

MACQUARIE ASSET MANAGEMENT

Pathways

Property and inflation: How reliable an inflation hedge is commercial property?

February 2022

03

Introduction

06

Inflation hedge mechanics and return drivers

10

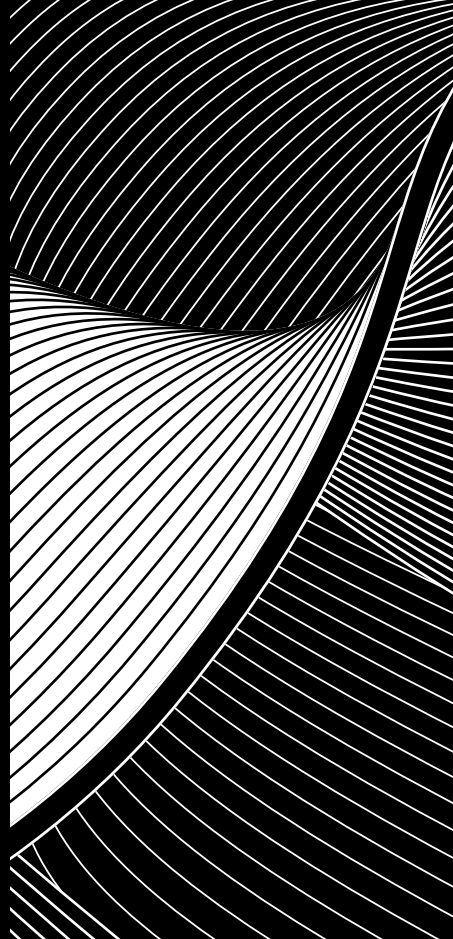
Global property benchmarks: Extending the period of analysis to provide a fuller picture of the dynamics

13

Property and inflation – Real returns over time and performance relative to other asset classes

17

Conclusions



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Investing in the real estate industry includes risks such as declines in real estate value, lack of availability of mortgage funds, overbuilding, extended vacancies, increases in property taxes, changes in zoning laws, costs from cleanup of environmental problems, uninsured damages, variations in rents, and changes in interest rates.

Narrowly focused investments may exhibit higher volatility than investments in multiple industry sectors.

International investments entail risks including fluctuation in currency values, differences in accounting principles, or economic or political instability in other nations. Fixed income securities and bond portfolios can lose value, and investors can lose principal as interest rates rise. They also may be affected by economic conditions that hinder an issuer's ability to make interest and principal payments on its debt. This includes prepayment risk, the risk that the principal of a bond that is held by a portfolio will be prepaid prior to maturity at the time when interest rates are lower than what the bond was paying. A portfolio may then have to reinvest that money at a lower interest rate.

The risk that the value of a portfolio's shares will be affected by factors particular to Real Assets Securities and related industries or sectors (such as government regulation) and may fluctuate more widely than that of a portfolio that invests in a broad range of industries.

Natural or environmental disasters, such as earthquakes, fires, floods, hurricanes, tsunamis, and other severe weather-related phenomena generally, and widespread disease, including pandemics and epidemics, have been and can be highly disruptive to economies and markets, adversely impacting individual companies, sectors, industries, markets, currencies, interest and inflation rates, credit ratings, investor sentiment, and other factors affecting the value of the Portfolio's investments. Given the increasing interdependence among global economies and markets, conditions in one country, market, or region are increasingly likely to adversely affect markets, issuers, and/or foreign exchange rates in other countries. These disruptions could prevent the Portfolio from executing advantageous investment decisions in a timely manner and could negatively impact the Portfolio's ability to achieve its investment objective. Any such event(s) could have a significant adverse impact on the value and risk profile of the Portfolio.

Inflation is the rate at which the general level of prices for goods and services is rising, and, subsequently, purchasing power is falling. Central banks attempt to stop severe inflation, along with severe deflation, in an attempt to keep the excessive growth of prices to a minimum.

Gross domestic product is a measure of all goods and services produced by a nation in a year. It is a measure of economic activity.

The Bloomberg Global Aggregate Index provides a broad-based measure of the global investment grade fixed-rate debt markets.

The Consumer Price Index (CPI) is a measure of inflation, representing changes in prices of all goods and services purchased for consumption by households.

The Global Real Estate Funds Index (GREFI) measures net asset value performance of non-listed real estate funds on a quarterly basis. Performance is measured net of fees and other costs, and represents the aggregate investor return.

The MSCI World Index represents large- and mid-cap stocks across 23 developed market countries worldwide. The index covers approximately 85% of the free float-adjusted market capitalization in each country.

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Introduction





Commercial real estate's strong linkages with economic growth means the asset class should provide a good hedge against high and rising inflation, with property valuations and cash flows moving in line with changes in broader prices. This could ensure real return rates (nominal returns after inflation) for property remain broadly stable during different inflationary environments, after controlling for other macro drivers such as gross domestic product (GDP) growth and interest rates.

In this paper, we test global real estate's inflation hedge characteristics both in absolute terms against rising inflationary pressures and on a relative basis compared with other risk asset classes such as global equities. We examine the performance of global real estate during different inflationary periods since the mid-1980s using data from the US, Europe, and Asia Pacific.¹ We also examine the performance of different US sectors, including retail, office, industrial, and multifamily. Data limitations restrict our ability to test the global inflation-hedging characteristics of alternative sectors, such as student housing, manufactured homes, and data centres, but this would be a useful extension as longer time series become available, particularly outside the US market.

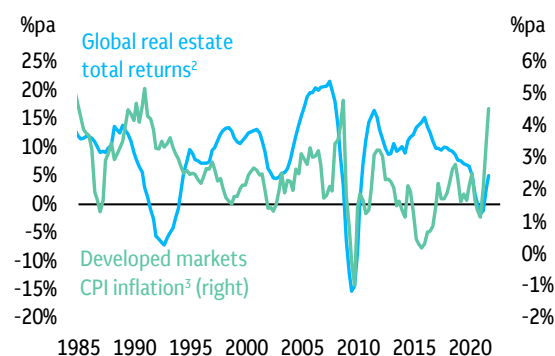
1. All data are on an unleveraged, pre-fee basis.

2. Developed markets included in the calculation of CPI inflation include the US, euro zone, UK, and Japan. The markets are weighted by real GDP measured in 2015 prices and US dollars as estimated by Oxford Economics.

3. ANREV is the Asian Association for Investors in Non-Listed Real Estate Vehicles. INREV is the European Association for Investors in Non-Listed Real Estate. NCREIF is the National Council of Real Estate Investment Fiduciaries, which is the US equivalent of ANREV and INREV.

We find that over long investment periods (30-plus years), global real estate has generated a strong average real return of around 6.7% per annum in developed markets.² On an absolute basis, while global real estate's performance tends to slow when inflation rises to high levels (>4%), total returns have tended to remain positive in that quarter. Beyond that quarter, the extent to which returns remain positive depends heavily on the response of central banks to high and rising inflation and whether economic growth subsequently slows in reaction to tightening financial conditions.

Figure 1
Global real estate total returns vs. developed markets headline consumer price index (CPI) inflation¹



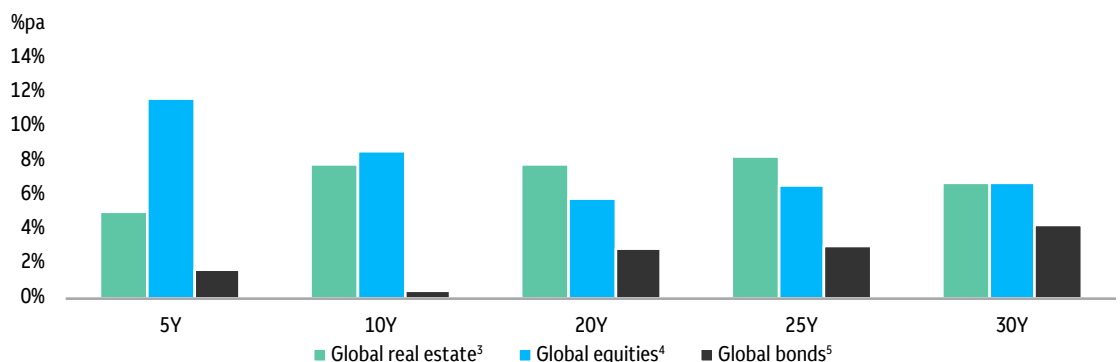
Sources: 1. MAM Real Estate Strategy, Bloomberg, JLL, Oxford Economics, PMA, as at November 2021. 2. Global real estate total returns are weighted annual average total returns across the office, industrial, and retail sectors for the US, Europe, and Asia Pacific regions. Market and sector total returns are weighted by ANREV, INREV, and NCREIF's³ Global Real Estate Fund Index allocations, which are currently North America (45%), Europe (35%), and Asia Pacific (20%), and office (45%), retail (35%), and industrial (20%). 3. Developed markets CPI inflation is the annual percent change of the weighted average CPI indices for the US, euro zone, Japan, and UK. Country CPI indices are weighted by real GDP in US dollar 2015 constant prices and exchange rates.

Overall, historical property returns continue to show that the best and most sustainable environment for real estate performance remains one of solid global growth, subdued inflation, and low cash rates, which supports cap rate compression and moderate income growth. This is what we saw in the decade ended 2019. During this period, real returns for global real estate averaged around 9.4% per annum on an unleveraged basis (asset level returns), which is well above the 30-year average.

Importantly, though, we find that property performance remains healthy compared with that of global equities as inflation rises above

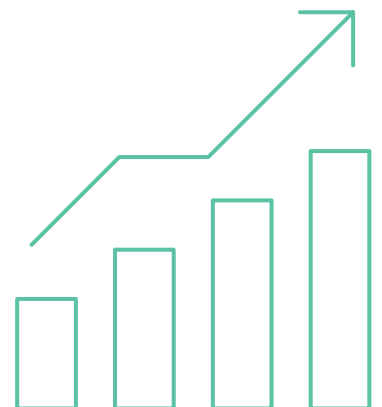
3%. This suggests that commercial real estate can potentially provide a better hedge against rising prices than global equities can, at least during a quarter when inflation rises sharply. As such, investors with a view that markets and central banks are underestimating the risk of higher inflation over the medium term (three to five years) may be well served by increasing their allocations to real assets, including commercial real estate over the next couple of years, particularly in those sectors and regions where real estate has done well during inflationary periods or is expected to continue to perform well.

Figure 2
Average annual inflation-adjusted total returns by sector (total returns are adjusted for developed markets CPI inflation)^{1,2}



Sources: 1. MAM Real Estate Strategy, Bloomberg, JLL, Oxford Economics, PMA, as at November 2021. 2. Developed markets CPI inflation is the annual percent change of the weighted average CPI indices for the US, euro zone, Japan, and UK. Country CPI indices are weighted by real GDP in US dollar 2015 constant prices and exchange rates. 3. Global real estate total returns are weighted annual average total returns across the office, industrial, and retail sectors for the US, Europe, and Asia Pacific regions. Market and sector total returns are weighted by ANREV, INREV, and NCREIF's Global Real Estate Fund Index allocations, which are currently North America (45%), Europe (35%), and Asia Pacific (20%), and office (45%), retail (35%), and industrial (20%). 4. MSCI World Index, as at November 2021. 5. Bloomberg Global Aggregate Total Return Index Value Unhedged USD, as at November 2021.

Inflation hedge mechanics and return drivers





An asset's return is the amount by which the value of the asset appreciates or depreciates plus any income received from that investment. For conventional or traditional bonds, the income is the coupon payment which is fixed in nominal terms. Capacity for capital growth if held to maturity is limited by the fact that standard bonds are issued with a fixed maturity date, at which point they are redeemable at their par value.

All else being equal, lower inflation which results in an equal downward movement in nominal interest rates boosts the value of existing bonds as their outstanding coupon payments are discounted at lower rates. Conversely, rising inflation and interest rates negatively impact the value of a bond as both

the coupon and the par value on conventional bonds are fixed in nominal terms. Therefore, rising inflation tends to negatively impact bond prices, as a bond's value needs to fall to offer investors a higher nominal return to compensate them for the rise in inflation.

In contrast, the returns on both equities and real estate are more flexible, offering the possibility both that incomes (dividends and rental incomes) and capital values (equity prices and real estate valuations and sales prices) may adjust to offset rising inflation. For commercial real estate, capital growth comes via any uplift relative to the purchase price or book value from independent revaluations and eventually the realisation of gains on sale in private or public markets.

For global equities, the income of an individual stock is its dividend payment, which is linked to corporate profits. Profits and earnings are linked to broader macro conditions and inflation rates. Provided that economic growth is not affected by inflation, then profits, dividends, and discount rates should move in line with inflation. As a result, nominal equity returns should also rise in the same direction and in line with inflation. However, depending upon the causes of the inflation shock, the assumption that an inflation shock does not impact real growth may not always hold, as in the case of the energy-related shock in the 1970s where high inflation hurt growth.

Discounted cash flow approach to valuing real estate

The hedging characteristics of commercial real estate can be considered in the context of a simple discounted cash flow (DCF) valuation model. Real estate values are equal to the present value of future net operating income flows discounted by the appropriate discount rate.

In theory, a change in the current and future path of inflation would be expected to result in an equal change in the future growth of rental incomes and the discount rate, which ensures the capitalised value remains unchanged in real terms. That is, both real estate cash flows and capital valuations should move in line with inflation, keeping total returns unchanged in real terms. This, of course, implicitly assumes that an inflation shock does not impact the broader economy and real growth of cash flows, which may not necessarily be the case.

Real estate income returns take the form of contractual rents paid by the occupier or tenant to the landlord or investor. Market rents should grow at least in line with inflation over long time periods, given linkages to underlying construction cost inflation and broader macro conditions which drive demand and supply of real estate space.

If market rents were failing to keep up with broader inflationary pressures and construction costs, development activity would likely slow as development returns and profit margins come under pressure. That is, construction costs associated with building a property would outstrip the expected operating incomes from leasing up the asset. As such, supply would tighten, rental growth would pick up, and occupancy costs for tenants would adjust to the higher general level of prices in the economy. Higher market rents would eventually feed into higher operating incomes and stabilisation of construction activity. Conversely, if rents and operating

incomes were growing well above inflation, providing investors with a high real return on their capital, developers would likely respond by increasing construction, which would eventually dampen rental growth.

Leasing contracts can provide protection against inflation in some markets and sectors

In practice, property leases in some markets and sectors have contractually specified annual uplifts which are typically indexed to CPI inflation (or higher) on an annual basis, although this is not always the case. These rental “escalators” are useful in protecting the cash flows from inflation and dampening the immediate negative impact of demand and supply shocks on incomes.

In markets with long duration leases, such as Australia where terms for central business district (CBD) office space are often seven-plus years, rents are typically reset annually at rates that exceed the previous 12 months’ CPI inflation rates (typically 3-4% per annum). Elsewhere in the Asia Pacific region, the duration of leases is typically much shorter at two to three years (reflecting the faster pace of economic activity relative to many developed markets), which means rents can be quickly rebased at expiry to a level consistent with the higher prices.

Commercial lease contracts are also relatively long-term in the UK, averaging seven years, and nearly all provide for a rental review if the lease term is more than five years. Rents are usually reviewed and revised to the level of the prevailing market at that time, supported by a provision that the change is based on upward-only revisions. Other common leasing structures in the UK include fixed uplift rents, index-linked rents, and turnover rents, all of which provide the investor with some comfort that rents can grow in line with inflation.

Other drivers of real estate performance

As with global equities, real estate values and cash flows may also change in response to a broader set of macro drivers than just inflation, which can make it difficult to isolate the inflation-hedging characteristics of property. For example, global macro events such as the 2008-2009 global financial crisis (GFC) and COVID-19 can hurt the demand and supply dynamics of real estate. In fact, strong global macro conditions tend to increase real estate prices and cash flows, whereas weak growth and supply shocks tend to do the opposite. Beyond a certain threshold, rising cash rates, which ultimately lead to slower economic growth, also tend to negatively impact the performance of risk assets, including real estate.

Property supply cycles within the sector will also impact pricing, with rents and vacancies coming under pressure and market growth slowing or turning negative in major downswings such as the early 1990s recession, the 2001 dot-com downswing, and the GFC. This often happens as developers and lenders become more aggressive during an economic expansion, which is typically when broader inflationary pressures rise.

Moreover, given the long lead times required to develop real estate, supply of commercial real estate generally responds to above-average demand conditions with a lag. As such, inflation-adjusted real estate returns tend to increase when real estate assets are in demand and decrease when supply is plentiful.

Figure 3:
Strong linkages between global GDP growth and global property returns¹



Sources: 1. MAM Real Estate Strategy, Bloomberg, JLL, Oxford Economics (forecasts), PMA, as at November 2021. 2. Global real estate total returns are weighted annual average total returns across the office, industrial, and retail sectors for the US, Europe, and Asia Pacific regions. 3. World GDP estimated as real (in 2015) * GDP, nominal (in 2015) / exchange rate per \$US, period average (in 2015), in \$US millions.

Global property benchmarks: Extending the period of analysis to provide a fuller picture of the dynamics





In this paper we aggregate real estate data for Europe, US, and Asia Pacific markets to construct a global returns series from the mid-1980s onwards across sectors (office, industrial, and retail). European data is sourced from Property Market Analysis (PMA), US data from the National Council of Real Estate Investment Fiduciaries (NCREIF), and Asia Pacific data from Jones Lang LaSalle (JLL).

The global returns series is constructed in local currency by weighting the returns using the market caps of real estate on a regional basis. The industry bodies of ANREV, INREV, and NCREIF estimate the value of core institutionally managed real estate in Asia Pacific, Europe, and the US respectively in the construction of their Global Real Estate Funds Index (GREFI). This index is based on the performance of their member funds. We adopt their estimated market weights of US (45%), Europe (35%), and Asia Pacific (20%) in constructing a global property index. The sector weights are office (45%), retail (35%), and industrial (20%).

The GREFI index has been in existence on a quarterly basis since only March 2005, which limits its usefulness in assessing the performance of real estate during different inflationary environments. The index used

in this paper dates from the mid-1980s and so provides a fuller historical view of the asset class's performance during different inflationary periods.

Global unleveraged real estate returns index

The global returns series measures the performance of core real estate on an unleveraged basis and pre-management fees and performance incentives. The index excludes the performance of debt secured against real estate (private real estate debt), land, development sites (at least prior to the point where the asset is valued as a fully leased property or sold as a fully stabilised asset), and opportunistic investments which would boost real estate's historical returns. Including leverage and developments in the index would likely boost returns during upswings but amplify volatility during downswings.

The index focuses on the performance of equity investments in core stabilised income-producing assets, which is traditionally how real estate has been benchmarked against other asset classes. There are a couple of reasons for this:

- First, institutional investors such as pension funds, insurance companies, and sovereign wealth funds tend to allocate most of their real estate allocation to core property (70%+), with the remaining portion allocated to higher risk-return strategies.
- Second, the returns of development and opportunistic investments are lumpy during the construction phase or investing phase, with the full valuation uplift only being realised on sale. For these reasons we focus on the performance of core real estate in this paper.

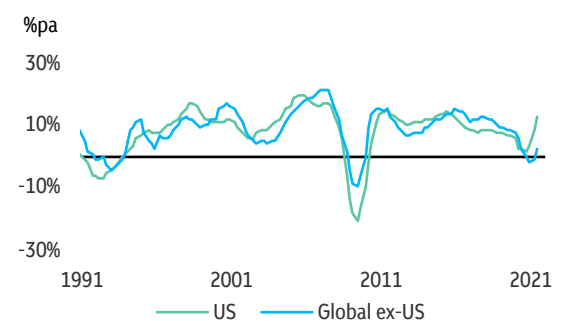
Typically, between 75% and 80% of core real estate's total return comes from income, with the remaining percentage driven by capital growth. As annual rental cash flows provide most of the total returns over most years and subperiods, looking at returns in real terms emphasises the need to maintain and protect income, particularly in higher inflation environments.

Separately, we also benchmark NCREIF's US National Property Index (NPI) against inflation and other asset classes given the series has been in existence since the late 1970s and, importantly, covers the multifamily residential sector. NCREIF's NPI index measures the performance of core unleveraged real estate across the traditional asset classes (office, retail, multifamily, retail, and hotels) based on a sample of \$US742 billion in property across more than 9,500 investment grade, income-producing properties as at June 2021.

The relatively higher volatility of US real estate reflects the dampening impact of diversifying exposure across global markets and sectors, particularly during downswings. Moreover, often there are lags with how quickly local property values and returns respond to global events such as the GFC, dot-com crash, and

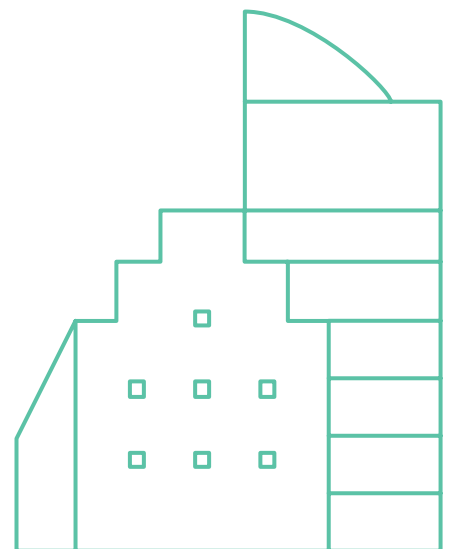
COVID-19, particularly if transactional evidence and comparable sales results dry up, which often occurs in downswings. With different markets responding at different speeds during downswings and upswings, the result is that the volatility of global exposure tends to be dampened relative to individual markets, as shown in Figure 4 between global and US real estate exposure.

Figure 4:
Global ex-US vs. US property total returns¹



Sources: MAM Real Estate Strategy, Bloomberg (NCREIF), JLL, PMA, as at November 2021.

Property and inflation – Real returns over time and performance relative to other asset classes





In this section we examine empirically how property has performed in high inflation periods. Specifically, we:

- calculate property's real return over time and in different five-year intervals
- examine its real return compared with listed equities and do that at different inflation thresholds
- compare real returns across different sectors (retail, office, industrial, and multifamily) and different geographies.

Global real estate's real return through time

Here we benchmark global real estate against headline CPI inflation for key developed markets, including the US, euro zone, Japan, and the UK, weighting each by real GDP measured in average prices and exchange rates versus US dollars for 2015. For 2021, this would equate to weights of US (50%), euro zone (31%), Japan (11%), and UK (8%).

Historically, global and US real estate have performed solidly over the past four decades and through different inflationary periods. Global real estate has delivered positive real long-run returns of around 6.2% per annum over the past 30 years. Over the same period, US real estate has delivered a real return of 5.8% per annum. Asia's commercial real estate markets have lifted global real estate's

performance relative to the US, particularly leading up to and during the 2008-2009 GFC period.

Looking at five-year intervals, global real estate has delivered positive annual real returns in each of these periods since the early 1980s, except for the 1991-1995 period. This reflects the downswing in commercial real estate in developed markets during the early 1990s recession, which was exacerbated by excess supply. Over the same period, US real estate has delivered a positive real return in seven out of the eight five-year periods, with the only exception again being the early 1990s when excess overbuilding severely impacted fundamentals. During this period, high vacancies limited the ability of owners to collect rents and service their debts, resulting in a sharp rise in arrears and defaults, which impacted the US savings and thrift banks that found themselves overexposed to commercial real estate following years of strong lending to the sector.

Figure 5:
Real (total) returns on property –
five-year intervals¹



Sources: 1. MAM Real Estate Strategy, Bloomberg (NCREIF), JLL, Oxford Economics, PMA, as at November 2021. 2. Global real estate total returns are deflated by developed markets CPI inflation. 3. Deflated by US CPI inflation.

Global real estate's performance during different inflationary periods

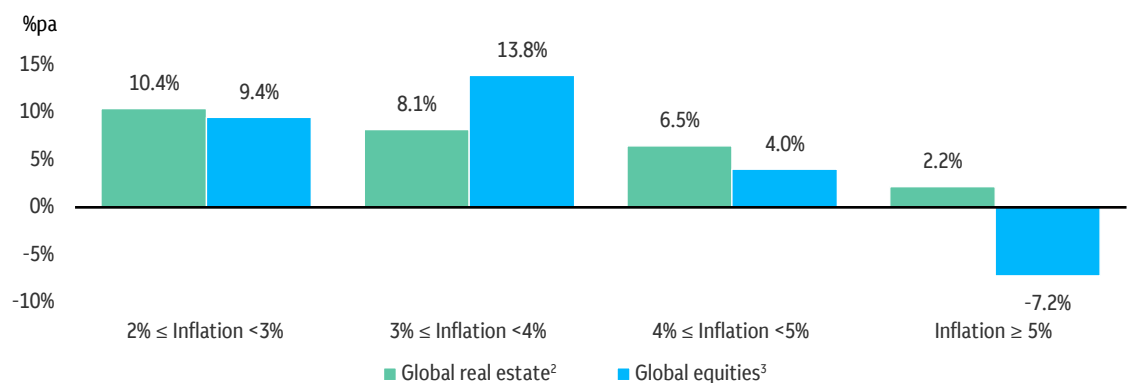
Here we benchmark global and US real estate quarterly total returns against global equity total returns (represented by the MSCI World Index) under different inflation rates for developed markets since the mid-1980s. The results show that average quarterly returns for global and US real estate slow with higher inflation but remain positive. Slower returns may reflect a combination of actual or expected monetary tightening as central banks raise cash rates to cool the economy and excess property supply, which tends to come on stream following an extended economic and credit expansion.

Importantly, though, global real estate returns have outstripped global equities as inflation has risen. For example, annual total returns

have averaged 6.5% when the annual inflation rate for developed markets has increased to at least 4% and has averaged 2.2% when inflation is above 5%. By contrast, returns for global equities have slowed to 4.0% per annum when annual inflation reaches 4% and have turned negative when inflation is above 5% as markets begin to price in the risk of tighter monetary policy or actual policy tightening reduces the relative attractiveness of global equities.

Similar conclusions also apply to US real estate against global equities. Real estate performance slows as inflation rises but returns remain positive. Interestingly, global equities respond more negatively to periods when US inflation is high than when developed markets inflation is high. This likely reflects the importance of US monetary policy, capital markets, and credit conditions for global stocks.

Figure 6:
Property total returns as inflation rises above certain levels¹



Sources: 1. MAM Real Estate Strategy, Bloomberg (NCREIF), JLL, Oxford Economics, PMA, as at November 2021. 2. Global real estate total returns are deflated by developed markets CPI inflation. 3. Deflated by US CPI inflation.

Real estate performance by sector and market

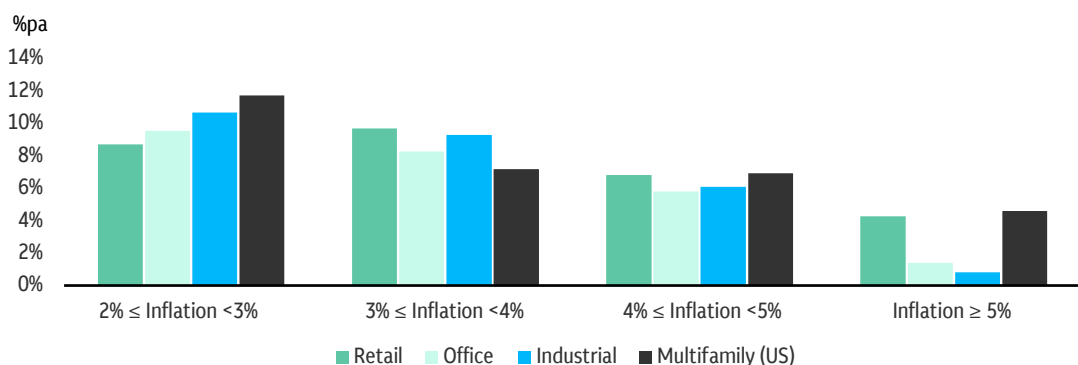
Historically, the retail sector has been one of the most resilient in the face of higher inflation, followed by office and industrial. In the US, multifamily has also displayed resilience against rising inflation relative to other sectors, reflecting the strong linkages between housing rents, wages, and CPI inflation.

Retail's historical outperformance reflected the strength of its fundamentals through cycles, at least until four to five years ago when online sales began to have a material impact on instore spending and occupier fundamentals. The flip side of this coin is that the industrial sector is now benefitting from the shift to online purchases and is likely to provide a better hedge against inflation in the future given the strength of its fundamentals in the post-COVID-19 environment.

On a regional basis, the historical data show that Asia Pacific's real estate performance has tended to accelerate during higher inflation periods. Intuitively, this makes sense as inflation in developed markets has tended to coincide with periods of above-trend GDP growth in Asian markets, at least during the period under consideration, which is in turn linked to China's march to becoming the second-largest economy by GDP.

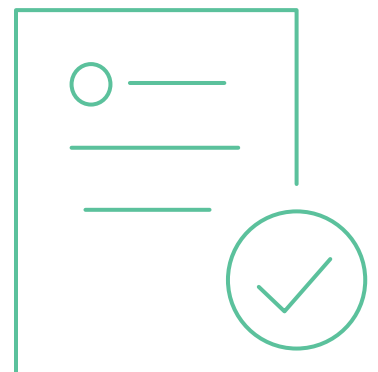
In fact, global capacity in labour and product markets tend to tighten when the Asian region is seeing above-trend GDP growth, which pushes wages and inflation higher in developed markets. The strength of Asia's economy continues to support real estate performance at a time of higher inflation in developed markets. The shorter duration of Asia's leases also allows rents to be quickly rebased in line with strong macro conditions and higher inflation, which feeds directly into higher values and total returns.

Figure 7:
Property total returns as inflation ranges between certain thresholds



Sources: 1. MAM Real Estate Strategy, Bloomberg (NCREIF), JLL, Oxford Economics, PMA, as at November 2021. 2. Global real estate total returns by sector are deflated by developed markets CPI inflation.

Conclusions





In our view, the key drivers of global real estate through cycles and over long investment periods on an absolute basis are GDP growth, position in the cycle at purchase, sector weighting, and inflation, in that order. We will analyse these variables in more detail in separate papers.

In this paper we find that over long investment periods global real estate has generated a strong real return of 6.7% per annum in developed markets. On an absolute basis, we find that global real estate's performance slows when inflation rises but total returns remain positive. Importantly, we find that real estate's performance remains healthy compared with global equities as inflation rises above 3%.

As such, investors with a view that markets are underestimating the risk of higher inflation over the medium term (three to five years) – for example, driven by current expansionary fiscal and monetary support, or higher commodity prices – may be well served by increasing their allocation to real assets, including commercial real estate, over the next couple of years.

We think it likely that the industrial and multifamily housing sectors (particularly in suburban locations, lifestyle markets, and for larger apartments and more affordable products such as manufactured homes) alongside niche sectors such as data centres and cold storage should be the most defensive if inflationary pressures remain elevated over the medium term.

Furthermore, investors looking to inflation-proof their portfolios should be looking to tilt their exposure to these sectors in the Asia Pacific region where real estate's performance has tended to improve when inflation in developed markets accelerates above 3%, particularly in an environment where inflation negatively impacts world GDP growth.

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