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Rockefeller Insights

Macro Themes in Focus

2/28/2021

For Sustainable Income and Resilience Amid Uncertainty:
Private Real Estate & Infrastructure

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In the beginner's mind there are many possibilities, in the expert's mind there are few.

– Shunryu Suzuki

Beginner's Mind

As investment strategists, it has long been ingrained in us that “the more, the better” when it comes to absorbing information. Yet, few people – ourselves included – truly embrace this practice.

A recent study by researchers from Carnegie Mellon, Northwestern, and Harvard Universities found that people are twice as likely to actively avoid learning information that contradicts what they already think or believe, even when this means they might not be able to make fully informed decisions.¹ This behavior stems from what psychologists call cognitive dissonance – people are naturally averse to inconsistencies in their perceptions, and therefore tend to feel stressed and defensive when presented with conflicting ideas.

Zen philosophy presents a solution to this – a concept called Shoshin, meaning “beginner’s mind.” It refers to an attitude of openness, inquisitiveness, and a lack of preconceptions – as a novice would – even when addressing complex, advanced problems.

Intellectual integrity and relentless pursuit of truth are at the very core of our own investment philosophy. To some extent, we thrive on the beginner’s “not knowing.” As Shunryu Suzuki, who was renowned for helping popularizing Zen Buddhism in the West, put it, “in the beginner’s mind there are many possibilities, in the expert’s mind there are few.”

At present, we – investors, strategists, economists, policymakers – are collectively entering uncharted territory. Yet, the degree of conviction among strategists in the future paths of inflation and interest rates, in our view, is too high relative to the amount of uncertainty outstanding. Could this have been influenced by our expert cultures, where not-knowing is an unforgivable

failure? Sure, we all acknowledge that the market is not deterministic and uncertainty is always present. Critically, many often fail to sufficiently appreciate that the level of uncertainty itself is also highly uncertain. This is likely because our minds have been so trained to focus on assessing problems and providing answers that we sometimes equate the lack of a single, high-conviction view with weakness.

Conditional Probabilities

High Probability of a New Regime of Higher Inflation

Now, to be clear, we do believe that there is a strong argument for the scenario of an inflation overshoot this year as the economy reopens, led by a surge in spending by consumers who have recently received stimulus checks from the December COVID relief bill (with more on the way). Low- and middle income households, which are the recipients of the direct transfer payments, also have a higher propensity to spend.

More importantly, we see a strong case for higher inflation beyond the near-term transient period.² While we acknowledge the presence of both structurally inflationary forces and disinflationary forces, we expect the combined effect of coordinated, committed, and accommodative fiscal and monetary policy actions to be the most influential driver behind inflation expectations in the medium term.

Rising Conditional Probability of Higher Real Rates

Higher inflation matters in general because of its relationship with purchasing power and wealth erosion. At present, however, the prospect of higher long-term inflation expectations matters in particular because it introduces uncertainty around long-term interest rates. This, in turn, affects asset prices because the financial market, in large part, is a discounting mechanism. Already, nearly \$6 trillion of the world’s stock of negative yielding debt has melted away since mid-December as

¹ Emily H. Ho, David Hagmann, George Loewenstein. Measuring Information Preferences. Management Science, 2020

² In fact, we have written quite extensively on this topic in the past.

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inflation expectations rise. The implied volatility on at-the-month 10-year swaptions has nearly doubled since the beginning of 2021, as institutional investors rushed to add reflation hedges.

The prospect of higher inflation has also resulted in market expectations of higher real rates, since historically nominal rates typically increase more than one-to-one with inflation. This is evidenced by recent trends in ETF flows – a pickup in net inflows into VIX has been accompanied by an outflow from gold. Investors tend to rush into both when they are nervous about a growth downturn. However, controlling for growth, the two have opposing relationships with real rates. Real rates can be viewed as the cost of capital of owning gold, which is an asset that does not product real value or generate cash flows. The connection between VIX and real rates stems from VIX's negative correlation with equity returns. Historically, equities did well during periods of rising real rates accompanied by rising inflation (if the underlying driver is improving growth expectations). Rising uncertainty around the future paths of real rates nonetheless induces investor anxiety in the equity market.

The relationship between rates and bond prices is much more straightforward. The Bloomberg Barclays 20+ Year US Treasury Index has delivered a total return of around -10% year-to-date.³ Fueled by reflationary expectations, we have seen a rapid pickup in outflows from long-term debt and US Treasuries, and correspondingly a dramatic pickup in inflows into floating rate debt such as bank loans that offer limited duration risk should rate continues to rise. For these trades to be profitable, investors must believe that the market has underestimated the risk of higher long-term rates and that they are taking actions before even higher long-term rates are reflected in asset prices.

Multiplying Conditional Probabilities

We advise that investors be aware of the risk of overconfidence. Structurally disinflationary forces such as technological advances, changes in consumer

behaviors, and age demographics may turn out to be more influential than we expect. In addition, the scenario of yield curve control remains a proximate possibility. Aggressive policy actions in 2020 benefited the larger businesses by allowing them to raise cash and issue debt at low interest rates. However, many smaller and middle market businesses continue to struggle, some even face solvency issues. A rapid and significant rise in interest rates may be detrimental to these businesses, especially as stimulus dries up.

More importantly, it is critical that we view conditional probabilities in the appropriate context – they are conditional. While we see a strong case for higher inflation in the medium term, and a higher likelihood of rising interest rates in an inflationary scenario, the latter outcome is dependent on the former. At the risk of oversimplifying, let's say we estimate an 80% chance of higher inflation and correspondingly a 70% chance of higher real rates (a disinflationary outcome will mostly likely imply persistently low rates). What we are actually forecasting is merely a 56% probability of higher real rates – not much greater than a coin flip.

A Complementary Approach: Private Real Assets

For investors who are used to seeking income in the traditional public debt market, rather than choosing between fixed versus floating coupon debt (effectively betting on the direction of future rates), a complementary approach is to consider assets that generate fairly stable cash flows, offer reliable protection against rising inflation, and have sufficiently lower sensitivities to changes in real rates.

In particular, we are thinking of private real assets such as real estate and infrastructure. In the following discussion, we explore the characteristics of their behaviors, the fundamental drivers behind their prospective returns, and why we believe incorporating private real assets has the potential of improving the resilience of one's portfolio across various macro environments.

³ Source: Bloomberg. Data as of 2/26/2020.

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Private Real Estate

After stocks and bonds, real estate represents the third largest repository of the world's wealth. The size of global income-producing real estate, which includes commercial properties (e.g., industrial, office, and retail) as well as rented residential buildings (not owner-occupied), is around \$58 trillion.⁴ Compare this to the \$67 trillion market cap of global investment grade debt⁵ – of which \$13 trillion or 20% is negative yielding.⁶

Following years of muted capital inflows after the global financial crisis and the bursting of the housing bubble, we have seen a notable recovery of investor interest and confidence in real estate investments. Note that private real estate may be viewed as a hybrid asset class as it captures both the characteristics of private equity (i.e., capital appreciation) and private debt (i.e., income). Private real estate AUM breakout by strategy in recent years indicates that investors in private real estate have gradually shifted down the risk curve and have shown an increasing interest in core and core-plus strategies that focus more on income as opposed to alpha generation. This is likely driven by investors increasingly identifying their allocations to private real estate as fixed-income substitutes with higher and sustainable yields, the potential for greater tax efficiency, as well as other benefits such as diversification. (Income accounts for approximately two-thirds of the long-term returns from core equity real estate investments.⁷)

In the spirit of keeping our discussion focused, in the rest of this paper we refer to real estate investments as equity ownership in core, income-producing properties, excluding higher risk strategies such as value-add, opportunistic, or distressed investments. The latter have different return drivers from those for core real estate and primarily aim to generate returns in form of capital appreciation as opposed to income.

Sustainable Income & Resilience

Real estate has characteristics that could potentially present an effective hedge against inflation. Unlike fixed rate debt, real estate is a long-lived asset with an income stream that generally adjusts to inflation. The behaviors of real estate across various macro environments ultimately rely on the nature of their cash flows.

The financial markets are a discounting mechanism – asset prices are a function of the present values of expected future cash flows. Intuitively, in an inflationary regime, if we assume no changes to growth expectations (a big if), the net effects of a higher growth rate in future rental income combined with a higher valuation discount rate should be fairly minimal on cash flow yield as well as asset price on a real basis.

Overall, we have found strong empirical evidence that supports the effectiveness of commercial real estate across different regimes as an inflation hedge.

Excluding the two real estate recessions in the early 1990s and 2007-2009, the NCREIF Property Index, which measures the unleveraged performance of direct investments in private commercial properties in the US, has outpaced inflation consistently over the past four decades.⁸

In reality, the relationship between real estate and inflation is a lot more nuanced than the theory presented above. For example, different property types typically have different lease durations and structures. This results in varying degrees of inflation sensitivities across real estate sectors. We explore this topic more in-depth later in this paper. Besides inflation, other macro forces, notably growth, also play an important role in influencing real estate asset prices and income returns. The sensitivity to growth is evidenced in the long-term historical time series of dividends per share for the

⁴ Source: LaSalle, NCREIF, US Bureau of Economic Analysis, the Federal Reserve. Data as of Q4 2020.

⁵ Bloomberg Barclays Global Aggregate Index. Source: Bloomberg. Data as of 2/26/2021.

⁶ Source: Bloomberg. Data as of 2/26/2021.

⁷ Source: LaSalle. Data as of Q4 2020.

⁸ The NCREIF Property Index data is available from January 1978.

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FTSE/NAREIT Equity REITs Index.⁹ As expected, the cash payout – adjusted for inflation – remained fairly stable throughout the past three decades, with the exception of three corrections: (1) the commercial real estate recession in the early 1990s, (2) the residential housing bubble burst during the global financial crisis, and (3) the current pandemic-induced economic recession (albeit with highly dispersed results across sectors and geographies). It is therefore important that real estate investors understand the potential vulnerability (and the degree of impact) the rental cash flows may experience during a growth downturn, especially in a potential stagflationary environment, due to the non-linear relationship between inflation and growth. We examine later in this paper the variations in behaviors of real estate returns across macro environments with various combinations of inflation, growth, and real yield.

A Deep Dive into Stagflation: Myth, Perception, and Reality

To most US investors, the period from the early 1970s to the early 1980s is synonymous with stagflation – a term coined by British politician Iain Macleod, in 1965 when the UK experienced an outbreak of inflation. During the stagflation period, the US economy experienced the highest unemployment rates as well as arguably the worst years of real GDP growth since the Great Depression. By 1975, the so-called Misery Index – the sum of inflation and the unemployment rate – reached 20% before peaking in 1980 at 22%.¹⁰

The performance of various asset classes during this hyperinflation period is used by some investors as a reference for the assets' effectiveness as a hedge against inflation. This approach, in our view, has a critical flaw – notably, the lack of distinction between correlation and causation.

For example, gold was probably the best performing asset class in the 1970s. Although the combination of

negative real yields and weak economic growth is indeed the perfect recipe for a gold rally, we believe the severing of the link between the US dollar – which had been under tremendous downward pressure – and gold in 1971 was the primary driver behind the dramatic takeoff in gold prices in the following years. Simultaneously, this also set the stage for the multi-year decline in the value of dollar against other currencies, resulting in higher inflation in the US.

Similarly, commodities – notably energy – delivered strong performance over the same period. While we do not consider the twin oil crises in 1973 and 1979 as the root cause of the decade-long stagflation, skyrocketing oil prices due to supply disruptions directly led to increased scarcity and prices of goods, thus further fueling the inflationary pressure.

On the other hand, while real estate also saw impressive returns during the stagflation years, the underlying drivers were drastically different from those for gold and oil. Importantly, the exceptional performance by real estate was in response to the rapid rise in inflation. This, in our view, is a powerful suggestion of real estate's potential resilience across various inflationary environments, regardless of the causes of higher inflation.

Over the period from 1973 to 1981, investors in the S&P 500 and US Treasuries suffered cumulative losses of 53% and 23%, respectively, adjusted for double-digit inflation.¹¹ In an attempt to preserve purchasing power, investors fled into real assets such as land and property, thus driving up demand for equity ownership in real estate. Such investor behavior, in our view, further strengthens real estate's potential to perform well as inflation rises. The fundamental reason that real estate may be a good inflation hedge stems from the fact that rental income generally moves with inflation in the long run. In most cases, however, rental cash flows are fixed in the short term, which means the relationship between real return performance and inflation is more meaningful over a longer period. However, as inflation rises, the

⁹ The FTSE/NAREIT Equity REIT Index is a composite of publicly listed US equity REITs across property sectors (excluding Timber and Infrastructure) on market cap-weighted basis.

¹⁰ Source: Bloomberg. Data as of 2/25/2021.

¹¹ US Treasuries are proxied by the Bloomberg Barclays US Treasury Total Return Index. Source: Bloomberg.

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increased relative attractiveness of real estate versus other assets such as stocks and bonds has the potential of further lifting the returns from real estate driven by greater capital appreciation.

The headline CPI rose 13.5% in 1979, the largest year-over-year increase since the end of World War II. Remarkably, in the same year, the NCREIF Property Index delivered a nominal total return of 20.5%, outpacing inflation by 6.3%.

Assessing Inflation Protection Effectiveness Across Regimes

In our view, the examination of the nuances in asset class behaviors during the 1970s highlights the risk of extrapolating an asset class' macroeconomic sensitivities solely based on observations from one single period, partly due to the distortion by idiosyncratic forces present within each macroeconomic environment.

To develop a more robust assessment of the relationship between real estate and inflation, we take an alternative approach by conducting a systematic analysis across a long time period (from 1972 to 2020) that covers a variety of inflationary regimes.¹²

Methodology

Note that although correlation is commonly used to measure the closeness of a relationship between two variables, this approach implicitly assigns equal significance to all time periods. We, however, are much more interested in the behaviors of asset classes during periods of higher inflation. In addition, a strong positive correlation does not establish the effectiveness of an asset's ability to act as a hedge against inflation. For example, it adds little value for an investor own an asset that returns 0.1% more when inflation rises by 1%.

What we ultimately seek to determine is real estate's ability to deliver sufficiently higher returns during rising inflation periods. This is the key to why incorporating real estate into a multi-asset portfolio has the potential of improving the portfolio's overall resilience against the adverse effects of rising inflation. Given the shortcomings of the correlation approach, we instead evaluate - based on empirical data - the percentage of instances in which real estate generated positive real returns across the high inflation periods considered in our analysis.¹³

We are also interested in how this percentage may change as we focus on periods of incrementally higher inflation. In addition, we examine the relative attractiveness - from the perspective of providing effective inflation protection - of real estate versus a few other asset classes that have also historically exhibited positive inflation sensitivities.

A key question that we need to address is what constitutes "high inflation." Since Federal Reserve chair Paul Volcker dramatically raised the fed funds rate to 20% in the early 1980s, which ended the period of hyperinflation, the subsequent decades have been characterized by generally stable growth, declining interest rates, and declining inflation. As a result, the distribution of year-over-year changes in headline CPI from 1972 to 2020 exhibits a strong positive skew. While the median annual inflation over this period is 3.0%, the average inflation is 3.9% - a non-insignificant difference of 0.9% especially in the context of current inflation levels.¹⁴ For completion purposes, we also extend our analysis to "hyperinflation" periods, defined as inflation above one standard deviation (6.4%)

Real Estate

Real estate income exhibits the highest inflation protection effectiveness (82%) across periods of above-median inflation (CPI>3.0%). In fact, real estate income

¹² We use the FTSE NAREIT Equity REITs Index as a proxy for real estate, given its longer history than the NCREIT Property Index. The FTSE NAREIT Equity REITs Index data is available from January 1972. We have found that the two indices have comparable performance over the long term after adjustment for leverage. The FTSE NAREIT Equity REITs Index is arguably more representative of the actual averaged returns received by investors on the long term, as leverage is commonly used in real estate investments. Public REITs are roughly 50% levered, based on information provide by Cliffwater.

¹³ The comparison between asset performance and inflation is based on year-over-year change.

¹⁴ The headline CPI of January 2021 is 1.4%. Source: Bloomberg.

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remains the most effective inflation hedge when inflation is above historical average (CPI>3.9%). We consider the findings fairly intuitive, as rental income generally moves with inflation. We observe that the inflation protection effectiveness of real estate total return is higher than income during periods of “hyperinflation” (CPI>6.4%). This reflects rising real estate prices (i.e., capital appreciation returns) – consistent with the tendency of investors re-allocating their wealth to real assets at times of severe purchasing power erosion, as we discussed earlier in this paper.

The fundamental reason that real estate may be a good inflation hedge stems from the fact that rental income generally moves with inflation in the long run. In most cases, however, rental cash flows are fixed in the short term, which means the relationship between real return performance and inflation is more meaningful over a longer period.

Stocks

Stocks, proxied by the S&P 500 Index, show overall the a weaker ability to generate positive real returns in high inflation periods. We believe that these results understate stocks’ ability as an inflation hedge, given the strong relationship between stock returns and growth expectations. The inclusion of the 1970s – a period of arguably the weakest GDP growth since the Great Depression – has likely resulted in a substantial downward skew in the return potential of stocks. We suspect that the effectiveness of stocks’ ability to hedge against rising inflation will increase substantially if we exclude periods of hyperinflation.

Commodities

Commodities¹⁵ appear to be the most dependable hedge against inflation in modestly inflationary to hyperinflationary environments. This may be simply a reflection of the fact that exogenous price shocks – caused by short-term supply-demand imbalance – were

the causes of many notable high-inflation episodes in the past few decades: the oil price shock during the 1990 Persian Gulf War; the 1996 cold weather-induced energy demand spike in Europe and the US; the commodities boom in the first decade of the 21st century driven by rising demand from emerging markets. In our view, using commodities as an inflation hedge is a fairly challenging task, as commodity-induced inflation spikes tend to short-lived, and it is very difficult to get the timing the just right. Once the temporary supply-demand imbalance is resolved, the reversal of commodity prices can result in sizable losses for investors. And most importantly, our expectation of rising inflation over the coming years is primarily driven by the outlook of higher economic growth, supported by coordinated expansionary fiscal and monetary policies. Naturally, the efficacy of commodities as an inflation hedge should weaken significantly when higher commodity prices are not the cause of higher inflation.

Gold

Finally, the ability of gold¹⁶ to generate returns in excess of inflation is the weakest when we consider all periods in which inflation exceeds its historic median (CPI>3.0%). Gold outperformed inflation in just over half of the instances considered. On the other hand, it shows the highest inflation protection effectiveness in the “hyperinflation” scenario. It is worth noting, however, that periods in which inflation exceeded its historic one standard deviation level or 6.4% occurred entirely during the stagflation period. Putting aside the linkage between the ending of the gold standard in 1971 and the subsequent dramatic rally in gold prices, we do know that gold has a positive relationship with falling real rates and slowing economic growth. Given the historic levels of national and corporate debt in the US and the potential burden on growth should there be a material move up in interest rates, a stagflationary environment is a scenario that cannot be completely dismissed. In the near term, however, as improving economic growth is generally associated with rising

¹⁵ Commodity returns are based on the total returns of the S&P GSCI Total Return Index.

¹⁶ Gold returns are based on the returns of spot prices, as there were no total return indices for gold in the early part of our analysis time period.

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inflation and real rates, we do not consider gold as a suitable hedge against inflation risk.

Growth and Real Rates

A consistent theme throughout our assessment of the relationship between real estate and inflation is that asset classes' returns are driven by a combination of macro forces that are also interconnected. For example, a moderate rise in inflation is often associated with improving growth expectations, whereas a dramatic rise in inflation may have the opposite implications for growth.

Given that simple correlations between asset returns and a single macro factor may result in a misleading interpretation of the behaviors of an asset class, we investigate how real estate performs across various permutations of changes in macro factors.

Our analysis finds that real assets tend to outperform with rising inflation and rising growth expectations - not controlling for other macro forces, but exhibit even greater risk-adjusted returns in an environment of both rising inflation and rising growth expectations. This may be attributed to the structure of real estate lease income, which anchors the perceived market value of the asset class. In theory, property types with short-duration leases should perform better in inflationary environments as income is adjusted for inflation more quickly. Hotels have the shortest lease terms (daily) among all property

types. However, its cash flows are also a function of the vacancy rate, which correlates closely with the level of economic activity and consumer spending. In comparison, residential rentals generally have annual leases. Although rental income may lag inflation in the short term, prices within residential tend to be driven by secular trends such as demographics. The inelasticity on both the demand side as well as the supply side determines that any imbalance tends to take years to adjust. This translates into a lower sensitivity to growth.

Another macro factor to consider is real rates, as leverage is common in real estate investments. Intuitively, all else being equal, real estate financed with long-term fixed rate debt should outperform those with floating rate debt in a rising rate environment. Our analysis finds that real asset tends to outperform when real rates are rising - not controlling for other macro factors - likely due real rate's positive relationship with growth and inflation. Interestingly, assuming rising growth and inflation expectations, real estate exhibits significantly higher risk-adjusted returns given lower real rates (accommodative liquidity environment) but only a modest decrease in risk-adjusted returns in higher real rates environments. This likely supports the thesis that, despite real estate investments' leveraged nature, their returns are someone resilient against rising rates, as the interest expenses can be partially offset by rising inflation.

Infrastructure

Infrastructure can be thought of as the essential systems required to allow a business, community, or nation to function, such as electricity, toll roads, and cell towers. Historically, the bulk of infrastructure investment has been driven by the public sector. However, budget constraints facing national and local governments today suggest that the financing of infrastructure may continue to move toward private investment to help close the infrastructure funding

gap, which is estimated to expand to \$15 trillion globally by 2040.

Infrastructure as an asset class was pioneered in the early 1990s by the Australian financial industry when the government required that the country's pension funds invest in the country's infrastructure assets to bridge the gap between available government funding and infrastructure needs. Pension funds, which incur long-term liabilities, embraced infrastructure

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investments within their portfolios, given the dependable, inflation-adjusted, and long-term nature of the cash flows. Since then, countries around the globe have followed Australia's lead by encouraging private investment to help finance and operate infrastructure assets.

In recent years, the growing trend of privatization and investment opportunities in infrastructure has helped the space mature and grow substantially, resulting in increased interest in the asset class from institutional and retail investors. The FTSE Global Infrastructure Index, which represents the global listed infrastructure market, has grown to a market cap of roughly \$3 trillion. Preqin estimates that the size of the global private infrastructure market stands at \$656 billion and is expected to reach \$795 billion by 2025.

The asset class has gained popularity among investors searching for dependable, long-term cash flows, often with some form of inflation protection. Revenues derived from infrastructure assets tend to be stable and predictable, due to regulation as well as usage patterns that are not as cyclical compared to other sectors. Operating expenses comprise a low percentage of revenues for infrastructure assets, leading to EBITDA margins that are commonly in the range of 50% to 80%. Unlike other businesses that have consistent, ongoing capex and reinvestment needs, capex on maintenance and new projects is generally more limited, which contributes to higher margins and the ability of infrastructure companies to pass along more cash flows to investors. Dividend yield and payout ratios in the telecommunications and utilities sectors, for example, are among the highest in the equity market.

Infrastructure investing can be separated into three categories: *mature*, *growth*, and *development* infrastructure. Since our analysis of the infrastructure space is geared toward its potential to generate attractive, inflation-resilient cash flows, we focus on mature infrastructure. An example of mature infrastructure is a fully operational, regulated power distribution network. Growth infrastructure is focused on growing the business through expansionary capex, taking on greater operational and market risk. Development infrastructure is the highest risk of the

three and seeks to develop new assets. Mature infrastructure is concentrated in large, pre-existing assets that require limited capex and are expected to generate income relatively quickly following investment. Contrarily, growth and development infrastructure aim to generate returns primarily in the form of capital appreciation, taking on a greater degree of operational, development and construction risk.

Within the infrastructure asset class, the main sectors in the space include *utilities*, *transportation*, and a mixture of other sectors dominated by *pipelines* and *telecommunications*:

Utilities include power generation (i.e. electricity and heat), from coal, gas, oil, nuclear and renewable energy sources, power distribution (providing gas and electricity to end users), and water. Utilities make up more than half of the listed infrastructure space.

Transportation is primarily made up of a combination of airports, seaports, rail, and toll roads. The most commonly used index to represent core, mature infrastructure is the FTSE Global Core Infrastructure 50/50 Index. It was developed by FTSE using capping methodology mainly to ensure a balanced allocation to transportation sectors like seaports, airports, and toll roads. The transportation sector in most indices is typically dominated by railroads.

The rest of the market is comprised of mostly pipelines and telecommunications infrastructure. Pipelines are underground systems designed to transport oil and gas products over long-distances to market areas for consumption. Pipelines exclude operators that derive the majority of their revenues from direct sales to end users, which are classified under "gas distribution" in utilities. Telecommunications is dominated by companies that own, manage and operate transmission towers and satellites to facilitate communication.

Note that the investable infrastructure universe does not typically include "Social Infrastructure" assets, which cover certain healthcare facilities, public transportation, judicial and defense facilities, educational facilities, and housing. Social Infrastructure

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is usually fully operated and owned by the government.

It is important to understand the composition of the investable universe. While infrastructure generally provides attractive yield, inflation protection, and cash flows that are less sensitive to the economic cycle, every sector is different.

Sensitivities To Growth & Inflation

We examine the risks of investing in each infrastructure sector through the lens of its exposure to the economic cycle and inflation risk.

Exposure to the economic cycle can be thought of as the degree of demand elasticity of each sector. For example, water infrastructure is essential to sustaining human life and its demand is highly inelastic. Conversely, seaports, for example, are more reliant on shipping volumes and subsequently the health of the economy.

Growing consensus of an impending period of higher inflation may have investors looking for places to hide. While infrastructure as a whole has provided income that is resilient to inflation, there is some degree of nuance between sectors. For example, electricity distribution tends to have an explicit link to inflation through regulated pricing, with contracts directly tied to CPI. Other sectors, like railroads, have a more implicit link to inflation due to their monopolistic nature and pricing power. Colonial First State Global Asset Management estimates that “more than 70% of assets owned by listed infrastructure companies have effective means to pass through the impacts of inflation to customers, to the benefit of shareholders.”

Utilities

Utilities tend to have varying degrees of exposure to the economic cycle but are mostly well insulated. For utilities, it is important to make the distinction between

power distribution and power generation. Power distribution (i.e. a utility company selling electricity to a consumer) is highly regulated and typically monopolistic. Certain utility infrastructure responsible for power distribution can be volume-neutral through a regulatory mechanism called “decoupling”. Decoupling is meant to remove pressure on utilities from selling as much energy as possible to increase revenues by eliminating the relationship between revenue and volume sold to consumers. This allows power distributors to adjust the rate they charge for power to ensure they meet their revenue targets, thus leading to protection from changes in demand. Power generation does not benefit from the same regulation and is more exposed to changes in energy demand.

Demand for power generated from fossil fuels like oil, gas and coal fell in Q1 2020 as COVID-19 struck. However, renewable energy was highly resilient. Variable renewable energy, like solar and wind, was the only energy source that posted growth in the same quarter. In most countries, variable renewable energy receives priority in the electricity grid and because variable renewable energy output accounted for only a small percentage of global electricity usage, its output was insulated from the impact of lower electricity demand.

On the inflation front, power distribution infrastructure and water utilities tend to have an explicit link to inflation through CPI and upward pricing adjustments that are allowed each regulatory cycle. Power generation infrastructure does not benefit from the same explicit link to inflation. Arguably, rising commodity prices affect inflation levels and therefore could support power generation infrastructure in a period of higher inflation; however, the link is not as ironclad as we find with regulated power distribution infrastructure.

Transportation

Intuitively, transportation has more exposure to the economic cycle than regulated utilities, however it varies by sector. Toll roads, airports, and rail exhibit some sensitivity to economic growth and have cash

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flows that are contracted, but more exposed to the risk of volatility when compared to fully regulated assets. Seaports, on the other hand, tend to negotiate prices directly with shippers. Overcapacity in some regions has led some port operators to reduce prices.

Toll roads and airports have an explicit link to inflation through concession agreements or regulated fee increases that are directly tied to CPI. Rail and seaports have an implicit link to inflation through their monopolistic nature and pricing power and are not as explicitly protected as other regulated and contracted assets.

Telecommunications & Pipelines

Telecommunications and pipelines are both fairly resilient to changes in the economic cycle. Telecommunications benefits from stable revenues from increasing penetration and data traffic growth. Similarly, pipelines, which tend to be monopolistic, are not as highly correlated with underlying changes in commodity prices as other energy infrastructure, as they act as the mid-point between resource exploration and production, which is highly dependent on commodity prices, and supplying oil and gas for end users, which is clearly affected by consumer energy demand.

Telecommunications has a degree of inflation protection in the form of contracted annual price escalators, which are typically around 3% per annum. While the price escalators would provide protection against a modest rise in inflation, they would not be as effective in a hyperinflationary environment. Pipelines generally vary in terms of inflation protection. Most have contracts linked to the Producer Price Index (PPI), which tends to be more volatile, but fairly similar, to CPI, leading to explicit inflation protection for most pipelines.

Infrastructure's ability to provide steady, inflation-adjusted cash flows that are higher than traditional bonds and public equities is valuable in a low interest rate environment. Coupled with the notion of rising inflation gaining traction, we expect the increased

interest in the space to continue. Additionally, structural tailwinds in the infrastructure space bode well for continued infrastructure investment, specifically in the renewable energy space.

A Global Focus On Increased Infrastructure Investment

The successful passing of the budget resolution bill in early February paved the way for Democrats to pass the long-anticipated \$1.9 trillion COVID relief bill. Some issues still need to be ironed out, like the inclusion of the \$15 federal minimum wage, which has garnered criticism from some Democrats. We expect some form of the proposed bill to pass in mid-March. The stimulus bill represents the first of two major initiatives President Biden is aiming to pass in the first few months of his term. The second is his infrastructure plan. President Biden is broadly aiming to invest an estimated \$2 trillion into rebuilding and improving America's infrastructure with the goal of achieving net-zero emissions by 2050.

President Biden's bill could benefit existing core infrastructure with low-cost federal financing or tax incentives for an array of activities, including R&D and upgrading facilities. Upgrading existing core infrastructure could help increase efficiency and drive profit margin expansion. We do not believe that failure to pass the infrastructure bill will have a profound negative impact on core infrastructure as the nature of the cash flows are typically long-term and protected by regulation or contracts. Some critics who have pushed back on President Biden's plan have highlighted the potential inflationary effects of the massive proposal. While President Biden has not confirmed how he plans to fund the initiative, an increase in government spending could have inflationary implications. This would benefit existing core infrastructure investors due to the explicit or implicit inflation-link from which many forms of infrastructure benefit. The risk does arise for pain in the fossil fuels space, but it is unclear how President Biden's plan will ultimately affect this sector.

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The bigger opportunity of the bill comes in the form of job creation and advancement of the renewable energy space. President Biden's plan promises to create millions of jobs helping to rebuild America's infrastructure, transitioning to clean, American-made electricity, upgrading buildings and housing, and many other fields. This would clearly have a positive impact on economic growth especially at unemployment levels that are still elevated due to the COVID-19 pandemic. Additionally, a large portion of Biden's bill is focused on building modern, sustainable infrastructure to meet climate change goals and position the US to build a clean energy economy. We believe the passing of the bill could drive growth and development in emerging industries like renewable energy and electric vehicles by potentially injecting capital directly, in the form of grants, subsidies, or tax incentives. The European Green Deal was largely created to attain goals similar to President Biden's plan. With policymakers around the world increasingly focused on climate change, we believe the increased investment in new, emerging sectors will be a boon for the development of renewable and climate change-resilient infrastructure globally and lead to an increased interest in the space from investors.



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