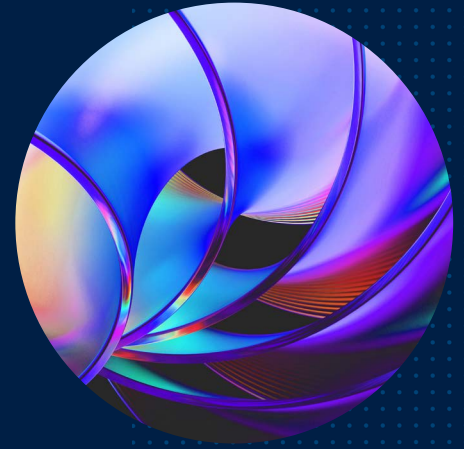


LATE-CYCLE INVESTING

What's New, and How to Rethink the Case for De-Risking

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EXECUTIVE SUMMARY

Economies spend more time in “late-cycle” phases than they used to, which poses difficult challenges for investors. Economic growth can hover on the cusp between a slowdown and an expansion for a long time, increasing the number of false signals of slowdown. Investors who get out of risk too early have suffered large performance setbacks.

Large market drawdowns are often amplified by crowded long positioning. But there are no good direct measures of positioning. We propose that positioning is a function of the length of time that economic growth has been above trend. The longer an economy has been above trend, the longer positioning in risky assets gets, the more expensive valuations get, and the more vulnerable to large drawdowns risky assets get.

We examine whether the subsequent performance of the S&P 500 and other global risk assets is consistent with this hypothesis by looking at S&P500 and other global risk asset returns conditional upon how long an economy has been above trend, which is a proxy for long positioning in risky assets. We find that, in recent years, market drawdowns have tended to happen primarily after quite long periods of above-trend growth – longer than what was typical in the past.

INTRODUCTION

How many times has the U.S. economy been on the verge of a large slowdown, or worse – a collapse into recession – in the last 10 years? And how many times has it actually fallen into a slowdown or recession state (aside from the two-month COVID-19 recession)?

¹ The views and opinions expressed in this report are solely those of the author and are made in his/her personal capacity. They do not necessarily reflect, and should not be construed as representing, the views, positions, or policies of Temasek or any of its affiliates.

Exhibit 1. United States: PGIM Quant Recession Sentiment Index, Jan 2016 – Apr 2026 (Yr-Yr Chg)



Sources: PGIM Quantitative Solutions, Bloomberg.

Many, and never.

We show a couple of examples in Exhibit 1, which depicts PGIM Quant's proprietary "Recession Sentiment Index", based on a machine-learning-driven analysis of a large corpus of media articles on the economy and markets (a lower index value indicates greater expectations of a recession). There was a recession scare in 2019 (but no recession), and one at the height of the COVID-19 recession (which was due to "a single unobserved shock", i.e. not to the usual macroeconomic causes, according to an NBER working paper).² More recently, recession sentiment peaked in mid-2022; but the anticipated recession did not materialize. There were also sudden increases in recession sentiment in mid-2024 (right before the Fed started to cut rates), and in spring 2025 (following the announcement of significant new U.S. tariffs), but here too, the anticipated recession did not materialize.

That's because the economic cycle is different than it used to be, which poses stiff challenges to investors. We have been in a late stage of the economic cycle for a long time, and if one got out of risky assets at each point in time when *late-cycle* appeared to be turning toward a *slowdown* or even a recession, the underperformance would have been very painful. In this piece we describe the new phenomenon of "late-cycle investing," its causes, and how investors can adjust to it. Our main recommendations include:

- The economy has many self-regulating mechanisms that tend to keep it hovering in a late-cycle state – between an expansion and a slowdown.
- Stretched positioning is a key precondition for a tradable risk asset decline. If investors reduce risk before positioning has become stretched, they risk being repeatedly whipsawed.
- The length of time the economy spends growing at an above-trend rate is a good proxy for long positioning in risky assets. Historically, more favourable opportunities to reduce risk have tended to arise after the economy has remained above trend for an extended period.
- These views can be implemented via portfolio tilts using "portable alpha" overlays.

1. HOW WE USED TO THINK ABOUT THE BUSINESS CYCLE

Exhibit 2 shows how we used to look at the business cycle. It's basically the framework of the pioneering work by Burns and Mitchell in the 1940s, as they were setting up the National Bureau of Economic Research (NBER), which became the unofficial arbiter of business cycles. The level of economic activity is on the horizontal axis, and the rate of change of

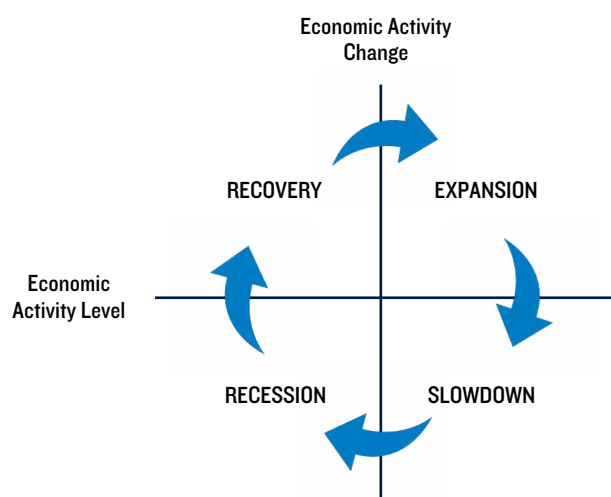
² "Recovering from COVID", James H. Stock & Mark W. Watson, NBER Working Paper 33857, May 2025 (<https://www.nber.org/papers/w33857>).

economic activity is on the vertical axis. The zero point in the middle indicates that the level of growth is at its trend, and the rate of change of growth is zero – in other words, there is neither upward nor downward momentum.

Starting at the lower left quadrant, growth is below trend and falling, which is a “Recession”. In the upper left quadrant, growth is still below trend, but it is rising, so that is a “Recovery”. In the upper right quadrant, growth has been rising for a long time, so it is now above trend, and it is still rising – an “Expansion”. Then momentum begins to sag, eventually turning negative. But growth is still above trend – which is the lower right, “Slowdown” quadrant.

The traditional method has been to map these states of the growth cycle into asset prices. “Recovery” was a “risk on” state: positive for equities, and less positive for bonds. “Expansion” (which usually raises inflation) was even more negative for bonds, although still somewhat positive for equities. Then as soon as the economy entered into a late Expansion state, the traditional asset allocation rule was to move to “risk off” positions, because at that point the economy would soon dip into “Slowdown”, on the way to “Recession”. The progressive movement from one state to another was regular and predictable, so this diagram was a workable rule of thumb for quite some time.

Exhibit 2. Classic Stylized Version of the Business Cycle



Source: PGIM Quantitative Solutions

But how do we measure the business cycle itself? Economists have used many indicators as classic rules of thumb to indicate when the business cycle is slipping from expansion into slowdown or recession. There have been many indicators that were thought to be nearly foolproof, perfectly accurate predictors of a slowdown or recession. For example, an inverted yield curve, the Sahm rule, or the Conference Board’s Leading Economic Index. Not long ago, Business Insider even claimed that seven such indicators have “perfect track records.”³

We show a selection of six such indicators in Exhibit 3. The indicators span the labor market, business sentiment, and market assessment of credit risk. We define a “late-cycle” economy as one where more than half of these six indicators (i.e., four or more) are flashing red. Based on this definition, the U.S. economy has been in a late-cycle state eight times since 1980. Many of the classic indicators (especially those related to the labor market, such as the Sahm rule and initial claims for unemployment insurance) were not “on” during the entire time of the late-cycle episodes, suggesting that their value as indicators of a slowdown might be less than their value in signalling large recessions.

For reference, in Exhibit 4 we compare these late-cycle periods with official NBER recessions. Late-cycle periods preceded the 1981, 1991, 2001, and 2008 recessions, demonstrating a relatively smooth progression from late-cycle down into recession. But that has not been the case since. There have been three “false alarms” since 2008, when late-cycle indicators flashed but recession did not follow (the two-month COVID-19 recession in early 2020 was due to “a single unobserved shock”, (i.e. not to the usual macroeconomic imbalances, according to the NBER working paper cited above)).

There is also an interesting pattern in the market over time. Namely, stocks have not performed as badly in the late-cycle periods since 2006 as they did in the preceding decades. In late-cycle periods up to 2001, the stock market was either flat in the seven months following the shift to late-cycle, or down sharply (after the 2000-2001 episode). But in the late-cycle periods since then, the market has generally done well – up between 5% and 17% (with the exception of the late 2019-early 2020 period which, to be fair, was doing fine until COVID-19 hit the markets in February 2020).

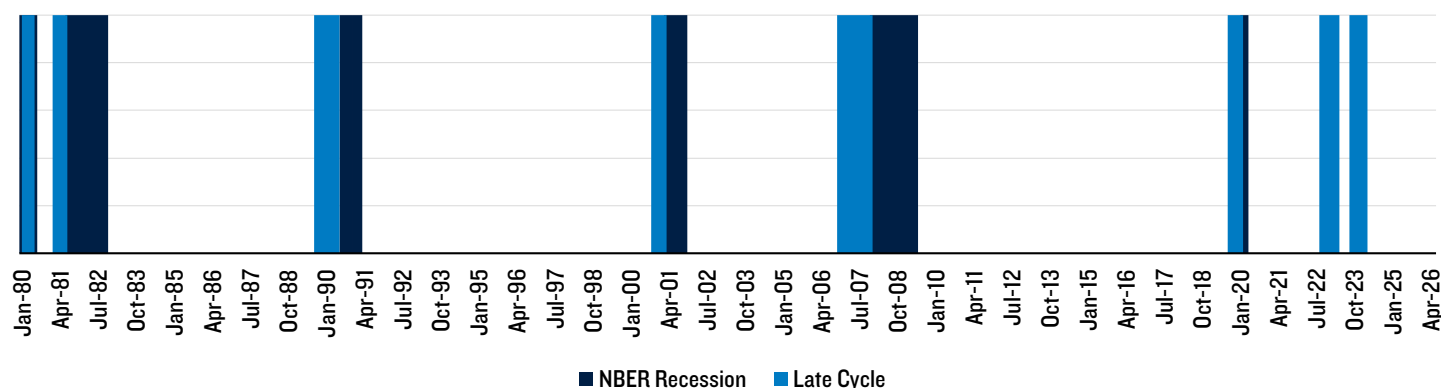
³ “Here are 7 recession indicators with perfect track records flashing warning signs”, Business Insider, Sep 6, 2024, <https://www.businessinsider.com/recession-indicators-perfect-track-records-sahm-yield-curve-conference-board-2024-9>.

Exhibit 3. United States: Late-Cycle Periods Since 1980, and S&P 500 Performance, Feb 1980 – Mar 2024 (Pct)

Period	S&P 500 Return	Indicators Missing
Feb - Jun 1980 (5m)	0.07%	ISM (entire period); Sahm (early in period)
Feb - Jul 1981 (6m)	1.06%	ISM (entire period); Sahm (early in period)
Sep 1989 - Jun 1990 (10m)	1.87%	Sahm (entire period); Claims (early in period)
Oct 2000 - Mar 2001 (6m)	- 19.23%	Sahm (entire period); Claims (early in period)
Nov2006 - Dec 2007 (14m)	6.56%	Sahm + Claims (entire period); Credit (early in period)
Sep 2019 - Feb 2020(6m)	0.95%	Sahm, Claims, Credit (entire period)
Sep 2022 - Apr 2023(8m)	5.42%	Sahm (entire period) + Claims (most of period)
Sep 2023 - Mar 2024 (7m)	16.56%	Most signals off late

Source: PGIM Quantitative Solutions

Exhibit 4. NBER Recessions vs. Composite “Late-Cycle” Periods, Jan 1980 - Feb 2026



Sources: National Bureau of Economic Research, PGIM Quantitative Solutions.

2. THE MODERN BUSINESS CYCLE: LONGER, AND DIFFERENT AT THE END

The modern business cycle looks different from business cycles of past decades. Major differences include:

- Expansions have become longer – even in the face of persistent beliefs that the economy is in a “late-cycle” state and widespread recession fears.
- The economy tends to oscillate between expansion and slowdown phases more than it used to. It often dips briefly and narrowly below trend, and then rises above trend in a similar manner. The frequent oscillation below

and above trend is itself a cause of the persistent belief among market participants that the economy is in a “late-cycle” phase – and about to enter a more serious downturn.

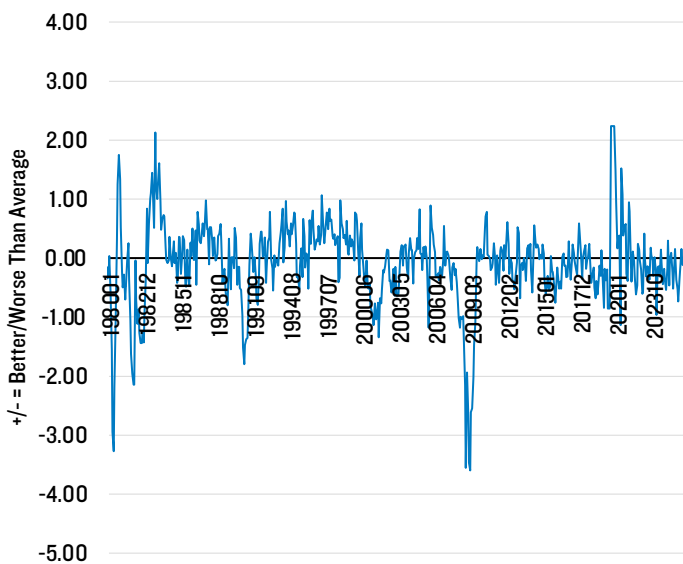
We will focus on this second point because it seems to frustrate more investors.

We also believe that single-indicator signals may be less suitable for identifying late-cycle states than they were in earlier periods. Especially during periods of structural change, it seems unlikely that any individual indicator will perform as well as it used to. If the economy is less manufacturing-centric than it used to be, will a slowdown in the ISM Survey of Manufacturers reliably indicate a slowdown in the

broader economy? Or in the gig economy, what do initial claims indicate? What makes more sense is a holistic view of whether activity is above or below trend. From a multi-asset point of view, markets respond more to shifts in the entire economy than they do to the fluctuations of any individual indicator, no matter how good the indicator might have been in the past.

Exhibits 5 and 6 illustrate the changing nature of the cycle. Exhibit 5 shows the Philadelphia Federal Reserve Bank's ADS index, which is a composite business conditions indicator constructed from a variety of macroeconomic and market indicators (see Appendix). A positive number indicates that business conditions are stronger than the long-term average (and vice versa). When the indicator goes from a positive to a negative number, the economy is going from an above-trend to a below-trend phase (and vice versa). We call these shifts above and below the trend line “zero-crosses”.

Exhibit 5. US: Philadelphia Fed ADS Business Conditions Index, Jan 1980 - Feb 2026
(Level vs. Long-Term Average, + = Better Than Average)



Note (Exhibit 6): Number of zero crosses in 2020s annualized based on data through Feb 2026.
Source: Philadelphia Federal Reserve Bank.

We see two interesting patterns here. First, the economy goes back and forth above and below trend more often than it used to. We show the number of zero-crosses by decade in Exhibit 6. The 1990s and 2000s showed a declining trend in zero-crosses, from 35 in the 1980s to 28 and 25, respectively. This rose to 38 in the 2010s, and it has hit 26 so far in the 2020s, which at this pace would reach 42 zero-crossings for the whole decade – far above the number seen in any prior decade. This is the “oscillation” referred to above, which has proven frustrating to manage in portfolios.

Second, the magnitude of the peaks and troughs in the cycle has declined. The average positive reading (when business conditions are better than usual) has declined over time, and the average negative reading (when business conditions are weaker than usual) has shrunk. It’s as if some force pulls the economy back toward “normal”, preventing it from getting too hot or too cold, more strongly than it used to (though there are some important exceptions).

Exhibit 6. US: Philadelphia Fed ADS Business Conditions Index, Averages By Decade, Jan 1980 - Feb 2026
(Level vs. Long-Term Average, + = Better Than Average)

	Average change in months that are:		Number of “Zero Crosses”
	Above Trend	Below Trend	
1980s	0.57	-0.73	35
1990s	0.43	-0.48	28
2000s	0.21	-0.77	25
2010s	0.23	-0.29	38
2020s	0.72	-0.35	42*

3. WHY?

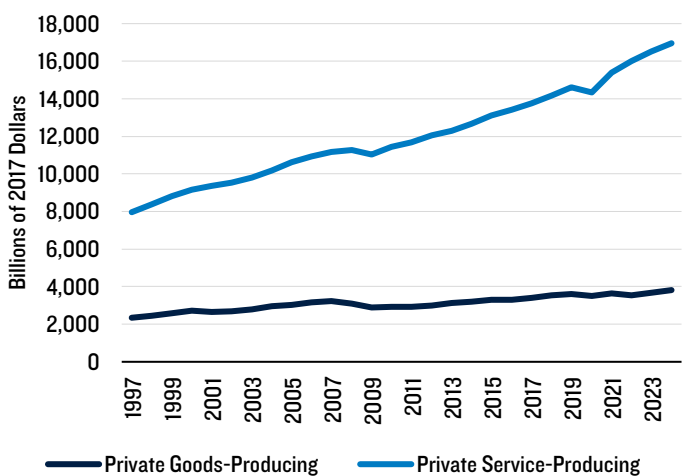
One reason is the structural shift from goods-producing industries (manufacturing, construction, agriculture) to services-producing industries. Exhibit 7 shows real GDP for private goods versus services-producing industries since the late 1990s. Since that time the annualized growth rate of services-producing industries has outpaced that of goods-producing industries by a full percentage point (2.84% vs. 1.82%). Over time, this has led to a substantial shift toward services, which are less cyclical and less volatile.

One impact of this shift is that the inventory cycle’s influence on the economy — and therefore on inflation, monetary policy, and overall asset prices — has declined. We show this in Exhibit 8, which presents an analysis similar to Exhibit 6. We measure the average contribution of the change in private inventories to real GDP growth by decade, examining periods when the contribution was positive and when it was negative, as well as the average absolute contribution in the last column.

- The average absolute contribution has declined each decade.
- The average contribution when inventory contributions were positive has also declined each decade.
- The average contribution when inventory contributions were negative has also declined each decade.

(In each case, except for the COVID-19-distorted 2020s).

Exhibit 7. US: Real Gross Domestic Product, Private Goods- vs. Service-Producing Industries, 1997 - 2024
(Billions of 2017 Dollars)



Source: Bureau of Economic Analysis.

Exhibit 8. US: Private Inventory Contribution to Real GDP Growth by Decade, Quarters with Positive vs. Negative Contributions to Growth, 1Q 1970-4Q 2025
(Pct Point Contribution to Annualized Real GDP Growth)

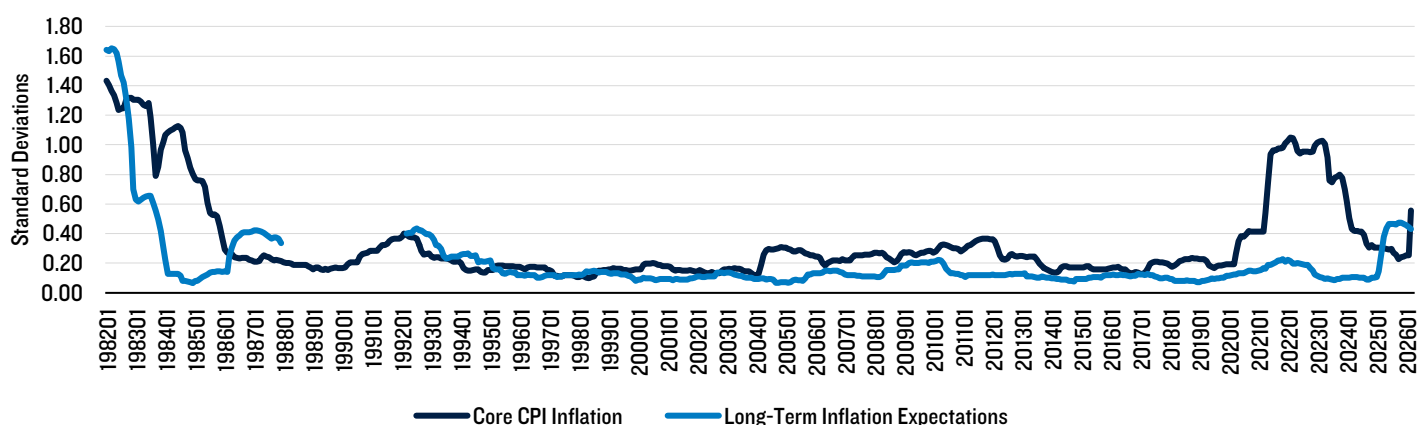
	Average contributions in:		All quarters
	Positive quarters	Negative quarters	
1980s	2.10	-2.16	2.13
1990s	1.16	-1.12	1.14
2000s	1.16	-1.01	1.07
2010s	1.10	-0.76	0.91
2020s	1.72	-1.16	1.37

Source: Bureau of Economic Analysis.

Second, inflation expectations have been more stable than in the past, consistent with greater stability in longer-term inflation expectations and structural changes in the economy that have worked to keep inflation down. Exhibit 9 shows the volatility of long-term inflation expectations (orange line) and how they relate to the volatility of changes in core CPI inflation (blue line). In the early 1980s, both measures of volatility were very high, and they tended to move together. Even through the early 1990s, the volatility of long-term inflation expectations was high and reacted fairly strongly to increases in actual inflation volatility. However, from the mid-2000s onward, inflation expectations have been significantly more stable than actual core CPI inflation. Granted, the Great Inflation of 2021–2023 was a close call. But even this inflation surge had little effect on the volatility of inflation expectations: after a small uptick in 2022, the volatility of inflation expectations returned to the low levels that had prevailed prior to the surge in actual inflation.

It is true that in recent years above-target inflation outcomes, along with factors such as tariffs (which preceded the increase in inflation expectations volatility in 2025 in Exhibit 9), have led to some questioning of Fed credibility. However, market-based inflation expectations (such as long-dated inflation swaps) did not rise above previous ranges. This has allowed the Fed to remain patient during late-cycle periods of elevated inflation, to refrain from raising interest rates further (it has been cutting rates since September 2024), and keep the economy oscillating between expansion and slowdown phases.

Exhibit 9. US: Volatility of Core CPI Inflation vs. Volatility of Long-term Inflation Expectations, Jan 1982 - Feb 2026 (Std Dev)



Notes: Core CPI inflation volatility = standard deviation of the three-month difference of the yr-yr pct chg of core inflation (2-year lookback period). Long-term inflation expectations volatility = standard deviation of the three-month difference of the yr-yr pct chg of 5-year-ahead inflation expectations (University of Michigan survey, 2-year lookback period. Data from Jan 1988 – Feb 1992 not available).

Sources: Bureau of Labor Statistics, University of Michigan.

Exhibit 10. Aggregate Capital Ratios (Projected) and Regulatory Minimums, 4Q 2024 – 1Q 2027P (Pct)

Regulatory ratio	Actual 2024:Q4	Stressed minimum capital ratios, severely adverse	Minimum regulatory capital ratios
Common equity tier 1 capital ratio	13.4	11.6	4.5
Tier 1 capital ratio	14.9	13.2	6.0
Total capital ratio	16.9	15.3	8.0
Tier 1 leverage ratio	7.7	6.7	4.0
Supplementary leverage ratio	6.5	5.6	3.0

Note: The capital ratios are calculated using the capital action assumptions provided within the supervisory stress testing rules. See 12 C.F.R. §§ 238.132(d); 252.44(c). These projections represent hypothetical estimates that involve an economic outcome that is more adverse than expected. The minimum capital ratios are for the period 2025:Q1 to 2027:Q1. Supplementary leverage ratio projections only include estimates for banks subject to Category I, II, or III standards.

Source: Board of Governors of the Federal Reserve System, 2025 Federal Reserve Stress Test Results, June 2025 (<https://www.federalreserve.gov/publications/files/2025-dfast-results-20250627.pdf>).

Structural changes in the real economy and the greater stability of longer-term inflation expectations (thereby reducing the need for aggressive policy responses) have been ongoing for several decades. More recently — and more tentatively, in our view — the financial system has become better capitalized and, hence, less of a magnifier of shocks. Exhibit 10 shows aggregate capital ratios of major banks during “severely adverse” stress scenarios. Ratios remain well above regulatory minimums and not far off recent levels. Such stress testing is inherently contingent on the accuracy of assumptions and market reactions, and there is ample reason not to take the specific numbers too seriously. Nonetheless, it is true that the U.S. banking system has withstood several

shocks in recent years that were considered severe at the time: the COVID-19 shutdown of the economy; the pronounced weakness in commercial real estate, including bankruptcies and significant losses on asset sales, due to COVID-19 and the spread of work-from-home practices; the refinancing crisis as interest rates rose sharply from 2022; and the regional bank crisis of 2023 sparked by the failure of Silicon Valley Bank. More recently, pressures have emerged in private credit markets. It is still early, but so far there have been few signs of systemic distress.

We now return to our earlier observation that the economy has oscillated between expansion and slowdown phases for an extended period. We are not suggesting that the

economy does not slow down or dip below trend levels of activity. Rather, we argue that there are many self-correcting mechanisms that push activity back above trend when it falls below it. The inventory cycle does not collapse, causing widespread layoffs. The Fed does not need to raise interest rates aggressively to combat inflation and restore credibility. Financial institutions and markets do not retreat sharply due to fears of systemic instability. As inflationary pressures ease, real income growth rises, and consumption and broader economic activity can accelerate again.

This dynamic also works in reverse: when growth becomes too strong, inflationary pressures rise, interest rates increase, and both real income growth and real wealth decline (while the cost of financing new projects rises), which tends to restrain demand, cool inflationary pressures, and reduce the need for significantly higher interest rates.

4. AN OPERATIONAL RULE: WAIT FOR STRETCHED POSITIONING

How should investors react to this world?

The first thing to realize is that positioning is critically important.

Think about it this way: if the economy has been oscillating in a late-cycle state, it is likely that positioning is relatively balanced. In this type of state, investors disagree about the economy. Some are bearish and some remain bullish, and therefore there is disagreement about allocation between risky and safe assets. It's also the case that some portfolios are simply too big to reallocate quickly. Therefore, time is important in two dimensions. First, it takes time to build market consensus. Second, it takes more time to move actual portfolios towards this consensus. In an oscillating late-cycle environment, the economy has not been in an expansion phase for long enough for large long positions to build up in risky assets, nor has it been in a slowdown phase for long enough for large positions to build up in safe assets. Therefore, if investors cut risk, they are vulnerable to the self-correcting mechanisms which can push up the economy and risk asset prices described above. Accordingly, investors should have rules in place to estimate when positioning has built up. Only at that point are markets vulnerable to exploitable reversals.

The second thing to realize is that direct data on positioning is limited.

There are some (relatively) direct measures of positioning. But none of the direct measures we know of are comprehensive and none seem to have strong predictive power for assets. They generally cover only certain types of assets; certain types of investors; the clients of certain intermediaries; or they are mostly judgmental. Among the commonly used direct measures and their shortcomings, we would list these:

- **CFTC “Commitment of Traders” report:** This covers equity futures contracts on the CME, with a breakdown into investor class (asset manager, broker dealer, etc.) The main issue here is that the investor classes we are interested in (asset managers, leveraged funds) use futures for a variety of purposes other than alpha generation, so the data do not give a clean read on true long positioning.
- **Broker surveys:** Many of the major brokers survey their clients and convert the information into indexes of positioning. The main issue here is that the coverage is partial — by definition, the surveys only cover the clients of the broker. In addition, these surveys tend to be judgmental, and there isn't much transparency as to how indexes are constructed.
- **Custodian surveys:** Basically the same flaws as broker surveys.
- **Independent equity flow data providers:** These data cover mutual funds and ETFs of a large number of global markets, so they are extensive. At the same time, they are flow data, not stock data.
- **Government data:** Some sources, such as the Fed's Flow of Funds report, include information of the outstanding stocks of assets (i.e., positioning). But these data are generally low frequency (quarterly) and released with a long lag (about 6 weeks after the end of the quarter). So the data are too stale to be of much use.

The third thing to realize is that in the absence of good direct data, proxies for positioning will have to do.

We like the idea of using the length of time the economy has been above trend as a proxy for positioning. A long time above trend (“TAT”) is required for large long positioning

for the two reasons cited above: it takes time for a market consensus to form, and it takes time for portfolios to allocate after the consensus is formed. We like this concept because it is logical, it reflects market realities, and it's a novel way to fill a gap in available data.

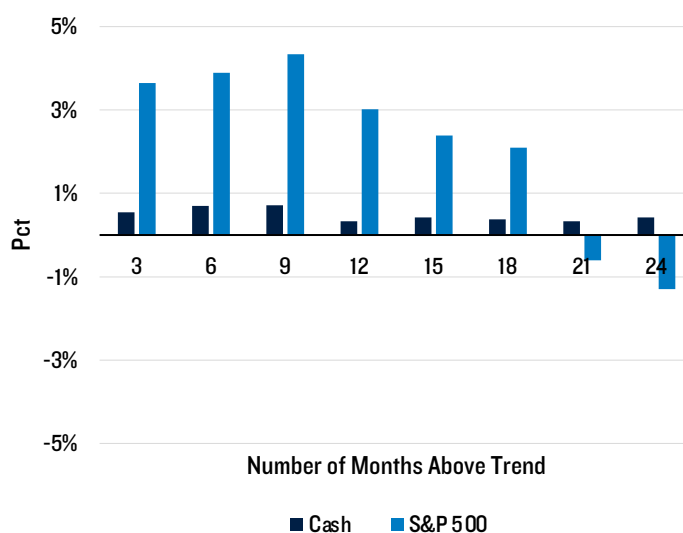
We want to test the performance of a signal that shifts out of risk when two requirements are met:

- **Time above trend growth (TAT):** We require the ADS index to have remained above trend for at least N consecutive months, where N ranges from 3 to 24 months. This condition is the time available for pro-risk positioning to build.
- **Reversal toward slowdown:** We require a short-term reversal condition: ADS momentum must turn to and remain negative for 20 trading days (approximately one monthly macro data cycle).
- We then measure the subsequent 90-day return of the risky asset and compare with USD cash.

Exhibit 11 shows the results of going short when the negative economic momentum signal is triggered after periods of 3, 6, 9, etc. consecutive months above trend. The blue bars represent the 90-day returns of the S&P 500 index, and the gray bars represent the 90-day returns of USD cash. We observe that S&P 500 performance remains positive, and above cash returns, when the negative momentum signal is

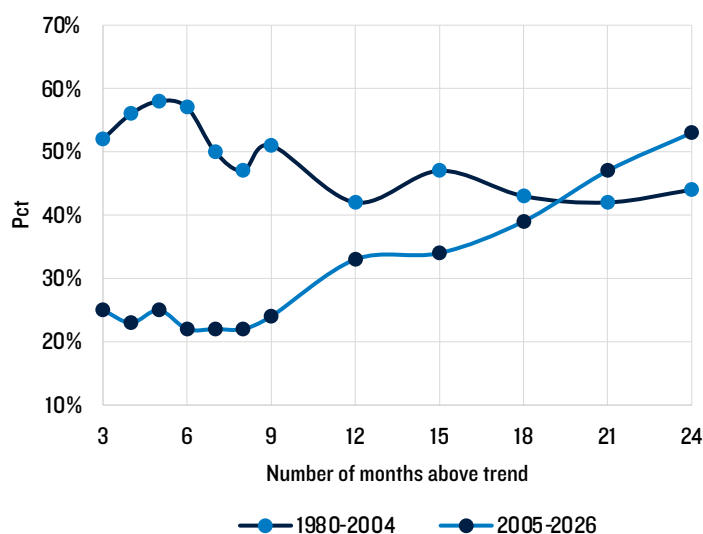
triggered after periods of above-trend growth of up to 18 months. However, equity returns turn negative beyond that point, and far below cash returns. In fact, the positive return premium of equities over cash already begins to decline after the nine-month window.

Exhibit 11. S&P 500 vs Cash: Performance After Varying Number of Months Above Trend Economic Growth, 1 Jan 2005 – 15 Apr 2026 (Pct)



Sources: Federal Reserve Bank of Philadelphia, PGIM Quantitative Solutions.
Notes: Figure shows the performance of the S&P 500 vs. cash (90-day returns) after the economy had spent varying number of months (3 to 24) above trend, and the signal was triggered.

Exhibit 12. Hit Rates of Reversal Strategy After Varying Number of Months of Above-Trend Economic Growth, Jan 1980 - Mar 2026 (Pct)



Source: PGIM Quantitative Solutions.

Months Above Trend	Full Sample	1980-2004	2005-2026
3	40	52	25
4	41	56	23
5	43	58	25
6	41	57	22
7	37	50	22
8	36	47	22
9	39	51	24
12	38	42	33
15	41	47	34
18	41	43	39
21	44	42	47
24	48	44	53

We can also look at “hit rates” as another test of our hypothesis. Hit rate is defined as the number of positive profit trades divided by the number of total trades. Exhibit 12 shows hit rates of a “go to cash” strategy after consecutive months above trend from 3 to 24. We also show the hit rates by consecutive months for the periods 1980-2004 and 2005-2026, which roughly corresponds to the periods when classic indicators used to work, and when they have become less reliable. What we find is striking. In the earlier period, the hit rates after the economy had spent only a short period of TAT were quite positive – well above 50%, and even close to 60%. This indicates that it was often profitable to reduce risk soon after the economy had shown signs of slowing. By contrast, hit rates for the short periods of TAT after 2005 are quite low, and only rise above 50% after the economy had been above trend for 24 months. Reducing risk too early in the cycle was generally not profitable.

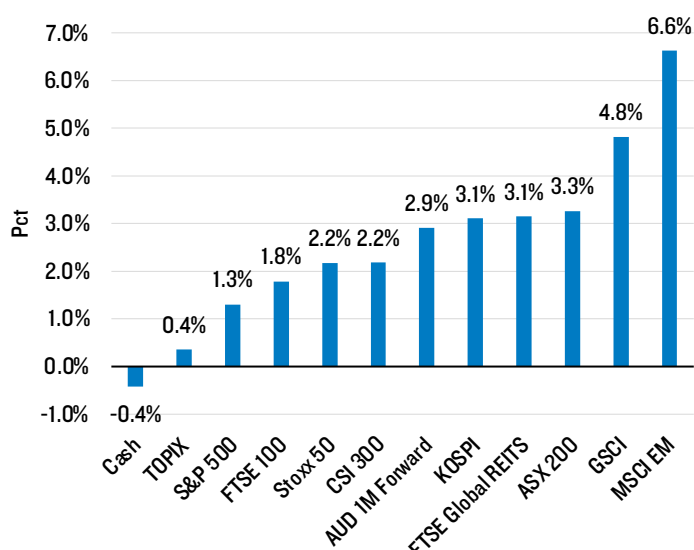
This puts the struggles some investors have had in recent years into context. From the 1980s until the GFC, investors could move away from risk after the economy began to develop negative momentum after only short to medium periods of time (3 to 6 months was fine, no need to wait any longer). But these tried-and-true signals would have underperformed after the Global Financial Crisis.

The results largely hold for a variety of global risky assets (international equity markets, commodities, listed REITs,

and currencies). In Figures 13 and 14, we examine the performance of redeploying not just from the S&P 500, but from select global risky assets into USD cash (also over the subsequent 90 days), using a 24-month TAT length and 20-day negative economic momentum signal. We continue to use the Philadelphia Fed ADS index as our indicator of the business cycle because the U.S. economy has been a primary driver of the global business cycle (and we use USD cash as the reference for risky asset returns so that results are comparable across countries).

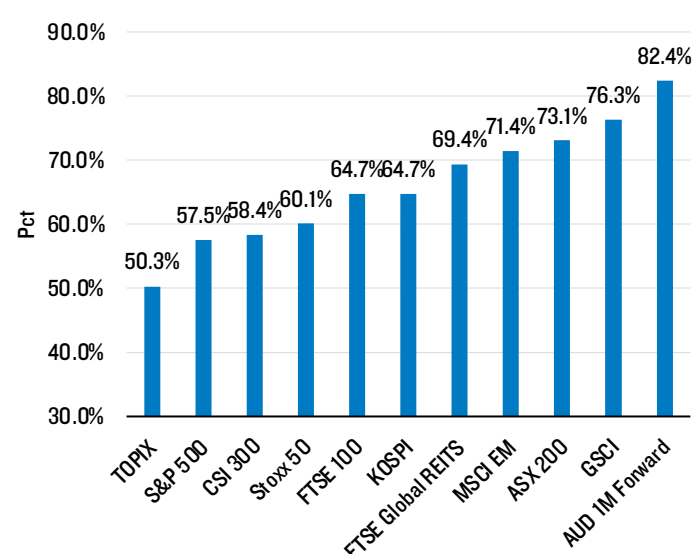
The results are broadly positive across a range of assets (see Exhibit 13). The sample spans January 2005 to April 2026, during which the late-cycle reversal signal was triggered on 346 days, or approximately 6.2% of the total period. On average, cash delivers modest positive returns following the signal. In contrast, risky assets experience declines, including an average drop of -1.3% in the S&P 500, with declines ranging from a maximum of -6.6% for MSCI Emerging Markets to a minimum of -0.4% for Japan’s TOPIX. Commodities and global real estate also post negative returns during these periods. The success rate of the strategy (see Exhibit 14), measured by the hit rate, is broadly favorable across assets. The minimum hit rate is 50% for TOPIX, and the hit rate rises to 58% for the S&P 500, and over 75% for assets such as global commodities (GSCI) and AUDUSD forwards.⁴

Exhibit 13. Selected Assets: Excess Return Over Cash After 24 Month Signal, 1 Jan 2005 – 15 Apr 2026 (Pct)



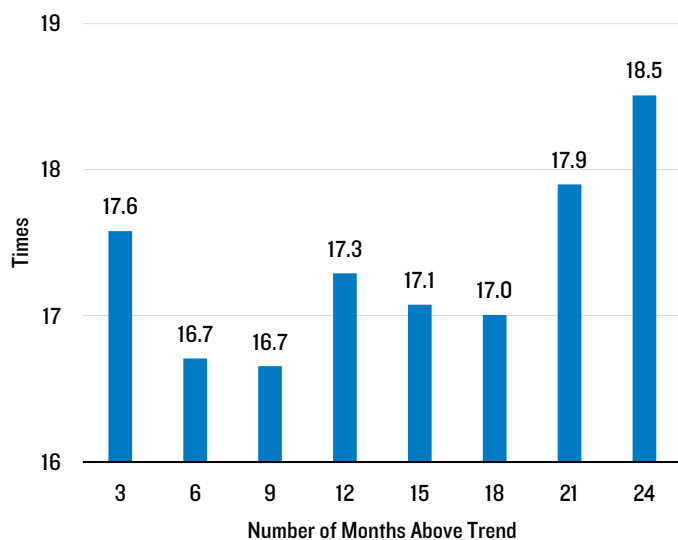
Sources: PGIM Quantitative Solutions, Bloomberg.

Exhibit 14. Selected Assets: Hit Rate After 24 Month Signal, 1 Jan 2005 – 15 Apr 2026 (Pct of Trades With Positive Profit)



⁴ Because signals may remain active across consecutive trading days, the observations and their subsequent 90-day return windows are not fully independent. The results should therefore be interpreted as evidence across signal periods rather than as 346 separate investment episodes.

Exhibit 15. S&P 500 Valuation At Varying Number of Months Above Trend, 1 Jan 2005 – 15 Apr 2026 (Times)

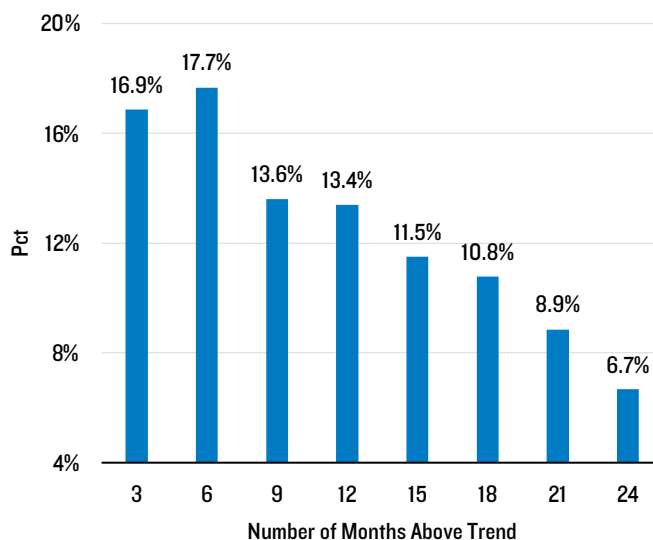


Sources: PGIM Quantitative Solutions, Bloomberg.

There are a few other interesting features of markets following these long periods of sustained above-trend growth, which support the idea that reversals can occur due to positioning unwinds. First, valuation tends to be elevated. For the S&P 500, valuations as measured by forward P/E tend to rise at a TAT of about 9 months, rising to a maximum of 18.5x on average at the 24-month TAT mark. Shorter TAT windows have lower multiples (see Exhibit 15). This suggests that the signal's effectiveness at the 24-month horizon is partly associated with elevated valuations. Second, average market momentum, while positive across all windows, diminishes monotonically after the economy has been above trend for six consecutive months (see Exhibit 16). Taken together, these findings point to a late-cycle environment characterized by stale long positions, elevated valuations, and slowing momentum — conditions under which reversal signals are most effective.

In Exhibit 17, we present in narrative form the results of recent episodes in which the late-cycle reversal signal was active, along with context regarding contemporaneous market conditions. In October 2018, U.S.–China relations

Exhibit 16. S&P 500 Momentum At Varying Number of Months Above Trend, 1 Jan 2005 – 15 Apr 2026 (Pct)



were deteriorating, and the negative momentum in the signal was driven primarily by housing and manufacturing. The S&P 500 experienced a sharp decline during that period (despite valuations not being stretched). The next trigger occurred in September 2021, when the post-pandemic recovery began to encounter supply-side constraints amid still-strong demand, and early signs of inflation and weakening economic activity emerged. Valuations were also elevated, which is an important part of the story. The S&P 500 declined in four of the subsequent six months. In 2022, as inflation accelerated, the Fed tightened policy, and the economy weakened, another reversal signal was triggered, and the S&P 500 experienced its worst year since 2008.

While the specifics of each episode differ, the episodes are consistent with the hypothesis that extended above-trend growth allows long positions and elevated valuations to build before economic momentum reverses.

Where are we now? As of June 2026, the economy was firmly in “oscillation” mode — below trend for five of the first six months of 2026. This suggests that positions were likely not stretched on the long side.

Exhibit 17. Recent Examples of Late-Cycle Reversal Triggers, 2018 – 2022

October 2018	
News	U.S.-China trade war and tariff concerns
Macro	U.S. housing market weakness and mixed regional manufacturing
Valuations	Forward P/E moderate at ~18.4x
Sentiment	"Red" October with steep ~7% losses for the S&P 500

September 2021	
News	Uncertainty surrounding infrastructure legislation
Macro	Rising jobless claims + inflation fears
Valuations	Forward P/E elevated at ~25x
Sentiment	The S&P 500 dropped amid Fed taper + fiscal policy uncertainty

2022	
News	Russia-Ukraine war disrupted energy/commodities
Macro	Fed hikes +425 bps (2022) drove markets; Recession fears intensified with tightening
Valuations	Forward P/E ~21x (still elevated)
Sentiment	The S&P 500 down 7/12 months, -19% FY

5. PORTFOLIO IMPLEMENTATION: "PORTABLE ALPHA" OVERLAYS AND RISK MANAGEMENT

How can these rules be applied in a portfolio context? The signal could be used for a variety of purposes. The primary use is not as a binary "recession/no recession" signal, but as a tactical risk budgeting tool. When the reversal signal is active, investors could simply choose to reduce risk. Or, the evidence

from assets other than the S&P 500 (presented in Exhibits 13 and 14) suggests that tactical portfolio tilts could be taken across asset classes within a Global Tactical Asset Allocation (GTAA) framework. One common way to implement such tilts would be as "portable alpha" overlays using derivatives (futures, forwards, and swaps), which have the advantage that investors may evaluate a variety of implementation approaches based on their objectives, constraints and circumstances.

6. DON'T BE COMPLACENT – BIG RISK-OFF EVENTS CAN STILL HAPPEN

It is important to note that we are not suggesting that the business cycle has been repealed, that the economy will not fall into recession again, or that there will not be systemic crises. The features of the business cycle we analyze here — longer cycles with many small oscillations above and below trend — are themselves a function of underlying factors (stable inflation expectations, well-capitalized banks, etc.). If these factors weaken, we would expect shorter cycles, with more frequent and deeper slowdowns or recessions, and much worse late-cycle performance of risky assets than has been the case in recent years.

Accordingly, it is important to remain vigilant for signs of a weakening in the factors that have supported these historically benign late-cycle risky-asset returns. Among the key risks to monitor, our primary focus remains inflation. While inflation is well below post-pandemic levels, it remains elevated, has persisted for several years, and inflation expectations appear to have risen among certain segments of the population.

7. APPENDIX

Data Collection

This section describes the return sources, business cycle measures, and approach to portfolio construction used in our empirical analysis.

7.1. Investment Universe and Data Sources

In our empirical analysis, we sought to use only liquid, investable assets a global macro institutional investor could trade.

Cash: We used FTSE 3 Month Treasury Bill index for 3 Month US T-bill returns from Bloomberg.

Country/Regional Equities: We used the local returns of country indices in the following developed and emerging countries: U.S. (S&P 500 Index), UK (FTSE 100 Index), Australia (S&P/ ASX200 Index), Japan (Tokyo Stock Exchange Index TOPIX), Europe (Euro Stoxx 50 Index), Korea (KOSPI Index), China (Shanghai Shenzhen CSI 300 Index), MSCI Emerging Markets Index (in USD). Returns were sourced from MSCI/ Bloomberg.

Currencies: We focused on AUDUSD because it is one of the most liquid currencies traded by active currency investors to express a “risk on” view. We used forward exchange rates from Bloomberg. We computed returns for one-month currency forwards from the perspective of a local AUD-based investor who goes long USD-short AUD when the late-cycle signal is triggered.

Real assets: We used the GSCI commodity index (USD) and the FTSE EPRA Nareit Global REITs TR Index (USD) sourced from Bloomberg.

7.2. Value Measures

Country Equities: We used the forward 12-month P/E from the local exchange/MSCI country indices to measure value for country/regional equities.

7.3. Macroeconomic Measures

We use the Philadelphia Federal Reserve’s Aruoba–Diebold–Scotti (ADS) Business Conditions Index as a proxy for the U.S. business cycle.

The (ADS) Business Conditions Index provides a broad-based, high-frequency measure of real economic activity. It aggregates indicators across different data frequencies, including weekly initial jobless claims; monthly payroll employment, industrial production, real personal income, and real manufacturing and trade sales; and quarterly real GDP, into a single composite index. The ADS index is updated in real time as new data and revisions become available.

STRATEGY CONSTRUCTION

The tactical strategy involves underweighting the asset when a reversal signal is triggered. The long-term trend in economic activity is measured as a simple average over several months, and we test the strategy across a range of trailing windows. The historically most effective in our sample is when the long-term average is calculated over the previous 18-30 months. The tactical trigger to go underweight the asset is based on a shorter-term condition, requiring the ADS indicator to remain consistently negative over a lookback period. The signal is effective with a 20-30 trading-day window, broadly corresponding to at least one full monthly macro data cycle. The performance of redeploying from the asset into cash is calculated over the subsequent 90 days, using a 24-month long-term trend and a 20-day short-term reversal signal.

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