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MACQUARIE ASSET MANAGEMENT

Pathways

Real Assets Outlook 2023: The right horse for the current course

January 2023

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The **Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES) Agricultural Index** refers to the rate of return (including capital appreciation) for large farmlands with gross turnover more than $US 1 million.

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The **Cambridge Associates Private Infrastructure Index** is an index based on data compiled from 154 infrastructure funds, including fully liquidated partnerships, formed between 1994 and 2022. All returns are net of fees, expenses, and carried interest.

The **CBRE Long Income Index** is the most comprehensive monitor of UK Long Income property performance.

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The **Steel Price Composite Index** refers to a weighted average of steel prices across 33 cities and import prices for iron ore across ten major ports in China.

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Executive summary

Economic outlook. Inflation is likely to fall over the next 12 months as supply chains normalise, commodity markets realign, and aggregate demand softens. But, in our view, inflation is unlikely to fall back to central bank targets quickly. Recessions are likely for the world's major developed world (DW) economies in 2023. The UK and Euro area are probably already in recession and the US will probably join them in 1H23. But these downturns are likely to be mild by recent historical standards and we expect recoveries in 2H23. With China's economy set to steadily accelerate all year, the global economic landscape is likely to improve significantly in the second half of the year.

Structural change and implications for investors. In addition to the cyclical dynamics, we believe there has also been a structural shift in supply-side growth for the global economy. Understanding this dynamic and its implications is critical to successful asset allocation, in our view. This new world is likely to be characterised by higher and stickier inflation, higher interest rates, shorter economic cycles, and less policy support at critical economic junctures. In such a world, investors are likely to be chasing investments that are defensive, have a stable yield profile, and offer inflation protection. Many real assets have these attractive traits.

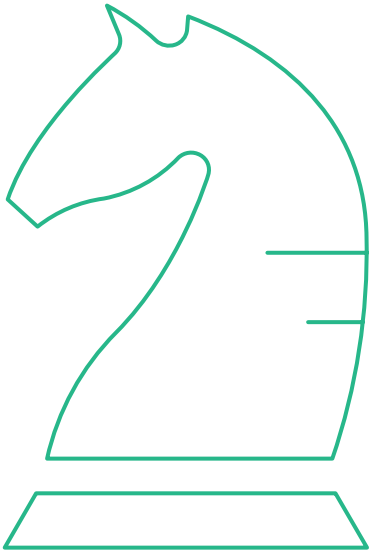
Real estate. Cyclical downturns often present opportunities for new investments, such as acquiring assets at higher capitalisation rates ("cap rates") alongside equity and debt recapitalisations as credit conditions tighten. Opportunities also appear to have emerged in public debt and equity markets, particularly in sectors and markets with solid long-term fundamentals. In general, high-quality buildings with strong cash flows and premium tenants, and assets in locations where there are supply-demand imbalances, should perform solidly through the cycle. Higher replacement costs – driven by elevated construction prices – may also help protect pricing, or at least provide a floor for prime valuations. In other sectors and locations, higher construction and financing costs are creating opportunities to acquire development sites at discounted prices with less competition from highly levered investors.

Infrastructure equity. Infrastructure is relatively well placed in 2023 due to its ability to pass through inflation, the essential nature of the services it provides, and the presence of regulated or long-term contracted cash flows. Higher-than-average inflation could be particularly beneficial for core and core plus infrastructure assets given that for many of these assets the link between returns and inflation is tighter than for those higher up the risk spectrum. Consistent with other periods of economic slowdown, we may see traditional merger and acquisition activity soften as price expectation gaps emerge between sellers and buyers. That said, we anticipate increased activity across all energy transition sectors, including the build-out of core renewable generation as well as new opportunities in areas such as battery storage and green hydrogen.

Infrastructure debt. On the infrastructure debt side, higher interest rates have made the asset class more attractive. Credit spreads also started to widen in 2H22, which we expect to continue in 2023. In the sub-investment-grade market credit spread increases have occurred faster and been larger than in investment grade markets. At the same time, infrastructure debt opportunities may decline as infrastructure assets hold off raising financing and/or focus on shorter-tenor debt.

Agriculture. Agriculture's stable return profile and inflation hedge characteristics make it a relatively attractive place to be in the current macroeconomic environment. Within the sector, margin management will continue to be key to better-than-average performance. Large, professionally managed farms are arguably well positioned in this regard due to their scale benefits, professional management teams, input purchasing power, and ability to deploy productivity enhancing capital and technology.

Introduction: Real assets are now part of the game



In our "Outlook 2023: Opportunity in a volatile world" we discuss in detail our views on the macroeconomic environment for the year ahead and what this implies for returns and asset allocation. With interest rates having risen sharply over the past 12 months, 2023 is likely to be a challenging year from an economic perspective. Inflation should continue to ease in the near term as supply chains normalise, commodity markets realign, and aggregate demand softens. But the structural inflationary pressure in the system means it is unlikely to return to central bank targets and, in our view, will remain elevated at between 3% and 5%, even towards the end of 2023.

We also expect the DW to be in recession in 1H23. The UK and Euro area are probably already there, and the US will likely join them in early 2023. DW growth should bounce back in 2H23, however, as a modest but synchronised recovery takes hold. With China's gross domestic product (GDP) growth likely to be steadily accelerating over the course of 2023, the global economic landscape is likely to be much improved towards the end of the year.

Looking beyond near-term cyclical developments, we believe there has also been a structural shift in the global economy that has significant implications for asset allocation. With growth in the supply side downshifting – a function of slowing or reversing globalisation, poor demographics, and deteriorating productivity growth across the DW – the underlying dynamics are likely to be very different from what we have experienced in the past 30 years or so. We explore these changes in more detail in our Outlook 2023, but in short we believe that the upcoming economic cycle will be characterised by:

- Higher and sticker inflation, which returns more quickly when demand surges
- Higher interest rates, both across the cycle and across the curve
- More stop-start GDP growth and shorter economic upswings
- Greater constraints on policymakers – both fiscal and monetary – which limit their ability to use policy countercyclically.

In this more volatile world, traditional asset classes could become more correlated – as observed in 2022 – incentivising investors to look beyond listed equities and bonds. Strategic portfolio construction considerations may see institutional investors increasingly look to alternative asset classes for inflation protection, stable yield, and portfolio diversification. "Real assets" refers to investments that encompass physical assets such as real estate, infrastructure, and agriculture (e.g., farmland) and many of these assets offer these attractive characteristics:

- Real assets typically provide a hedge against higher inflation through stronger income growth due to higher rental growth (in real estate), inflation-linked cash flows courtesy of regulation or long-term contracts (in infrastructure), and the high correlation between food prices and inflation (in agriculture).
- Many real assets have historically exhibited a low correlation to listed equities, a feature that is particularly attractive during periods of market volatility.
- Real assets often offer a stable yield, which helps them perform relatively well through the economic cycle.

The current economic pressures may give rise to some divergence in performance across real assets, with some asset classes and sectors proving more resilient than others during periods of higher interest rates and weaker economic growth. At the same time, for patient investors, attractive long-term opportunities are likely to emerge in the next 12 months.

"The current economic pressures may give rise to some divergence in performance across real assets, with some asset classes and sectors proving more resilient than others during periods of higher interest rates and weaker economic growth."

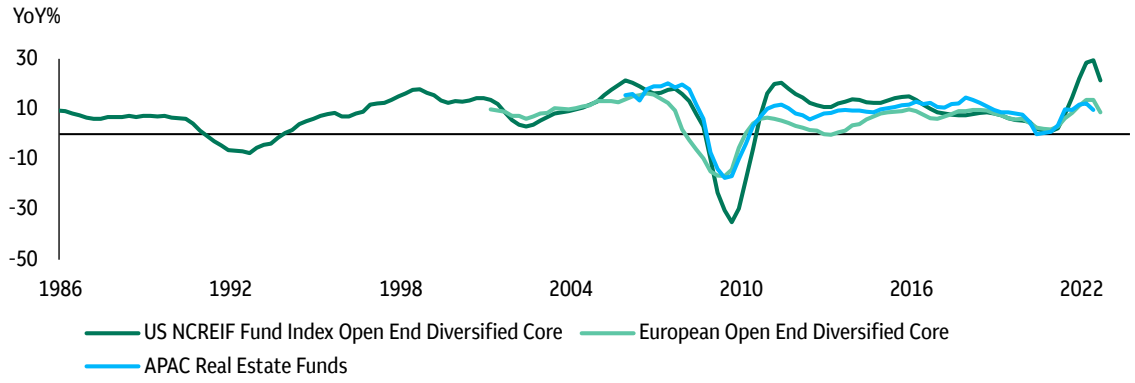
Real estate: Market volatility creates cyclical opportunities

Following a decade of strong performance for private real estate, global returns slipped in 2H22 as higher risk-free rates and financing costs impacted investor sentiment and near-term pricing, despite fundamentals generally remaining solid as we enter 2023 (outside of offices and secondary retail). Importantly, dislocation in public real estate markets, and more attractive pricing in private markets, are creating good opportunities across both the listed and unlisted sectors for those with liquidity and capital to deploy. This includes take-private opportunities, equity and debt injections at refinancing events, and acquiring existing buildings at higher cap rates and potentially discounted prices to replacement costs.

Private real estate: A year of two halves

In aggregate, global core real estate funds generated a return of 8.4% in 1H22 and 19.8% year over year (YoY) to 2Q22, according to the European Association for Investors in Non-Listed Real Estate Vehicles (INREV). This index measures levered total returns across the traditional sectors (office, retail, industrial, and multifamily apartments in the US). More timely data show that European core funds saw performance weaken in 3Q22 (to -1.6% quarter over quarter (QoQ) from 2.6% QoQ in 2Q22), with valuations declining 2.4%. US core property funds' performance also slowed sharply, with total returns stagnating in 3Q22 compared with a 5-year average quarterly return of 2.6%, which implies that aggregate capital values also declined over the quarter.

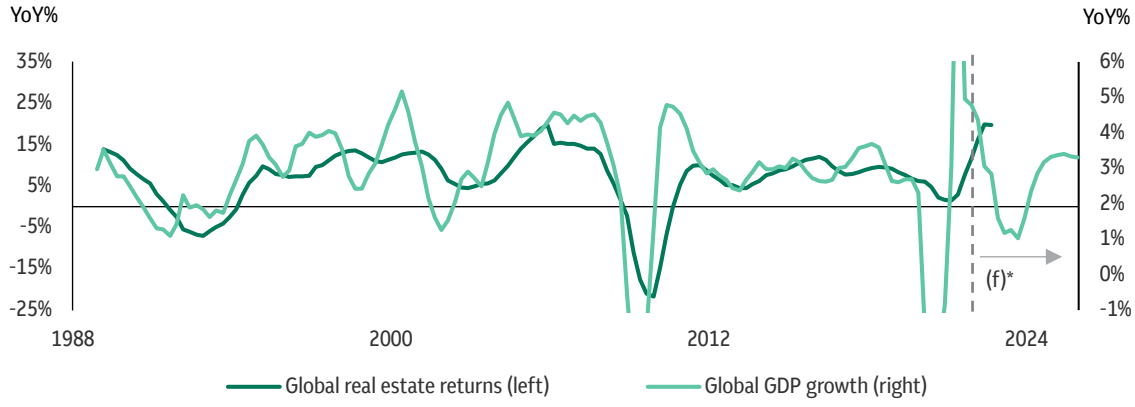
Figure 1:
Global real estate fund level returns have peaked in this cycle (local currencies)



Source: INREV (December 2022).

Looking ahead, core returns for existing portfolios are expected to remain soft in 1H23 before accelerating in 2H23 and into 2024 as global growth accelerates. The next global upswing in property is likely to be led by gateway cities and markets in the US and UK given their greater transparency and liquidity, with valuations tending to adjust more quickly in these markets. This is expected to be followed by continental European, Australian, and US non-gateway markets. Japan is the general exception to the downward pressure on near-term valuations given its monetary easing bias through most of 2022, though this appears to be shifting as the Bank of Japan looks to shore up its currency and reverse some of the negative impacts that imported inflation is having on real incomes.

Figure 2:
Global GDP growth is a key driver of global real estate (core) fund level returns



Sources: INREV, NCREIF, Oxford Economics (December 2022).

Year-end sales remain subdued

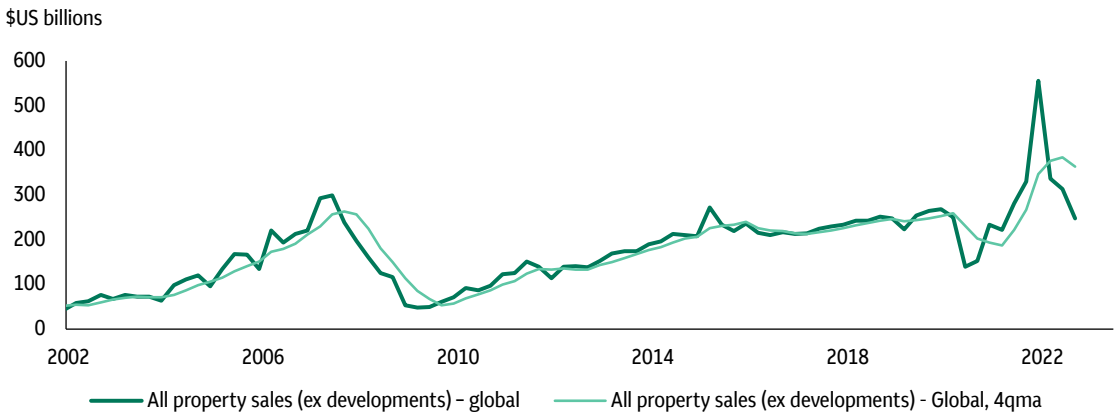
Global investment year to date through 3Q22 was 13% higher than pre-COVID 2017-2019 averages, although volumes weakened as the year progressed with transactions in the quarter around 27% below prior year levels. Transactional markets, which tend to move ahead of valuations as bid-ask spreads widen as buyer and seller expectations diverge, softened in 2H22 as investors became increasingly cautious on pricing and valuations amid elevated market uncertainty.

To some extent the pullback was inevitable following the very strong recovery from COVID-19 where investment activity jumped across markets and sectors, supported by accommodative debt markets, a wall of dry powder targeting private markets, and expectations of an ongoing economic recovery through 2022 and into 2023. Clearly, tighter credit conditions across markets ex-Japan in 2022 – including higher "all-in" borrowing costs and tighter loan-to-value ratios (LTVs) – and the deteriorating near-term global macroeconomic environment have also impacted investor sentiment.

Sovereign wealth funds, family offices, high-net-worth individuals, and other predominately equity investors have been more active in 2H22, with many continuing to build exposure and deploying capital through cycles. By contrast, the pullback in transactional markets has been particularly evident from the following groups of investors:

- Highly levered investors given that financing costs have doubled from early 2022 levels and lenders have become more conservative in their underwriting
- Real estate investment trusts (REITs) that are trading at sizeable discounts to underlying property values, which have seen their equity financing and debt costs jump sharply from early 2022 levels
- Institutional investors with large exposures to sectors with weaker fundamentals such as secondary offices and discretionary retail in non-core locations where valuations are under the most pressure.

Figure 3:
Global commercial property sales have normalised in 2H22 (excludes developments, seasonally adjusted)



Source: Real Capital Analytics (December 2022).

Near-term outlook for investment markets

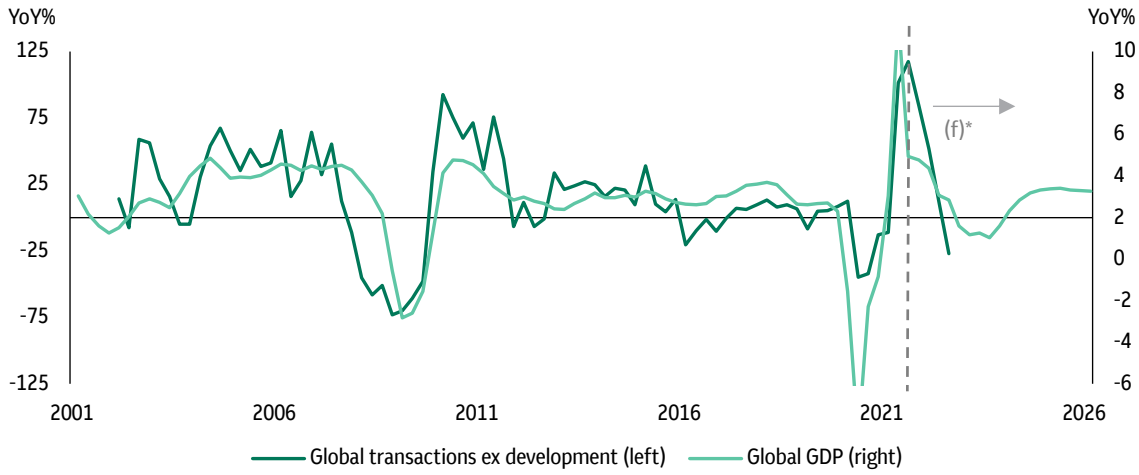
Further softness in transactional activity is likely in 1H23, particularly if global growth weakens further and unemployment rates rise from the current cyclical lows in key developed markets, as we expect. A sustained pickup in global property investment would coincide with the following:

- More visibility and transactional evidence that cap rates have reset in line with higher risk-free rates and borrowing costs
- Bid-ask spreads narrowing from their current elevated levels
- Global growth indicators bottoming out and starting to pick up from cyclical lows.

For a cyclical pickup in transactions and pricing we are looking for clear signs that core inflation, including wages and housing rents, is moving back towards 2-3% targets, allowing central banks to pause, pivot, and possibly ease policy. Given the importance of US capital markets for global real estate transactions and liquidity, we are watching both US 2-year bond yields for market expectations of rate cuts and the US yield curve (10-year – 2-year) for indications of a potential sustained upswing in asset pricing. Historically, the yield curve has turned positive, and the US Federal Reserve has begun to cut rates, well ahead of recessions ending. Both actions tend to support a turnaround in global manufacturing (manufacturing Purchasing Managers' Indices (PMIs) begin to contract at a slower pace) and global equities, and eventually private real estate pricing as credit and financial conditions ease.

We are likely to see more deals take place through 2023 as pricing adjusts further and investors take advantage of more attractive cap rates. Any pivot towards looser monetary policy by key central banks would add further support to the cyclical recovery as levered investors become more active, including if credit conditions ease and financing costs normalise more quickly than currently envisaged.

Figure 4:
Global property sales vs. global GDP



Sources: Real Capital Analytics, Oxford Economics (December 2022).

Elevated levels of dry powder still targeting real estate

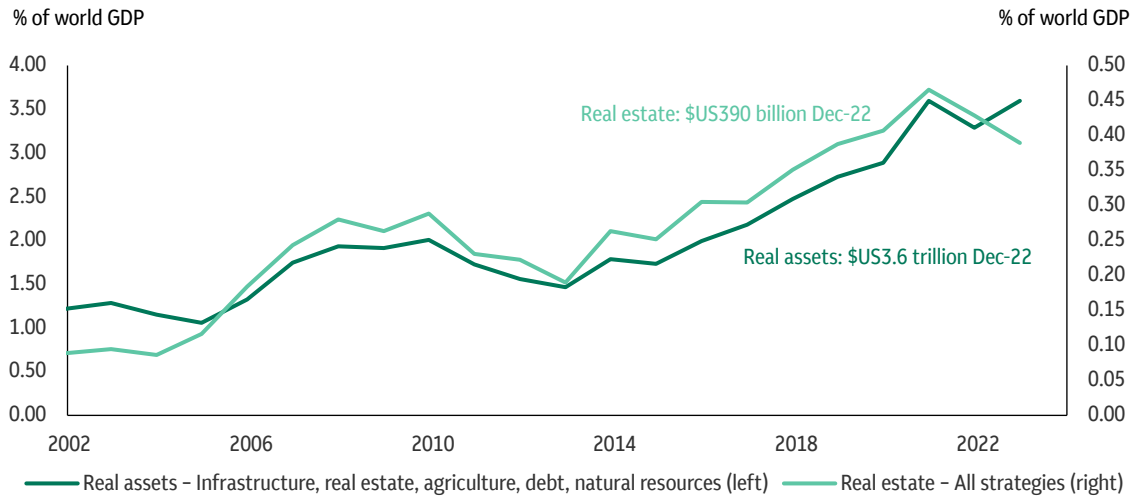
There is still a significant amount of global capital that has been raised by closed-end real estate funds but has not yet been deployed into the asset class. The latest Preqin data suggest that real estate dry powder is around $US390 billion, which is equivalent to 30-35% of annual global real estate transactions excluding developments, or 0.4% of global GDP measured in US dollars.

A large amount of this capital was raised to deploy into existing core buildings and portfolios using significant amounts of leverage to achieve opportunistic returns of 10-15% per year in Europe and 15-20% per year in Asia and the US over typical seven-year hold periods. In the case of the US, these strategies made a lot of sense when "all-in" borrowing costs (swap rates plus lending margins) were around 3%, cap rates were 4-5%, and investors were able to gear up portfolios with 60-70% LTVs.

The issue now is that with borrowing costs above cap rates (as proxies for income returns) and LTVs tighter relative to late 2021 levels, it is more difficult to achieve target returns from just leveraging real estate. Thus, managers and investors need to be more creative and either take advantage of market dislocation in public debt and equity markets or increase their exposure to operating companies in sectors with stronger fundamentals alongside their traditional real estate investments and developments to achieve target returns. But these types of investments require different skill sets and more patience to deploy capital.

For the moment, a lot of this dry powder is sitting on the sidelines and waiting for cap rates to reset at higher levels, valuations to stabilise, and credit conditions to ease again before being deployed. Certainly, any pivot towards looser monetary policy by key central banks would potentially help to kickstart another upswing in commercial real estate returns and pricing.

Figure 5:
Global dry powder to be invested into real assets as a percentage of world GDP in $US



Sources: Preqin, Oxford Economics (December 2022).

US market has held up better, supported by rental housing and logistics

On a regional basis, US investment activity held up better into 3Q22, with quarterly volumes 26% higher than 2017-2019 levels, supported by healthy activity in multifamily apartments (66% higher), industrial (37% higher), and to a lesser extent, retail (7% higher), all of which helped to offset the weakness in offices (23% lower). However, momentum has slowed sharply, with commercial property sales down 19% in 3Q22 relative to prior year levels as investors became more cautious on pricing and the near-term economic outlook. This weakness is likely to extend into 1H23 if market expectations for negative US GDP growth in the first two quarters of 2023 plays out and labour markets deteriorate, which would then impact commercial property fundamentals.

US transaction volumes tend to peak in the final quarter of each year, as buyers and sellers close transactions ahead of year end for accounting, performance-related, and tax purposes. This pattern has been observed over the past five years and 2021 was no different with a record $US308 billion of buildings excluding developments being sold during 4Q21, according to Real Capital Analytics (RCA). That was more than double the previous quarterly high of $US146 billion set in 4Q19, just before the onset of COVID-19 disruptions. This time around, however, investment activity may end up being around half the record levels of deals closed in 4Q21 if past relationships between global GDP growth and sales volumes continue to hold. This implies that investment volumes may fall relative to 3Q21 levels in original terms and by even more on a seasonally adjusted basis.

Europe has seen a sharper pullback in transactions

The transactional pullback in global property markets impacted Europe earlier than other regions, with investors facing additional uncertainties around high and volatile energy prices which pushed up overall occupancy costs for property tenants (rents plus outgoings and energy costs), particularly in the office sector, and eroded real household incomes which in turn impacted consumer demand. Overall, European investment volumes year to date through 3Q22 were 17% below 2017-2019 averages and 41% lower in 3Q22 relative to 3Q21. To some extent, these figures overstate the softness in European transactional markets by a few percentage points given that many currencies weakened against the US dollar in 1H22. For example, Germany's transactions year to date were 36% below pre-COVID-19 averages in local currencies and 39% below in US dollars.

Across Europe, the number of active buyers and sellers has softened, at least temporarily, as some investors choose to sit out this period of dislocation in anticipation of a bottoming out in cyclical growth indicators, better cap rates, or to take advantage of distressed opportunities and market dislocation. Unless forced by refinancing events or to meet redemption queues or other liquidity events, existing sellers are also reluctant to sell into a soft market, which is also impacting transactional activity. Like the US market, better visibility on pricing, higher cap rates against borrowing costs, and a cyclical pickup in growth expectations will be key to momentum shifting across Europe in 2023.

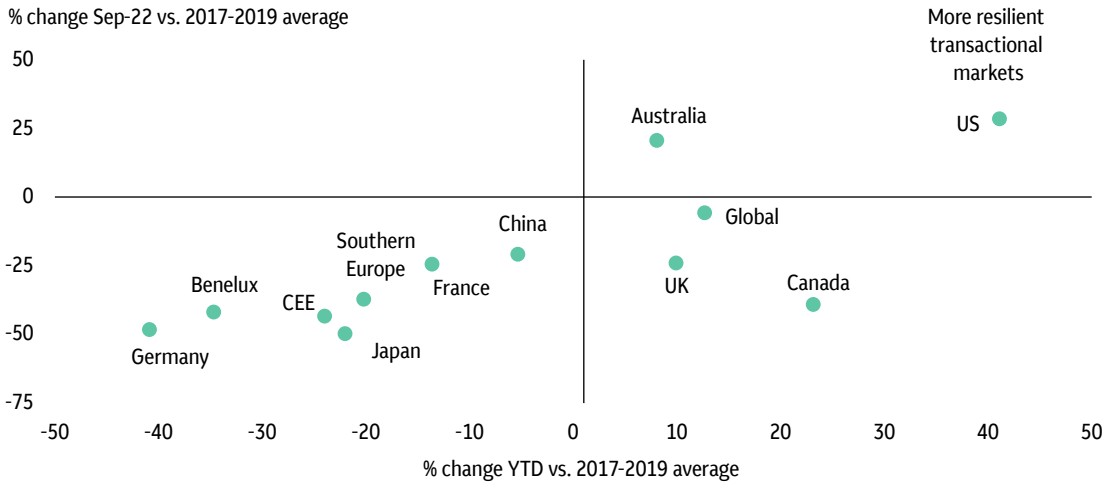
Asia Pacific's capital markets are more nuanced

The Asia Pacific (APAC) transactional environment is more nuanced by market, reflecting the region's heterogenous nature and the varying degrees of economic maturity and transparency from its highly developed core markets, such as Australia and Japan, through to its large emerging economies, such as China and India and the cyclical gateway cities of Hong Kong and Singapore. Credit conditions and monetary policy vary across the region, which means that property cycles also move at different speeds, particularly relative to individual markets and cities in Europe and North America.

Japan's limited monetary tightening relative to other developed markets supported local commercial property pricing and returns through 2022 given low financing costs and still-positive cap rate spreads to 10-year bonds, though investment volumes did slow over the course of 2022. However, the combination of a weaker currency and higher imported goods and energy prices has translated into a loss of real purchasing power for corporates and households, which forced the Bank of Japan to shift its stance towards the end of 2022 by allowing 10-year bond rates to rise to 0.5%, versus the previous 0.25% upper limit. Any further tightening may impact transactional activity in 2023, although a subdued currency and still-low financing costs presents a potential upside for new investments, or at least minimises the downside for unhedged investors when returns are measured in foreign currency.

Elsewhere in the region, China's real estate downswing is more advanced, given soft GDP growth and tight financing conditions for real estate developers and investors, despite some marginal policy easing through 2022. Australia's commercial property pricing and transactions held up relatively well in a regional and global context to 3Q22, at least in private markets, given ongoing capital flows from Asia and activity from high-net-worth individuals, although these tend to lag global capital shifts.

Figure 6:
Commercial property sales by market – YTD and 3Q22 levels vs. pre-COVID-19 averages



Source: Real Capital Analytics (December 2022).

Demographics remains a key driver of relative property performance across markets and sectors

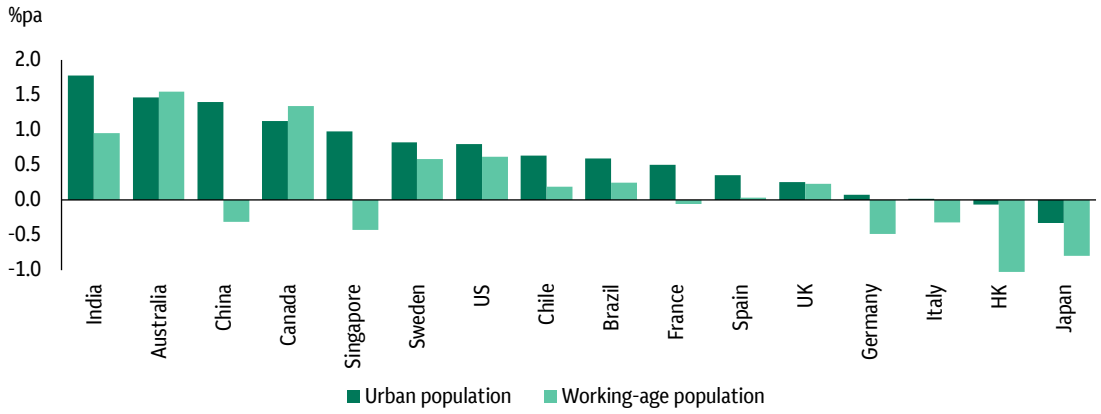
Alongside interest rates and financial conditions, population growth and demographic shifts are expected to remain key drivers of relative property performance across markets, sectors, and cities given the long-term nature of many real estate investments and strong linkages between property demand and household formation rates. These factors may even become more important if labour productivity growth slows further, which would in turn keep a lid on household incomes and corporate profits, and interest rates remain at elevated levels over the longer term.

When assessing the overall property outlook, we first look at urban populations and working-age population growth rates as proxies for demand at a nationwide level. We focus on working-age population growth rather than the 15-64 age cohort given that retirement ages are lifting in many markets and people are generally working longer, either because they need to fund longer retirements or because they enjoy the mental stimulation and social aspects of working. The focus on urban populations reflects the fact that cities can escape national demographic constraints via inward migration and overseas migration patterns as people move for jobs, education, and lifestyle reasons.

For example, the growth of US tech cities and sunbelt markets could not occur if they were not able to attract young workers and corporates to migrate to them. In Europe, too, inward migration allows cities to escape national demographic constraints. Europe's working-age population has been in decline over the past decade and that is expected to continue over at least the next five years, whereas working-age populations in Europe's major cities are expected to climb further. In Asia, urbanisation trends have supported the growth of China's large cities at the expense of rural areas as people move for better-paying jobs. Even in Japan, where the working-age population is now shrinking at a national level, Tokyo has benefitted from internal migration patterns for similar reasons, while Australia's major cities are expected to benefit from ongoing net migration from overseas.

Across key developed markets, some of the strongest population growth forecasts are expected in Australia and Canada, where both urban and working-age populations are likely to grow by more than 1% annually over the next decade (from the end of 2022 through end of 2032), which should translate into ongoing demand for commercial and residential real estate space in larger cities. Solid growth is also expected in Sweden and the US, where the same metrics are expected to grow more than 0.5% annually over the period. The UK's urban and working-age populations are forecast to grow by around 0.25% per year to 2032, which is better than many parts of Europe. At the other end of the spectrum is Germany, Italy, Hong Kong, and Japan, where urban populations are flat or shrinking and working-age populations are declining. Any investments into real estate in these markets needs to focus on the growth of individual cities, submarkets, and micro-locations to ensure demand remains positive over the investment period in the face of broader national headwinds.

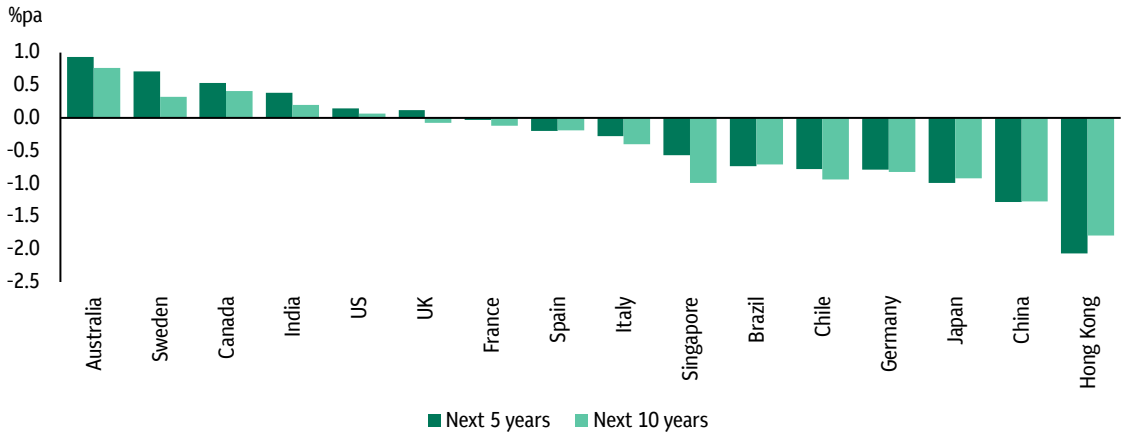
Figure 7:
Nationwide population growth forecasts (from end of 2022 to end of 2032)



Source: Oxford Economics (December 2022).

For rental housing we focus on the 15-39 age group, which represents the typical occupiers in the multifamily apartment and build-to-rent (BtR) sectors, although we note that owner occupier rates have been generally falling across all age groups over the past couple of decades as house prices have outstripped incomes for many households. For other rental housing products – such as land communities, manufactured homes, and retirement villages – typical occupiers are moving towards the end of their working careers or are in retirement, so the focus for these investments is the growth of older age cohorts.

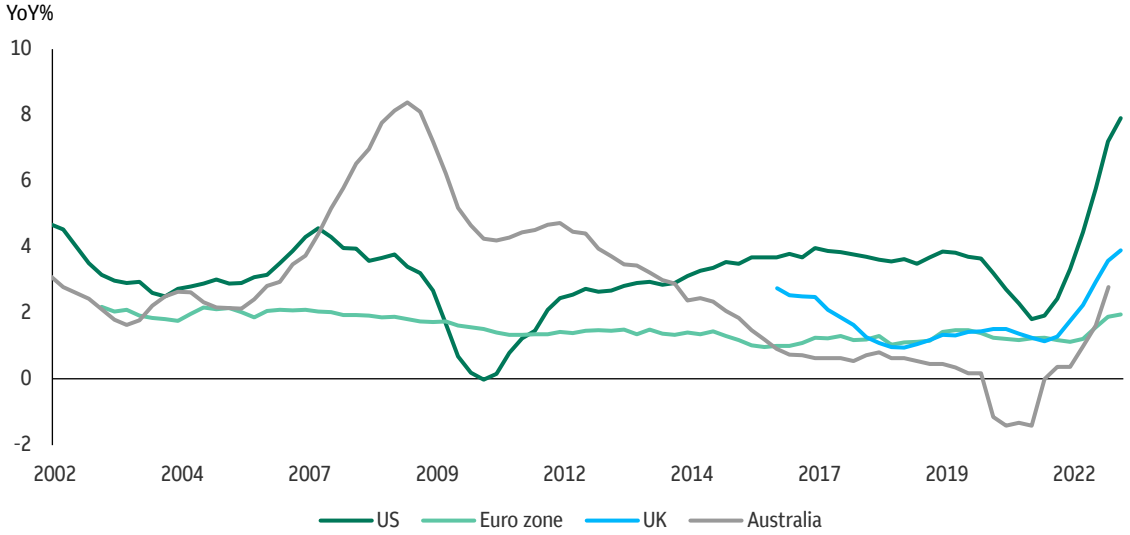
Figure 8:
Nationwide 15-39 age group population growth



Source: Oxford Economics (December 2022).

Australia, Sweden, and Canada are expected to see strong growth rates in the 15-39 age group over the coming decade, which will continue to support demand for all types of housing, including rental accommodation. The US and UK are expected to see marginal growth in this age group, at least over the next five years. Rental demand may also be boosted beyond these headline numbers by worsening housing affordability metrics for purchase, including in large cities where there are better job prospects and attractive lifestyle considerations that tend to draw in younger people. For many of these potential buyers, homeownership is often delayed and pushed back given prices have outstripped wages and, more recently, mortgage rates have jumped sharply, which forces many young people to rent for longer stretches and save for a deposit. To some extent this trend is now playing out in many developed markets where rental growth is jumping sharply as young people return to cities and mortgage rates normalise. In the case of the UK (and possibly Australia, though the product is still in its infancy), security of tenure and better amenities for BtR products may also boost overall rental demand relative to the 15-39 age group projections as households see the benefits from renting from institutional investors against individual buy-to-let owners.

Figure 9:
CPI housing rental growth is lifting with tight demand-supply fundamentals



Sources: Australian Bureau of Statistics. Federal Reserve Economic Data, The Office for National Statistics (December 2022).

Institutional allocations to core offices remain high

For many institutional investors, office allocations have fallen back from recent peaks as they actively tilt toward logistics and rental housing (where available) and other institutionalising sectors (such as data centres) where demand drivers tend to be less sensitive to GDP and jobs growth. The shift has also been achieved by slower capital growth relative to other sectors. Nonetheless, many large pension funds and insurance companies remain heavily exposed, which means that overall portfolio returns will continue to be influenced by the performance of the office sector.

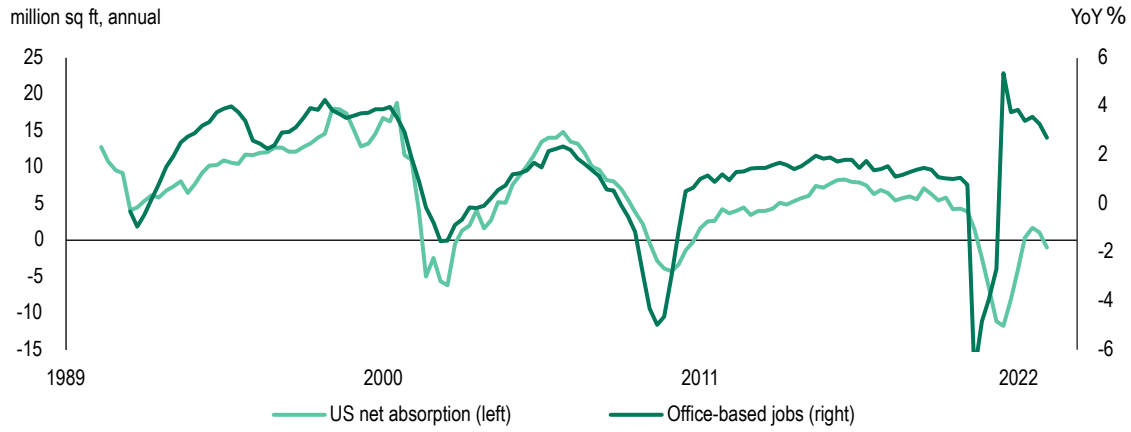
For example, office allocations for US Open-End Diversified Core Equity (ODCE) real estate funds – which source a significant share of their capital from pension funds and insurance companies – is currently around 23% compared to a peak of 40% in 2016 as managers have shifted to rental housing and industrial buildings. The equivalent figure in Europe, which is published by INREV, is closer to 38%, reflecting the limited availability of alternative sectors for institutional investors relative to the US. By transactions, offices accounted for 28% of total global sales over the past five years and 24% over the 12 months to 3Q22, and the sector remains the easiest route for many cross-border investors and is thus the cornerstone of their global core allocations.

In the decade to 2021, aggregate office valuations across the quality spectrum were supported by a combination of cap rate compression, a narrowing of spreads between prime and secondary assets (reflecting the search for yield and general weight of capital into property), and moderate rental growth and accretive debt financing costs (at least in developed markets). New York and San Francisco were obvious exceptions where sluggish demand-supply dynamics impacted valuations, particularly for lower-quality buildings. Looking ahead, high and increasing capital expenditure (capex) requirements for existing buildings – particularly those that were built or last had a major refurbishment at least a decade ago – makes existing office investments trickier to navigate in the post-COVID-19 environment where landlords also face the headwinds of a hybrid working environment and rising environmental, social, and governance (ESG) considerations.

Shifting office demand drivers across markets

Historically, office-based jobs growth has been the key driver of net absorption, with strong employment growth coinciding with above-average levels of demand and vice versa. Net absorption measures the change in occupied stock and equals the space that is leased during a given period less the space that is vacated as occupiers move between buildings and expand or contract their footprints. But this relationship has broken down, at least temporarily, with a surge in office-based jobs over the past 18-24 months failing to translate into a meaningful pickup in demand, at least in key developed markets. The reasons are both cyclical and structural in nature and related to hybrid working, high energy costs, increasing ESG considerations, and general macroeconomic uncertainty.

Figure 10:
US white-collar jobs growth vs. national office demand



Sources: US Bureau of Labor Statistics (BLS), CoStar (December 2022).

Occupiers continue to reassess their total spacing requirements in a hybrid working environment characterised by increased employee flexibility. This is particularly evident in large cities in developed markets, reflecting a combination of long commutes for many, poor public transport systems, and tight labour markets. In Europe, high energy prices, which have also pushed up occupancy costs for tenants, in conjunction with the need for occupiers to achieve their net zero carbon targets, have also limited the cyclical upswing in net absorption relative to jobs.

However, a sharper upswing has been seen in gross leasing activity as occupiers focus their strategies on newer officers and next-generation assets and reduce their overall footprints, which is translating into ongoing rental tension and general pricing for prime buildings in well-connected locations where it's generally easiest for most staff to get into the office. Across most markets and submarkets, higher-quality buildings (e.g., newer, longer leases, energy-efficient buildings) are holding capital values and rents are sturdier than for lower-quality ones.

Significant opportunities to upgrade or repurpose aging office stock

The general flight to quality by tenants is likely to accelerate operational obsolescence of an important percentage of office stock. Across key European cities, 65% of all offices are now aged 20 years or more, or last had a major upgrade around the early 2000s dot-com boom when buildings were being developed for a different working environment and internet usage was still in its infancy. Similar trends can be seen in other developed markets (including the US) where the age of the average office asset is now at a 100-year high of 23 years. This is creating significant opportunities to upgrade and reposition aging office stock given ESG and net zero commitment (NZC) targets. High and volatile energy prices alongside the transition to green energy sources will only bring forward the shift to high-quality space as occupiers focus on buildings with high energy ratings and those that can source cheap, sustainable energy to minimise overall costs of occupying a building (rent plus service charges plus energy costs).

For existing buildings, we are likely to see rising rental premiums for high-quality buildings as corporates grapple with the changing requirements being driven by hybrid working models. This should translate into greater usage of technology in the workplace with increasing tenant requirements for more collaboration space, breakout areas, and meeting rooms. Corporates are also using their space as marketing tools to attract and retain talent given tight labour markets, further adding to upward pressure on rents. This theme may become more pronounced as workforces and middle management become dominated by millennials and zoomers and working-age population growth slows further across markets.

Existing owners of secondary assets need to make a quick decision on whether to increase the capex spending on these assets today to maintain value and support occupancy rates over the medium term, convert them into other uses, or liquidate their holdings and recycle the capital into newer stock or other sectors. This will be an asset-by-asset decision, but the sooner it is made, the more managers will be able to protect value for investors. Current macroeconomic volatility is likely to bring forward some of these adjustments, with valuers expected to attach higher initial yields (lower values), higher capex estimates (lower free cash flows), and lower long-term rent growth estimates to secondary assets.

Widening discounts for Grade B and Grade C assets and those buildings with leasing risk and high and rising capex requirements should create repositioning and repurposing opportunities for investors with liquidity and capital to deploy. This is particularly the case in and around large urban markets where offices can be repositioned as higher-quality buildings or converted into other uses.

Given the heightened focus on ESG metrics for companies in recent years, buildings that address sustainability goals while also providing operating efficiencies and cost savings to owners can strengthen their long-term competitiveness.

Orderly housing correction is creating opportunities to acquire new land and developments

Higher mortgage rates are now weighing on residential prices and sales in key developed markets. Generally, the most levered markets measured in terms of debt secured against housing as a percentage of GDP, and those where existing mortgage rates are directly linked to central bank policy rates, have corrected first in this cycle. This list includes Australia, Canada, and New Zealand. These markets are likely to see deeper peak-to-trough declines in prices and sales volumes, although valuations are generally expected to remain above pre-COVID-19 levels given the sharp run-up seen during 2020 and 2021, which will minimise the overall negative equity position of the household sector.

According to Oxford Economics, nationwide prices are expected to see peak-to-trough declines of -15% in Australia, -20% in New Zealand, and -30% in Canada. These aggregate declines naturally mask variations within and between cities, locations, and product types (apartments versus single family and detached housing, for example). Like previous cycles, the next upswing is likely to be linked to a combination of lower initial deposit requirements as prices reset to lower levels and a pivot in cash rates and other forms of policy stimulus such as government support for first-time buyers and lower-income households.

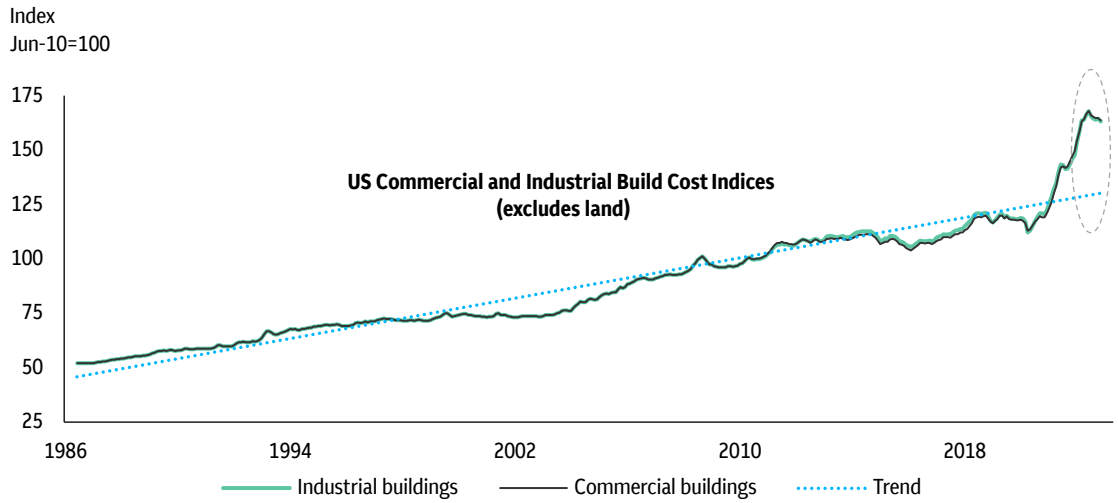
In the UK and US, residential prices are also starting to soften at the national level as new buyers face much higher mortgage costs today than they did in late 2021 and early 2022. For example, 2-year fixed-rate mortgages with 75% LTVs for UK households have jumped from 1.6% at the end of 2021 to around 6%, according to the Bank of England. In the US, 30-year fixed mortgage rates have increased from 3.1% at the end of 2021 to 6.0-6.5%. However, expected peak-to-trough price declines are less in these markets. Both markets saw much steeper corrections and more subdued recoveries emerging from the global financial crisis, with household debt more contained relative to incomes today. Existing owners – at least in the US – should be somewhat insulated given that many borrowers take out 30-year fixed-rate mortgages, assuming unemployment rates do not increase sharply, and households are able to continue servicing their debts. The downside is that if mortgage rates remain at these levels for an extended period, internal mobility between cities and states may slow as households face the prospect of much higher financing costs if they sell and move somewhere else, or corporates may be forced to pay more relocation costs to entice people to move to cities.

At this stage, the housing correction across markets appears orderly at the national level. This reflects a combination of ongoing tight labour markets where borrowers can continue to service their debts, healthy domestic banking sectors where credit conditions remain stable, and the sharp run-up in prices during 2020-2021 that has meant the equity position of most households is still positive. Softening housing markets may create opportunities to acquire development sites and land in less competitive processes and at lower prices if prices and sales volumes remain subdued and construction costs elevated. Longer term, the pullback in house prices and starts will only amplify the shortage of housing in key developed markets and cities with growing populations, including in the rental space. More broadly, rental housing owners and operators in public markets appear to have been caught up in this broader housing slowdown as higher mortgage rates impact new sales of home builders. At the same time, the underlying revenues of rental housing providers are being supported by stretched affordability for potential home buyers and positive household formation rates as pandemic disruptions ease, including the normalisation of international migration.

Construction costs, valuations, and development activity

In the pre-COVID-19 environment, build costs and consumer prices moved together across developed markets and through cycles. For example, US Consumer Price Index (CPI) inflation averaged 2.6% annually between June 1986 and March 2021 compared with 2.7% for commercial producer prices (which can be considered a proxy for build costs excluding land). This relationship has broken down over the past 18-24 months with building costs jumping 2 to 2.5 times CPI. Since early 2021, build costs (excluding land prices) have jumped sharply and are now 25% above trend growth rates, on average, across construction projects. Similar trends have been observed in other markets.

Figure 11:
Higher replacement costs may help to protect prices, or at least provide a floor for valuations – marginal projects will fall away

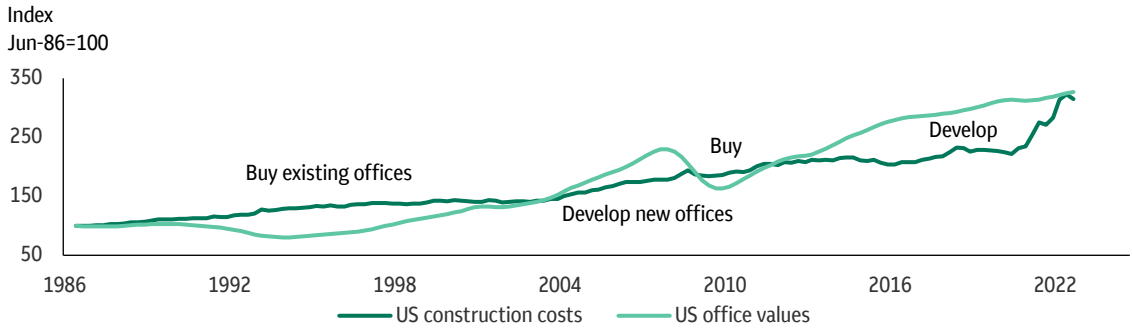


Source: Bloomberg, (December 2022).

Construction costs may ease back if global commodity and energy prices soften as global growth slows, manufacturing production comes under pressure, and housing construction activity moderates further. However, unless unemployment rises sharply next year, construction wages, which represent 50% of total costs for many projects, are likely to remain elevated and sticky. Medium term, building cost inflation should fall back in line with CPI inflation but overall costs are unlikely to revert to pre-COVID-19 trend levels.

High build costs can be passed onto tenants in sectors and locations with stronger demand such as coastal logistics and locations around major consumer populations, rental housing (UK, US, Australia), self-storage, student housing, and next generation offices, which will help to maintain profit margins. In other sectors and locations, unless land prices adjust lower, higher costs will lead to a pullback in activity as returns struggle to achieve typical hurdle rates for developments (e.g. secondary office locations, discretionary retail, tier 2/3 logistics locations, owner-occupier housing).

Figure 12:
Buying existing offices vs. ground-up development signals through cycles



Source: Bloomberg, CoStar (December 2022).

Market dislocation creates opportunities

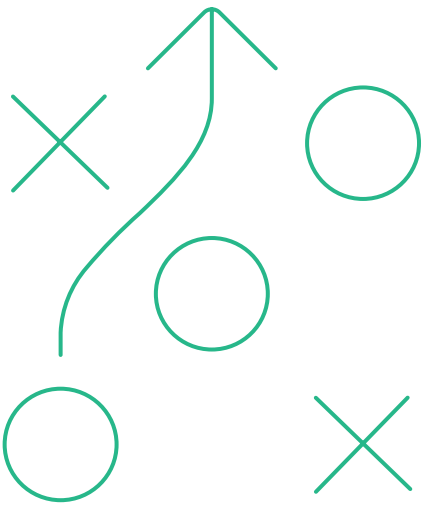
While challenging for existing portfolios, downturns often present opportunities for new investments, such as acquiring assets at higher cap rates and cheaper entry points relative to recent peaks, either directly or indirectly as property funds look to meet redemptions. Elevated macroeconomic volatility may also create opportunities for equity recapitalisations at refinancing events and/or debt injections if soft covenants are breached and banks become more conservative on their underwriting.

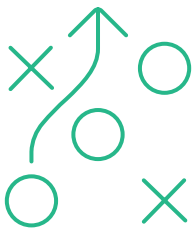
Opportunities appear to have emerged in public debt and equity markets, particularly in sectors and markets with solid long-term fundamentals where implied cap rates are trading well above private valuations. This includes in the rental housing space where public REITs have been caught up in the broader owner-occupier housing downswing as higher mortgage rates impact sales and pricing.

Overall, high-quality buildings with strong cash flows and premium tenants, and property assets in stronger locations where there are supply-demand imbalances, should perform solidly through the cycle, as they have done historically. The sharp run-up in construction costs since early 2020 means there may also be opportunities to acquire buildings at discounts to replacement values, assuming values adjust appropriately from recent peaks. Conversely, higher development costs may also help protect pricing, or at least provide a floor for prime valuations as future supply pipelines soften, particularly in weaker sectors and markets.

Widening discounts for Grade B and Grade C office assets and those buildings with leasing risk and/or high and rising capex requirements – related to increasing sustainability and energy efficiency requirements of occupiers and the general shift to tech-enabled space – should create repositioning and repurposing opportunities. This is particularly the case in and around large urban markets where buildings can be converted into other uses. It is likely to be most obvious in the office sector where occupier shifts to newer space are becoming more pronounced. Looking beyond any near-term adjustment, history suggests that pricing is likely to start firming ahead of the low point for both global growth and real estate fundamentals, as investors take advantage of cheaper entry points.

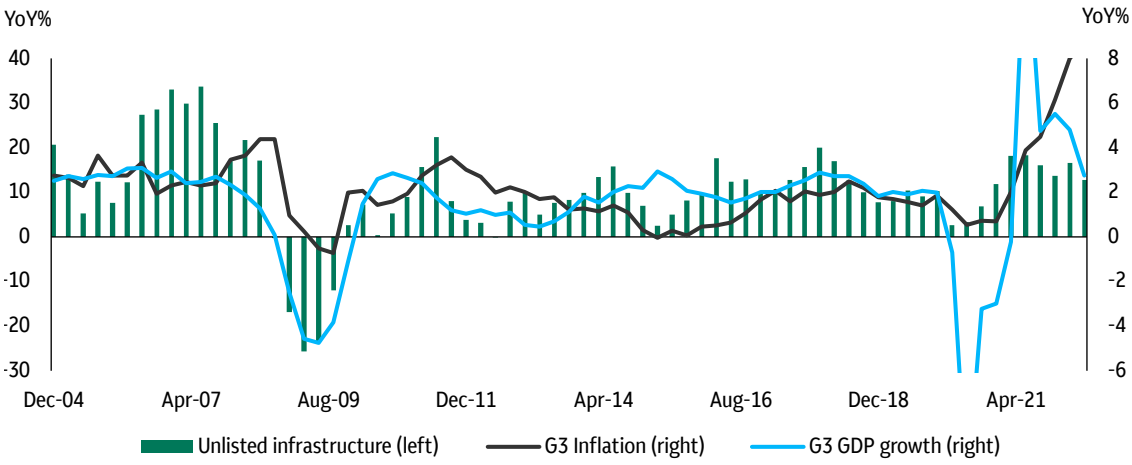
Infrastructure equity: Defensiveness, yield, and inflation hedge





Infrastructure has historically delivered consistent long-run returns of 9.9% annually since 2004 (Figure 13).[1] As of 2Q22, infrastructure had delivered a 12.8% return over the prior 12 months, making it one of the strongest-performing asset classes over that period. In 2023 we expect infrastructure to remain relatively resilient in the face of what is likely to be a challenging macroeconomic backdrop. Assets in the core and core plus parts of the spectrum could be particularly attractive to investors given their defensiveness, high yield, and reliable inflation hedge. That said, the headwinds of tight monetary policy and weaker economic growth may cause uncertainty for some assets at the higher end of the risk spectrum. A prudent approach to leverage and good access to liquidity will be increasingly important going forward.

Figure 13:
Infrastructure's performance has been resilient through COVID-19 and so far in 2022



Source: Macrobond, Cambridge Associates (June 2022).

1. Based on Cambridge Associated Infrastructure Index (2Q22).

Rapid change: Geopolitical tensions accelerate energy transition

Despite higher geopolitical risks in 2022, governments globally continued to deliver on their energy transition agendas. In fact, the war in Ukraine has urged many governments to accelerate the transition to clean energy sources to increase energy security and independence. An energy system powered by domestically sourced renewable power will inevitably be more secure than one that is dependent on supply from a foreign power.

If we look at previous historical episodes, conflicts have often fuelled transformations in the energy sector. During World War I global use of petroleum grew by 50%, accelerating the transition from coal to oil.[2] The reason was that oil occupied less space than coal, required less personnel on ships, and was less reliant on docking stations for refuelling. The share of oil-based vessels in the British navy rose from 5% at the start of the war to more than 40% by the war's end.[3] Another example is nuclear-powered electricity, which was first generated in 1951,[4] shortly after World War II. While the tensions in 2022 were different in nature and magnitude, they may ultimately accelerate the transition to domestically produced energy sources.

> "In our opinion, the Inflation Reduction Act (IRA) in the US may provide the largest boost to clean energy technologies by moving learning curves towards commercial deployment and mobilising substantial additional private capital. We also believe that the IRA may act as a catalyst for other nations to step up their energy transition strategies."

In the table below we summarise the major policy developments in 2022 that have implications for infrastructure. In our opinion, the Inflation Reduction Act (IRA) in the US may provide the largest boost to clean energy technologies by moving learning curves towards commercial deployment and mobilising substantial additional private capital. We also believe that the IRA may act as a catalyst for other nations to step up their energy transition strategies.

2. Oil was discovered in the US in 1859, but the transition was accelerated during World War I. Source: IMF, "Bumps in the energy transition" (December 2022).
3. Yergin D. Simon & Schuster; New York: 2009. "The Prize: the Epic quest for oil, money and power".
4. US Department of Energy, "The History of Nuclear Energy".

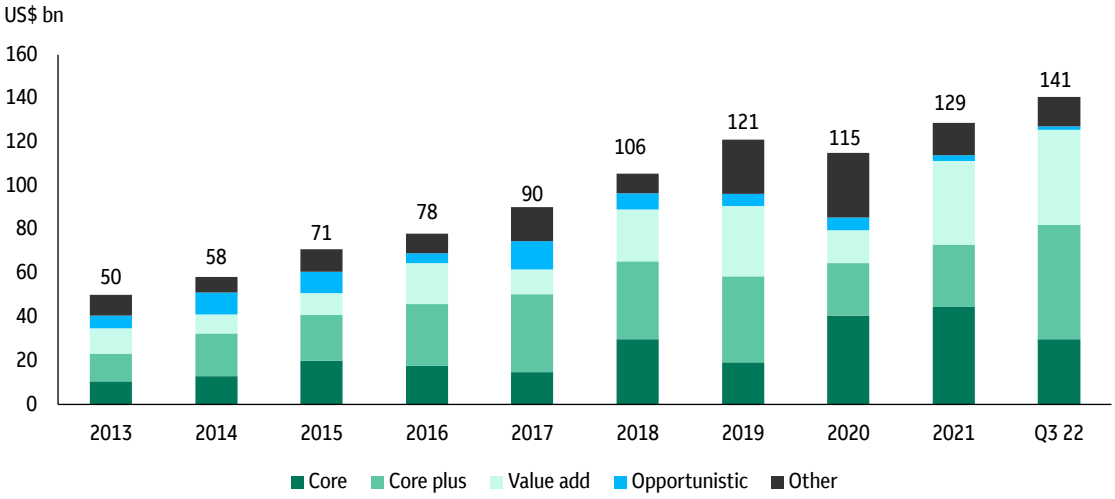
Country	Relevant policy developments for infrastructure in major economies
US	In August 2022, the US Inflation Reduction Act (IRA) was signed into law. It provides $US369 billion for decarbonisation in power and transport, energy security, and climate change solutions over the next decade. In particular, the aim of the new spending is to help increase the share of clean power generation to up to 80% by 2030, and to achieve a zero-carbon power sector by 2035.[5] The legislation introduces several new tax credits[6] and is expected to accelerate the deployment of clean energy technologies by supporting their cost competitiveness.
EU	Under the RePowerEU package, the EU proposed to increase the 2030 renewables target from 40% to 45%,[7] set a goal of 10 million tonnes of domestic renewable hydrogen production and 10 million tonnes of imports by 2030, and increased energy efficiency targets from 9% to 13%.[8]
Germany	In July 2022, Germany approved the "Easter Package" – a series of adjustments to its clean energy legislation – under which the country aims to boost solar from the currently installed 59 GW[9] to 215 GW cumulative installed solar PV capacity by 2030, and 400 GW by 2040.[10]
UK	The new British Energy Security Strategy published in April 2022 sets out a policy path to energy independence, supporting nuclear, offshore wind, and low carbon hydrogen. The new ambition of up to 50 GW of offshore wind by 2030 includes as much as 5 GW of floating offshore wind.[11]
India	In August 2022, as part of its revised Nationally Determined Contributions (NDC), India committed to reduce its GDP emissions intensity to 45% below 2005 levels by 2030, up from 33-35%. India has also pledged to achieve about 50% cumulative electric power installed capacity from non-fossil-fuel-based energy resources by 2030.[12]
China	In June 2022, China published its 14th Five-Year Plan, which includes a target of 33% of electricity generation to come from renewables by 2025 (up from about 29% in 2021), including an 18% target for wind and solar technologies.[13]
Australia	In September 2022, Australia passed the Climate Change (Consequential Amendments) Bill 2022, its first major climate legislation in more than a decade, to set legally binding targets to cut greenhouse gas emissions 43% below 2005 levels by 2030.[14]

5. Compared to 38% in 2021, according to BCG, "US Inflation Reduction Act" (August 2022).
6. A tax credit is an amount of money that taxpayers can subtract directly from the taxes they owe.
7. Proposed under the EU "Fit for 55" package in July 2022.
8. Proposed under the EU "Fit for 55" package in July 2022.
9. Bloomberg, "Germany's Solar Panels Generate More Power Than Ever Before" (June 2022).
10. The Federal Government of Germany, "Easter package for energy transition approved by the Bundesrat" (July 2022).
11. HM Government, "British Energy Strategy" (April 2022).
12. Government of India, "India's Updated First Nationally Determined Contribution Under Paris Agreement" (August 2022).
13. IEA, "Renewable Electricity" (September 2022).
14. Parliament of Australia, "Climate Change Bill 2022".

Fundraising may slow down in 2023 from its all-time high in 2022

As of 3Q22, global infrastructure fundraising reached a record $US139.6 billion, above the $US128.9 billion raised for the full year of 2021 (Figure 14).[15] This said, there was a slowdown in 2H22 that could extend into 2023 due to the uncertain economic environment and the denominator effect[16] (applicable to all private markets). Infrastructure, however, could be better positioned than other private markets, as many institutional investors may still be below their target allocations.[17] In the UK, for example, 85% of the local government pension scheme (LGPS) schemes are underallocated to infrastructure relative to their long-term strategic allocation targets, according to an Infralogic survey.[18] Therefore, we believe that although the denominator effect may have an impact in 2023, it is unlikely to derail fundraising from its long-term trend and it is likely to rebound in 2H23.

Figure 14:
Infrastructure fundraising reached all-time high in 2022 but a slowdown expected in 2023



Source: Preqin (Q3 2022).

15. Preqin database (Q3 2022).
16. When public markets fall in value, the allocation to less liquid asset classes mathematically increases and can appear outsized in an investment portfolio.
17. According to the Preqin database, on average, globally private sector pension funds currently allocate 3.2%, below their target of 5.3%; public pension funds allocate 4.5%, below their target of 4.5%; and insurance companies allocate 2.9%, below their target of 4.1% (November 2022).
18. Infralogic analysed annual accounts and meeting minutes for 61 UK LGPS from March through October 2022.

Over the next 12 months, we expect the following dynamics to shape the fundraising market:

- **Strategies.** Core and core plus strategies are expected to remain as key building blocks of institutional infrastructure allocations due to their strong potential to deliver stable, inflation-linked returns. In high inflation environments (such as the 1970s) yield tends to become a disproportionate driver of total return, hence we believe strategies focused on delivering yield will attract substantial investor interest in 2023. In the value-add infrastructure space, investors may prefer platforms with a proven track record, good access to liquidity, and a strong pipeline of opportunities.
- **Structures.** Investors may increasingly complement existing stakes in closed-end funds with allocations to open-end structures, particularly for core assets of a perpetual nature.[19] For investors concerned about deployment timing, market conditions, and matching the lifecycle of the asset with the fund's lifetime, an open-end structure may be appealing. Open-end funds are not constrained by a fixed investment period and have the flexibility to execute their investment strategy by enabling consistent access to capital for portfolio companies, especially for medium-term capex programmes.
- **New opportunities – secondaries.** As the infrastructure asset class matures, limited partners (LPs) in primary funds may increasingly consider active portfolio management. This could be more pronounced in 2023, particularly as we enter a new macroeconomic environment, which may lead to increased portfolio rebalancing needs. As a result, some interesting opportunities may come up in the secondaries market. Secondaries can provide liquidity to investors looking to exit their current stakes, while at the same time offering new investors access to highly diversified, yielding portfolios.

19. Core assets tend to focus on generating a mix of yield and capital appreciation over the longer term through capital investment.

Deal activity: Traditional M&A may slow, but energy transition sectors to accelerate

Infrastructure deal activity recovered in 2021 and remained strong in 2022 (Figure 15). As of December 2022, it stood at 95% of 2021 activity in value terms. In 2023, traditional merger and acquisition (M&A) activity could slow down as price expectation gaps emerge between sellers and buyers. This said, we expect to see increased activity across all energy transition sectors, including the build-out of core renewable generation as well as new opportunities in battery storage, green hydrogen, and electric vehicle (EV) charging infrastructure.

In 2023, there could be an increase in partnerships between infrastructure funds and other market participants (governments or corporates) that require capital to deliver new sustainable solutions to meet their carbon reduction and climate impact goals. The latest data suggest there are approximately $US0.93 trillion[20] worth of deals expected to close over the next 12-24 months, indicating an overall healthy environment (Figure 16). Investments in energy transition sectors are expected to account for about 10% of the deal activity over the next 12-24 months, a substantial step up from the 2% of the market it accounted for in 2022.[21]

Figure 15:
Global unlisted infrastructure deal activity

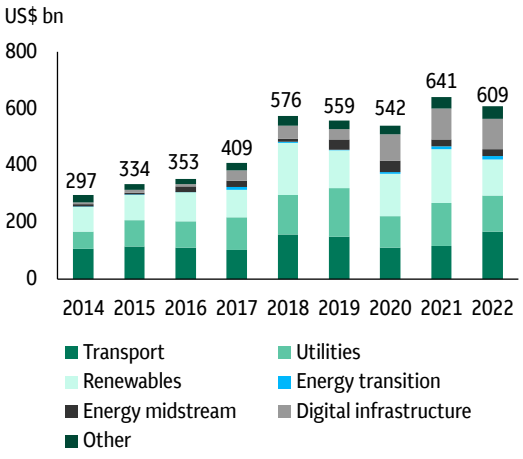
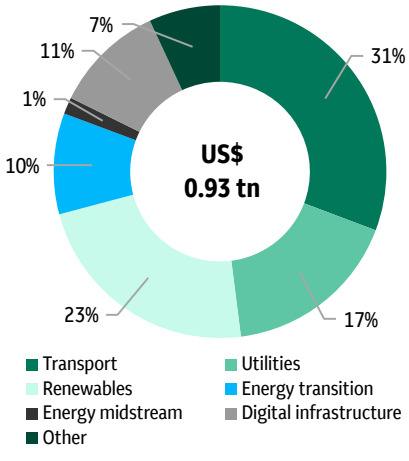


Figure 16:
Expected pipeline of deals over the coming 12-24 months



Source: Infralogic by Inframation (December 2022). Excludes energy upstream and downstream. Energy transition sectors include EV infrastructure, hydrogen, battery storage, carbon capture, energy efficiency. Pipeline of opportunities refers to live transactions launched over the past 12 months, excluding cancelled or on-hold deals.

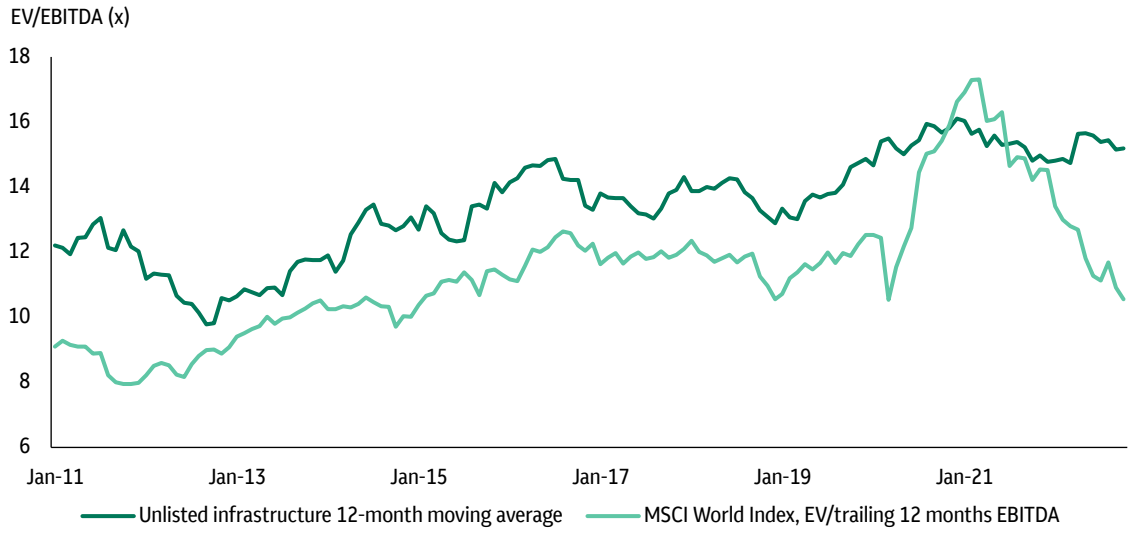
20. Infralogic by Inframation, Macquarie Asset Management (November 2022). Excludes energy upstream and downstream. Pipeline of opportunities refer to live transactions launched over the past 12 months, excluding cancelled or "on-hold" entries. The pipeline may not materialise fully due to delays and cancellations.
21. Infralogic by Inframation, Macquarie Asset Management (November 2022). Pipeline of opportunities refers to live transactions launched over the past 12 months, excluding cancelled or on-hold entries.

Valuations: More divergence between assets to emerge

Our global infrastructure market price tracker[22] – the 12-months moving average of EV/EBITDA multiples – shows that despite market volatility and rising interest rates, infrastructure valuations remained largely stable in 2022 (Figure 17). As of October 2022, transaction multiples averaged 14.9x, just below last year's average of 15.0x. Compared to listed equities, infrastructure has experienced significantly less volatility in valuations over the past two years.

Higher interest rates, in isolation, negatively affect all equity asset classes due to the higher discount rates applied to future cash flows. Infrastructure, however, tends to at least partially offset this effect in the current environment as higher inflation acts as an opposing force supporting valuations.[23] That said, the ability to recover inflation depends on the strength of the link between inflation and the revenue line. Assets underpinned by regulation and/or long-term contracts with creditworthy counterparts are likely to provide greater protection to valuations. As a result, in 2023 we may observe a divergence in valuations: assets with either strong inflation-linked cash flows or high-quality growth platforms are likely to show strong resilience in terms of valuations, while assets with a weak link to inflation and lower-quality growth may be more exposed. Overall, the pressure on valuations in 2023 may be higher than what we observed historically.

Figure 17:
Unlisted infrastructure EV/EBITDA transaction multiples have been stable so far despite the derating in the listed equities space



Sources: Inframation, Bloomberg, Macquarie Asset Management database of transaction multiples (October 2022).

22. Based on Macquarie Asset Management's proprietary databased of EV/EBITDA transaction multiples. The database contains more than 1,000 data points. EBITDA = earnings before interest, taxes, depreciation, and amortisation.
23. If higher inflation leads to an improved earnings outlook, this could lead to an improved valuation.

Performance: Resilient returns with a linkage to inflation

Higher-than-average inflation tends to be a tailwind for infrastructure returns. Historically, infrastructure delivered stronger returns when inflation was above average than when inflation was below average (Figure 18). Importantly, infrastructure tends to outperform listed equities and bonds when inflation is above average. As at 2Q22, infrastructure delivered a 12.8% return over the prior 12 months, substantially above global bonds (-15.2%) and global equities (-13.9%) over the same period (Figure 19).

For many utilities, inflation is included directly in the regulated asset base (which is increased by the rate of inflation over time) or the return (owners being given a real return). Within the transport sector, the inflation link is sometimes less direct, but tariffs and pricing are sometimes escalated at the rate of inflation. That said, while higher inflation acts as a positive driver, weaker economic growth and higher interest rates may put a downward pressure on returns. The overall impact depends on individual asset characteristics. In 2023, we may see some divergence in infrastructure assets performance. Portfolio diversification is increasingly important in the current environment.[24]

Figure 18:
Infrastructure tends to perform better when inflation is above average...

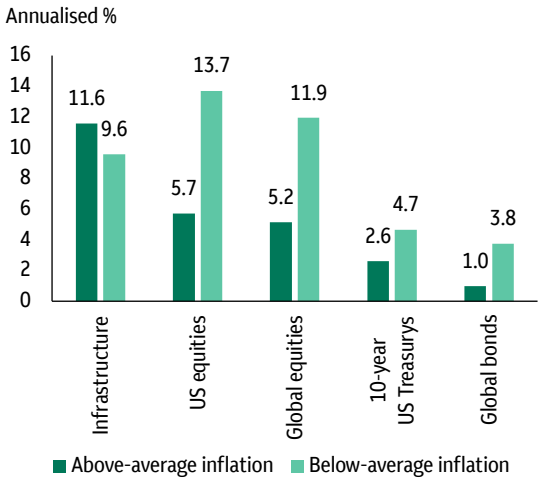
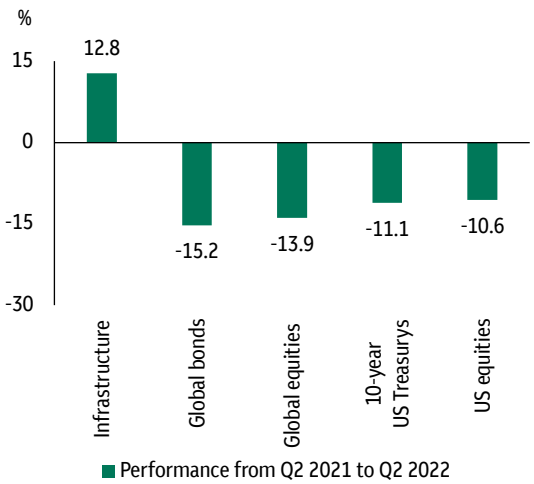


Figure 19:
...this has been more evident in recent quarters compared to other asset classes



Sources: Macrobond, Cambridge Associates, Bloomberg LP. US equities: S&P 500 Index; Infrastructure: Cambridge Associates Infrastructure Index; Global equities: MSCI World Index; Global bonds: Bloomberg Global Aggregate Index. Analysis conducted from 4Q03 to 2Q22 (December 2022).

24. It is worth noting that this is a generalisation and the inflation hedge potential of any asset will depend upon its individual traits.

Renewables: Outlook supported by declining construction costs and accelerating deployment

Many renewable energy projects are shielded from power price volatility because revenues are typically generated from long-term fixed-price contracts or regulatory subsidies. However, 2022 was a challenging year for the construction of renewable energy projects due to the supply chain issues, labour shortages, high metal and polysilicon prices, soaring shipping costs, and permitting delays. Compared with 2020, the overall investment costs of new utility-scale solar photovoltaic (PV) and onshore wind were higher by about 15% to 20% in 2022.[25] Despite these constraints, cumulative global renewables capacity is estimated to have expanded 10.8% in 2022, while net annual capacity additions grew by 22.8%.[26]

“Compared to fossil fuels, solar and onshore wind are already competitive in most geographies. On a levelized cost of electricity (LCOE) basis, either solar or onshore wind is the cheapest source of new-build bulk power in countries representing 90% of global electricity generation.”

We expect a normalisation of construction costs for renewable projects in real terms.[27] As of October 2022, freight shipping costs had fallen by 78.5% and steel prices had declined by 36.9% from their previous peaks (Figure 20). While turbine manufacturers could be reluctant to pass costs savings to customers immediately (due to their negative margins recently), we still expect costs to fall gradually due to high competition in the manufacturing space. In the solar PV sector, the latest data suggest that with many new polysilicon factories coming online in 2023, prices are likely to start converging back down to the learning curve trends despite growing demand.[28] Compared to fossil fuels, solar and onshore wind are already competitive in most geographies. On a levelized cost of electricity (LCOE) basis, either solar or onshore wind is the cheapest source of new-build bulk power in countries representing 90% of global electricity generation. The global LCOE benchmarks for utility-scale PV and onshore wind are around 60% lower than those of new coal- and gas-fired power (Figure 21).

25. Surging freight costs are the biggest contributor to overall price increases for onshore wind. For solar PV, the impact is more evenly divided among elevated prices for freight, polysilicon, and metals. IEA, “Renewable Energy Market Update Outlook for 2022 and 2023” (May 2022).
26. IEA, “Renewables 2022”, main case (December 2022).
27. This could vary substantially by geography.
28. BNEF expects 276-355GW of new solar to be built in 2023, with manufacturers potentially being able to deliver 500GW.

Figure 20:
Shipping costs and steel prices have fallen from their peaks

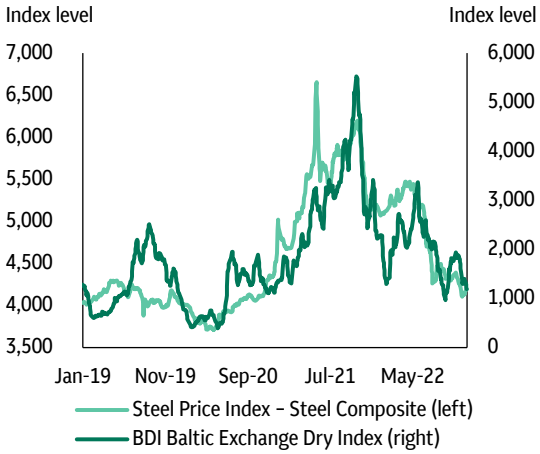
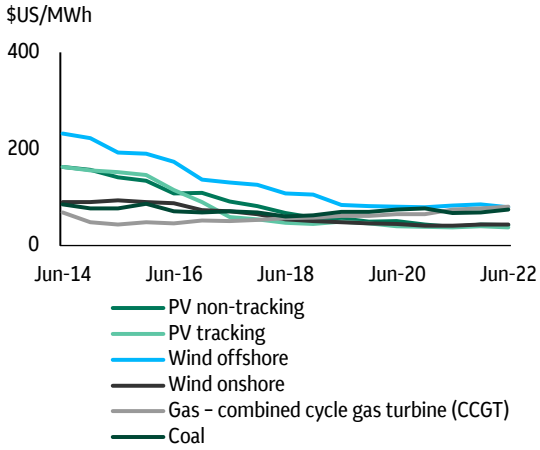


Figure 21:
Solar PV and onshore wind are cheaper than new coal- and gas-fired power plants on an LCOE basis



Sources: International Energy Agency (IEA), BloombergNEF (November 2022). LCOE for renewable energy projects could vary substantially by geography.

Energy transition: Positive outlook underpinned by strong policy support

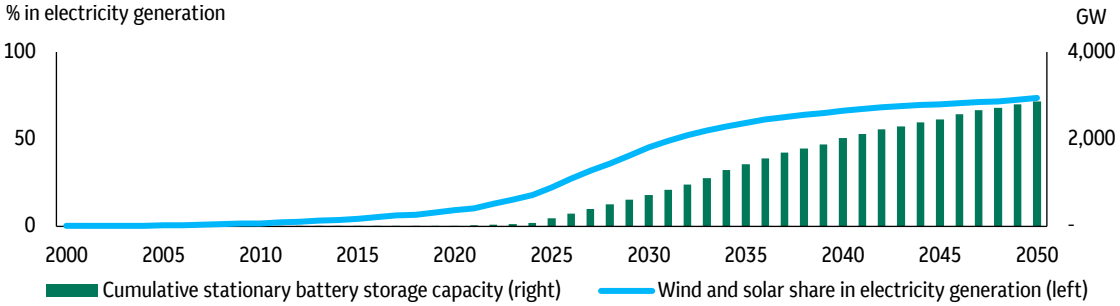
One of the key challenges of an electricity system with rising shares of solar and wind is higher variability in power generation (read more in our recent paper "Decarbonisation of electricity generation"). To ensure grid stability and a reliable electricity supply, both short-duration and long-duration storage will become increasingly important as the share of renewables in the power system grows. In our view, policy support and technological innovation will boost battery storage and green hydrogen deployment over the coming years. At the same time, electrification of transport is expected to continue, driving further demand for power.

Battery storage needs to expand to allow the deep decarbonisation of power

Energy storage is a key enabler for deep decarbonisation based on renewables. A greater share of renewables in the energy system means there is a greater need to accommodate moments when renewable generation is low and minimise curtailment when renewable generation is exceeding demand. Most flexible generation today is provided by natural gas and coal, but utility-scale batteries should increasingly replace peaker plants, making greater renewables deployment possible. In 2021, total battery storage capacity stood at 27 GW globally, including utility-scale and behind-the-meter storage. In their net zero scenarios, the International Energy Agency (IEA) and BloombergNEF estimate battery storage capacities of 780 GW and 722 GW respectively by 2030, indicating a substantial acceleration required over the coming years (Figure 22).[29]

The deployment of battery storage will depend on the technology mix of the generators, the demand profile, and government policies. Batteries are well suited for daily cycling. Hence sunny regions with high shares of solar PV, generating a charging and discharging event most days (e.g. California), may be more favourable for battery deployment than regions where wind is the dominant source of renewable power.[30] Government policies will impact where, at what scale, and for what use storage gets deployed. Germany, for example, is expected to become a large market for customer-sited storage as government subsidies bolster deployment. The UK, on the other hand, may continue to lead the utility-scale storage market in Europe.[31] Where batteries are approved to participate in ancillary services,[32] more shorter-duration storage may be built than in markets where the regulator restricts batteries to energy shifting.[33]

Figure 22:
In a net zero scenario, stationary battery storage needs to accelerate to allow a greater share of renewables in the electricity system



Source: BNEF's Net zero scenario (December 2022).

29. Currently, the battery energy storage market is dominated by lithium-ion chemistry. The fast demand growth for electric vehicles may keep lithium-ion battery costs high and make them difficult to access for storage projects. We may increasingly see a push for alternatives solutions such as sodium-ion batteries in the stationary batteries space. Sodium is abundant and less costly than lithium. While the EV sector will likely continue to rely heavily on lithium-ion batteries due to its light weight and compact features, stationary storage, free of the weight constraint, may adopt cheaper alternative technologies.
30. Storage cost for batteries is mainly an amortisation cost, meaning that fewer cycles per year results in higher cost per cycle. Wind may blow for extended periods, resulting in fewer yearly cycles.
31. BloombergNEF, "2H 2022 Energy Storage Market Outlook" (October 2022).
32. Ancillary service refers to services necessary for the operation of an electricity transmission or distribution system, e.g. frequency and voltage control.
33. Energy shifting services refers to shifting load demand from peak hours to off-peak hours of the day.

Low carbon hydrogen is coming

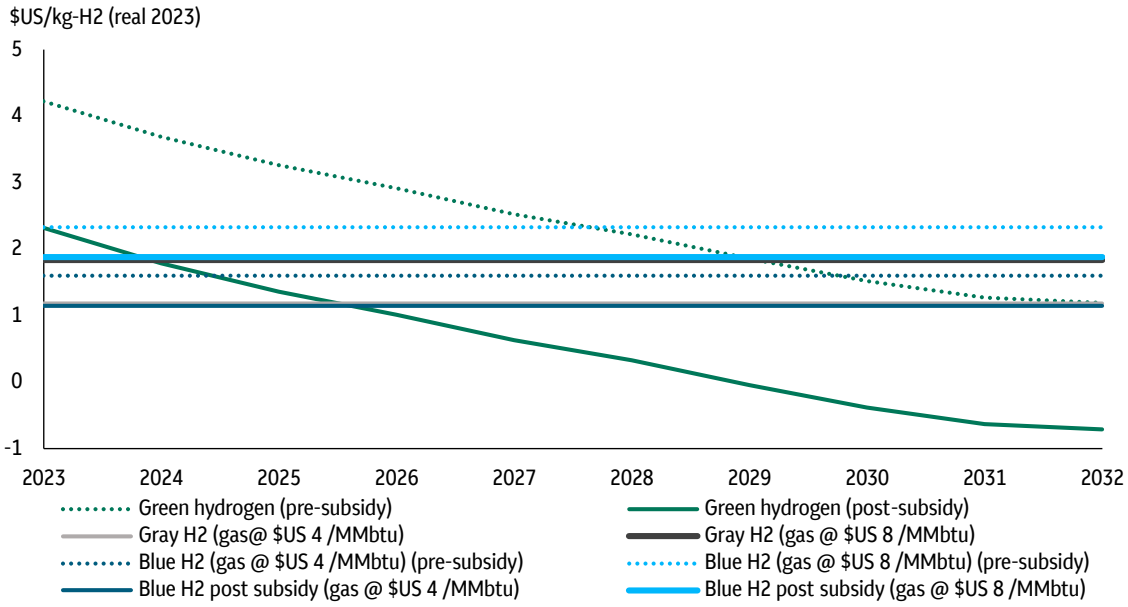
Hydrogen is often referred to as a "missing link" of the energy transition. Low-carbon hydrogen – produced via electrolysis of water using renewable electricity (green hydrogen) or through steam methane reforming[34] with carbon capture and storage (blue hydrogen) – is key to decarbonising hard-to-electrify sectors. It has multiple potential uses. For example, the substitution of natural gas in the gas network through blending (initially) and full substitution (later) allows the clean supply of heat where electrification is impractical or too costly.[35]

The main hurdle in producing low-carbon hydrogen is the cost. Under the US IRA, green hydrogen projects can receive a production tax credit (PTC) of up to $US3 per kg of hydrogen produced.[36] This could bring the average cost of green hydrogen production down to $US2 per kg in 2024 and make the net production cost negative by the early 2030s.[37] We believe this creates strong incentives for green hydrogen developers in the US starting from 2024.[38]

Blue hydrogen also benefits from the subsidy, but its benefits will be capped due to the emissions threshold applied in the bill. A blue hydrogen project would expect to receive $US0.75 per kg of hydrogen,[39] significantly less than green hydrogen and competitive with unabated hydrogen from steam methane reformation[40] (grey hydrogen). As a result of the subsidy, green hydrogen production may become competitive with blue hydrogen by 2025.[41] In a scenario where natural gas prices increase to $US8 per MMbtu, green hydrogen could become competitive with blue hydrogen as early as 2024 (Figure 23).

34. Steam methane reforming is a process in which methane from natural gas is heated with steam, usually with a catalyst, to produce a mixture of carbon monoxide and hydrogen.
35. Other potential uses include seasonal energy storage to facilitate dealing with the seasonal mismatch between the supply or renewable energy and the demand for energy and global trade of clean energy in the form of hydrogen or a hydrogen derivative such as ammonia.
36. If lifecycle carbon dioxide emissions are below 0.45 kg CO2 per kg of hydrogen and wage requirement for workers are met.
37. BloombergNEF, "US Hydrogen Tax Credits Could Make Hydrogen Costs Negative" (August 2022).
38. Developers and investors will need to incorporate the risks beyond 2033, when 10-year PTC expires.
39. Refers to the production of hydrogen using the 10-year carbon capture and storage (CCS) tax credit (45Q rule), capturing 95% of emissions.
40. Hydrogen from methane without CCS produces around 9 kg CO2 per kg of hydrogen produced and is the default method for practically all legacy hydrogen production.
41. This refers to the cost of production. The final cost will need to additionally account for storage and transportation.

Figure 23:
The US IRA creates strong incentives for green hydrogen production, which may become competitive with blue hydrogen sooner than expected if gas prices increase to $US8 per MMbtu



Source: Macquarie Asset Management calculations based on BloombergNEF (August 2022). Green hydrogen calculation assumes production tax credit of $US3/kg taken over equal production in each year. Blue hydrogen calculations assume projects choose 45Q credit. Subsidies are calculated on a levelized basis.

Transport electrification to continue despite recession risks

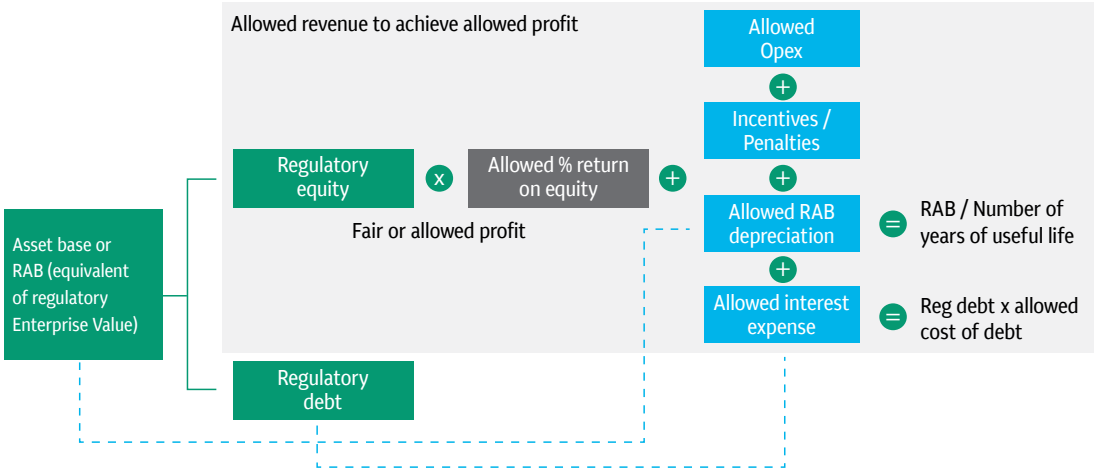
Higher inflation and borrowing costs may affect demand for large interest-rate-sensitive consumer items such as automobiles in 2023. With recession risks high in 1H23 across the DW economies, new vehicle sales may decline, but we expect EV sales to be resilient to this dynamic, supported by government schemes. In the US, the government will offer a $US7,500 EV tax credit at the point of sale on clean-vehicle purchases, subject to the cars meeting eligibility criteria.[42] With these measures in place, 52% of US passenger vehicle sales are expected to be electric in 2030, a substantial shift from the 5% of sales in 2021.[43] In Europe, new vehicle regulations effectively ban internal combustion engine (ICE) car sales from 2035.[44] Global EV sales are also expected to stay robust as China recently extended its purchase tax exemption for new EVs until the end of 2023.[45] The potential obstacle is likely to be on the supply side, as EV supply chains remain constrained in many markets.

42. Only cars under $US55,000 or SUVs, vans, and pickup trucks under $US80,000 are eligible for the tax credit. Qualifying vehicles must be assembled in North America and contain batteries made from raw materials sourced in countries where the US has free-trade agreements.
43. Bloomberg, "More Than Half of US Car Sales Will Be Electric by 2030" (September 2022).
44. Regulation was voted on and accepted in the European Parliament (June 2022).
45. National Development and Reform Commission (October 2022).

Regulated utilities: Stable outlook with pressures growing to expand and modernise the grids

Regulated utilities (such as transmission and distribution network operators) are generally expected to perform solidly in 2023. For many of these utilities, inflation is included directly in the regulated framework, positioning them favourably in a high inflation environment.[46] The return model for regulated utilities varies by geography. In much of Europe and Australia, returns are driven by regulation – in most cases it is a regulated asset base (RAB) or rate-based model (Figure 24). In the UK, the regulatory framework provides strong inflation protection, as regulated asset base and revenue allowances are indexed to inflation annually. In the current environment, with regulators being conscious of the rising cost of living and customer affordability, there could be a potential impact on net regulatory outcomes, although this risk is lower in countries with a history of private infrastructure ownership and transparent legal frameworks.

Figure 24:
Regulated asset base framework



Source: Macquarie Asset Management.

46. There can be a time lag between inflation and revenue adjustment for regulated utilities.

The shift to renewables-based power will mean that the architecture of the power system changes. The natural resource flows that are key for wind and solar output are not necessarily located in the same place as legacy thermal power plants. At the same time, the number of generation units is set to increase as renewable power plants tend to be smaller in size than thermal plants. Both of these factors mean that electricity grids will need to expand to accommodate a new power system.

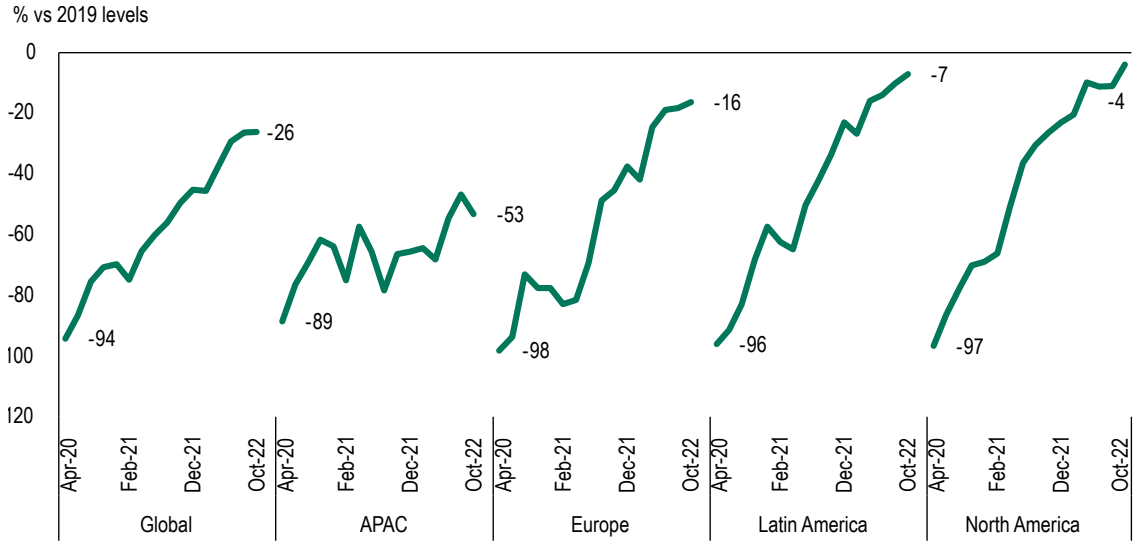
In parallel, electric demand will increase as the penetration of EVs increases and easy to electrify applications will move away from fossil fuels, requiring upgrading electric networks to cope with the new demand and demand profiles. Permitting and construction of extra-high voltage power lines may take up to 13 years,[47] implying that advanced planning is critical. Gas networks will also play a crucial role in the energy transition as they can be used to transport bio or synthetic methane (without modifications to the network) and hydrogen (with modifications).[48] We believe that the practical limitations to electrification, the intermittency of renewable power generation, and the need for long duration energy storage (LDES) will result in continued demand for gas networks.

Airports: Traffic recovery continues supported by international travel pick up

As of October 2022, global air passenger volumes stood at 74.2% of their pre-pandemic level (in revenue passenger-kilometres), with Latin America and North America leading the recovery at around 95% of their pre-pandemic levels (Figure 25).[49] The recovery in the Asia Pacific region has been lagging, but with major Asian markets reopening in 2H22 and travel restrictions easing in China in 1H23, international traffic may accelerate in 2023. While the overall economic conditions are likely to be constrained by the weakness in DW growth, we do not expect it to derail the global air traffic recovery. We believe there is a large amount of pent-up demand still in the system, meaning that air travel volumes could be stronger than forecasts based on what past relationships with GDP would suggest.[50] Beyond 2023, the outlook for airports remains robust, driven by strong demand for travel from an expanding middle-income population and a positive relationship between income level and travel intensity.

47. IEA, "World Energy Outlook 2022" (October 2022), p. 315.
48. IEA, "World Energy Outlook 2022" (October 2022).
49. IATA, "Air Passenger Market Analysis" (October 2022).
50. For more details, please see our Pathways paper "The post-COVID-19 recovery in global air travel" (April 2022).

Figure 25:
North America and Latin America lead global air travel recovery



Source: IATA (October 2022). Data refers to revenue passenger-kilometers.

Toll roads: Inflation-linked tariff increases could be offset by weaker traffic

With road traffic largely back to pre-COVID-19 levels, the sector is in a relatively good shape to enter a recession. US traffic volumes (in vehicle miles travelled) have effectively recovered to their pre-pandemic level (Figure 26).[51] In Europe, the road traffic recovery has also progressed well with traffic in some countries (e.g. France) back to 2019 levels, while traffic in others (e.g. Spain) is only slightly below pre-COVID-19 levels (Figure 27). In Latin America, road traffic has recovered robustly and was 9.0% above pre-pandemic volumes in November 2022.[52]

With inflation expected to remain elevated in 2023, we expect toll increases to provide an uplift to revenues, as tariffs are typically linked to inflation under a toll roads concession model. However, the weaker economic environment is likely to result in subdued road traffic, as higher interest rates affect households' disposable income and industrial production across DW countries in 1H23. These two forces push in opposite directions; however, the risks are skewed to the downside if economic growth weakens more than we currently expect.

51. Based on US Federal Highway Administration, monthly vehicle miles travelled seasonally adjusted data.
52. Based on Atlantia 2022 Monthly Traffic Performance (November 2022), measured in kilometres travelled.

Figure 26:
The US road traffic recovered robustly to the pre-pandemic level

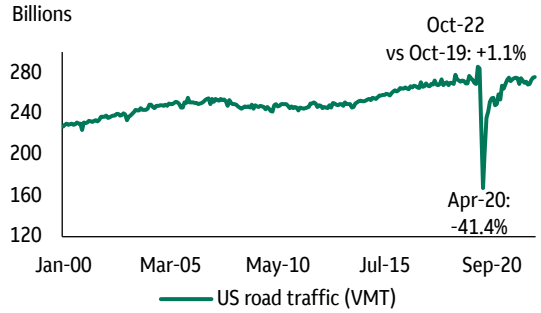
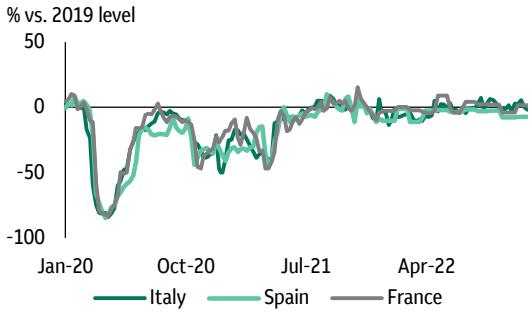


Figure 27:
European road traffic is also largely back to the COVID-19 level



Sources: US Bureau of Transportation Statistics, Atlantia (November 2022). US VMT traffic data is seasonally adjusted.

Ports: Outlook varied depending on the volume mix and port location

Ports globally performed strongly during COVID-19 as household spending was heavily skewed towards goods consumption, driving container volumes (Figure 28). With consumption softening as higher interest rates start to weigh on demand, we could see weaker growth in global container volumes in 2023. Indeed, US container volumes slowed over 2H22 (Figure 29), and we expect this weakness to continue in 1H23 as the US economy slows further. Looking at other segments, demand for liquid bulk may stay strong over the next 12 months. As Europe seeks to secure its energy supply, liquefied natural gas (LNG) flows are likely to remain elevated, lifting the outlook for liquid bulk terminals with LNG exposure. As for dry bulk, the 2023 outlook is expected to be largely driven by industrial activity in China.

Figure 28:
World trade has recovered robustly during COVID-19, supporting container volumes...

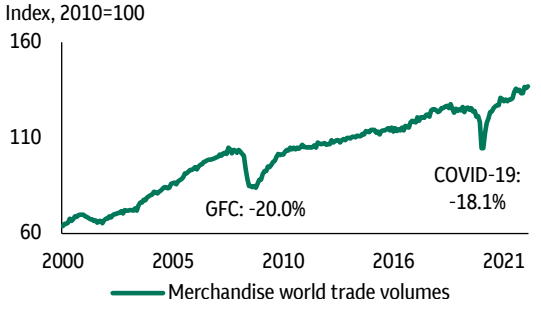
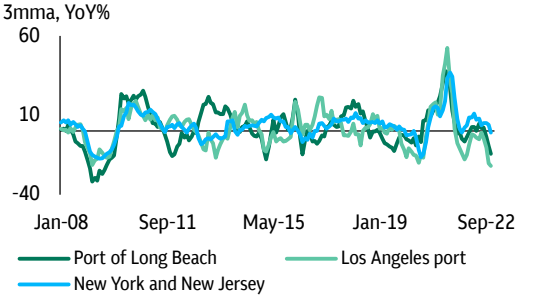


Figure 29:
...but growth was weak in 2H22 and may remain so in 1H23



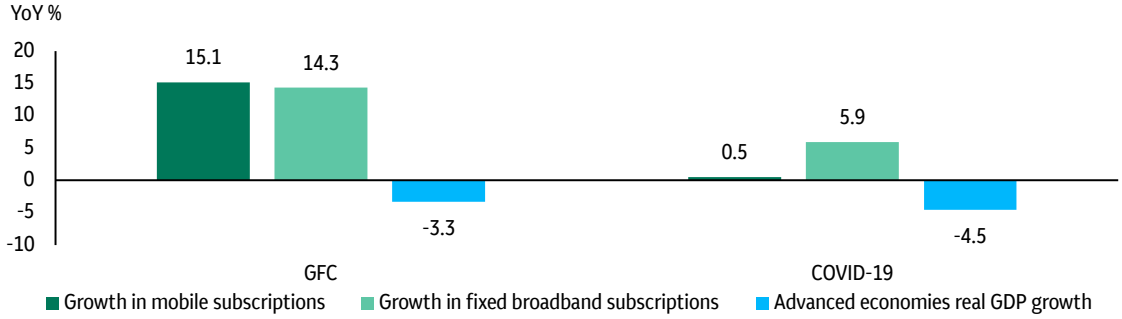
Sources: CPB Netherlands Bureau for Economic Policy Analysis (September 2022), Macrobond (October 2022). Trade volumes are seasonally adjusted.

Digital infrastructure: Underlying demand resilient to downturns

For digital infrastructure, long-term structural trends continue to drive demand for new and upgraded infrastructure. Our previous analysis[53] shows that fixed and mobile subscriptions continued to grow during economic downturns in the past (Figure 30), as digital connectivity is essential for businesses and consumers. Strong data growth and the limitations of existing cable and copper networks continue to drive demand for high-speed fibre optic connectivity. At the same time, fifth generation (5G) mobile technology requires network densification across both wireless and wireline infrastructure. 5G subscriptions[54] are estimated to have reached 1 billion in 2022, indicating a faster uptake than that of 4G following its launch in 2009.[55] In addition, digitalisation continues to be high up on policymakers' agenda. In Europe, €127 billion is dedicated to digital reforms and investments in the effort to reach gigabit[56] connectivity by 2030. In the US, the $US65 billion federal investment under the Infrastructure Investment and Jobs Act (IIJA) aims to increase accessibility of broadband, particularly in rural areas.[57] Policy support is expected to be a catalyst for additional private capital deployment.

In 2023, high-quality digital infrastructure assets could stand out in comparison to lower-quality assets. Platforms that have a proven track record and a strong pipeline of opportunities should continue to deliver growth and attract even stronger demand from investors than before. As the same time, not all digital infrastructure assets may be able to deliver on their growth agendas. Lower-quality operational businesses may come under stress, creating consolidation opportunities for both strategic and institutional investors. Overall, deal activity is likely to slow down due to higher financing costs and tighter liquidity than in the previous years. Companies may look for new ways of financing, which may lead to an increased number of interesting, structured finance deals in the sector.

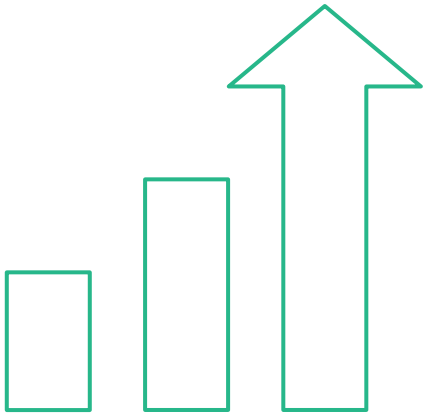
Figure 30:
Digitalisation has historically been resilient during economic downturns



Sources: Statista, OECD, IMF (May 2022). Global financial crisis (GFC) refers to the calendar year of 2009. COVID-19 refers to the calendar year of 2020.

53. For more detail, see our Pathways report, "Digital infrastructure: Transmitting signals of growth" (May 2022).
54. A 5G subscription is counted as such when associated with a device that supports New Radio (NR), as specified in 3GPP Release 15, and is connected to a 5G-enabled network.
55. Ericsson (November 2022). 5G is expected to reach 1 billion subscriptions two years sooner than 4G, following its launch in 2009.
56. Refers to at least 1,000 Mbps connectivity, as defined by the EU Digital Decade by 2030.
57. Fitch Ratings, "Federal Broadband Funds to Drive US Digital Infrastructure Projects" (November 2022).

Private markets debt: Yield returns



As we move into 2023, we expect several key themes from 2022 to continue. The macroeconomic environment has changed substantially recently, and some aspects of this change are particularly relevant for the private markets debt investment opportunity. Excluding event-driven changes, the market environment has generally been one of falling rates and credit spreads over recent decades. However, since the start of the Ukraine conflict we have entered a structural shift across the market and moved into a rising rate and credit spread environment which will in turn create a number of challenges and opportunities for debt investors.

Rising interest rates and their implications for private credit and infrastructure debt

The rising rate environment has resulted in increased returns from private credit markets, including infrastructure debt. For high yield infrastructure debt, this increases its appeal compared with other assets classes such as private equity and some other alternative credit asset classes that may currently see a smaller relative risk premium.

As the cost of debt becomes expensive relative to the cost of equity for infrastructure asset owners, this may see the attractiveness of private debt investments increase but the number of investment opportunities decrease. There are varying approaches being taken by infrastructure assets including holding off raising capital and/or deciding to focus on shorter-tenor debt, regular issuances of debt to avoid taking a risk on the timing of a debt raise, and raising long-term debt in private markets before the cost of debt increases further. This will contribute towards reducing the volume of debt issuance in the market.

Higher rates also make refinancings more expensive, which is a credit risk. We do not expect this to be a significant concern in the current rate environment because (a) infrastructure assets are performing well, with their performance supported by higher inflation, and (b) creditors have historically managed the maturity of debt to accommodate material increases in interest rates.

High inflation: Implications for credit risk

Infrastructure assets tend to benefit from higher inflation. Due to the essential nature of the services they provide and their inelastic demand, assets are often able to increase revenues with inflation, in contrast with many corporates that struggle to do this because of competition. While there are infrastructure assets with volume exposure (e.g. in transport or digital infrastructure), many of these businesses have shown historical robustness, benefitting from long-term contracts and other protections that make the debt sufficiently robust to recessions.

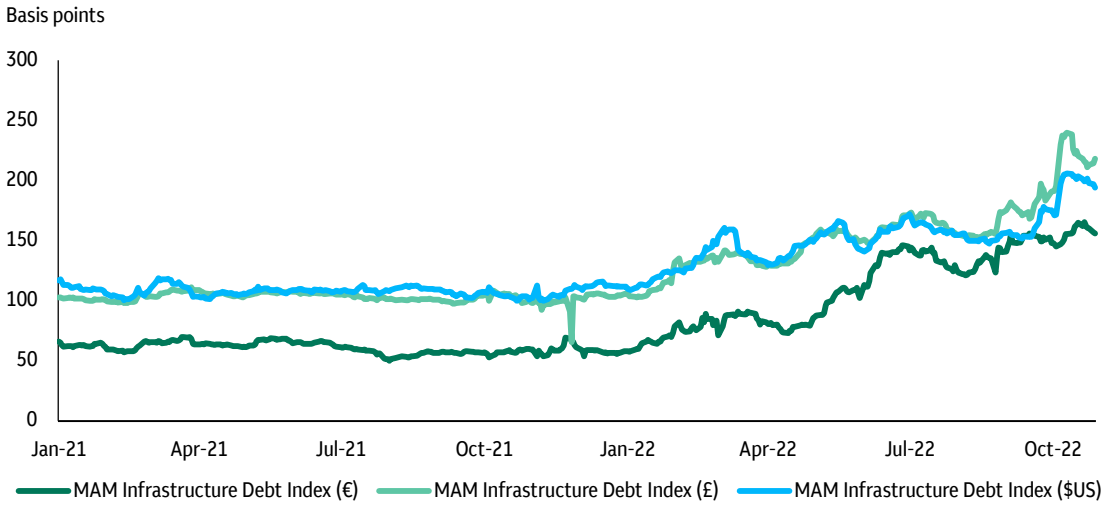
There are also some services such as water, electricity, and medical care that are unlikely to see any material change in demand. Due to the essential nature of the services and capital-intensive nature of the assets (i.e. high EBITDA margins), increases in maintenance, operating expenses (such as labour costs), and other cost items can typically be absorbed relatively easily by infrastructure businesses, and in some cases higher inflation even improves the cash flows generated and credit strength of the business.

There are some areas where high inflation can generate credit risks, especially in the construction of greenfield assets. General inflation can result in construction budgets being under pressure from contractors struggling to meet their fixed-price commitments. More specifically, there can also be supply chain issues for specific materials, which can result in cost-increases or delays to construction. Some smaller contractors may struggle to hold their price commitments on construction contracts. So far it has not resulted in any debt restructuring, but we consider construction counterparty risk always to be elevated in a recessionary or inflationary environment. Supply chain issues are typically not a material risk for infrastructure debt, but we believe these issues may be more significant and last longer than they have historically. In the current environment, it is important to closely monitor these risks and engage with contacts in the sectors to identify any potential issues that could cause an increase in risk and put in place mechanisms to avoid or mitigate them.

Widening of credit spreads

Over the past year we have generally observed a widening in credit spreads in the public fixed income markets. This has increased the cost of borrowing for asset owners who are issuing in public markets. Movement in private market credit spreads tend to lag public market credit spreads, which resulted in private market credit spreads starting to widen in 2H22 (Figure 31), something we expect to continue into 2023.

Figure 31:
Credit spreads are widening



Source: Macquarie Asset Management (December 2022). EUR credit spread is calculated as a zero-volatility spread to the EURIBOR curve. GBP and USD credit spreads are calculated as constant spreads that will make the price of an instrument equal to the present value of its cash flows when added to the yield at each point on the spot rate sovereign curve where a cash flow is received.

In contrast with public markets, bank lenders typically base their pricing on their funding costs (e.g. from deposits, central banks, or wholesale bond markets) and their cost of capital. Generally speaking, banks have not widened credit spreads as much as institutional investors, as their funding costs have not increased to the same extent. In addition, many banks see their infrastructure clients as a priority due to long-term relationships and the assets' resilience in a challenging macroeconomic environment.

Considering these dynamics, infrastructure debt investors typically seek to achieve relative value, or a private credit premium, to alternative fixed income opportunities. Therefore, to achieve a private credit premium, it has become even more important to invest in opportunities that are not driven by banks. For example, opportunities with long tenors, large issuances where some institutional liquidity is needed, or higher-risk debt investments that fall outside the risk appetite of banks.

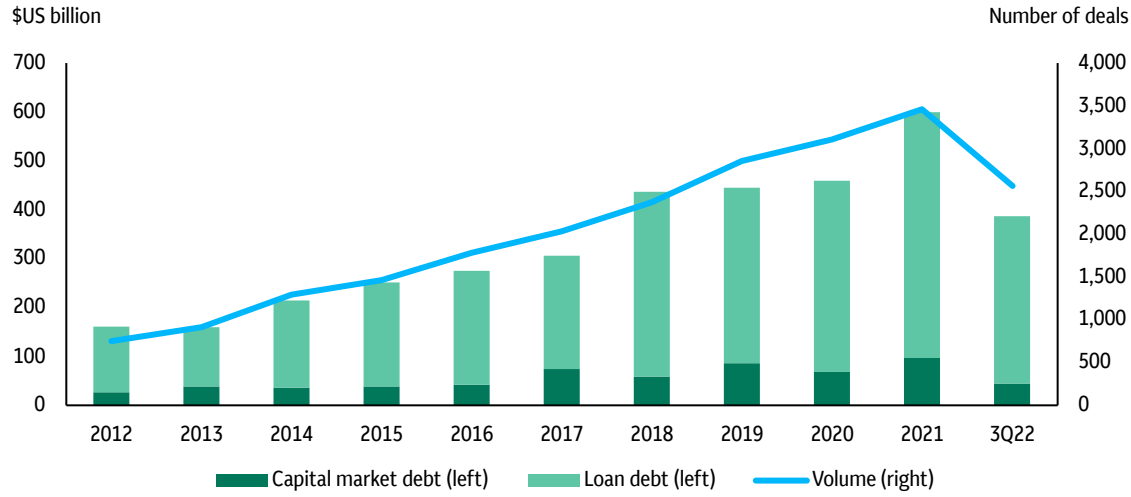
In the sub-investment-grade market, credit spread increases have taken place faster and have been larger than in investment grade markets. Certain lenders, including both the leveraged finance lenders and opportunistic lenders, have reduced their activity in the segment. With banks inactive, the high yield infrastructure debt market offers very good relative value for institutional lenders.

Several factors influencing volume

We start 2023 with several drivers influencing volumes in the market. There are a number of impediments to deal flow that will limit activity in certain areas. These include subdued activity in sectors recovering from the impacts of COVID-19 lockdowns and supply chain constraints. As noted previously, higher interest rates will also limit some asset owners' appetite to borrow.

That said, there are several themes that will drive opportunities for debt investments. The growth in digitalisation and infrastructure requirements in areas such as networks, towers, and data centres will continue to provide opportunities for lenders. The energy transition will also remain a key part of the market, historically representing a third of the volume and approximately half of the number of debt opportunities. This is driven by greenfield opportunities as countries seek to advance energy security and decarbonise the grid, as well as refinancings and portfolio acquisitions. These will come in the form of both bridge capital solutions and sponsors optimising the capital structure, especially as return targets are higher and equity dry powder declines. Notwithstanding the denominator effect, the substantial volume of institutional capital targeting infrastructure equity, as well as investors under allocation to the asset class, will also support M&A activity, creating opportunities for lenders.

Figure 32:
Infrastructure debt deal volumes



Source: Infralogic (as of Q3 2022).

Focused real estate strategies

In secure income real estate, we expect to see cap rates continue to move out, reflecting the shift in the global interest rate environment. Changes in valuations of existing assets will adjust to reflect a higher return environment with some offset from high levels of inflation feeding through into rent reviews and increasing rents.

With a number of major economies at risk of, or already in recession, sensibly sized commercial ground leases (CGL) should be well positioned, benefiting from the structural income and value overcollateralisation that is designed to withstand market cycles. There was evidence of this during COVID-19 where the investment performance was stronger than for traditional real estate sectors.[58] While tenants are typically sub-investment-grade and expected to change over the life of a CGL, the investment grade cash flows are created by the overcollateralisation, the intrinsic land value, and the sustainability of the building and its ability to continue to generate income over the long term.

We expect transactions to continue to occur across traditional CGL sectors including hotels, food stores, specialist healthcare, private hospitals, holiday parks, pubs, and day nurseries. With more liquidity currently in the market than in previous cycles, it is likely we will see some larger M&A driven opportunities arise in 2023 and beyond. This is expected to arise from private equity companies seeking to acquire assets at attractive pricing. In the UK, we expect more secondary opportunities to come to the market as well as some defined benefit pension schemes to buyout their liabilities.

In the UK income strip market (i.e. triple net leases provided to high-quality tenants), there continues to be strong demand from entities seeking to use income strips to support financing of new developments. During 2022 net initial yields were slow to catch up to market interest rates but we are now seeing tenants accept higher net initial yields, something that is making projects viable again. The core opportunity set is the delivery of social and affordable housing by local authorities, which may see further tailwinds against the backdrop of an expected reduction in the volumes of new-build homes from the build-for-sale market.

58. CBRE Long Income Index

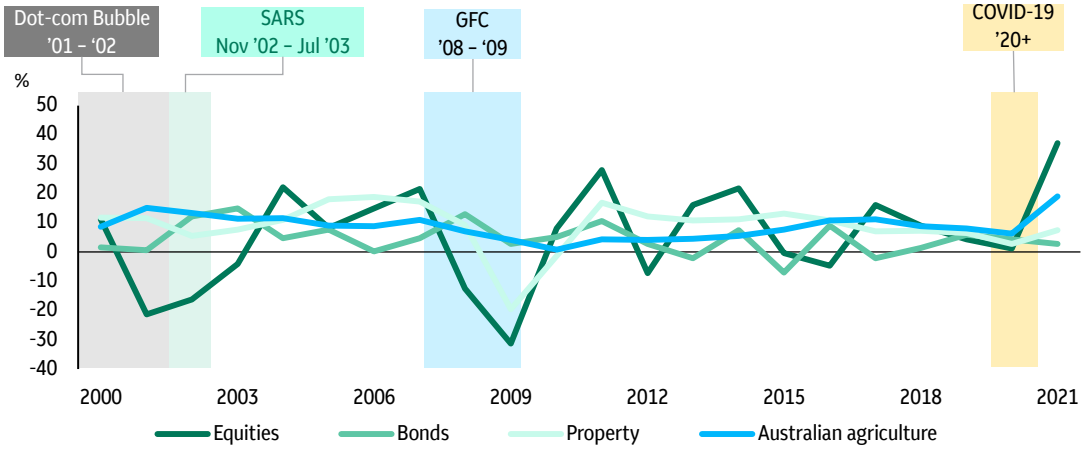
Agriculture: Tailwinds continue

In our view, agriculture continues to represent an attractive asset class, particularly in the context of heightened geopolitical uncertainty and the likelihood of recessions in 2023. Agriculture provides a stable long-term investment prospect. Agriculture returns are linked to powerful demographic drivers and are realised through the value store and appreciation of a land-rich natural capital asset, with annual operating income supported by basic needs demand and higher commodity prices.

Agriculture's performance: Consistent performance and resilience in downturns

Australian agriculture has been a strong performer over the past decades, with large farms delivering an average return of 8.5% since 1990. Critically for portfolio construction, agricultural returns have historically shown strong resilience during major economic downturns and financial crisis compared with other major asset classes (Figure 33) and have demonstrated a low correlation with other asset classes (Figure 34).

Figure 33:
Agriculture has shown strong resilience to economic downturns...



Provided for illustrative purposes only. **Past performance is not necessarily indicative, or a guarantee, of future results or returns.** Source: ABARES Agricultural Index (Australian agriculture), MSCI World Index (world equities), Bloomberg Global Aggregate Index Value Unhedged USD (bonds), NCREIF Property Index (Property), S&P 500 Index (US equities). Correlations are based annual data from June 1991 to June 2021.

Figure 34:
...while exhibiting low correlation with other asset classes

	Global equities	Global bonds	US property	US equities	10-year US Treasurys	Australian agriculture
Global equities	1.00	-0.13	0.47	0.91	-0.50	0.22
Global bonds	-0.13	1.00	-0.21	-0.04	0.62	-0.12
US property	0.47	-0.21	1.00	0.40	-0.24	0.32
US equities	0.91	-0.04	0.40	1.00	-0.28	0.10
10-year US Treasurys	-0.50	0.62	-0.24	-0.28	1.00	-0.29
Australian agriculture	0.22	-0.12	0.32	0.10	-0.29	1.00

Provided for illustrative purposes only. **Past performance is not necessarily indicative, or a guarantee, of future results or returns.** Source: ABARES Agricultural Index (Australian agriculture), MSCI World Index (world equities), Bloomberg Global Aggregate Index Value Unhedged USD (bonds), NCREIF Property Index (Property), S&P 500 Index (US equities). Correlations are based annual data from June 1991 to June 2021.

Agriculture's return characteristics are driven by compelling long-run structural demographic drivers in the form of rising food demand globally through both population and income growth. The world's population is expected to reach 9.7 billion in 2050, implying an increase in food demand from an additional two billion people. At the same time, real incomes are forecast to more than double by 2050 (Figure 35). Per capita food consumption tends to increase with rising incomes, most apparently in lower income brackets (Figure 36). At the same time, arable land per capita (as a measure of productivity to meet rising demand) is decreasing.

Figure 35:
Growing population and rising incomes are strong demand drivers for agriculture...

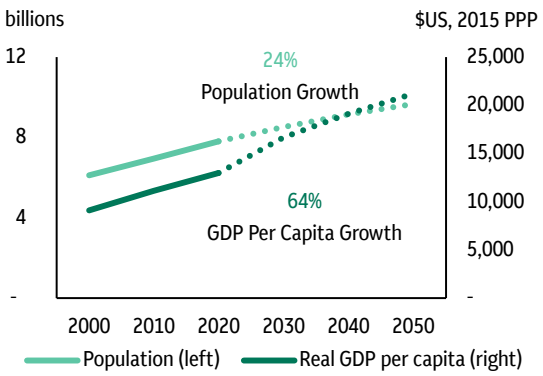
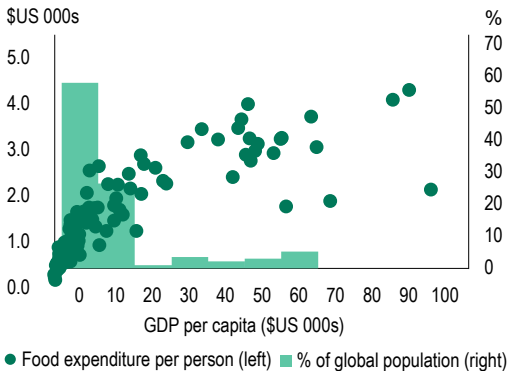


Figure 36:
...as food consumption tends to increase with rising incomes



Source: United Nations World Population Prospects (2022), Organisation for Economic Cooperation and Development (2021), United States Department of Agriculture (2021).

Australian agriculture: Well positioned to capture key growth markets

As a reliable and consistent exporter of high-quality produce, Australian agriculture is well positioned to benefit from the recent deglobalisation trends and heightened focus on food and supply chain security. This is particularly so for the geographically close and fast-growing Asian markets (Figures 37 and 38).

In Australia, operating conditions for agriculture are strong, both globally and locally in 2023. Globally, food commodity prices continued to find support in 2022, consolidating on prior year growth (Figure 39). Developments in supply bottlenecks, the Russia-Ukraine conflict, poor climate conditions in key regions such as South America, the Black Sea area and the US, and China's emergence from COVID-19 lockdowns are, in our view, likely to be the major drivers of price movements in 2023. A subset of these factors, and principally the Russia-Ukraine conflict, are likely to also be the major factors that determine the pricing trajectory of key agricultural inputs such as fertilizer, chemicals, and energy – which have all reached historic highs over the past couple of years.

Figure 37:
Australia has diversified global trade relationships with exposure to fast-growing Asian markets

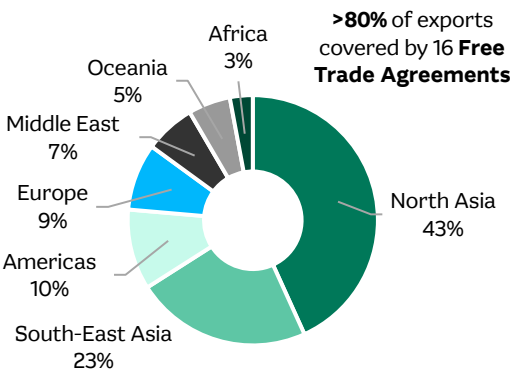
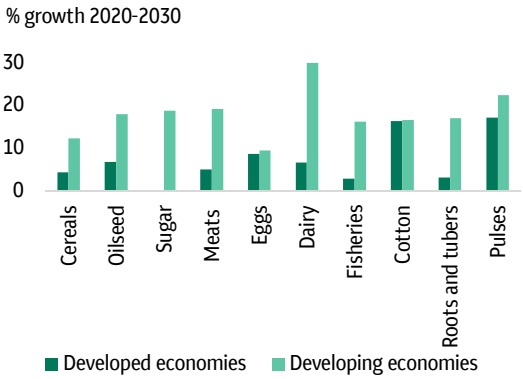


Figure 38:
In particular, food demand growth is expected to be strong in developing countries



Source: Australian Bureau of Agricultural and Resource Economics (ABARES), Agricultural Commodity Statistics 2021 (financial year end 30 June 2020).

Looking forward, we continue to see these macroeconomic fundamentals supporting strong market activity for agricultural investment into 2023. Additionally, the continuing emergence of nature-based climate solutions will likely drive additional and competing demand for an already finite productive resource base. Agriculture's inherent ability to play positively into the global decarbonisation need will position it well both as an industry with a clear and deliverable path to net zero, and as a source of net carbon sequestration to aid other industries in meeting their objectives.

Figure 39:
Food prices continued to increase in 2022

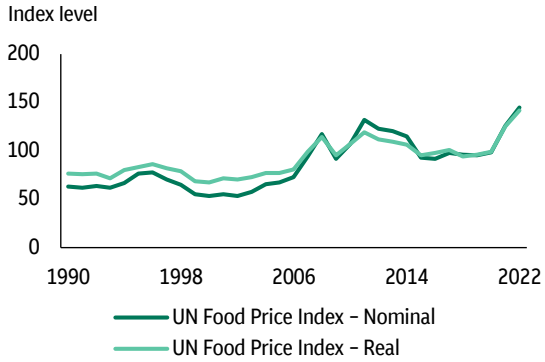
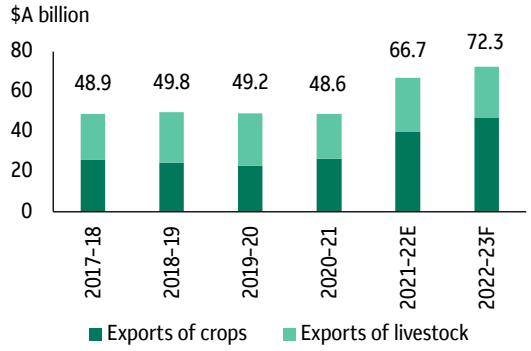


Figure 40:
Australia continued to act as a reliable exporter



Source: ABARES forecasts, UN Food and Agriculture Organization (FAO) (December 2022).

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For more information, or to speak to the authors of this issue, David Roberts, Aizhan Meldebek, Daniel McCormack, Tom Van Rijsewijk please contact your Macquarie Asset Management Relationship Manager.

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