Principal Asset Management®

Principal Real Estate

# A quantitative framework for estimating CRE cycles


AUTHORS

**Oscar Aguilar**
Director
Private Markets Quantitative Research

**Rich Hill**
Senior Managing Director
Global Head of Research & Strategy

**Armel Traore dit Nignan**
Senior Director
Head of Real Estate Data Analytics

## EXECUTIVE SUMMARY

**The commercial real estate market is at or near a cyclical trough and transitioning into an early-cycle recovery phase, and history says what comes next is long and durable.**

Using the NCREIF Property Index (1978–2025), we introduce a quantitative framework to isolate a dominant CRE cycle of roughly 20–21 years, materially longer than the typical business cycle. Today's pattern closely mirrors the early phases following the 1992 and 2009 troughs. Our prior fundamental analysis reached the same conclusion: recoveries (~2 years) and expansions (~12–13 years) are supported by both price appreciation and underappreciated income growth. By both quantitative and fundamental measures, the current cycle remains early by historical standards.

**For investors, this phase of the cycle has historically been associated with attractive forward risk-adjusted returns, though timing and selectivity remain critical given continued dispersion across markets and sectors.**

We introduce a quantitative framework for understanding the phases of the commercial real estate cycle over the long term — a companion to our earlier fundamental analysis, The (CRE)covery | How long do CRE cycles last? Using the NCREIF Property Index (1Q 1978–4Q 2025, ~191 quarterly observations), we combine time-series decomposition with frequency-based analysis to isolate the underlying market cycle from short-term volatility and structural trends. The framework offers investors an objective lens to assess market phase transitions, identify mid-cycle corrections, and contextualize current conditions within a longer-term cycle.


# Key findings

- **CRE cycles are long.** The periodogram identifies a dominant cycle of roughly 20–21 years, materially longer than the typical 7–10-year business cycle. This indicates that CRE performance is driven primarily by slow-moving capital, construction, and valuation dynamics rather than short-term macro fluctuations.

- **Turning points corroborate the long cycle.** Peak-to-peak distances measure ~18 and ~15 years (peaks circa 1990, 2007, and 2022); trough-to-trough distance is ~17 years (troughs circa 1992 and 2009, with a third forming in 2024–2025). The 2008–2009 drawdown and 2022–2024 correction are the two largest cyclical dislocations in the sample.

- **The market is currently near a cyclical trough.** The HP-filtered cycle component has fallen sharply from its 2022 peak into negative territory through 2024, and the underlying trend has rolled toward zero. The pattern closely mirrors the early phases following the 1992 and 2009 troughs - suggesting a long cycle ahead.

- **Mid-cycle corrections are real but distinguishable.** Private CRE markets experience periodic slowdowns and valuation resets that fall short of full downturns. We apply a minimum distance rule, set at ~70% of the dominant cycle length, to separate meaningful turning points from short-term fluctuations, reflecting the gradual, asymmetric nature of CRE pricing. Indeed, these corrections are essentially indistinguishable when viewed through the lens of a longer-term index (reference exhibit 1).

# Investment implications

By integrating trend-cycle decomposition, spectral analysis, and disciplined peak identification, this framework provides a consistent and intuitive way to interpret CRE market dynamics. Rather than relying solely on anecdotal indicators or short-term performance metrics, investors can evaluate current conditions relative to a historically grounded market cycle.

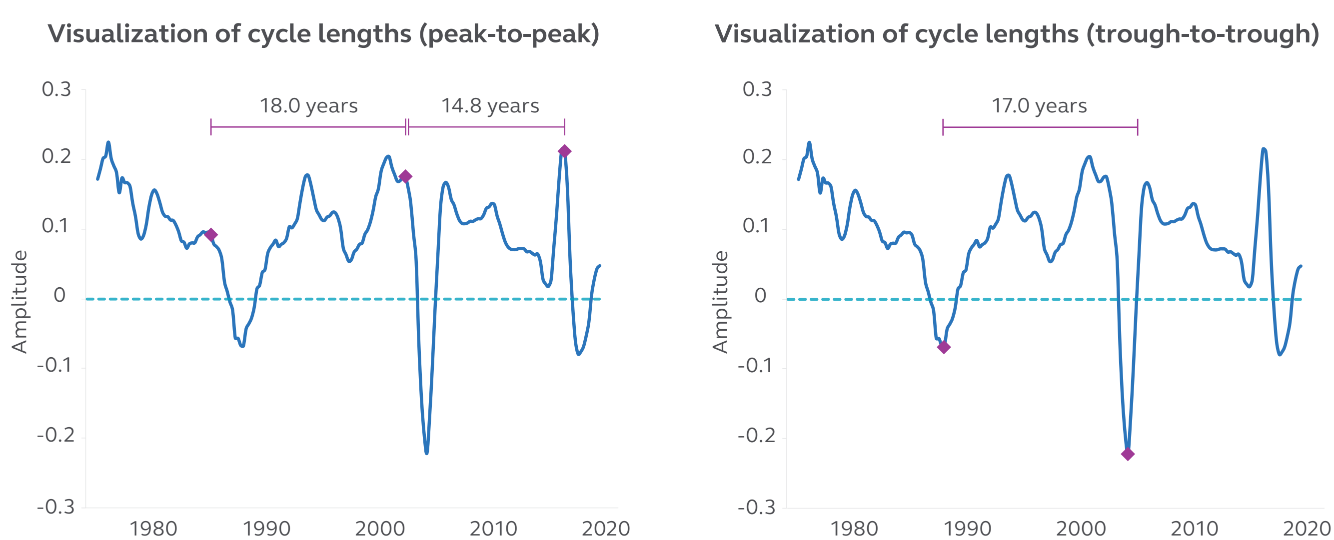
For long-horizon investors, understanding cycle positioning can inform pacing decisions, leverage management, sector rotation, and expectations for future return dispersion. While no model can predict turning points with certainty, a transparent, quantitatively grounded view of CRE cycles enhances decision-making across portfolio construction and risk management disciplines.

# Methodology overview

The NPI is validated as cycle-appropriate via stationarity testing (Augmented Dickey-Fuller and KPSS), then decomposed into a long-term trend and cyclical component using the Hodrick–Prescott filter (λ=1600). The cyclical component is analyzed in both the time domain (autocorrelation, peak-and-trough detection) and frequency domain (periodogram) to triangulate a robust estimate of prevailing cycle length and date the most recent turning points.

The following charts show NPI total returns decomposed into a long-term trend and cyclical component using the Hodrick–Prescott filter. The cyclical component captures deviations from trend that correspond to expansions, slowdowns, contractions, and recoveries in commercial property markets. For the avoidance of the doubt, this is different than as reported YoY changes in NPI total returns but is a more statistically rigorous process. Exhibit 1 highlights the identified peaks and troughs within the CRE cycle. Major turning points correspond to full market transitions, while intermediate peaks capture mid-cycle corrections commonly observed during periods of tightening financial conditions or softening leasing fundamentals.

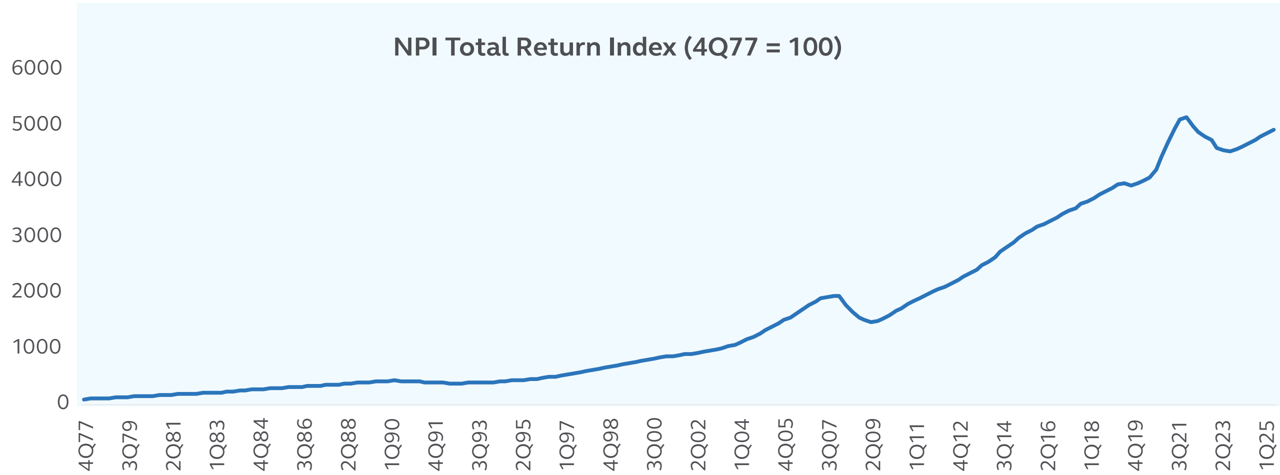
**EXHIBIT 1: Peak-to-peak and trough-to-trough analysis of CRE cycle length**




Source: NPI Total Return Index, as of 2Q25.

For Public Distribution in the United States. For Institutional, Professional, Qualified, and/or Wholesale Investor Use Only in other Permitted Jurisdictions as defined by local laws and regulations.

## EXHIBIT 2: NPI Total Return Index highlights long-term appreciation and market corrections




Source: NCREIF, Principal Real Estate. As of 31 March 2026.

## EXHIBIT 3: Cross-market comparison of CRE cycle phases, durations, and returns

| | Listed REITs (FTSE NAREIT Equity Index) | | | | Private Real Estate (NCREIF Property Index) | | | Average Prior Cycle | |
|---|---|---|---|---|---|---|---|---|---|
| Cycle | December 1974 - October 1990 | November 1990 - February 2009 | March 2009 - October 2023 | November 2023 - Current | 1Q93 - 4Q09 | 1Q10 - 2Q24 | 3Q24 - current | Listed REIT Avg | Private CRE |
| **Complete Cycle** | | | | | | | | | |
| **Duration (years)** | 15.8 | 18.3 | 14.7 | 2.6 | 17.0 | 14.5 | 1.8 | 16.3 | 15.8 |
| **Cumulative Return** | 995.8% | 324.7% | 463.3% | 55.3% | 285.0% | 206.5% | 8.1% | 594.6% | 245.7% |
| **Annualized Return** | 16.3% | 8.2% | 12.5% | 18.6% | 8.3% | 8.0% | 4.5% | 12.3% | 8.1% |
| **Recovery** | | | | | | | | | |
| **Duration (years)** | 1.8 | 0.4 | 3.4 | 1.1 | 2.5 | 2.3 | 1.8 | 1.9 | 2.4 |
| **Cumulative Return** | 58.0% | 31.1% | 217% | 42.7% | 12.5% | 32.7% | 8.1% | 102.1% | 22.6% |
| **Annualized Return** | 29.9% | 91.4% | 40.2% | 38.8% | 4.8% | 13.4% | 4.5% | 53.8% | 9.1% |
| **Expansion** | | | | | | | | | |
| **Duration (years)** | 12.9 | 15.8 | 9.4 | 1.5 | 13.0 | 10.5 | – | 12.7 | 11.8 |
| **Cumulative Return** | 811.3% | 922.1% | 150.8% | 8.8% | 349.5% | 161.6% | – | 628.1% | 255.5% |
| **Annualized Return** | 18.7% | 15.8% | 10.3% | 5.8% | 12.3% | 9.6% | – | 14.9% | 10.9% |
| **Trough-to-Peak** | | | | | | | | | |
| **Duration** | 14.7 | 16.3 | 12.8 | – | 15.5 | 12.8 | – | 14.6 | 14.1 |
| **Cumulative Return** | 1339.5% | 1239.5% | 695.9% | – | 405.7% | 247.1% | – | 1091.6% | 326.4% |
| **Annualized Return** | 19.9% | 17.3% | 17.5% | – | 11.0% | 10.3% | – | 18.3% | 10.6% |
| **Downturn** | | | | | | | | | |
| **Duration (years)** | 1.2 | 2.1 | 1.8 | – | 1.5 | 1.75 | – | 1.7 | 1.6 |
| **Cumulative Return** | -23.9% | -68.3% | -29.2% | – | -23.9% | -11.7% | – | -40.5% | -17.8% |
| **Annualized Return** | -20.9% | -42.4% | -17.2% | – | -16.6% | -6.9% | – | -26.8% | -11.7% |

Source: Bloomberg, NCREIF, Principal Real Estate. Listed REIT data as of May 28, 2026. Private real estate data as of 31 March 2026.

## Decomposing commercial real estate performance

Observed CRE return series reflect a combination of long-term structural trends (such as inflation, demographic demand, and secular shifts in property usage) and cyclical market dynamics driven by credit conditions, leasing fundamentals, and development activity. To isolate the cyclical component relevant for investment decision-making, we employ the Hodrick–Prescott (HP) filter.

The HP filter minimizes the following loss function:

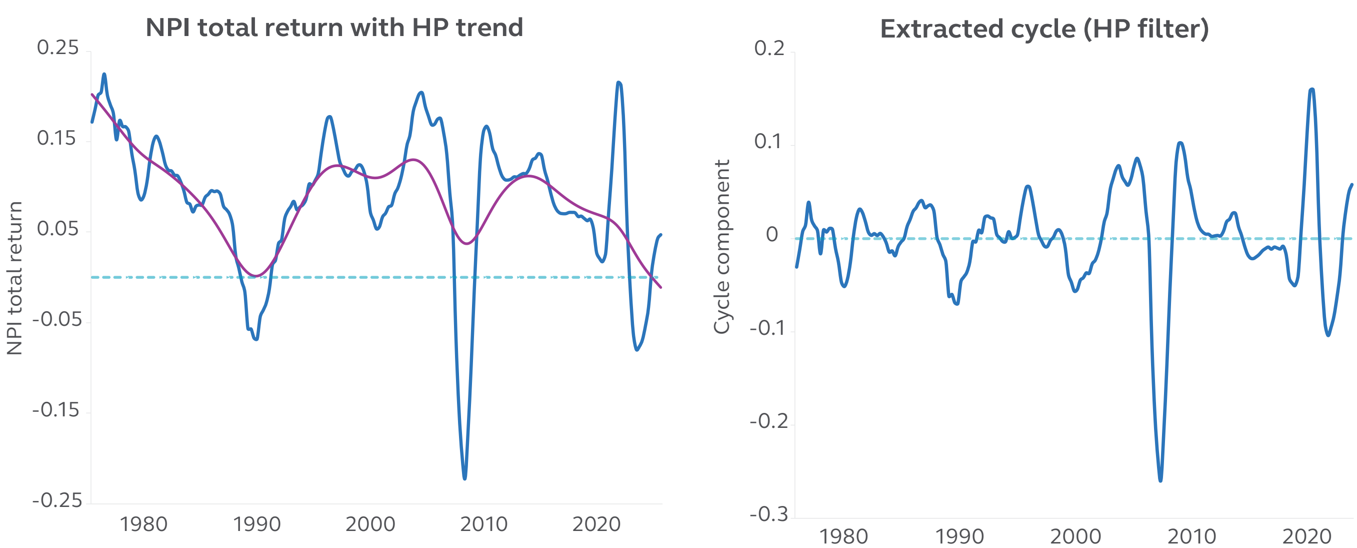
$$\min_{\tau_t} \sum_{t=1}^{T} (y_t - \tau_t)^2 + \lambda \sum_{t=2}^{T-1} [(\tau_{t+1} - \tau_t) - (\tau_t - \tau_{t-1})]^2$$

Where:

- $y_t$ is the original time series.
- $\tau_t$ is the trend component.
- $y_t - \tau_t$ represents the cyclical component.
- $\lambda$ is the smoothing parameter (typically 1600 for quarterly data).

The HP filter separates the observed time series into a smooth trend component and a cyclical component. The cyclical component captures deviations from trend that correspond to expansions, slowdowns, contractions, and recoveries in commercial property markets. For quarterly CRE data, a smoothing parameter ($\lambda$) of 1,600 is applied, consistent with standard macro-financial practice.

**EXHIBIT 4: HP filter decomposition of NPI returns into trend and cycle**




Source: NPI Total Return Index, as of 2Q25.

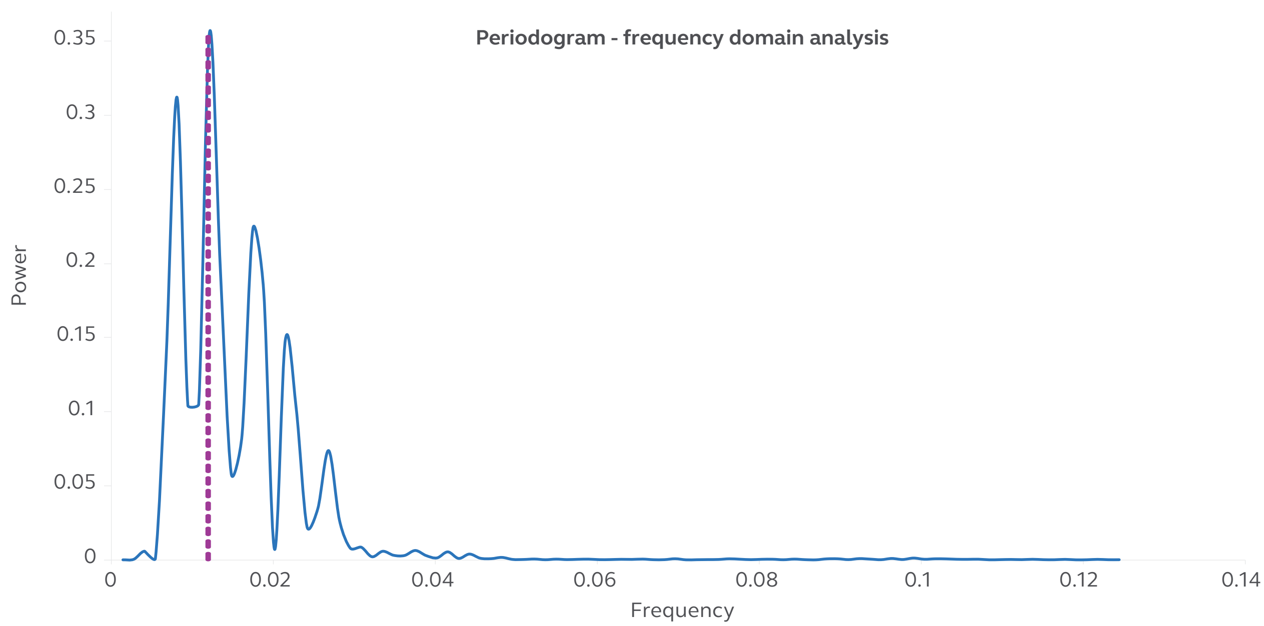
The above charts illustrate the decomposition of CRE performance into trend and cycle components. The trend line reflects long-term appreciation driven by structural factors, while the cyclical series highlights periods of market overheating, correction, and recovery that are most relevant for tactical allocation decisions.

## Identifying the dominant CRE cycle

Once the cyclical component is isolated, we analyze its frequency characteristics using spectral analysis. Specifically, we apply a periodogram to estimate the power spectral density of the cycle. This technique shifts the analysis from the time domain to the frequency domain, allowing us to identify which cycle lengths explain the greatest share of historical market variation.

The dominant frequency corresponds to the most economically meaningful market cycle — often associated with long real estate capital cycles driven by credit expansion and contraction. The implied cycle length is calculated as the inverse of this dominant frequency, providing an estimate of the typical duration from peak to peak or trough to trough.

**EXHIBIT 5: Frequency analysis highlighting the dominant CRE cycle**




Source: NPI Total Return Index.

The above chart displays the periodogram of the CRE cyclical series. Peaks in the chart indicate cycle lengths that contribute most significantly to historical performance volatility. The highest peak identifies the dominant CRE market cycle, which aligns closely with long-standing observations of real estate capital cycles.

## Capturing mid-cycle corrections and sub-cycles

While long-term cycles define the broader investment backdrop, CRE markets frequently experience mid-cycle slowdowns, risk-off episodes, or valuation resets that do not constitute full market downturns. To identify these sub-cycles without mistaking noise for signal, we apply a disciplined peak-detection process to the cyclical series.

A minimum distance rule — set at approximately 70% of the estimated dominant cycle length — is used to distinguish economically meaningful turning points from short-term fluctuations. This approach reflects the reality of CRE markets, where pricing adjustments often occur gradually and asymmetrically due to appraisal smoothing, limited transaction volume, and heterogeneous asset quality.

## Market and historical context

The estimated cycle lengths are consistent with both academic research and practitioner experience. Prior studies, including work by Homer Hoyt and Fred Foldvary, have documented long-duration real estate cycles often spanning 15 to 20 years, closely linked to land values and credit formation.

Within the 1990-present sample, the methodology captures several well-known market phases, including the post-Savings & Loan crisis recovery, the expansion and subsequent correction during the Global Financial Crisis, and the post-pandemic reset driven by rapid interest-rate normalization and evolving space-use dynamics.

### Bottom line

This quantitative analysis validates our prior fundamental conclusion; real estate cycles are long. It showed recoveries (~2 years) and expansions (~12–13 years) are durable and supported by both price appreciation and underappreciated income growth. Our prior fundamental analysis suggests that the U.S. private real estate market remains in recovery and the U.S. listed REIT market, a leading indicator, has transitioned from recovery into expansion. In other words, public and private market data indicate that the current cycle remains early by historical standards.

For Public Distribution in the United States. For Institutional, Professional, Qualified, and/or Wholesale Investor Use Only in other Permitted Jurisdictions as defined by local laws and regulations.

**Risk considerations**

Investing involves risk, including possible loss of principal. Past Performance does not guarantee future return. Potential investors should be aware of the risks inherent to owning and investing in real estate, including value fluctuations, capital market pricing volatility, liquidity risks, leverage, credit risk, occupancy risk and legal risk. Real estate investment options are subject to some risks inherent in real estate and real estate investment trusts (REITs), such as risks associated with general and local economic conditions. Commercial real estate (CRE) investing carries several inherent risks, including those related to the economy, interest rates, market fluctuations, high upfront costs, and tenant-related issues like defaults or high turnover. Economic downturns can lead to decreased property values and increased vacancy rates, while financing costs, insurance expenses, and potential environmental or structural problems can also pose significant challenges. All these factors and risks can impact rental income and overall investment returns.

Private market investments carry distinct risks due to illiquidity, limited transparency, and higher minimum investment requirements. These include liquidity, market, capital, and regulatory risks, as well as higher fees and longer investment horizons compared to publicly traded securities. Real assets require independent evaluation before investing. As an asset class, they are less developed, more illiquid, and less transparent than traditional asset classes.

**Important information**

This material covers general information only and does not take account of any investor's investment objectives or financial situation and should not be construed as specific investment advice, a recommendation, or be relied on in any way as a guarantee, promise, forecast or prediction of future events regarding an investment or the markets in general. Information presented has been derived from sources believed to be accurate; however, we do not independently verify or guarantee its accuracy or validity. Any reference to a specific investment or security does not constitute a recommendation to buy, sell, or hold such investment or security, nor an indication that the investment manager or its affiliates has recommended a specific security for any client account. Subject to any contrary provisions of applicable law, the investment manager and its affiliates, and their officers, directors, employees, agents, disclaim any express or implied warranty of reliability or accuracy and any responsibility arising in any way (including by reason of negligence) for errors or omissions in the information or data provided.

This material may contain 'forward-looking' information that is not purely historical in nature and may include, among other things, projections, and forecasts. There is no guarantee that any forecasts made will come to pass. Reliance upon information in this material is at the sole discretion of the reader.

This material is not intended for distribution to or use by any person or entity in any jurisdiction or country where such distribution or use would be contrary to local law or regulation.

Index performance information reflects no deduction for fees, expenses, or taxes. Indices are unmanaged and individuals cannot invest directly in an index.

This document is intended for use in:

• The United States by Principal Global Investors, LLC, which is regulated by the U.S. Securities and Exchange Commission.

• Europe by Principal Global Investors (Ireland) Limited, 70 Sir John Rogerson's Quay, Dublin 2, D02 R296, Ireland. Principal Global Investors (Ireland) Limited is regulated by the Central Bank of Ireland. Clients that do not directly contract with Principal Global Investors (Europe) Limited ("PGIE") or Principal Global Investors (Ireland) Limited ("PGII") will not benefit from the protections offered by the rules and regulations of the Financial Conduct Authority or the Central Bank of Ireland, including those enacted under MiFID II. Further, where clients do contract with PGIE or PGII, PGIE or PGII may delegate management authority to affiliates that are not authorized and regulated within Europe and in any such case, the client may not benefit from all protections offered by the rules and regulations of the Financial Conduct Authority, or the Central Bank of Ireland. In Europe, this document is directed exclusively at Professional Clients and Eligible Counterparties and should not be relied upon by Retail Clients (all as defined by the MiFID).

• United Kingdom by Principal Global Investors (Europe) Limited, Level 1, 1 Wood Street, London, EC2V 7 JB, registered in England, No. 03819986, which is authorized and regulated by the Financial Conduct Authority ("FCA").

• This document is marketing material and is issued in Switzerland by Principal Global Investors (Switzerland) GmbH.

• United Arab Emirates by Principal Investor Management (DIFC) Limited, an entity registered in the Dubai International Financial Centre and authorized by the Dubai Financial Services Authority as an Authorised Firm, in its capacity as distributor / promoter of the products and services of Principal Asset Management. This document is delivered on an individual basis to the recipient and should not be passed on or otherwise distributed by the recipient to any other person or organisation.

• Singapore by Principal Global Investors (Singapore) Limited (ACRA Reg. No.199603735H), which is regulated by the Monetary Authority of Singapore and is directed exclusively at institutional investors as defined by the Securities and Futures Act 2001. This advertisement or publication has not been reviewed by the Monetary Authority of Singapore.

• Australia by Principal Global Investors (Australia) Limited (ABN 45 102 488 068, AFS Licence No. 225385), which is regulated by the Australian Securities and Investments Commission and is only directed at wholesale clients as defined under Corporations Act 2001.

• Hong Kong SAR by Principal Asset Management Company (Asia) Limited, which is regulated by the Securities and Futures Commission. This document has not been reviewed by the Securities and Futures Commission. This document may only be distributed, circulated or issued to persons who are Professional Investors under the Securities and Futures Ordinance and any rules made under that Ordinance or as otherwise permitted by that Ordinance.

• Other APAC Countries/Jurisdictions. This material is issued for Institutional Investors only (or professional/sophisticated/qualified investors, as such term may apply in local jurisdictions) and is delivered on an individual basis to the recipient and should not be passed on, used by any person or entity in any jurisdiction or country where such distribution or use would be contrary to local law or regulation.

Principal Global Investors, LLC (PGI) is registered with the U.S. Commodity Futures Trading Commission (CFTC) as a commodity trading advisor (CTA), a commodity pool operator (CPO) and is a member of the National Futures Association (NFA). PGI advises qualified eligible persons (QEPs) under CFTC Regulation 4.7.

Principal Asset Management℠ is a trade name of Principal Global Investors, LLC.

Principal Real Estate is a trade name of Principal Real Estate Investors, LLC, an affiliate of Principal Global Investors.



MM15031 | 06/2026 | 5632131-062028