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Private Real Estate, Inflation, and Interest Rates

Invesco Real Estate

February 2022

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Executive summary

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Executive summary

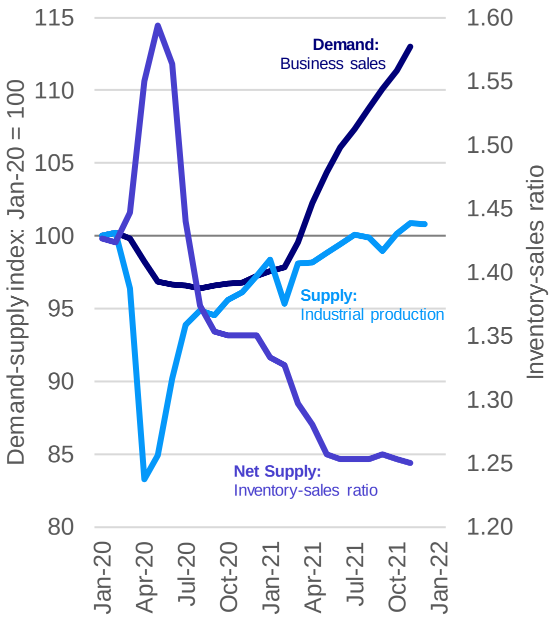
1.	Inflation has been more highly correlated with private real estate returns than stocks or bonds.
2.	High inflation is being driven by three factors: ✓ Supply-demand imbalance, exacerbated by supply-chain disruption ✓ Rising wages due to labor shortages ✓ Outsized money supply growth
3.	Expect those three factors to normalize in near/mid-term; expect lower inflation in long term.
4.	Expect short-term interest rates to rise; expect elevated debt to weigh on long-term rates.
5.	A rise in interest rates does not necessarily foretell a rise in cap rates.
6.	Strategic response: ✓ Lean into sectors and execution with stronger relative growth outlooks ✓ Lean into sectors and execution with lower relative op-ex and cap-ex ✓ Accentuate discipline around leverage

Source: Invesco Real Estate as of February 2, 2022

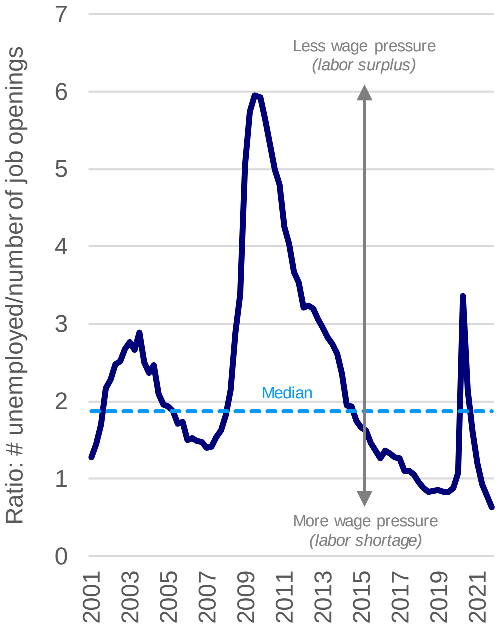
Why has inflation accelerated?

Supply-demand imbalances, rising labor market tightness, growth in money supply

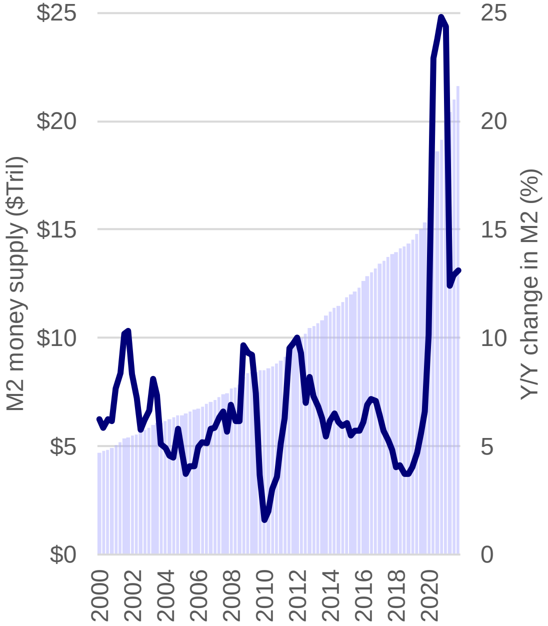
Demand and supply imbalance



Labor market tightness



Growth in money supply



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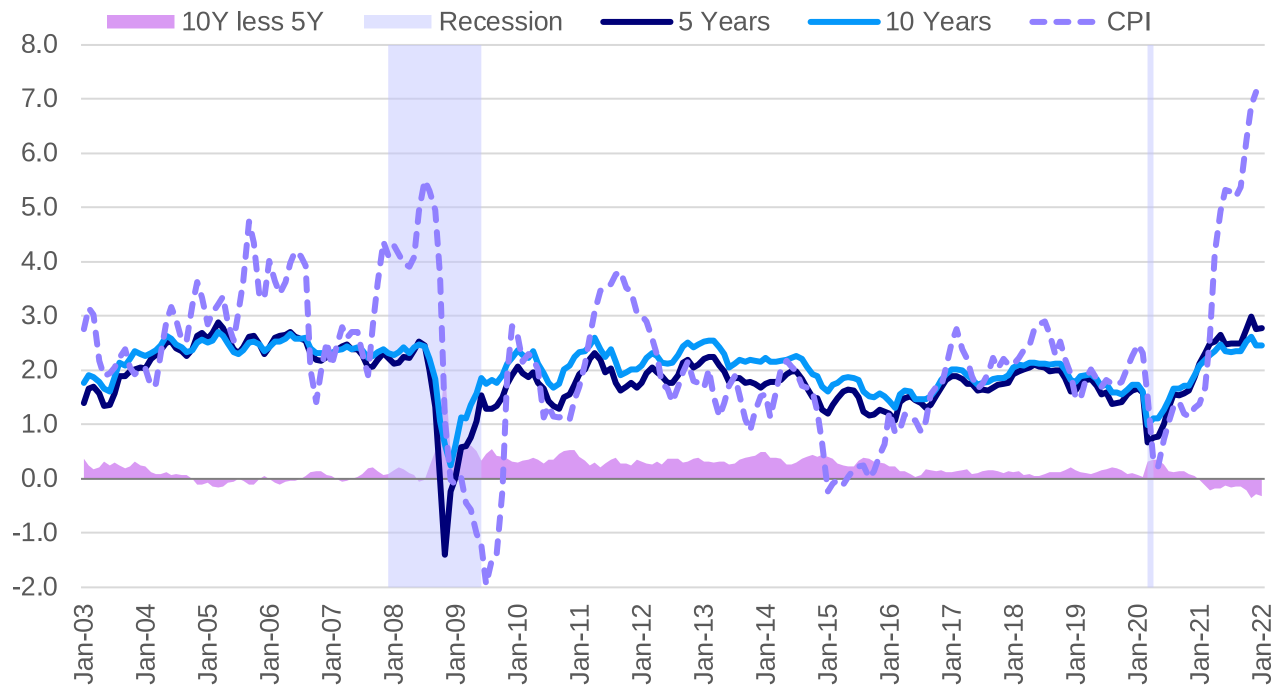
Demand and supply imbalance: demand = total business sales (BOC); supply = total industrial production (FRB); net supply = total business inventories/sales ratio
Source: Invesco Real Estate using data from Moody's Analytics as of February 2, 2022.

What are the market's inflation expectations?

The market's inflation expectations show more concern for the short term vs. long term

Breakeven inflation (%)

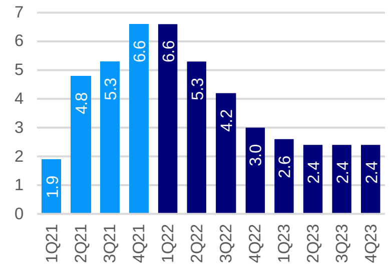


Jan-2022

5-year breakeven inflation
2.8%

10-year breakeven inflation
2.5%

Blue Chip Consensus Forecast: Jan-2022
Y/Y CPI (%)

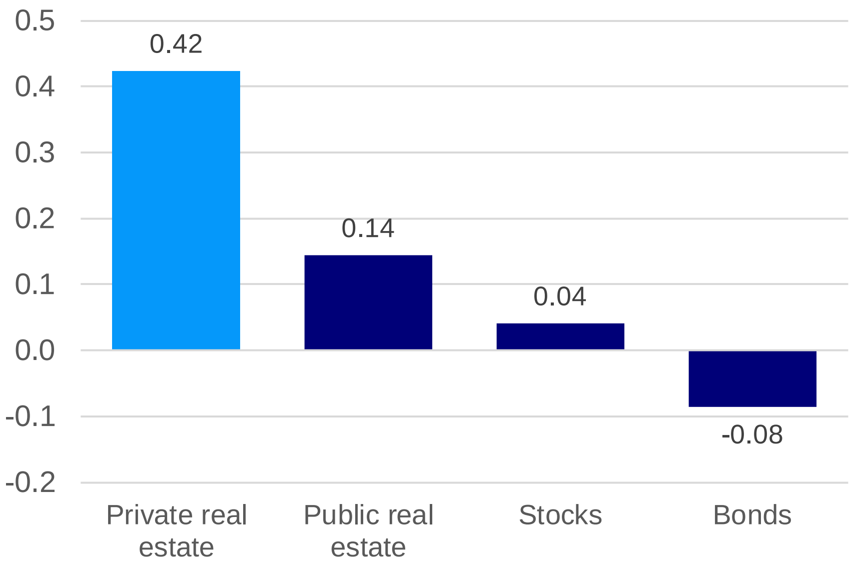


Breakeven inflation is the difference between the nominal yield on a fixed-rate investment and the real yield on an inflation-linked investment of similar maturity.
Source: Invesco Real Estate using data from Moody's Analytics and Blue Chip Economic Indicators as of February 2, 2022.

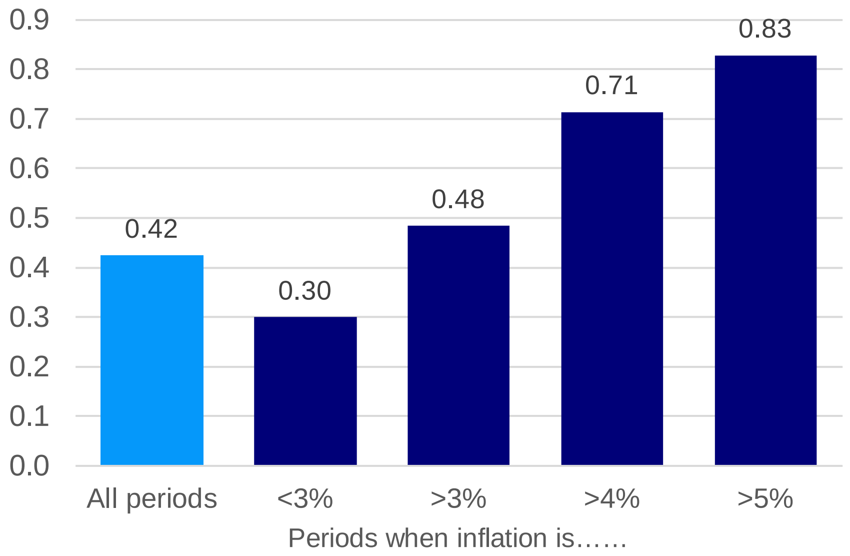
How does real estate perform in a higher inflationary economy?

Correlations are higher than other asset classes and strengthen in periods of higher inflation

Correlation of annual returns and inflation
1Q-1978 to 4Q-2021



Correlation between inflation and private real estate
1Q-1978 to 4Q-2021



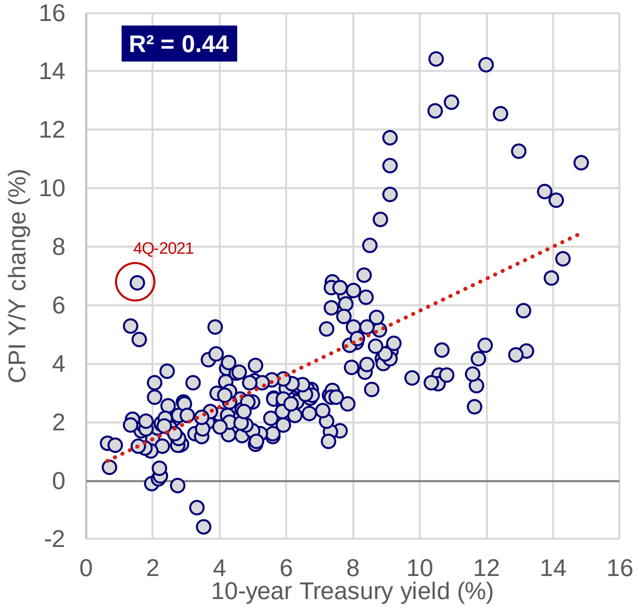
Private real estate = NCREIF Property Index (NPI); Public Real Estate = NAREIT All Equity REIT Index; Stocks = S&P 500 Index; Bonds = Bloomberg US Aggregate Bond Index. Since inception returns for NPI are from 1Q-1978 to 4Q-2021. You cannot directly invest in an index.
Source: Invesco Real Estate using data from NCREIF, and Moody's Analytics as of February 2, 2022.

Will interest rates rise if inflation remains high?

Not necessarily; expect a mild increase, while absolute rates remain relatively low

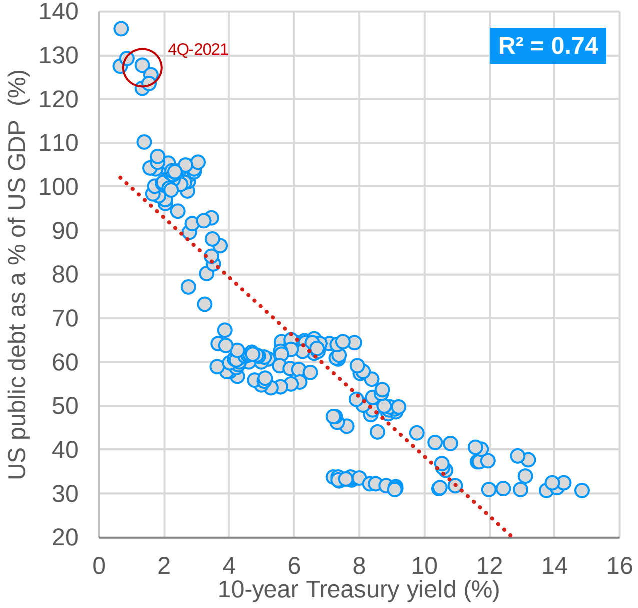
Interest rates and inflation

1Q-1976 to Q4-2021



Interest rates and government debt

1Q-1976 to Q4-2021



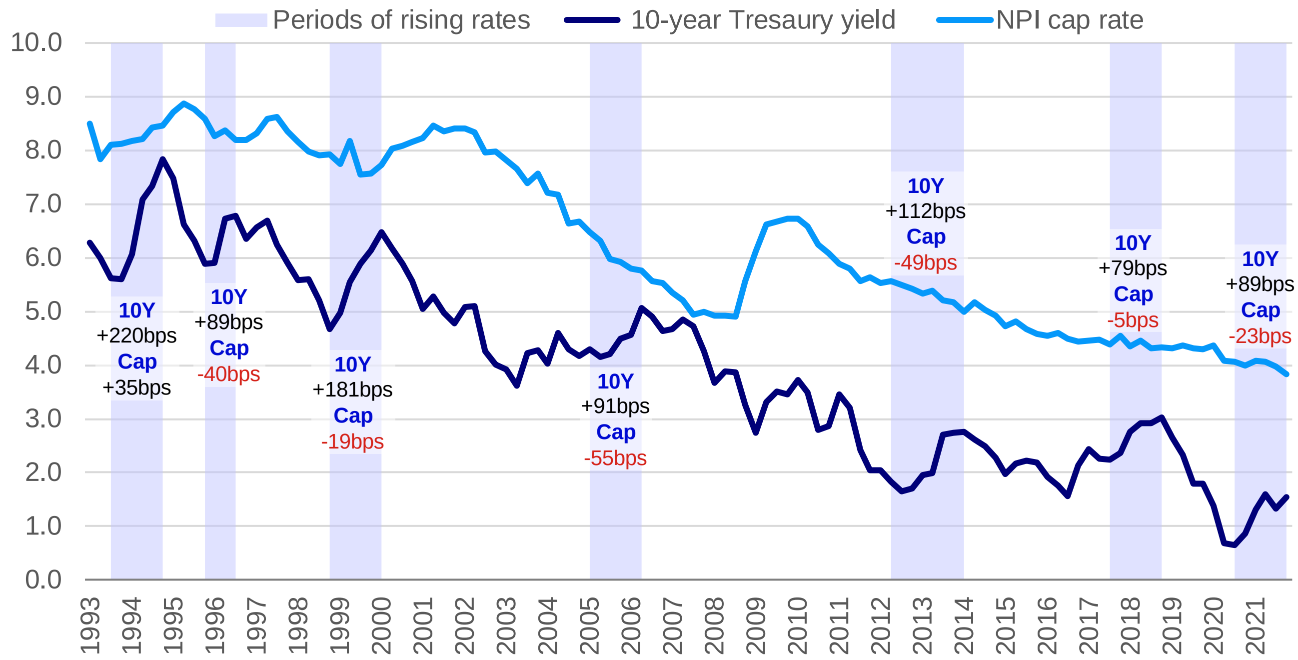
While interest rates appear influenced by inflation, **government borrowing relative to the size of the overall economy appears to be more impactful.**

Source: Invesco Real Estate using data from Moody's Analytics as of February 2, 2021.

Will real estate cap rates expand if interest rates rise?

Not necessarily; strength of capital flows and macroeconomy more impactful in short term

10-year Treasury yields and cap rates (%)



Since 1993:

Cap rates declined in **6 of 7 periods** when **10-year bond yields expanded** for three consecutive quarters or more

Correlations with cap rates:
Y/Y change 2001-2021

Bond yields	-0.09
Economic growth	-0.65
Capital flows	-0.76

Periods of rising rates = periods when the 10-year Treasury yield moved higher for at least three consecutive quarters. NPI cap rate = current value cap rate.
Economic growth = real GDP. Capital flows = trailing 12-month RCA transaction volume.
Source: Invesco Real Estate using data from Moody's Analytics, NCREIF, and RCA as of February 2, 2022. Past performance in not indicative of future results.

Strategy response to inflation and rising interest rates

Lean into investments with robust demand growth and lease expiration schedules than can capture near-term rent gains

Hedge against the risk of inflation by leaning into sectors with stronger relative demand and revenue growth potential

Lean into sectors with a lower cap-ex and operating expense drag

Accentuate discipline around leverage given the risk of rising interest rates in a higher inflationary economy

Source: Invesco Real Estate as of February 2, 2022.

Current conditions

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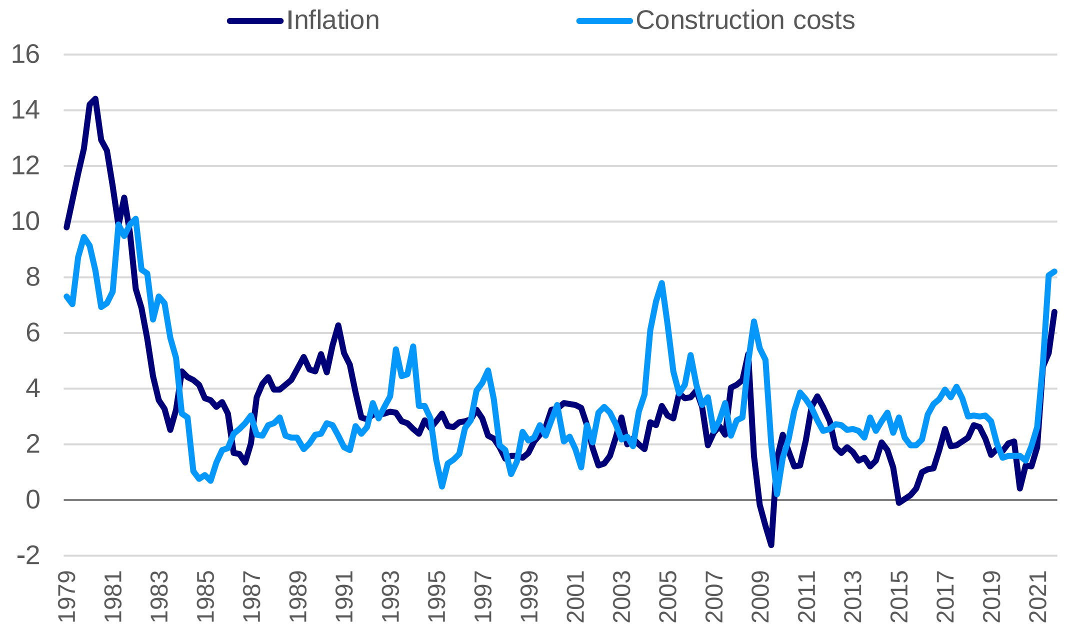
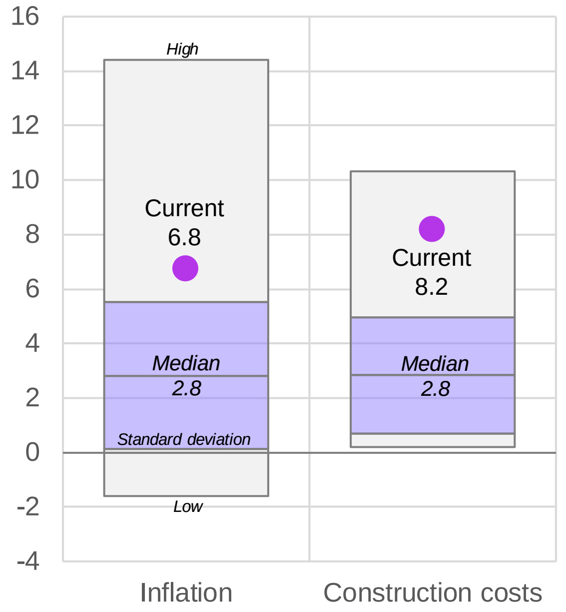
The current picture: How elevated is current inflation?

Both inflation and construction costs are approaching 40-year highs

Inflation and construction costs (Y/Y, %)



Inflation range: 1Q-1979 to 4Q-2021 (%)



Inflation = US Consumer Price Index: Urban Consumer-All Items; Construction costs = Engineering News Record (ENR) Construction Cost Index.
Source: Invesco Real Estate using data from NCREIF, and Moody's Analytics as of February 2, 2022.

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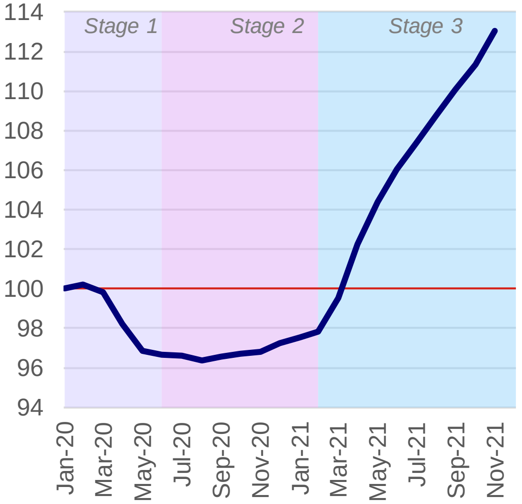
Why has inflation accelerated? Demand and supply

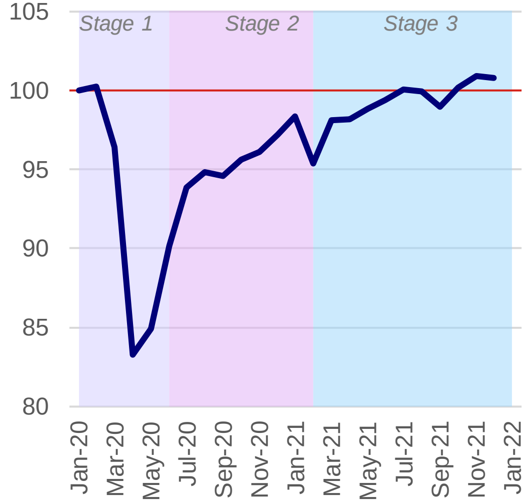
Surging demand amplifies production delays and low inventories; price pressure rises

Demand: Sales for manufacturing and trade (T12M, Index, Jan-20 = 100)



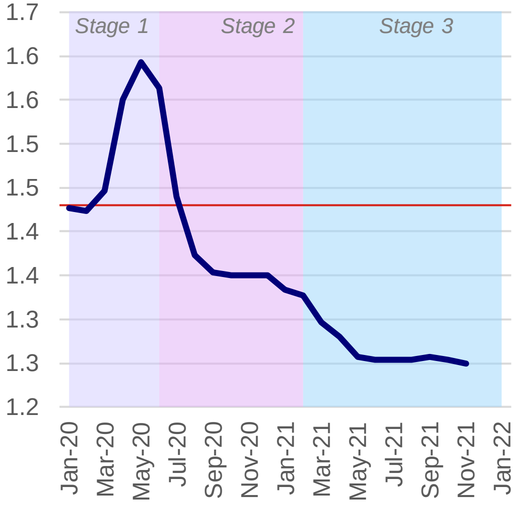
Pandemic hits; demand collapses
Sales recover toward pre-pandemic levels
Sales surge above pre-pandemic levels

Supply: Industrial production (Index, Jan-20 = 100)



Production drops in response to demand
Production increases in response to demand
Production constrained by supply chain issues

Net supply: Inventory-to-sales ratio (3M moving average, ratio)



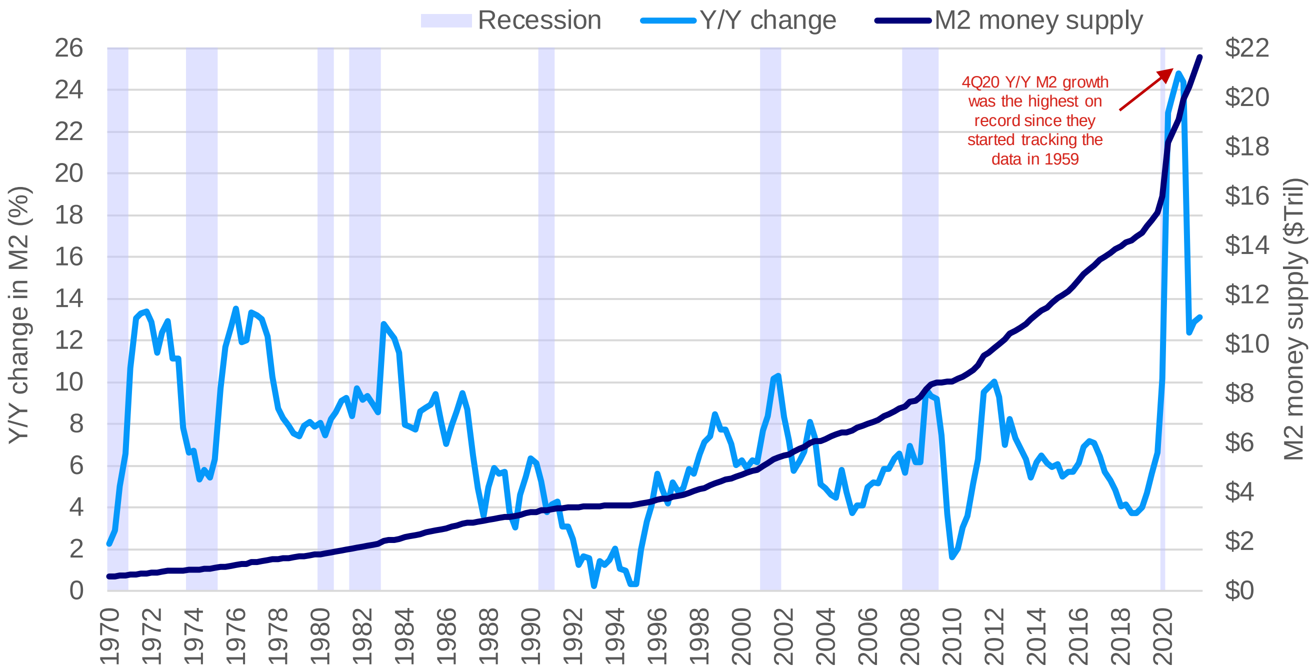
Drop in sales pushes I/S ratio higher
I/S ratio falls as production resumes
Price pressures rise as demand > supply

Source: Invesco Real Estate using data from Moody's Analytics as of February 2, 2022.

Why has inflation accelerated? Money supply growth

A surge in money supply can result in too much money chasing too few goods

Growth in M2 money supply



- Growth in money supply has been outsized during the pandemic.
- The recent surge in money supply could cause inflation to linger – too much money chasing too few goods.
- Money supply growth has fallen during 2021 but remains historically elevated.
- Monetary theory suggests that inflationary pressures will remain until money supply growth slows and/or the ratio between money supply and nominal GDP reverts to its pre-pandemic level.

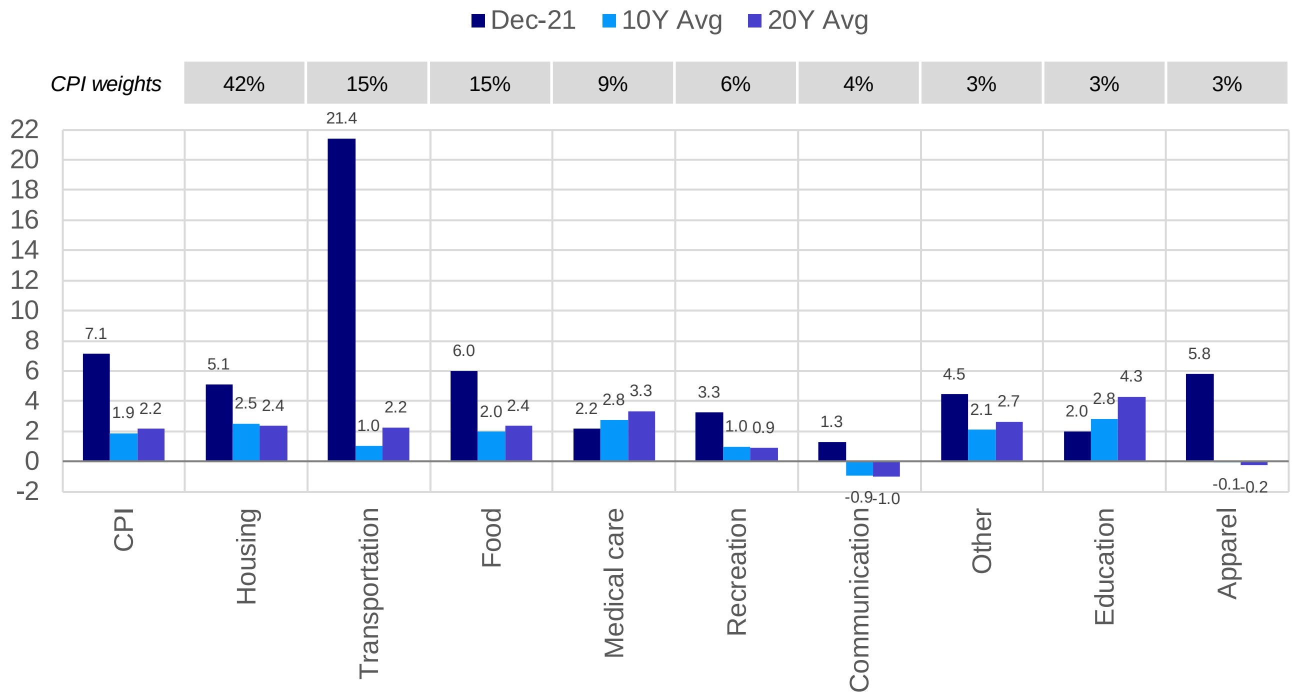
M2 is a broad measure of the money supply that includes cash outside of the private banking system, current account deposits, capital in savings accounts, money market accounts and retail mutual funds, and time deposits under $100,000.

Source: Invesco Real Estate using data from Moody's Analytics as of February 2, 2022.

What sectors are currently driving inflation?

Price gains are broadening, but largest gains have occurred in the transportation sector

Y/Y consumer price inflation by sector (%)



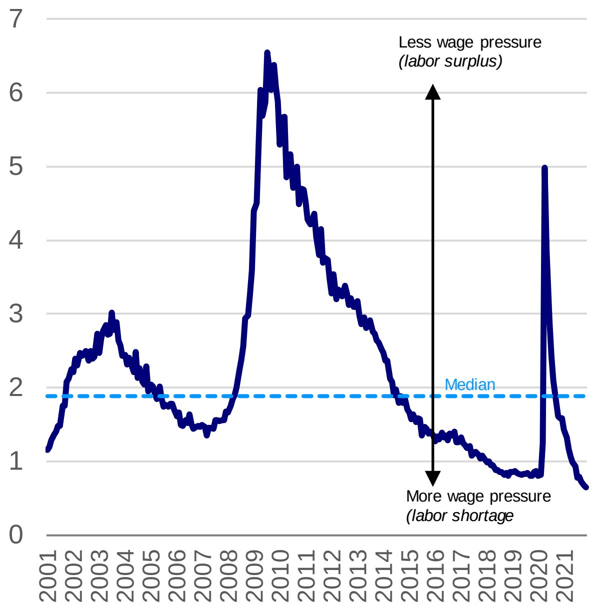
- Recent price gains are broadly higher than historical averages across all sectors except medical and education.
- To date, the most outsized gains have occurred in the transportation sector (particularly new and used cars), energy (gasoline, fuel oil, and gas utilities), and food (meats). Much of this price pressure has been driven by supply-chain challenges.
- Housing – the largest component of CPI – was 4.8% Y/Y as of Nov-21. Home prices continue to appreciate at an elevated pace.

Inflation = US Consumer Price Index: Urban Consumer-All Items.
Source: Invesco Real Estate using data from Moody's Analytics as of February 2, 2022.

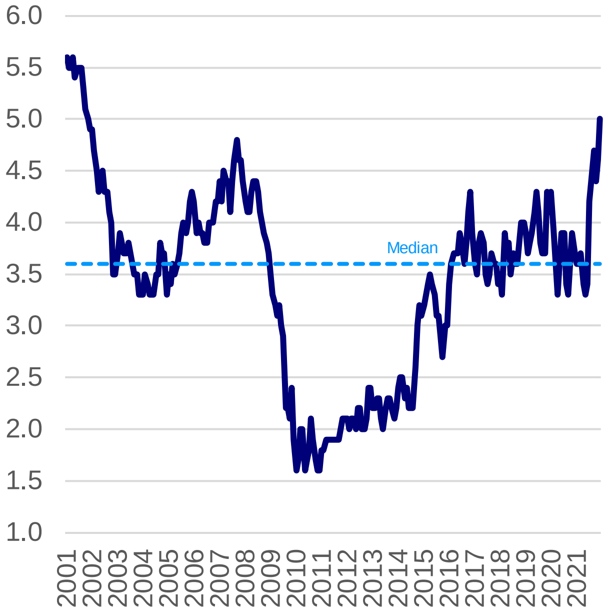
How might labor shortages impact inflation?

Wage inflation could sharpen; higher costs passed through to consumers

Ratio: Number of unemployed persons to number of job openings



Wage growth: 3-month moving average of median wage growth, hourly data



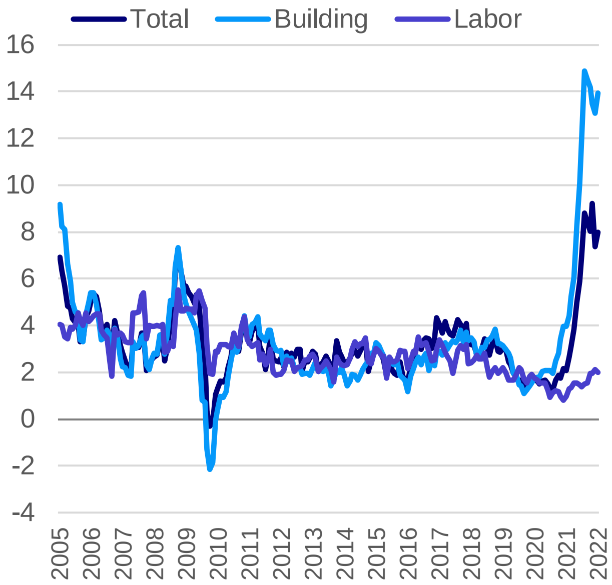
- As of November 2021, the ratio of unemployed people to new job openings was at a record low for the 20-year history of the data series.
- Data from the Atlanta Fed show wage growth at its highest level since the GFC.
- A growing number of large companies have raised minimum wages to $15 or higher (2X the US minimum wage), including the nation's largest employers, Amazon and Walmart.
- If labor shortages persist, wage pressures could rise further, increasing costs that could impact margins for producers/operators, resulting in higher prices for consumers.

Source: Invesco Real Estate using data from Moody's Analytics and Federal Reserve Bank of Atlanta as of February 2, 2022.

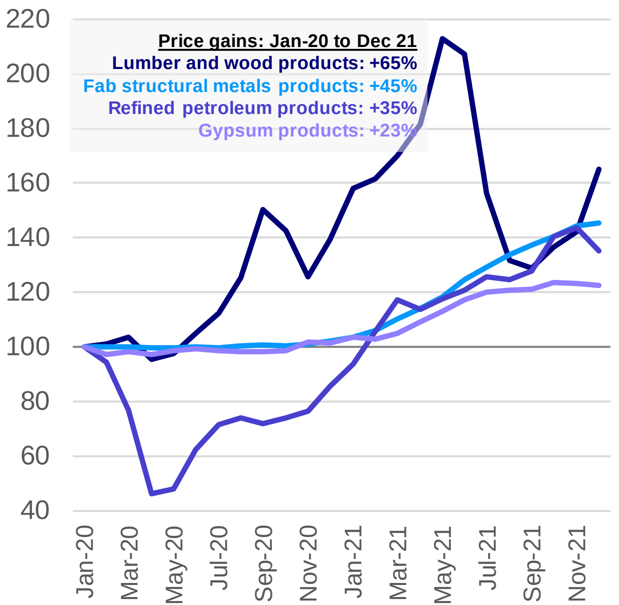
How has inflation materialized for construction costs?

Price gains have been notable for key construction materials

ENR construction cost index: Y/Y construction cost inflation (%)



Producer price index: Price trends during COVID pandemic (Jan-21 = 100)



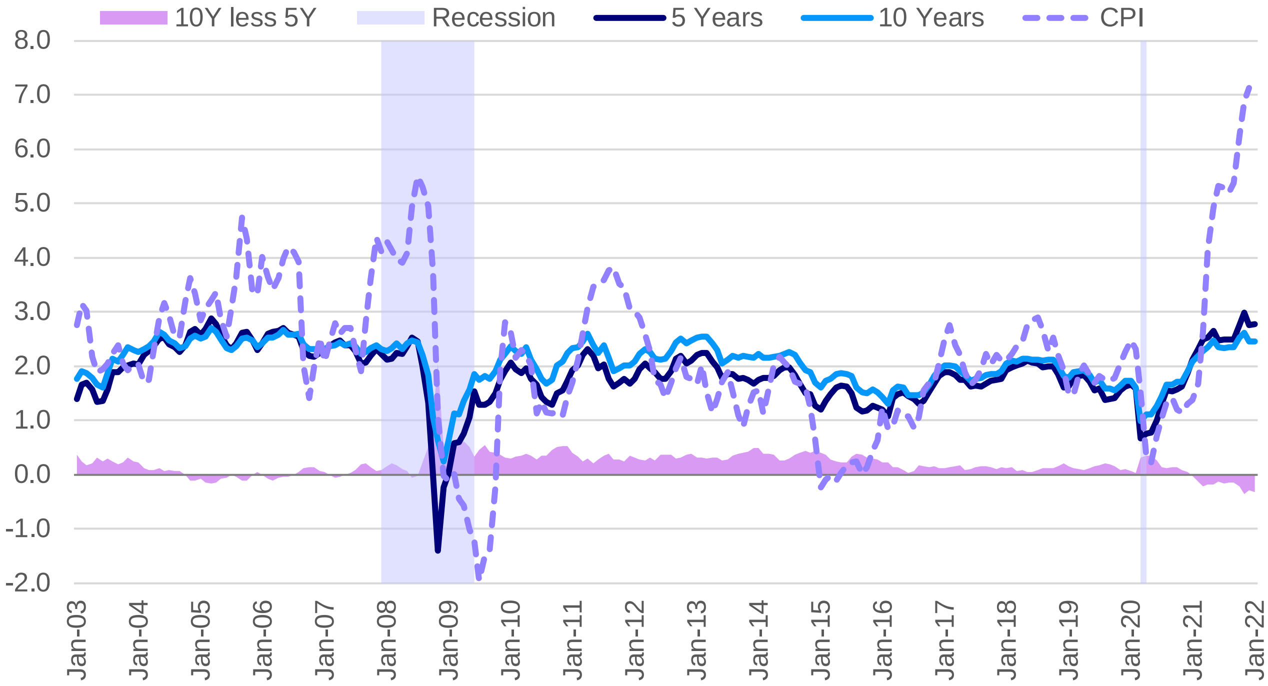
- Construction costs have recently elevated as the price of key materials have increased.
- ENR's construction cost index showed Y/Y gains of 8-9% in 2H-2021, the highest level since 1981-82.
- Cost appreciation has been driven by elevated price gains for key construction materials, such as lumber, steel, and gypsum products.
- Again, supply-chain challenges primarily underly the rise in materials prices.
- Rising construction costs could act as a governor on new supply, potentially benefiting owners of existing product.

Source: Invesco Real Estate using data from Moody's Analytics as of February 2, 2022. Engineering News-Record (ENR) publishes a Construction Cost Index (CCI) that is widely used in the construction industry. The CCI is calculated by 200 hours of common labor at the 20-city average of common labor rates, plus 25 cwt of standard structural steel shapes at the mill price prior to 1996 and the fabricated 20-city price from 1996, plus 1.128 tons of portland cement at the 20-city price, plus 1,088 board-ft of 2 x 4 lumber at the 20-city price. A complete explanation of the index methodology and history can be found at enr.com/economics.

What are the market's inflation expectations?

The market's inflation expectations show more concern for the short term vs. long term

Breakeven inflation (%)



- Breakeven inflation is the difference between the nominal yield on a fixed-rate investment and the real yield on an inflation-linked investment of similar maturity.
- Breakeven rates remain close to 20-year highs; the 5-year rate remains about 40bps higher than the 10-year rate.
- Breakeven rates remain well above the Fed's target inflation rate of 2% but suggest that the market does not expect persistently high inflation.

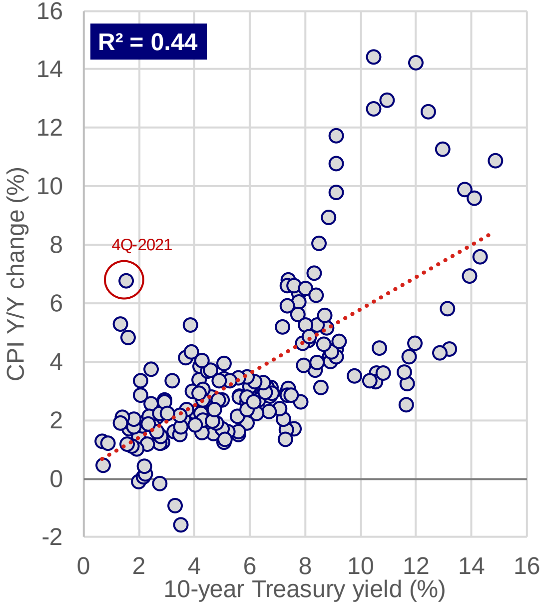
Breakeven inflation is the difference between the nominal yield on a fixed-rate investment and the real yield on an inflation-linked investment of similar maturity.
Source: Invesco Real Estate using data from Moody's Analytics and Blue Chip Economic Indicators as of February 2, 2022.

Will interest rates rise if inflation remains high?

Not necessarily; expect a mild increase, while absolute rates remain relatively low

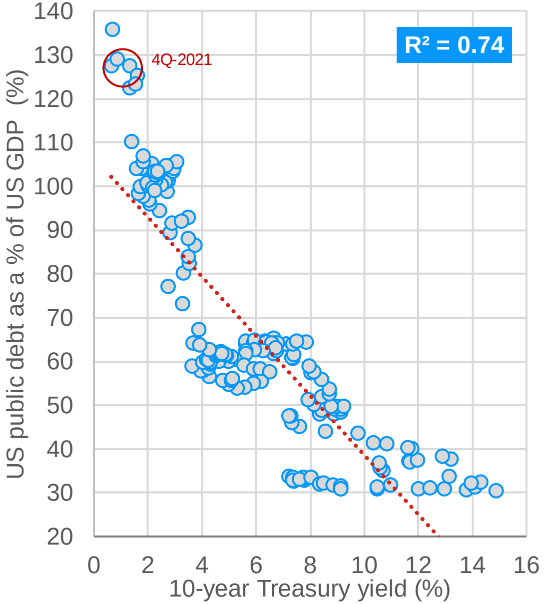
Interest rates and inflation

1Q-1976 to Q4-2021



Interest rates and government debt

1Q-1976 to Q4-2021



- While interest rates appear influenced by inflation, government borrowing relative to the size of the overall economy appears to be more impactful.
  - ✓ The correlation between interest rates and government debt is 0.74, compared to 0.46 between inflation and interest rates.
  - ✓ Higher ratios of public debt to GDP have been associated with lower interest rates.
  - ✓ The Q3-2021 ratio was 123%, down from a peak of 136%, but still historically high.
  - ✓ Since the relationship to inflation is persistent, a high debt ratio today implies low interest rates two to five years from now.
- Therefore, expect economic growth to eventually cause interest rates to lift while remaining on the low end of the historic range.

Source: Invesco Real Estate using data from Moody's Analytics as of February 2, 2021.

Private real estate and inflation

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Private real estate performance and inflation

Private real estate provides a better hedge against inflation vis-à-vis traditional asset classes

Inflation vs. asset classes

- ✓ Historically, inflation has been more highly correlated with private real estate returns than stocks or bonds.
- ✓ Real estate's inflation hedge derives from revenue streams that can more quickly adjust in an inflationary environment due to lease terms and structures.

Private real estate returns and inflation

- ✓ Historically, private real estate returns tend to be more highly correlated with economic growth than inflation.
- ✓ However, correlations between real estate and inflation have strengthened during higher inflationary periods.
- ✓ Historically, inflation correlations have been similar for both appreciation and income returns; during higher inflation periods, correlations have increased for both appreciation and income returns

Property sector returns and inflation

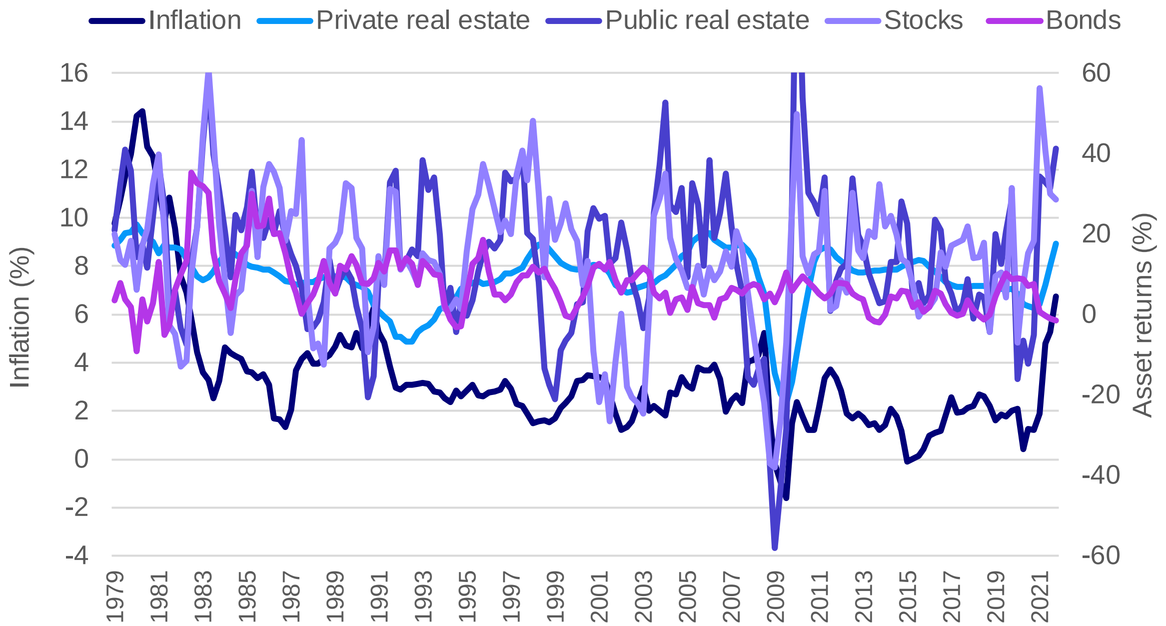
- ✓ Over the long term, inflation has had the highest correlation with the apartment and office sectors; correlations with the retail sector have been weak.
- ✓ During high inflation periods, inflation correlations increased substantially for apartment, industrial and office sectors; correlations with the retail sector remained weak.
- ✓ Preferred approach to hedge against inflation is to lean into property sectors and markets that are expected to deliver the best relative value.

Source: Invesco Real Estate as of February 2, 2022.

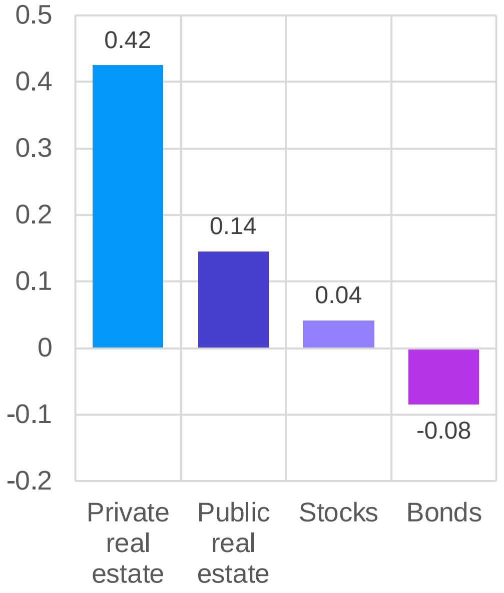
The long view: Inflation, real estate, stocks, and bonds

Private real estate returns are more highly correlated with inflation than other asset classes

Inflation and asset returns (Y/Y, %)



Correlation of annual returns and inflation 1Q-1978 to 4Q-2021



Private real estate = NCREIF Property Index (NPI); Public Real Estate = NAREIT All Equity REIT Index; Stocks = S&P 500 Index; Bonds = Bloomberg US Aggregate Bond Index. Since inception returns for NPI are from 1Q-1978 to 4Q-2021. You cannot directly invest in an index.

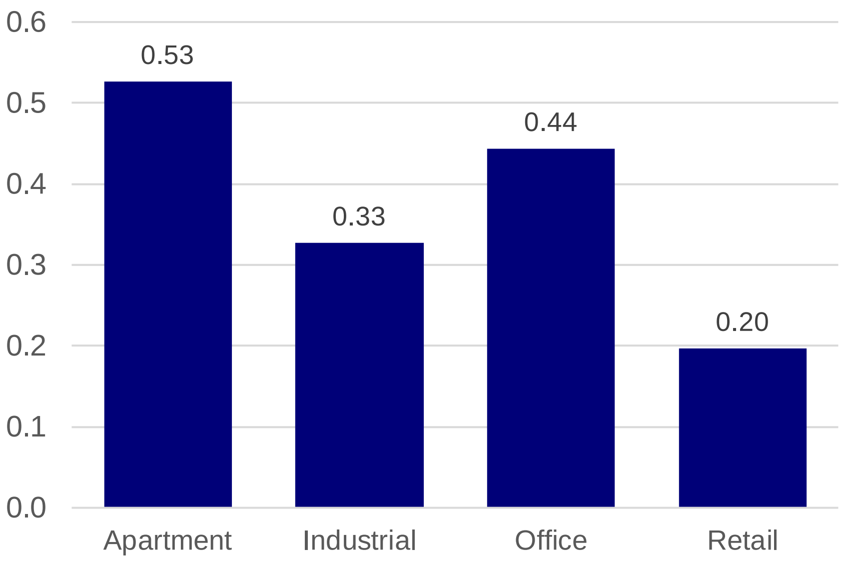
Source: Invesco Real Estate using data from NCREIF, and Moody's Analytics as of February 2, 2022. Past performance in not indicative of future results.

Inflation correlations: Components of return and property sectors

Strength of correlations similar for return components, but varies by property sector

Correlation between inflation and return components 1Q-1978 to 4Q-2021

Correlation between inflation and property sector returns 1Q-1978 to 4Q-2021

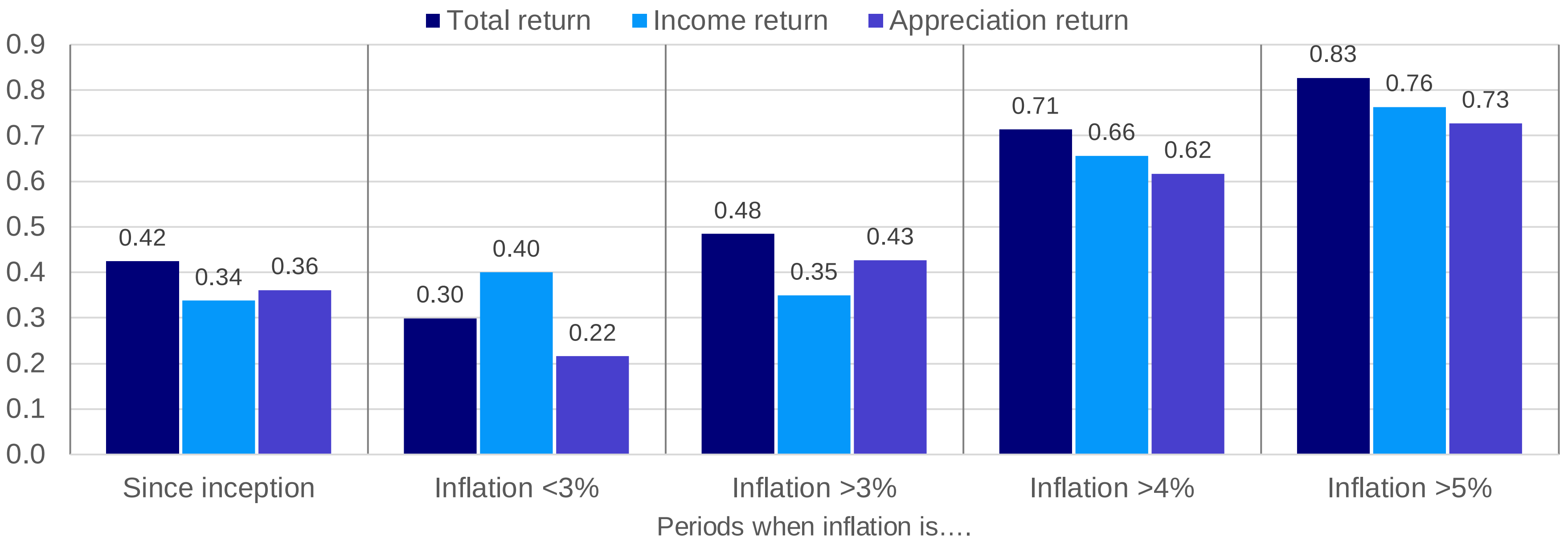


Since Inception returns for NPI (NCREIF Property Index) are from 1Q-1978 to 4Q-2021. You cannot directly invest in an index.
Source: Invesco Real Estate using data from NCREIF and Moody's Analytics as of February 2, 2022. Past performance is not indicative of future results.

Correlations during periods of higher inflation

Real estate and inflation are more highly correlated during periods of higher inflation

Correlations between inflation and private real estate returns: 1Q-1978 to 4Q-2021

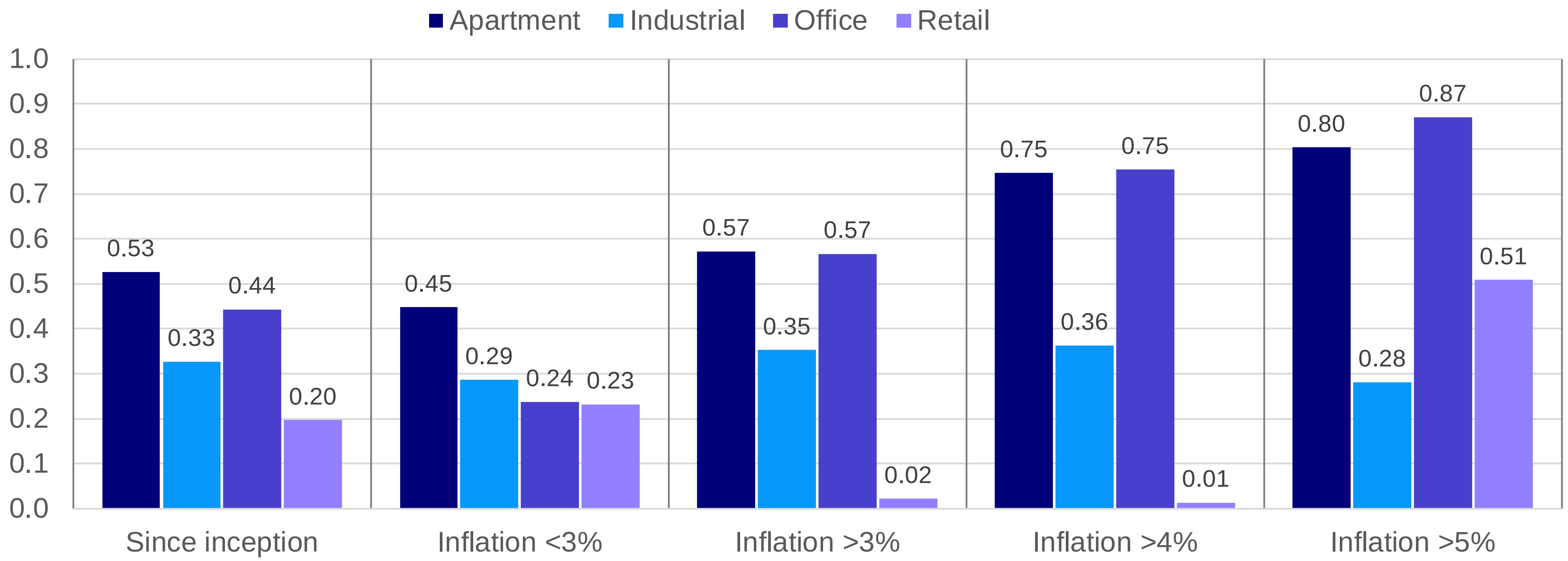


Since Inception returns for NPI (NCREIF Property Index) are from 1Q-1978 to 4Q-2021. You cannot directly invest in an index.
Source: Invesco Real Estate using data from NCREIF and Moody's Analytics as of February 2, 2022. Past performance is not indicative of future results.

Sector correlations during periods of higher inflation

All sectors have served as effective hedges against inflation, but retail less so

Correlation between inflation and real estate sector total returns: 1Q-1978 to 4Q-2021



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Source: Invesco Real Estate using data from NCREIF and Moody's Analytics as of February 2, 2022. Past performance is not indicative of future results.

Factors impacting real estate's responsiveness to inflation

Favorable lease terms and structures contribute to the sector's inflation hedge characteristics

Raising rents

- ✓ Commercial real estate can typically respond to rising prices during times of economic growth by increasing rents.
- ✓ The ability to raise rents can also offset rising property operating/ownership costs due to inflation.

Lease term and structure

- ✓ The ability and swiftness to increase rents varies across property sectors depending on underlying lease terms.
- ✓ Sectors with shorter lease terms, such as residential and storage, can more quickly respond.
- ✓ Inflationary cost exposure will also depend on prevailing lease structures and whether the tenant or the owner is responsible for property-level operating and maintenance costs (net versus gross leases).

Demand pull inflation

- ✓ Rising prices driven by demand outpacing supply (e.g., stimulus) is typically associated with an expanding economy.
- ✓ An expanding economy would broadly support increased demand for all real estate sectors, driving revenue.

Cost push inflation

- ✓ Rising prices driven by supply constraints (e.g., supply-chain challenges) could negatively impact material costs, impacting real estate construction if this is not associated with increased demand and the ability to raise rents.
- ✓ Rising construction costs could act as a governor on new supply, potentially benefiting owners of existing product.

Source: Invesco Real Estate as of February 2, 2022. Past performance is not indicative of future results.

Lease term/structures and ability to respond to inflation

Sectors with shorter lease terms can adjust quickly; net leases reduce landlord price exposure

Shorter lease terms

Month-to-month lease terms:

- Self-storage, senior housing

One-year lease terms:

- Apartment, single-family rental, student housing, manufactured homes

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- Property sectors characterized by shorter lease terms allow the owner to quickly reset rents during an inflationary period.
- For residential sectors, the tenant is responsible for utility costs and the landlord for all other operating and maintenance costs; for self-storage, the landlord is responsible for all operating and maintenance costs.

Longer lease terms

3-10-year lease terms:

- Industrial, office, medical office, life science, retail, data centers
- Large anchor tenants tend to have longer lease terms, often with predefined option periods/rents.

- Property sectors characterized by longer lease terms allow the owner to reset rents only for expiring leases.
- Longer-term leases typically include pre-set rent increases to offset inflation during the term, but these can vary in magnitude and timing.
- Lease structures (operating and maintenance cost responsibility) can also vary widely exposing either the tenant or owner to rising prices:
    - Triple net: tenant's responsibility
    - Full gross: owner's responsibility
    - Modified gross: tenant's responsibility above a base-year stop

Source: Invesco Real Estate as of February 2, 2022. Past performance is not indicative of future results.

Private real estate and bond yields

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Private real estate and bond yields
A rise in bond yields does not necessarily foretell a rise in cap rates

Bond yields and cap rates

- ✓ Historically, over the long-term, bond yields and cap rates have been highly correlated; for the past 30 years, both have been in a period of secular decline. But short-term changes are weakly correlated.
- ✓ Since 1993, there have been seven periods when 10-year Treasury yields moved higher for at least three consecutive quarters; in six of these periods, cap rates actually declined.
- ✓ Over the short term, changes in economic growth and capital flows are more highly correlated with cap rate movements, with correlations of 0.65 and 0.76 respectively; the correlation with changes in bond yields is zero.
- ✓ Rising long-term bond yields often portend a strengthening economy, which is typically positive for real estate demand and revenue growth, mitigating the impact of bond yield expansion on cap rates.
- ✓ The strength of capital flows can play a similar role and counter upward pressure on cap rates from rising bond yields. Capital flows to the sector are currently at historic highs.

Outlook

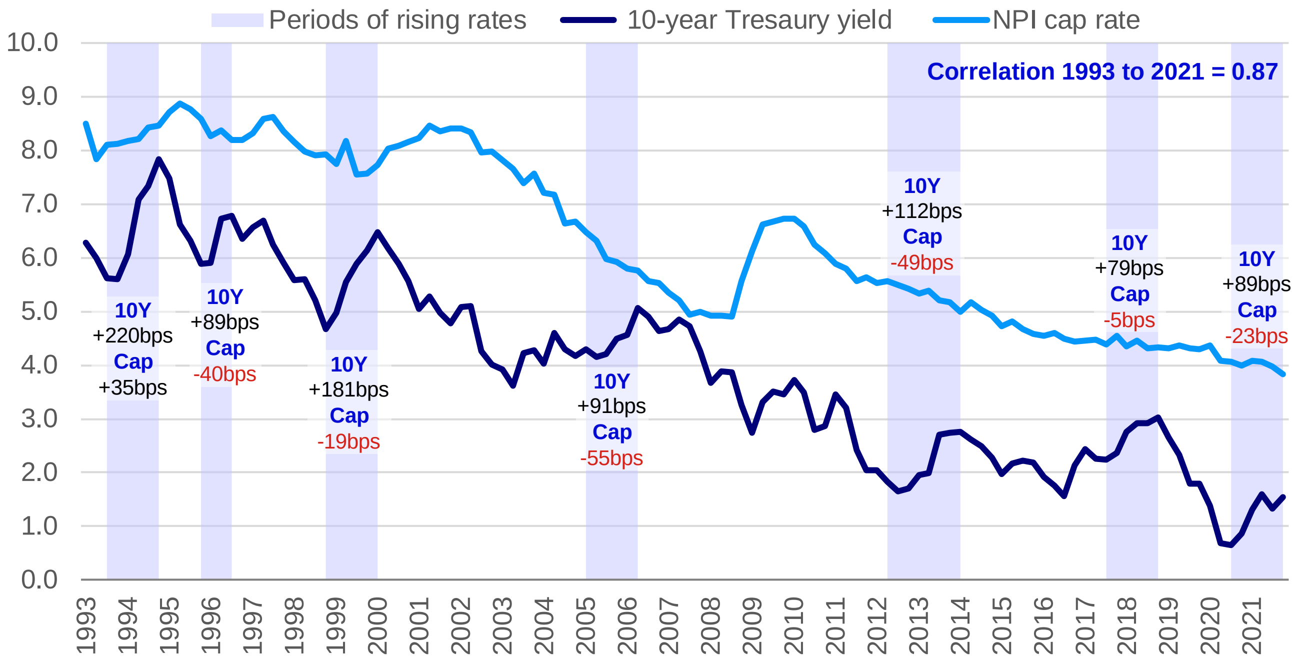
- ✓ Expect economic growth to eventually cause long-term bond rates to rise from current levels but remain on the low end of the historic range in absolute terms, with elevated levels of government debt acting as a regulator.
- ✓ Expect cap rate movement to be more influenced by the near-term direction of economic growth and capital flows than bond yields.

Source: Invesco Real Estate as of February 2, 2022.

Will real estate cap rates expand if interest rates rise?

Not necessarily; strength of capital flows and macroeconomy more impactful in short term

10-year Treasury yields and cap rates (%)



Since 1993:

Cap rates declined in **6 of 7 periods** when **10-year bond yields expanded** for three consecutive quarters or more

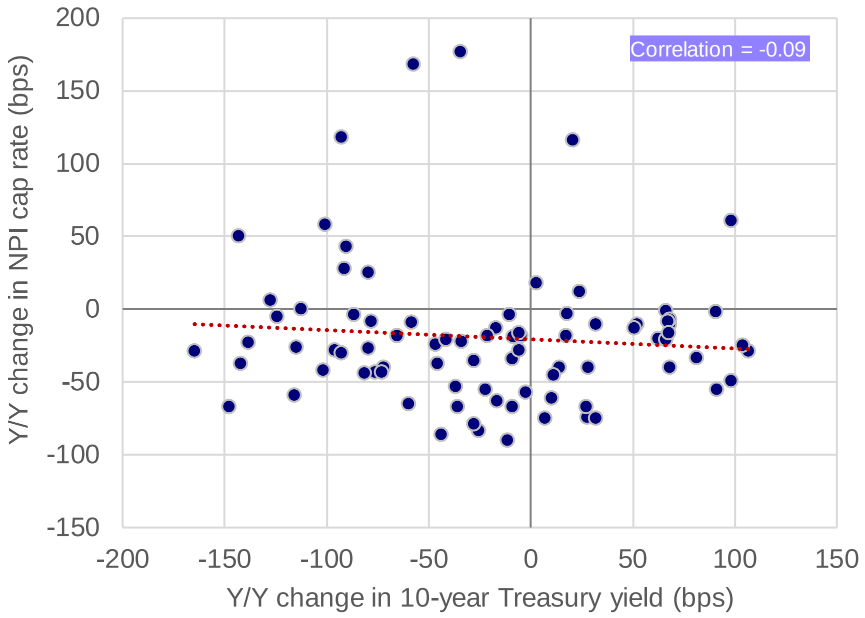
Periods of rising rates = periods when the 10-year Treasury yield moved higher for at least three consecutive quarters. NPI cap rate = current value cap rate.
Source: Invesco Real Estate using data from Moody's Analytics and NCREIF as of February 2, 2022. Past performance in not indicative of future results.

Real estate yields and rising interest rates

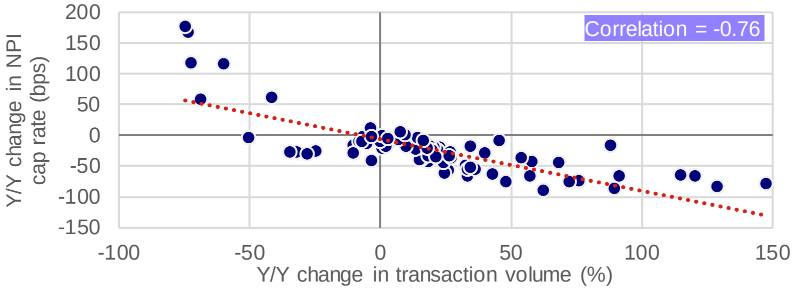
Short-term relationship is nonexistent; capital flows and economy more important

Relationship between bond yields and cap rates

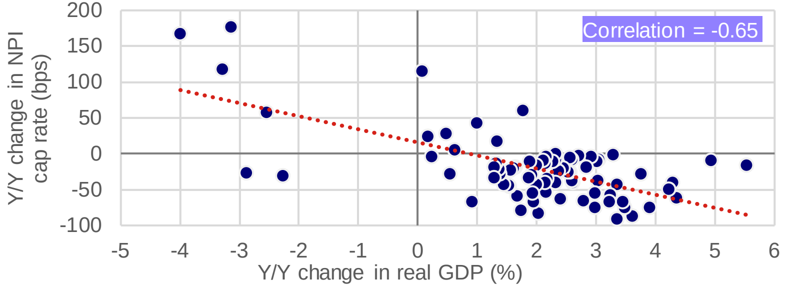
2001.1 to 2021.4



Relationship between capital flows and cap rates: 2001.1-2021.4



Relationship between economic growth and cap rates: 2001.1-2021.4



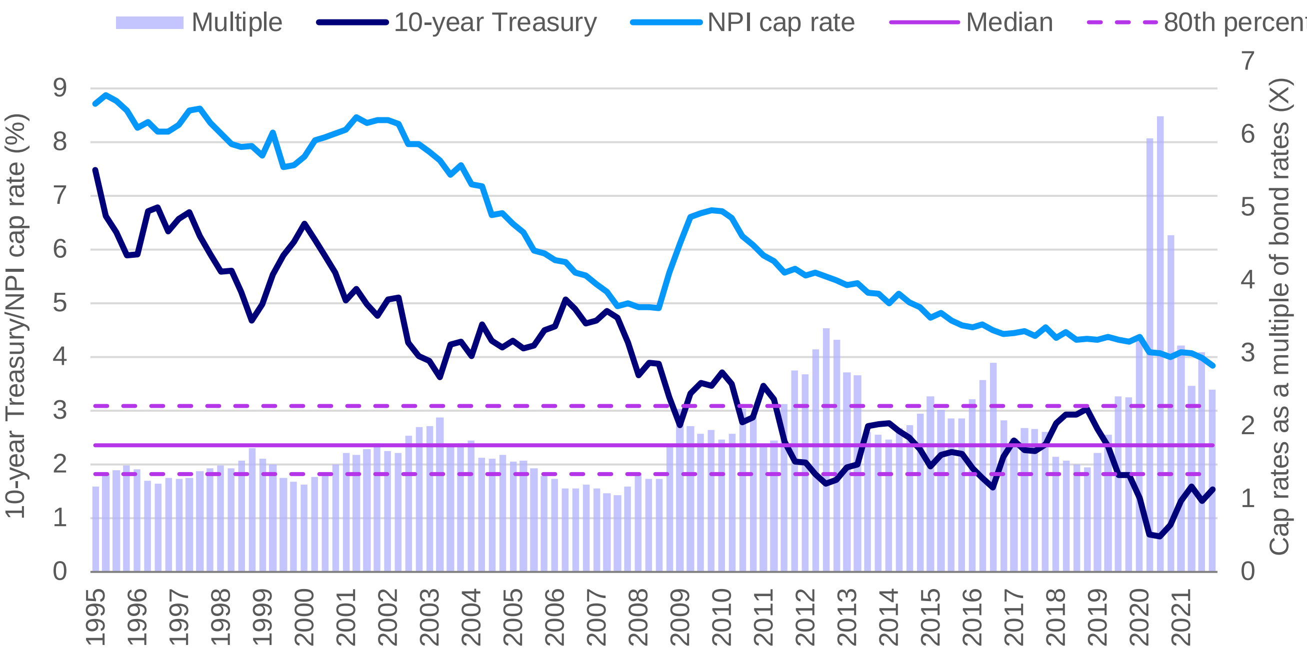
NPI cap rate = current value cap rate.

Source: Invesco Real Estate using data from Moody's Analytics and NCREIF as of February 2, 2022. Past performance in not indicative of future results.

Relative pricing: Where is the real estate yield premium today?

Multiples of government bonds to cap rates remain above long-term levels

Cap rates, bond rates, and multiples: 1Q-1995 to 4Q-2021



Current relative pricing appears favorable:
The Q4-2021 multiple between the NPI cap rate and the 10-year Treasury yield averaged 2.5x, notably higher than the long-term median multiple of 1.7x.

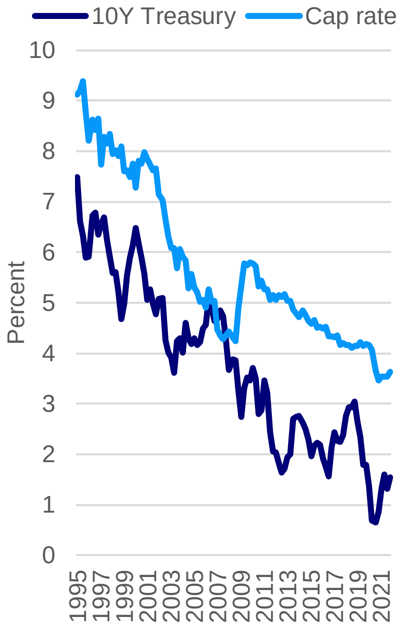
Room for movement:
Based on long-term metrics, and assuming cap rates remain unchanged, 10-year Treasury yields could rise to 2.9% before cap rate multiple falls below the normal long-term range.

NPI cap rates are quarterly current value cap rates; 10-year Treasury yields are average yields for the quarter; long-term medians and percentiles based on time period 1Q-1995 to 4Q-2021. You cannot directly invest in an index.
Source: Invesco Real Estate using data from Moody's Analytics as of February 2, 2022. Past performance in not indicative of future results.

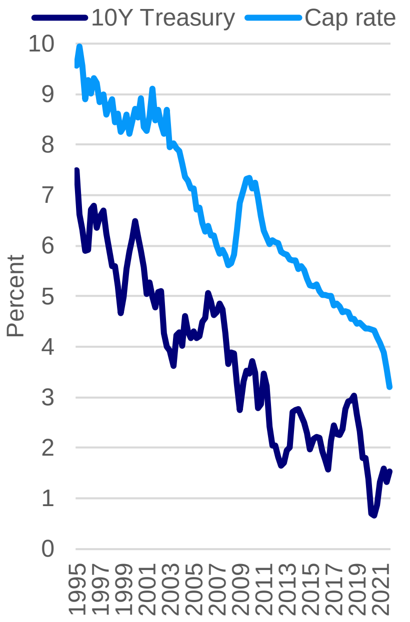
Relationship between bond yields and cap rates by property type

Correlated over the long-term trend, but not over the short term

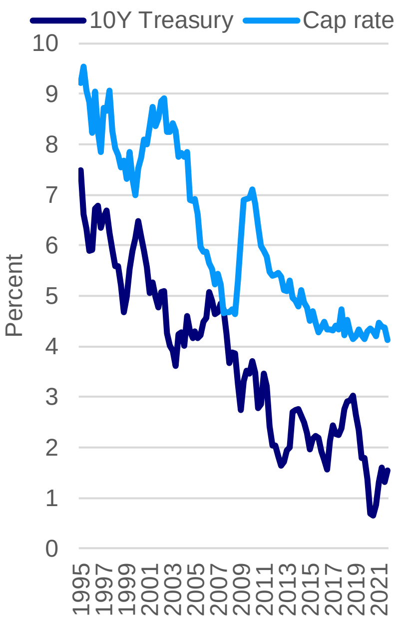
Apartment



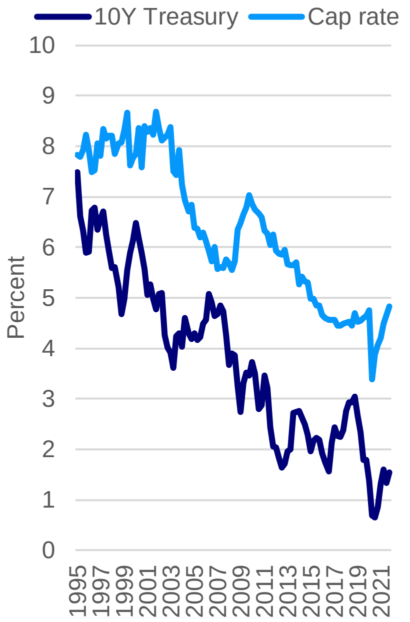
Industrial



Office



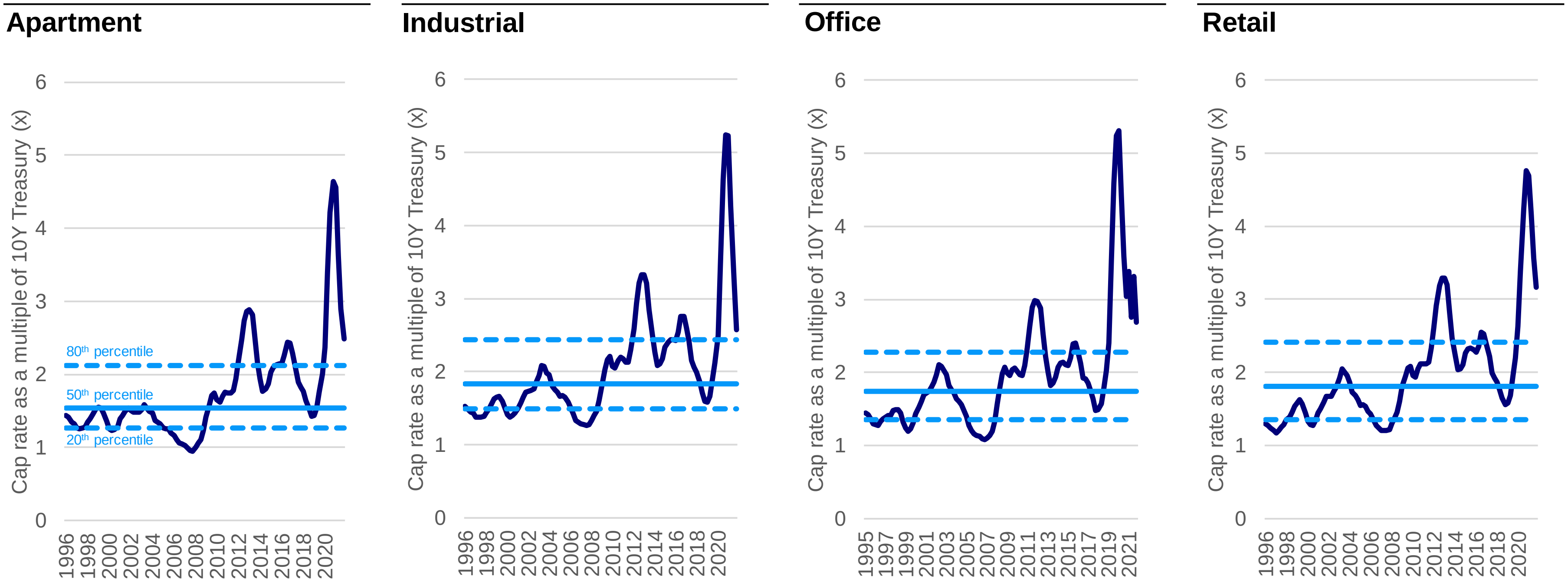
Retail



Cap rate = NPI current value cap rate.
Source: Invesco Real Estate using data from Moody's Analytics and NCREIF as of February 2, 2022

Relationship between bond yields and cap rates by property type

Cap rate multiples currently wide of normal range across property types



Cap rate = NPI current value cap rate. Multiple = cap rate as a multiple of the 10-year Treasury yield, trailing four-quarter average.
Source: Invesco Real Estate using data from Moody's Analytics and NCREIF as of February 2, 2022

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