.01	250.50	227.89
Feb 2	219.29	224.31	249.52	226.73

* Time-weighted average of the consensus estimates for current and next year.
Source: I/B/E/S data by Refinitiv.

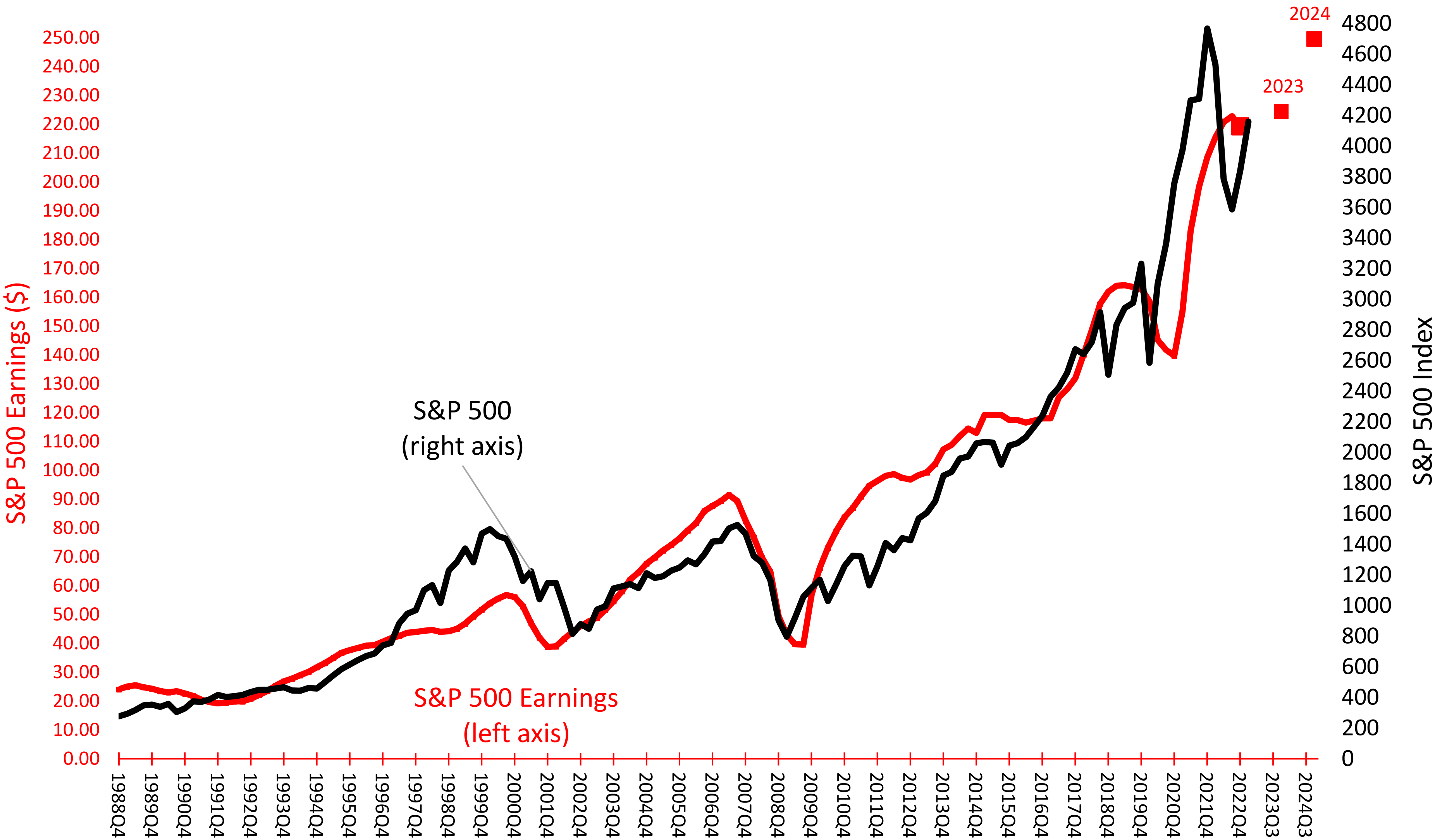
Source: Yardeni Research, Inc., with permission. February 2, 2023.

S&P 500 earnings – actual and I/B/E/S estimates



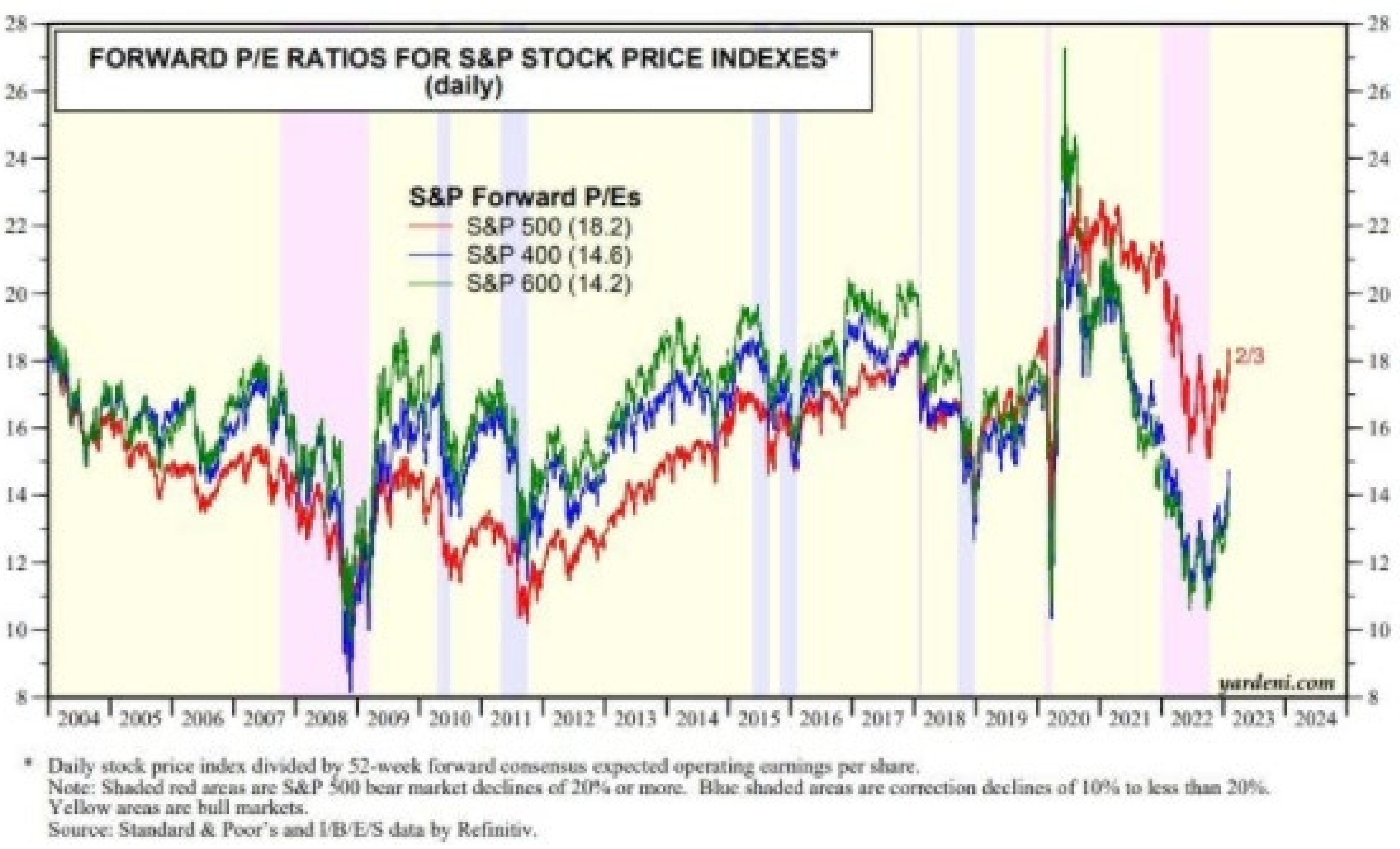
2022 (estimated), 2023 (estimated) and 2024 (estimated) bottom-up S&P 500 operating earnings per share as of February 2, 2023: for 2022(e), $219.29; for 2023(e), $224.31; for 2024(e), $249.52. Sources: Yardeni Research, Inc. and Thomson Reuters I/B/E/S for actual and estimated operating earnings from 2015. Standard and Poor's for actual operating earnings data through 2014.

S&P 500 vs. actual and I/B/E/S estimated earnings



2022 (estimated), 2023 (estimated) and 2024 (estimated) bottom-up S&P 500 operating earnings per share as of February 2, 2023: for 2022(e), $219.29; for 2023(e), $224.31; for 2024(e), $249.52. Sources: Yardeni Research, Inc. and Thomson Reuters I/B/E/S for actual and estimated operating earnings from 2015. Standard and Poor's for actual operating earnings data through 2014; index price data through February 14, 2023.

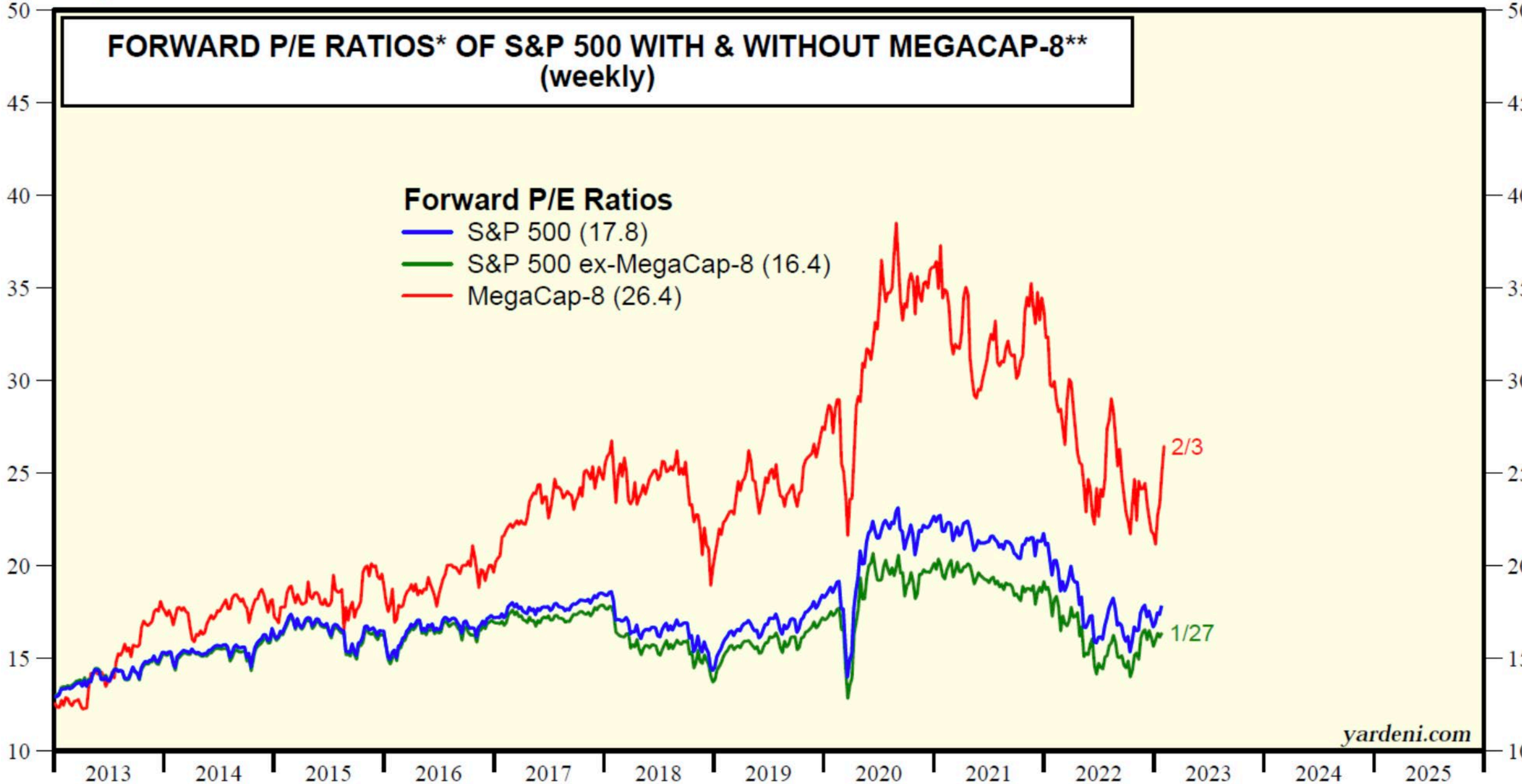
S&P 500 index forward P/E ratio



Source: Yardeni Research, Inc., with permission, February 5, 2023.

S&P 500 index forward P/E ratio

Figure 20.



* Price divided by consensus forward earnings forecast.
** MegaCap-8 stocks include Alphabet, Amazon, Apple, Meta, Microsoft, Netflix, NVIDIA, and Tesla. Both classes of Alphabet are included.
Source: I/B/E/S data by Refinitiv.

Source: Yardeni Research, Inc., with permission, February 5, 2023.

Fed policy

Source: *CNBC* screenshot, November 2, 2022.

More rate hikes ahead

THE WALL STREET JOURNAL.

Fed Approves Quarter-Point Rate Increase

Central bank slows its pace of tightening and signals another lift at next meeting in March.

"We're talking about a couple of more rate hikes to get to that level we think is appropriately restrictive," Fed Chair Jerome Powell said at a news conference after the central bank's policy meeting.

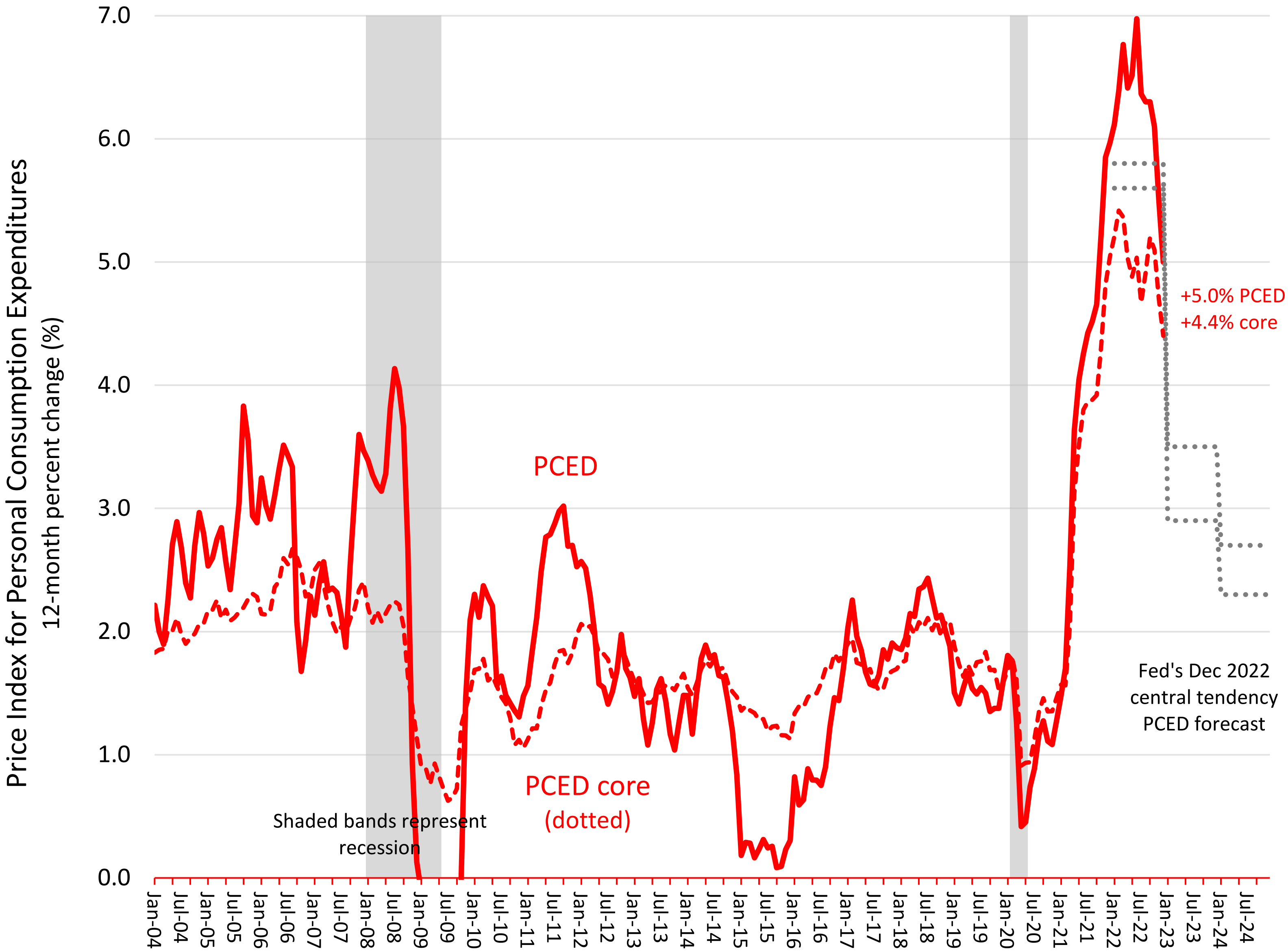
Source: *The Wall Street Journal*, "Fed Approves Quarter-Point Rate Increase", Nick Timiraos. February 2, 2023.

Inflation

- Year-over-year headline PCED +5.0%, +4.4% core
- Month-over-month plunging
- M2 driving inflation
- inflation expectations (TIPS spread) falling

Inflation

PCED – headline and core

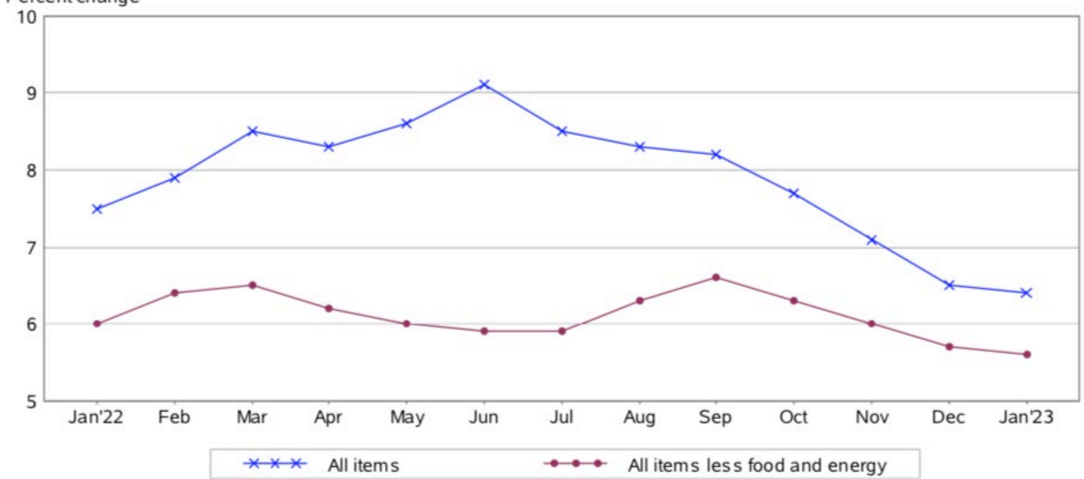


Inflation peaked, following the post-Covid surge.

Source: NBER, Federal Reserve Bank of St. Louis. Data through December 2022.

CPI – headline and core

Chart 2. 12-month percent change in CPI for All Urban Consumers (CPI-U), not seasonally adjusted, Jan. 2022 - Jan. 2023



Up +6.4% y/y in January.

Up +5.6% y/y in January.

Table A. Percent changes in CPI for All Urban Consumers (CPI-U): U.S. city average

	Seasonally adjusted changes from preceding month							Un-adjusted 12-mos. ended Jan. 2023
	Jul. 2022	Aug. 2022	Sep. 2022	Oct. 2022	Nov. 2022	Dec. 2022	Jan. 2023	
All items	0.0	0.2	0.4	0.5	0.2	0.1	0.5	6.4
Food	1.1	0.8	0.8	0.7	0.6	0.4	0.5	10.1
Food at home	1.3	0.8	0.7	0.5	0.6	0.5	0.4	11.3
Food away from home[1]	0.7	0.9	0.9	0.9	0.5	0.4	0.6	8.2
Energy	-4.7	-3.9	-1.7	1.7	-1.4	-3.1	2.0	8.7
Energy commodities	-7.9	-8.0	-4.1	3.7	-2.1	-7.2	1.9	2.8
Gasoline (all types)	-8.1	-8.4	-4.2	3.4	-2.3	-7.0	2.4	1.5
Fuel oil[1]	-11.0	-5.9	-2.7	19.8	1.7	-16.6	-1.2	27.7
Energy services	0.0	1.8	1.2	-0.7	-0.6	1.9	2.1	15.6
Electricity	1.5	1.2	0.8	0.5	0.5	1.3	0.5	11.9
Utility (piped) gas service	-3.8	3.5	2.2	-3.7	-3.4	3.5	6.7	26.7
All items less food and energy	0.3	0.6	0.6	0.3	0.3	0.4	0.4	5.6
Commodities less food and energy commodities	0.1	0.4	0.0	-0.1	-0.2	-0.1	0.1	1.4
New vehicles	0.5	0.8	0.7	0.6	0.5	0.6	0.2	5.8
Used cars and trucks	-0.8	-0.2	-1.1	-1.7	-2.0	-2.0	-1.9	-11.6
Apparel	-0.1	0.3	0.0	-0.2	0.1	0.2	0.8	3.1
Medical care commodities[1]	0.6	0.2	-0.1	0.0	0.2	0.1	1.1	3.4
Services less energy services	0.4	0.6	0.8	0.5	0.5	0.6	0.5	7.2
Shelter	0.6	0.7	0.7	0.7	0.6	0.8	0.7	7.9
Transportation services	-0.4	1.0	1.9	0.6	0.3	0.6	0.9	14.6
Medical care services	0.4	0.7	0.8	-0.4	-0.5	0.3	-0.7	3.0

Source: BLS. Data through January 2023.

Month-over month readings

THE WALL STREET JOURNAL.

The Fed Now Has a Good Chance at a Soft Economic Landing

Calling "ongoing" rate hikes "appropriate" displays no recognition whatsoever that inflation has crumbled, or in the committee's far-too-modest words, "has eased somewhat."

Somewhat? In truth, the first and second halves of 2022 were like two different worlds in terms of inflation. The most stunning example is the behavior of the overall consumer price index. While this measure of inflation isn't the Fed's favorite (more on that shortly), it gets vastly more public attention than any other measure. The CPI rose at an 11.1% annual rate in the first half of 2022 and a 1.9% annual rate in the second half. No, that is not a typo—a tad under 2%.

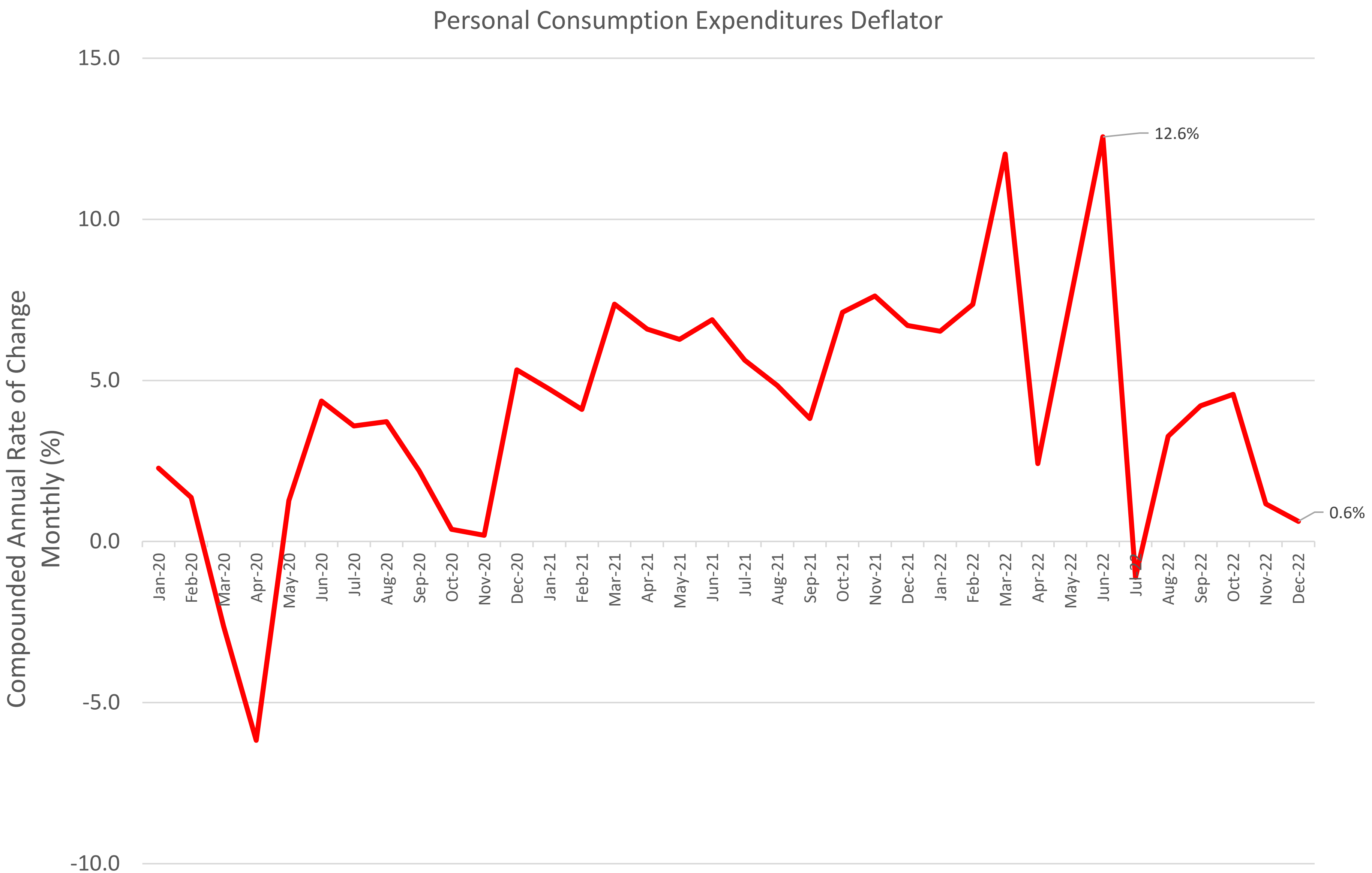
Yet the FOMC statement virtually ignored this important fact. Why?

One possible reason may be that the Fed's 2% inflation target applies not to the CPI but to the deflator for personal consumption expenditures— a wonkish point, but it's true. However, PCE inflation also crumbled— from 8% in the first half of 2022 to 2.1% in the second.

Source: *The Wall Street Journal*, February 9, 2023. Opinion section. Author: Alan S. Blinder.

Inflation

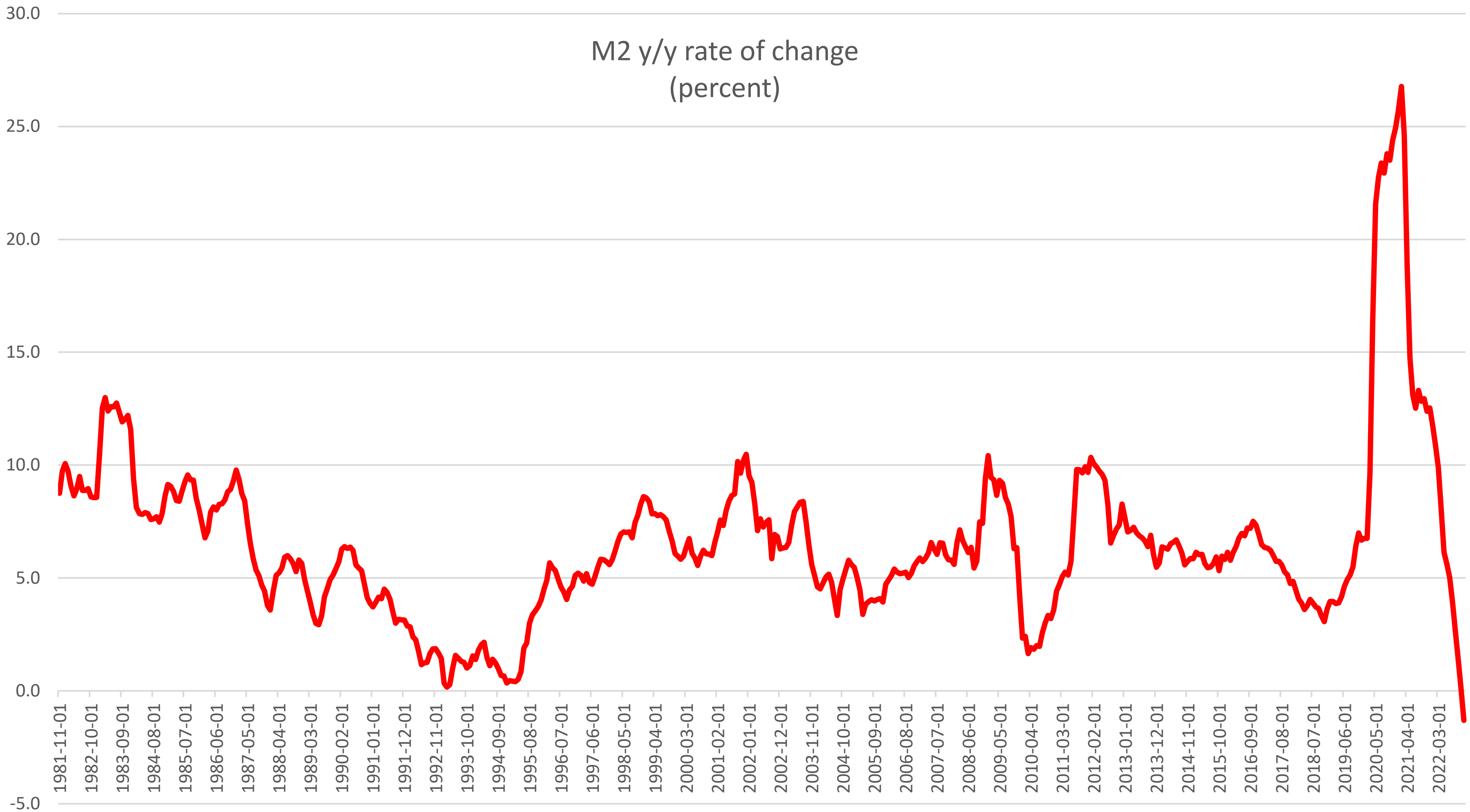
PCED – monthly rate of change annualized



Source: Federal Reserve Bank of St. Louis. Data through December 2022.

Federal Reserve policy

The money supply – y/y rate of change



Source: Federal Reserve Bank of St. Louis. Data through December 2022.

M2 vs. inflation

THE WALL STREET JOURNAL.

Why Inflation Is on the Way Down

Yet the relationship between money-supply growth, as measured by M2 and subsequent inflation has been statistically near-perfect in the pandemic era, with a 13-month lag. Year-over-year M2 growth began to accelerate during the pandemic recession in April 2020, and core inflation started to accelerate 13 months later, in May 2021. M2 growth peaked at a history making, off-the-charts 27% in February 2021, and core CPI peaked 13 months later, in March 2022. Both M2 growth and core CPI have been falling every month since their respective peaks.

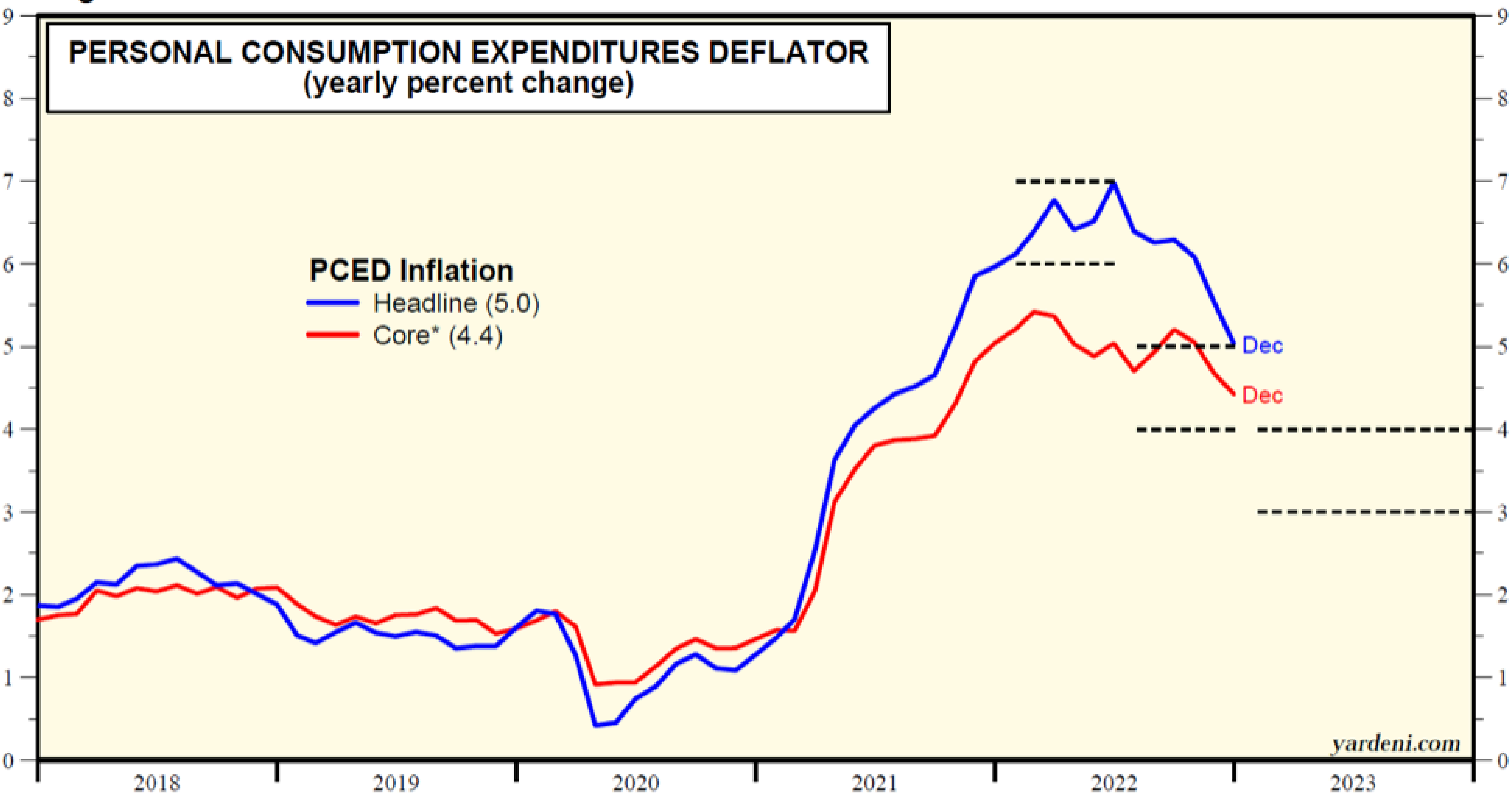
Experience is proving, 40 years after Friedman taught Volcker, that inflation is still a monetary phenomenon.

<u>If the relationship with inflation continues, core inflation will be at only 2.3% in 13 months, in June 2023</u>.

Source: *The Wall Street Journal*, July 26, 2022. Opinion section. Author: Donald L. Luskin.

Ed Yardeni's inflation forecast

Figure 25.



* Excluding food & energy.
Note: Dashed ranges are YRI forecasts for headline PCED inflation rate.
Source: Bureau of Economic Analysis.

Source: Yardeni Research, Inc., with permission, January 30, 2022.

Housing costs

THE WALL STREET JOURNAL.

Housing Costs Appear Poised to Ease

The end is in sight for one of the biggest sources of inflation. Surging housing costs helped keep inflation high this year but have likely already swung into reverse, economists say.
The signal comes from private- sector indexes of rents on new leases, which tend to lead the consumer-price index measures by a little less than a year, said Alan Detmeister, economist at UBS.

"Last year we saw huge increases in these market rent measures in June, July and August, but they're now coming in at or below their prepandemic pace," he said. "That suggests we should now be past the peak for monthly CPI rent increases." As a result, he predicted, inflation could be below the Federal Reserve's 2% target by 2024.

Source: *The Wall Street Journal*, "Housing Costs Appear Poised to Ease" by Gwynn Guilford. December 7, 2022.

Inflation expectations

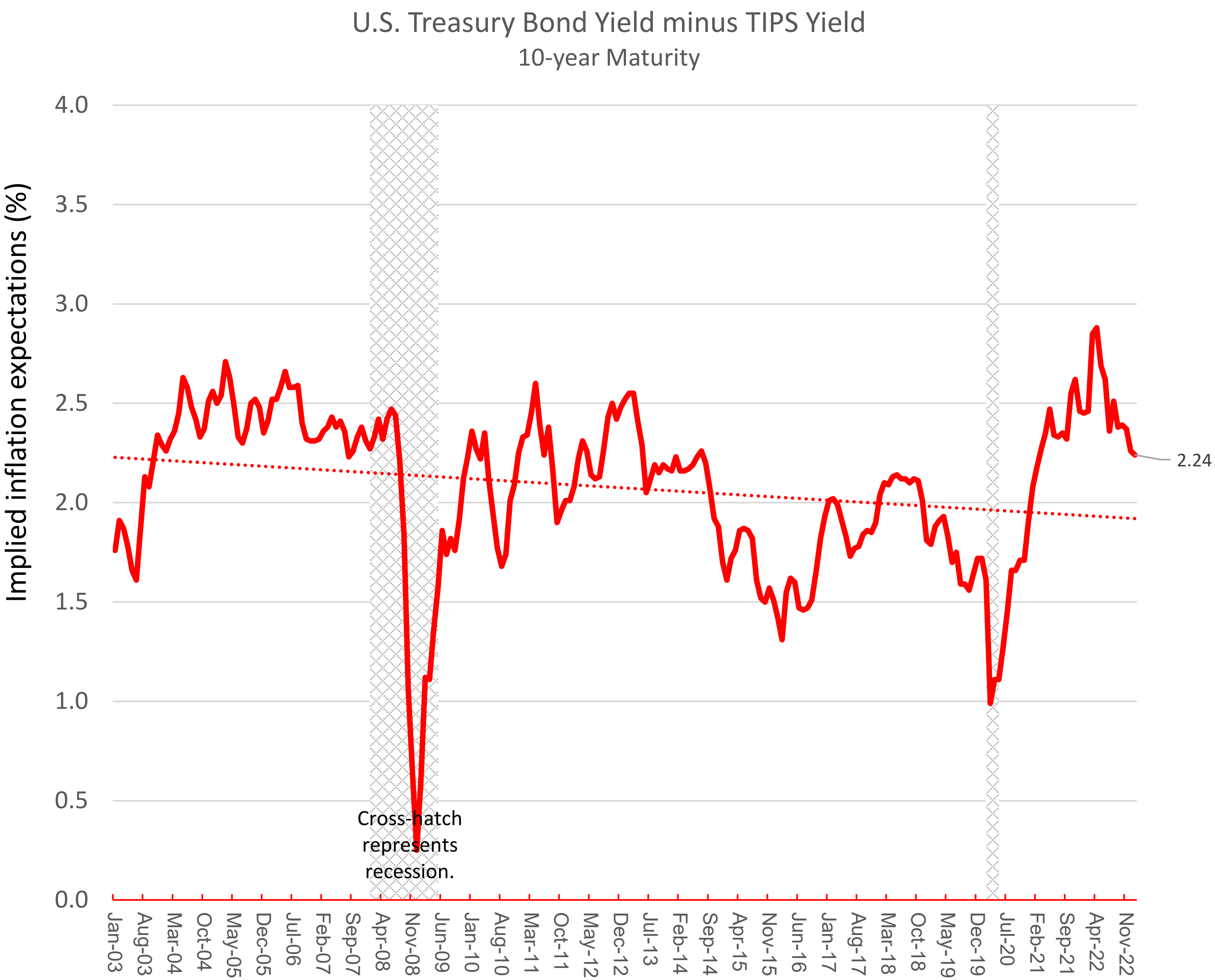
Inflation expectations

Median one-, three-, and five-year ahead expected inflation rate

Consumers expect substantially moderating inflation.

Source: Federal Reserve Bank of New York, *Survey of Consumer Expectations*. Data through January 2022.

Inflation expectations

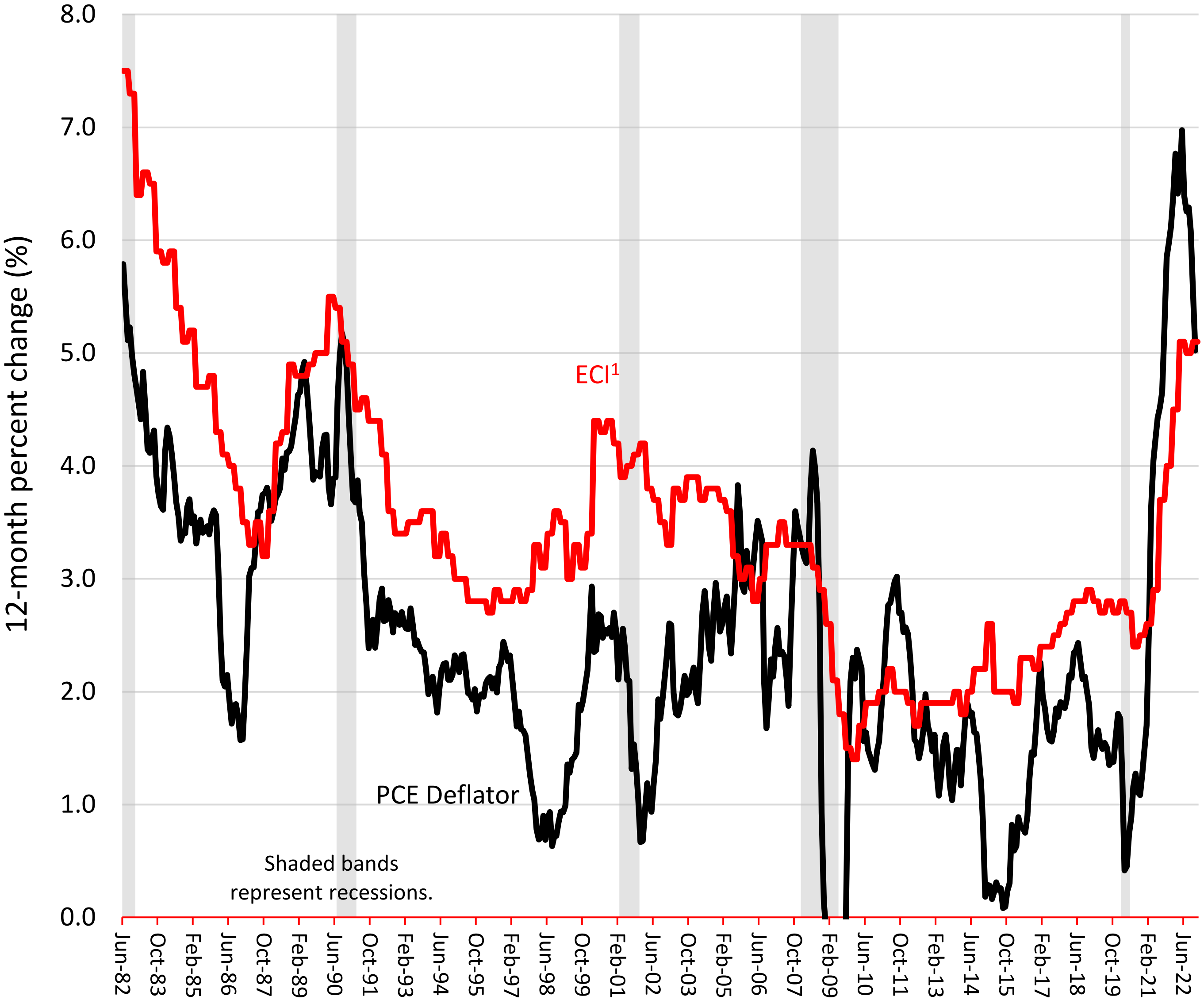


Source: Federal Reserve. Data through January 2023.

The difference between the nominal 10-year Treasury bond yield and the TIPS yield gives the market’s opinion for a 10-year inflation forecast.

It had been trending lower for 15 years but has moved higher post-Covid.

Employment cost index and inflation



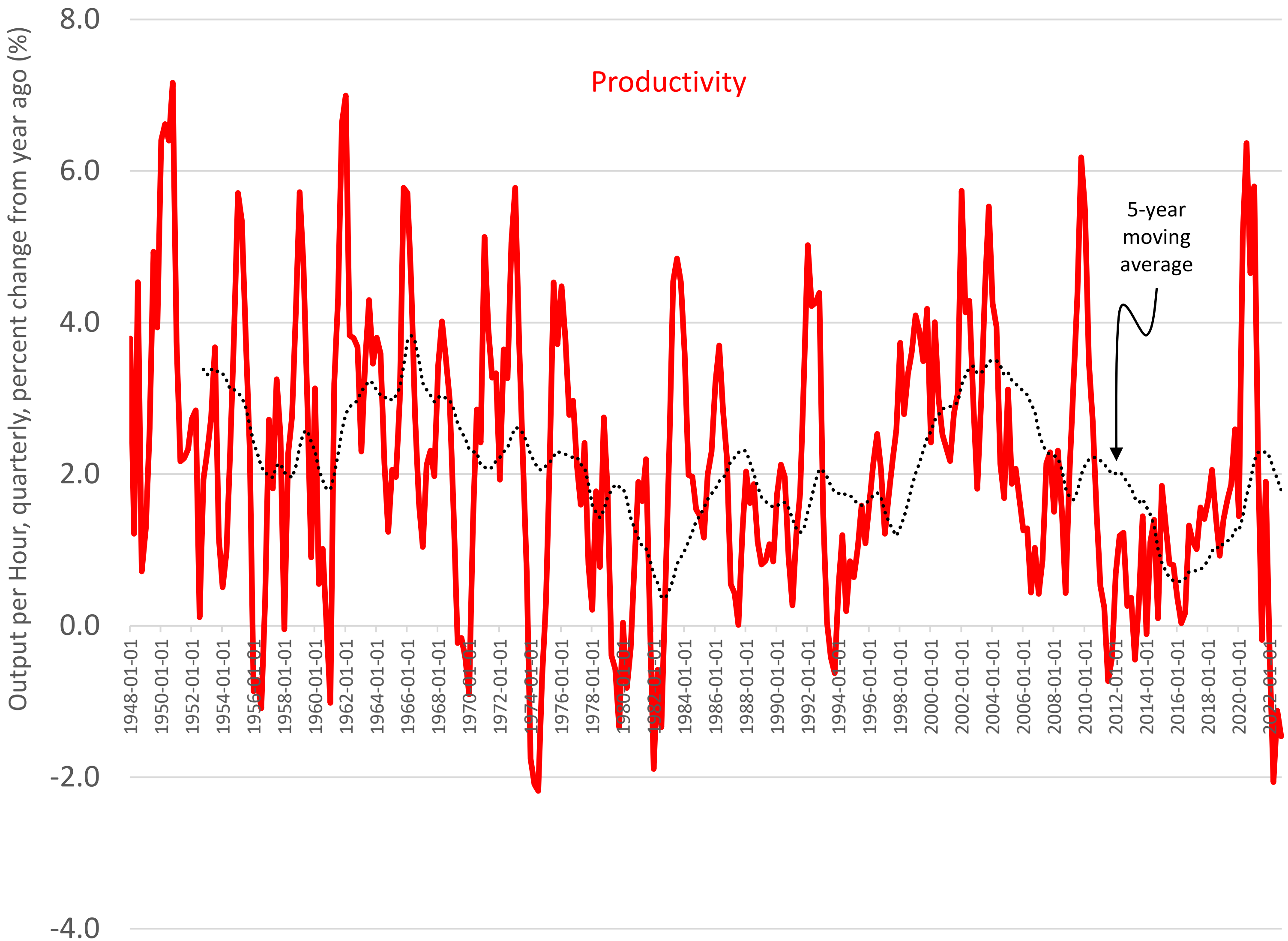
Overall inflation has generally remained below wage and benefit inflation.

Inflation (PCE deflator) generally runs lower than measured ECI inflation because higher employment costs can be offset by productivity gains.

Lately, inflation has shot higher faster than wage gains.

Source: Bureau of Labor Statistics and BEA. ECI quarterly data through December 2022. PCED monthly data through December 2022.
[1] Employment Cost Index. The BLS 's ECI is built with fixed weights for individual industries and occupations.

Productivity

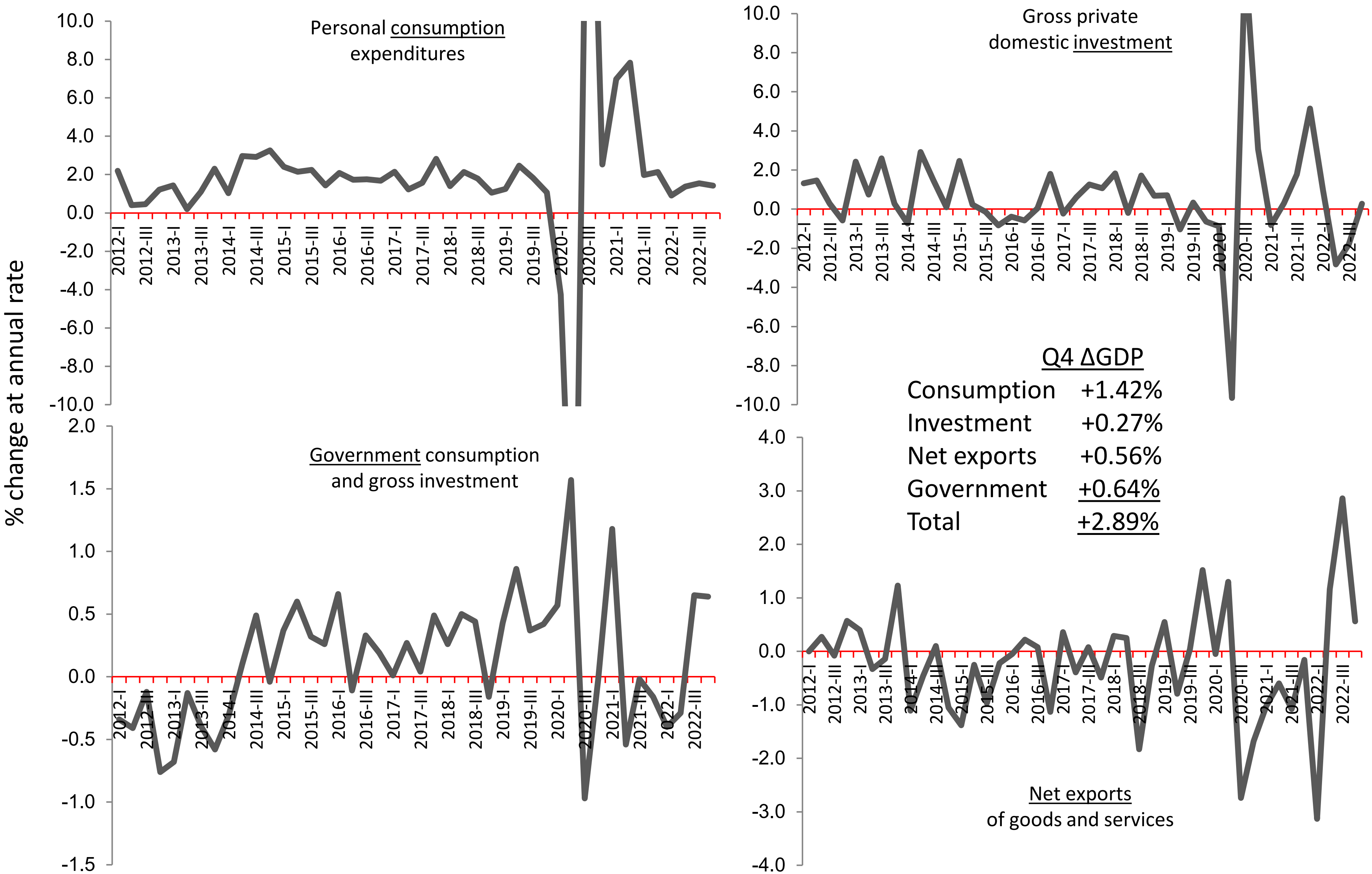


Productivity gains partially offset wage gains.

Source: FRBSL, quarterly data through December 2022.

Economy

Contributions to GDP growth: C + I + G + Net Exports

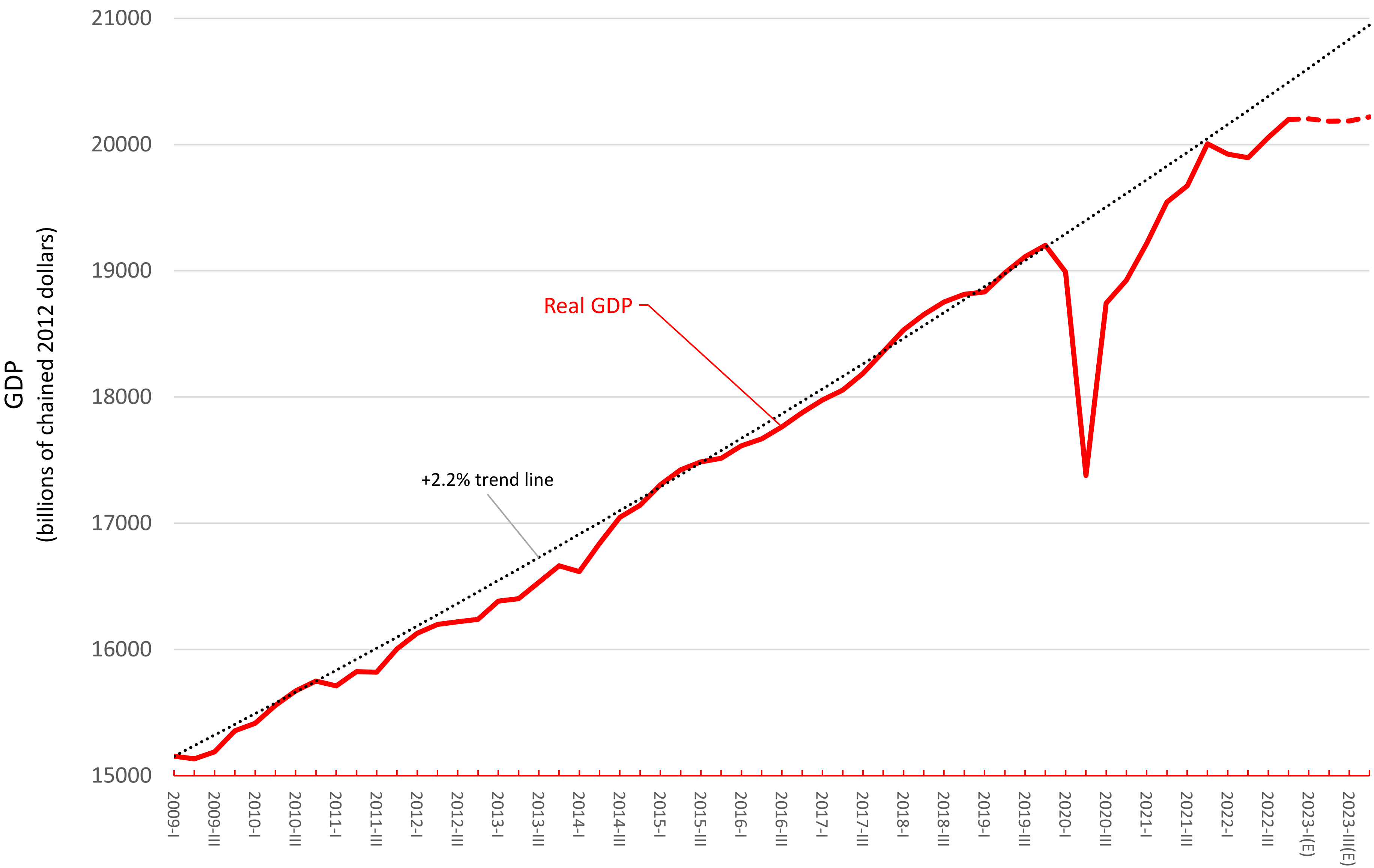


Q4 ΔGDP	
Consumption	+1.42%
Investment	+0.27%
Net exports	+0.56%
Government	+0.64%
Total	+2.89%

Source: Bureau of Economic Analysis, quarterly data through December 2022.

GDP forecast

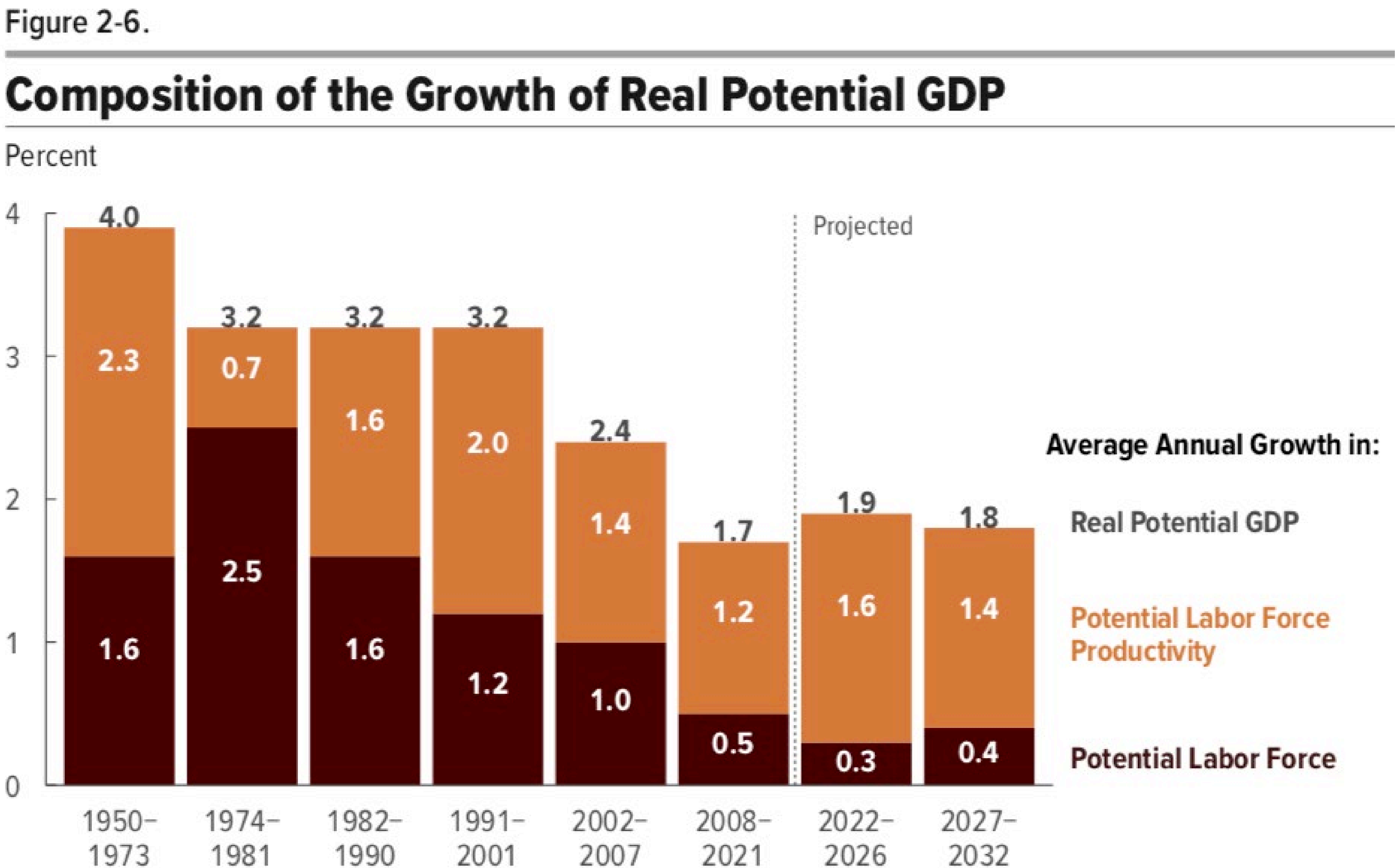
V-shaped recovery from Covid, followed by slowing growth



Sources: Bureau of Economic Analysis, actual quarterly data through December 2022. *The Wall Street Journal* survey released January 2023.

GDP growth potential = Δ productivity + Δ labor force

CBO's potential growth calculations



Source: Congressional Budget Office, *The Budget and Economic Outlook: 2022 to 2032,* released May 2022.

Active vs. passive

BARRON'S

Barron's: **Do you still think your hypothetical chimpanzee is better than the experts?**

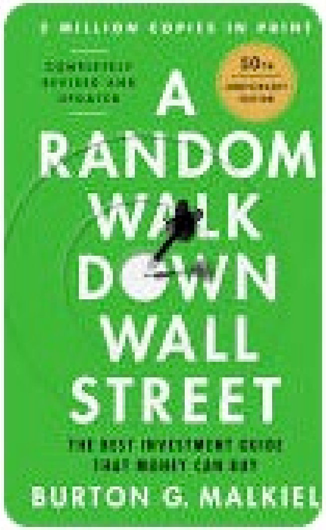
Burton Malkiel: I believe more strongly in my hypothesis today than I did 50 years ago.

… year after year two-thirds of the active managers are outperformed by a simple index fund. And the one-third that win in one year aren't the same as the one-third that win in the next year.

When you compound the returns over 10 years, or 20 years, these Spiva[1] reports show that 90% of the active managers are outperformed by a simple index fund. The same results hold in international markets and the bond market.

I'm not saying that no one can outperform. But when you try to go active, you are much more likely to be in the 90% of the distribution where you underperform, rather than the 10% where you outperform.

Burton G. Malkiel
Princeton professor and author



Source: *Barron's*, "50 Years On, He Still Favors Index Funds", February 13, 2023.
[1] S&P indices versus active management.

Behavioral economics

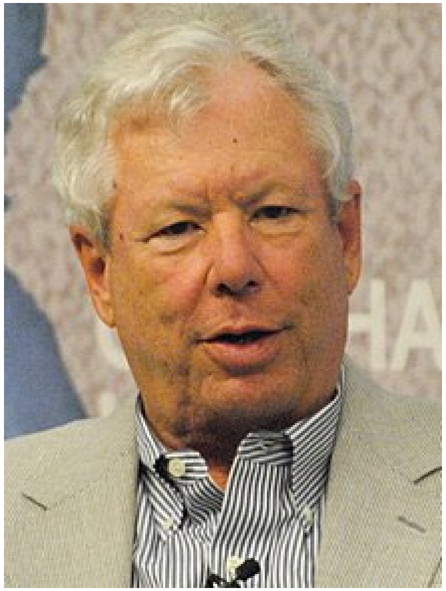
BARRON'S

***Barron's:* What investment opportunities should investors look for after the pandemic?**

Richard Thaler: It's not knowable. That's exactly the sort of thing we pride ourselves in not doing – trying to forecast what the world is going to look like six months from now or a year from now. For individual investors, the best strategy is benign neglect. Create a sensible long-term portfolio, and then ignore it.

***Barron's:* What elements of behavioral economics do you find particularly relevant now?**

Richard Thaler: … Well, one of the interesting things we observed in the past six months is a big increase in retail investing at the level of individual securities.. My opinion is, for individual investors to be doing that is a fool's errand. The world has conspired to make them overconfident now because the market's been going up pretty steadily, and it has been going up fast in the segment of the market that retail investors have been most attracted to. So, it's very easy to think that you've figured this stuff out. If you think you've figured it out right now, think again.



Richard H. Thaler
Nobel prize winner for behavioral economics

Source: *Barron's*, December 7, 2020.

Modern Portfolio Theory = Asset Allocation

Modern portfolio theory was introduced by Harry Markowitz with his paper "Portfolio Selection," which appeared in the 1952 *Journal of Finance*.

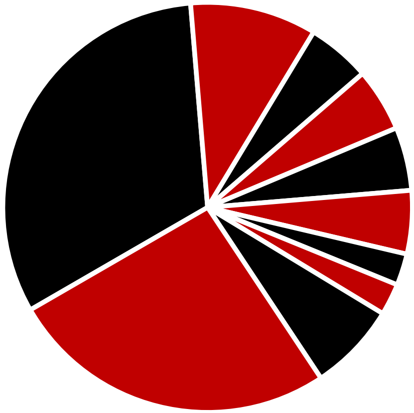
Thirty-eight years later, he shared a Nobel Prize with Merton Miller and William Sharpe for what has become a broad theory for portfolio selection.

<u>Modern Portfolio Theory</u>

Diversify

Optimize

Rebalance



Asset allocation and diversification do not guarantee a profit or eliminate the risk of loss.
Source: Riskglossary.com

Modern Portfolio Theory

Figure 1. Efficient frontier

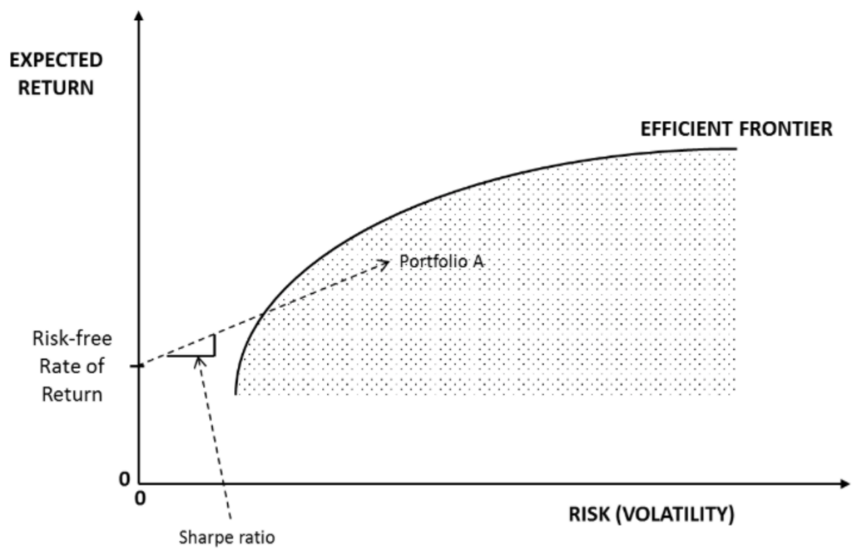
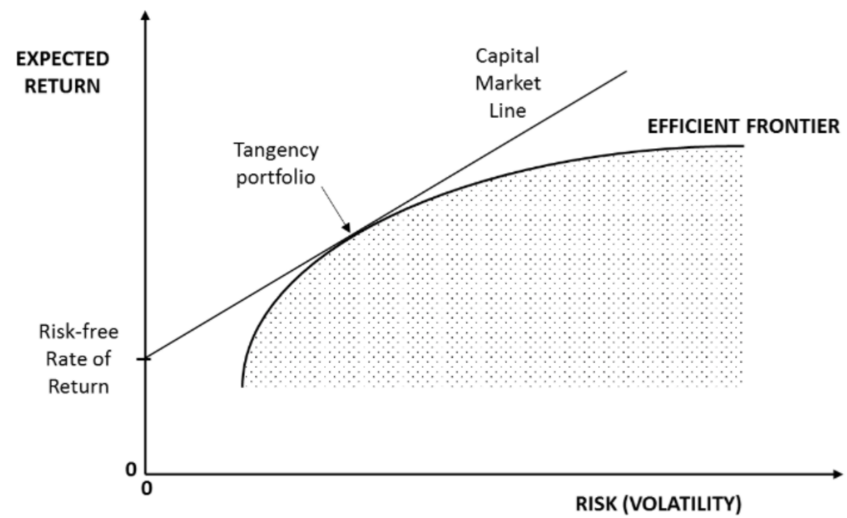


Figure 2. The capital market line



The dots under the curve in Figure 1 represent "inefficient" portfolios – some are even single stocks. Each one can be diversified further, either to reduce volatility without reducing expected return, or to increase expected return without increasing volatility. The ones that can't be so diversified any further lie on the efficient frontier.

Each portfolio has a "Sharpe ratio," named after Markowitz's successor in the development of portfolio theory, William F. Sharpe. The Sharpe ratio (see Figure 1) is the ratio of expected return (over and above the risk-free rate) to "risk," i.e. volatility (standard deviation of returns). Note that the inefficient Portfolio A's Sharpe ratio is lower than that of a portfolio on the efficient frontier above it.

The next step in the theory was to realize that the portfolio with the highest Sharpe ratio is the "tangency portfolio" – see Figure 2. The tangency portfolio is the portfolio at the intersection of a line drawn from the risk-free security that is tangent to the efficient frontier. This line is called the capital market line.

Any portfolio on the capital market line can be obtained by combining the risk-free asset with the tangency portfolio. Therefore, a portfolio on that line is *more* efficient than a portfolio on the efficient frontier. (For the upper right-hand part of that line, you have to assume that not only can you invest at the risk-free rate, you can also borrow at it.)

So it matters what the tangency portfolio is. If you make the assumption that all publicly available information is known to all investors, and that markets are in equilibrium, this leads to the conclusion that the tangency portfolio is the capitalization-weighted market portfolio. This is not in the least surprising – indeed it is trivial – since in equilibrium all investors, all with the same knowledge, will invest their risk assets in the same portfolio. And the only way they can all do that is if it is the market portfolio. It was this insight that originally brought forth the idea of creating capitalization-weighted index funds to mimic the market.

Source: The Myths and Fallacies about Diversified Portfolios, by Michael Edesses, January 9, 2017.

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