Insight INVESTMENT

GLOBAL MACRO RESEARCH
MODELING THE PERSISTENCE OF US INFLATION

OUR LONG-TERM INFLATION MODEL (DRAWING ON RENTS, THE LARGEST "STICKY" INFLATION COMPONENT) INDICATES THAT US CPI WILL REMAIN ABOVE-TARGET FOR THE NEXT TWO YEARS BUT WILL NOT ACCELERATE FURTHER.
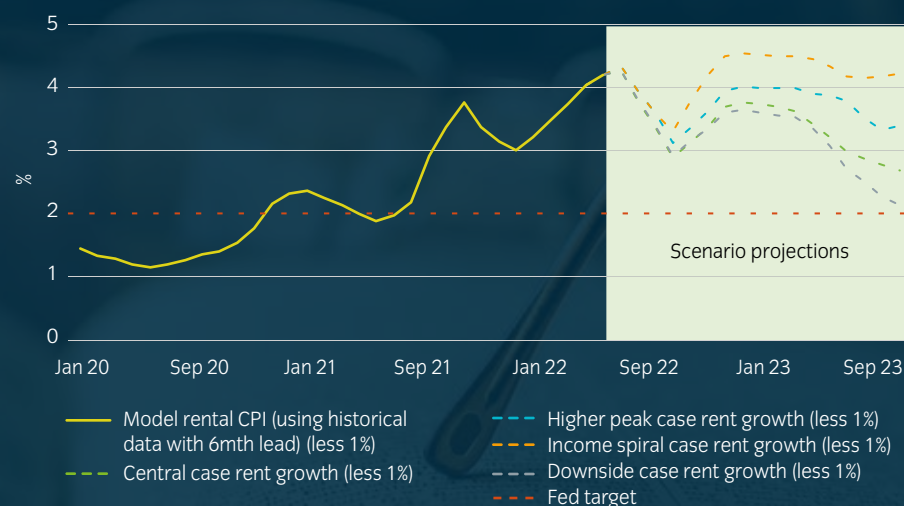
MARCH 2022

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EXECUTIVE
SUMMARY

THE HOUSING MARKET INDICATES STABLE BUT ABOVE-TARGET CPI FOR AT LEAST TWO YEARS

With US inflation at the highest levels since the 1980s, investors are worried about how long inflation will remain elevated. We attempted to answer this question – not by looking at supply chains, energy prices or goods and services – but by focusing on what has historically been the most persistent and long-term driver of CPI: rental inflation.

Our results show that inflation will remain stable but well above target for the next two years. Our central case indicates CPI will start to converge on the Fed's target by the end of 2023, but it could take longer.

Figure 1: Insight's projections imply stable, but above-target rental CPI for the next two years[1]

THE FED POTENTIALLY HAS LIMITED ABILITY TO RETURN CPI TO ITS TARGET IN THE MEDIUM TERM

If house prices continue to rise at a strong pace, we expect this to drag rents up. If the Fed instead raises rates enough to contain the housing market, it will likely result in higher mortgage rates, which would potentially drag rents up instead.
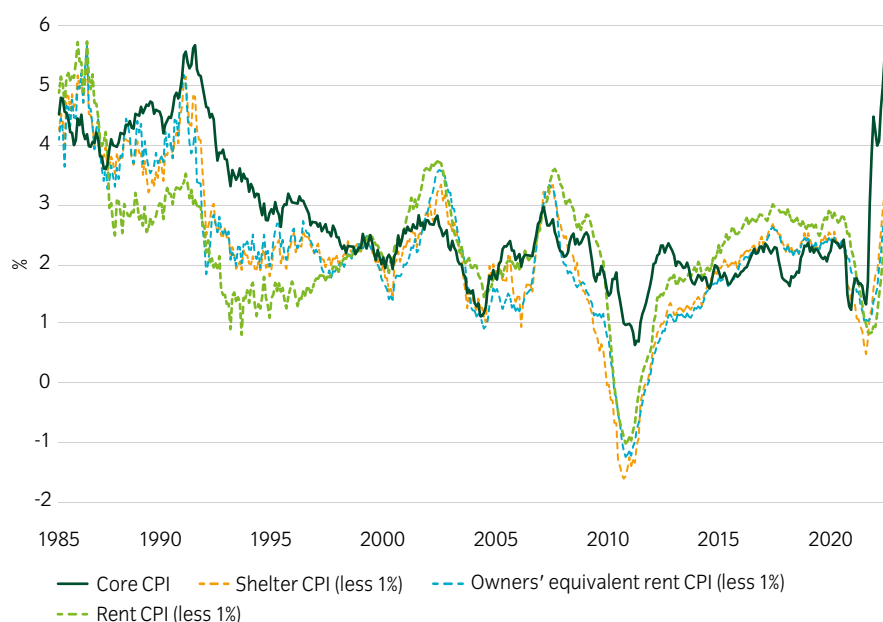
THE HOUSING MARKET POTENTIALLY DETERMINES LONG-TERM CPI TRENDS

Although energy prices, supply chains and other 'flexible' inflation categories dominate the headlines, we believe rents hold the key to longer-term inflation trends.

As a rule of thumb, rental inflation (less 1%), has tracked closely with overall Core CPI, but has been less volatile and thus acted as something of an 'anchor' (Figure 2).

Figure 2: Rents have historically served as an anchor for CPI[2]

Legend: Core CPI — Shelter CPI (less 1%) - - - Owners' equivalent rent CPI (less 1%) - - - Rent CPI (less 1%)

Rents are the major component of the 'Shelter' category of CPI, which makes up ~30% of the CPI index. Specifically, Shelter's major components are the following two rental categories:

- **rents** (~7% of the CPI index)
- **owners' equivalent rent** – an estimate of what homeowners would earn if renting their property (~23% of the CPI index)

Both categories are based on surveys that are refreshed every six months, with a sixth of the sample updated each month. This reflects the fact that rents are typically locked in for six to 18 months.

As such, rents tend to be less volatile than other CPI categories and have the 'stickiest', or most persistent effects on the index overall. As such, we believe that projecting rents will offer the best clue for understanding the path of inflation.
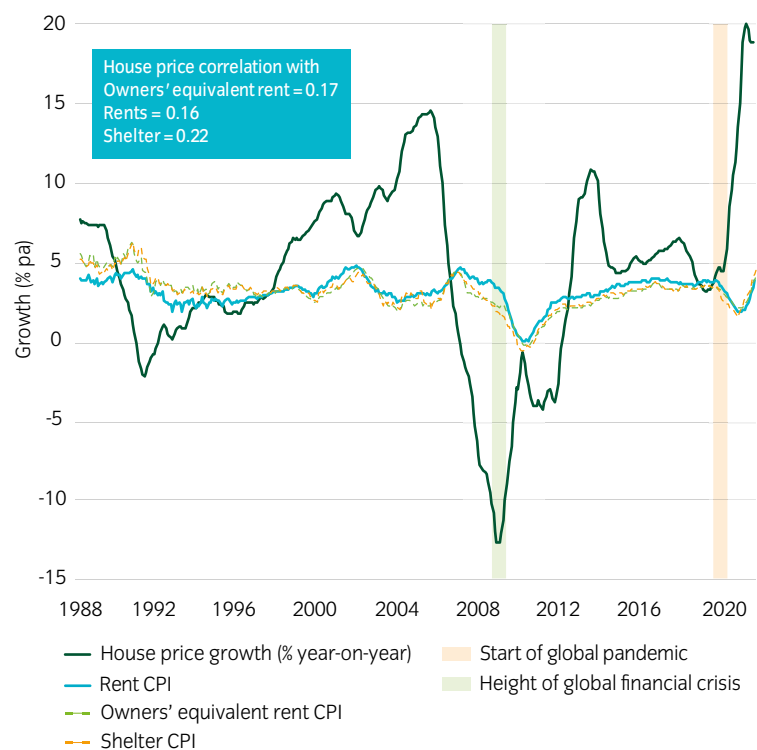
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[2] Source: FRED, February 2022.

PROJECTING FUTURE RENTS IS NOT EASY – A VIEW ON HOME PRICES IS NOT ENOUGH

When forecasting rents, the most obvious place to start is to look at home prices (which do not impact CPI directly as they are not included at all in the index). As home prices rise, landlords look to raise rents proportionally to keep their rental yields unchanged, assuming all else remains equal.

Unfortunately, in practice, all else is rarely equal. Historically, the correlation between house price growth and rental inflation has been close to negligible since the inception of the S&P Case Shiller House Price Index (Figure 3).

Figure 3: The linear relationship between home prices and rents is poor[3]

House price correlation with
Owners' equivalent rent = 0.17
Rents = 0.16
Shelter = 0.22

— House price growth (% year-on-year)
— Rent CPI
--- Owners' equivalent rent CPI
-- Shelter CPI
Start of global pandemic
Height of global financial crisis

The present day is case in point. Since the start of the global pandemic, house prices have risen a cumulative 31%, while rents have only risen ~5%, and even at times turned negative at the start of the pandemic when city rents fell.

As such, to understand the dynamics of rental inflation, we need to consider more than home prices alone.

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[3] Source: FRED, S&P Case Shiller Home Price Index, December 2021.
Please see index descriptions at the back of the document.

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MODELING THE RENTAL MARKET

By introducing just two more variables, we can create a potentially workable rental model with just three steps.

STEP 1: ACCOUNTING FOR MORTGAGE RATES (NOT JUST HOME PRICES)

Although it makes sense to expect landlords to adjust rents to match their desired rental yield when home prices change, we also need to consider that rental yields themselves have fallen over time.

As central bank interest rates have fallen over the last 40 years (and sharply since the start of the pandemic) so too have mortgage rates. As such, landlords do not need to earn as much in rent to cover their own mortgage interest costs.

To include mortgage rates in our model, we have made the following assumptions for simplicity:
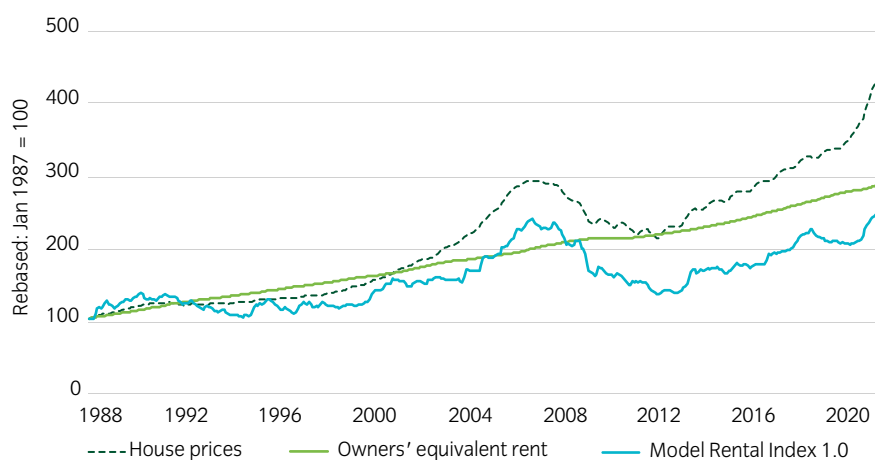
- All mortgages have 30-years outstanding
- All mortgages have a 20% down payment

We then assume that landlords demand rent that:

- covers their monthly mortgage payments
- additionally, provides a 0.5% monthly return (or ~6% pa) on their 20% down payment
- adjusts each year to reflect changing mortgage rates and changing home prices

This gives us a slightly closer fit to historical rents than using house prices alone (Figure 4).

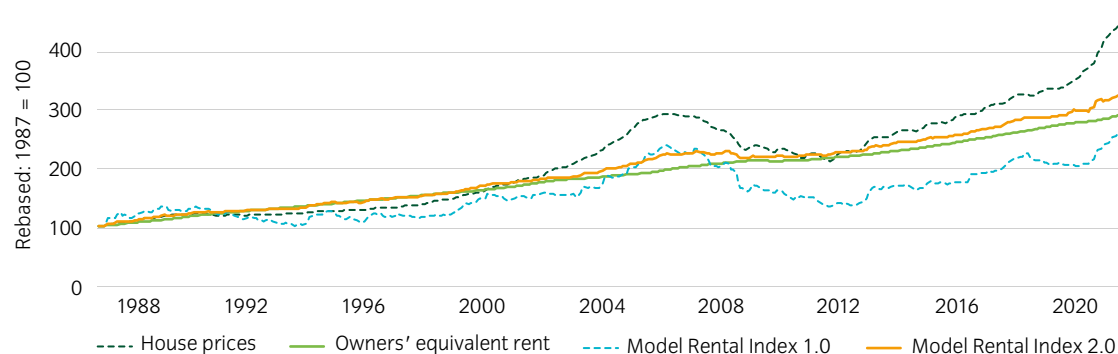Figure 4: Adding a mortgage-proxy gets us closer to modeling historical rents[4]

-·-·- House prices   —— Owners' equivalent rent   —— Model Rental Index 1.0

STEP 2: ACCOUNTING FOR DISPOSABLE INCOME

Landlord demands can only be met if renters can afford them.

If we adjust further for disposable income per capita and account for inflation, we now get much closer to matching historical rents (Figure 5).
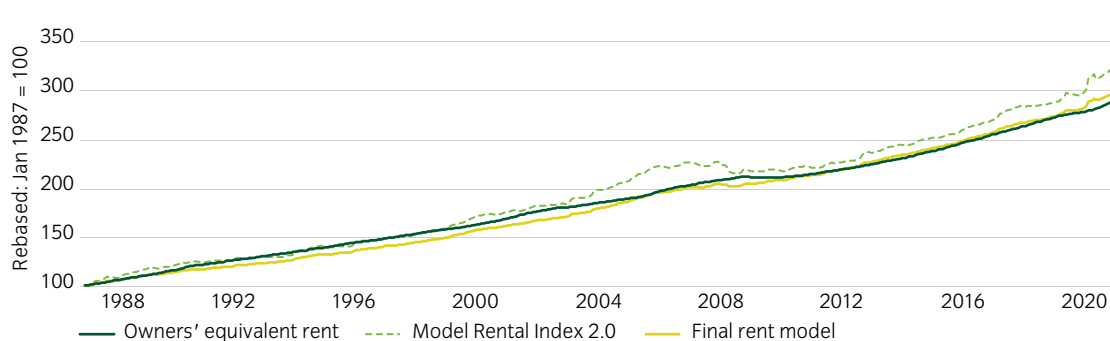
Figure 5: Adding disposable income and inflation inputs improves our model[5]

Legend: ---- House prices — Owners' equivalent rent ---- Model Rental Index 1.0 — Model Rental Index 2.0

## STEP 3: REGRESSION ANALYSIS TO SCALE PARAMETERS TO OUR FINAL MODEL

Our final step is to combine our model with a regression analysis to scale our parameters to create a final workable model to project future rents (Figure 6).

Figure 6: Our final model scales our parameters using a regression[5]

Legend: — Owners' equivalent rent ---- Model Rental Index 2.0 — Final rent model

This model offers potential predictive power, working best with a six-month lead given that households are only polled every six months for purposes of calculating rental CPI (Figure 7).

Figure 7: Our model works best with a 6-month lead, implying predictive power[5]
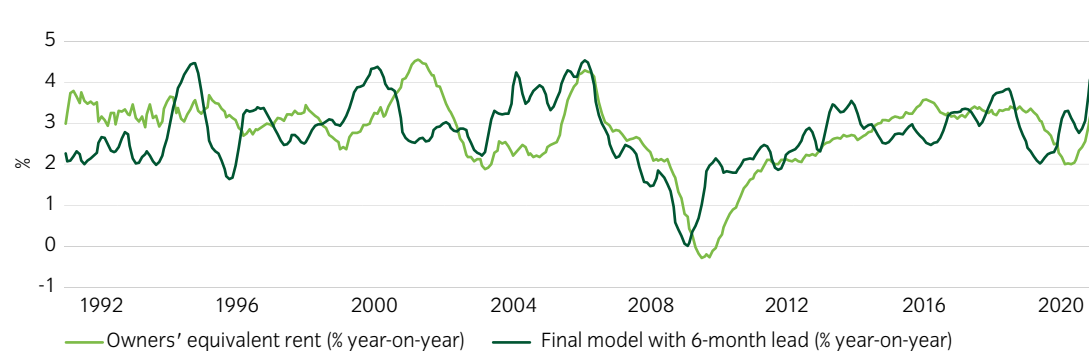
Legend: — Owners' equivalent rent (% year-on-year) — Final model with 6-month lead (% year-on-year)

DETERMINING RENTAL MARKET SCENARIOS TO TEST

The inputs for our rental model need to reflect our view that home prices look well supported by demand and supply dynamics. Although, the strength of the rally so far and the rising rate environment imply a more moderate trajectory looking ahead.

SUPPLY: SHORTAGE BACKLOG WILL TAKE TIME TO CLEAR

New home supply is operating at a deficit, exacerbated by the pandemic, with levels more constrained than in housing bubble of the early 2000s (Figure 8).

Figure 8: Housing supply has been constrained and is in deficit[6]


Months Supply: Existing Homes

While we are seeing a modest uptrend in new building permits, this supply backlog will take time to work through, particularly given migration trends within the US structurally altering demand and lengthening building times, given trends towards larger houses.

DEMAND: DEMOGRAPHICS SUPPORT NEW HOME-BUYING

The 'echo boomer' generation (a large cohort born between 1989 and 1994, an overlapping period in which early baby boomers had their last children and late boomers had their first) are entering their 30s – prime first-time homebuying age (Figure 9).

Figure 9: The 'echo boomers' will potentially support growth in demand for new homes[7]


30 to 34 year old US population
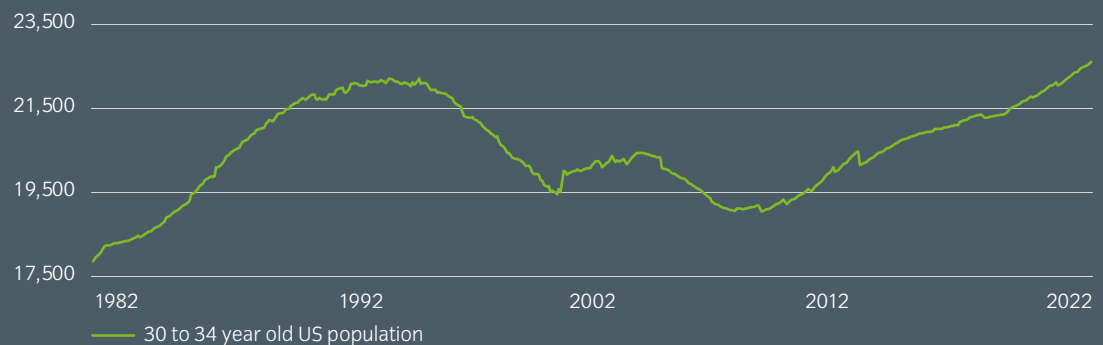
Migration trends across states are also supporting house prices as populations move from high income to lower income localities, creating housing inflation in destination areas.

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[6] Source: FRED, February 2022. [7] Source: Census, February 2022.

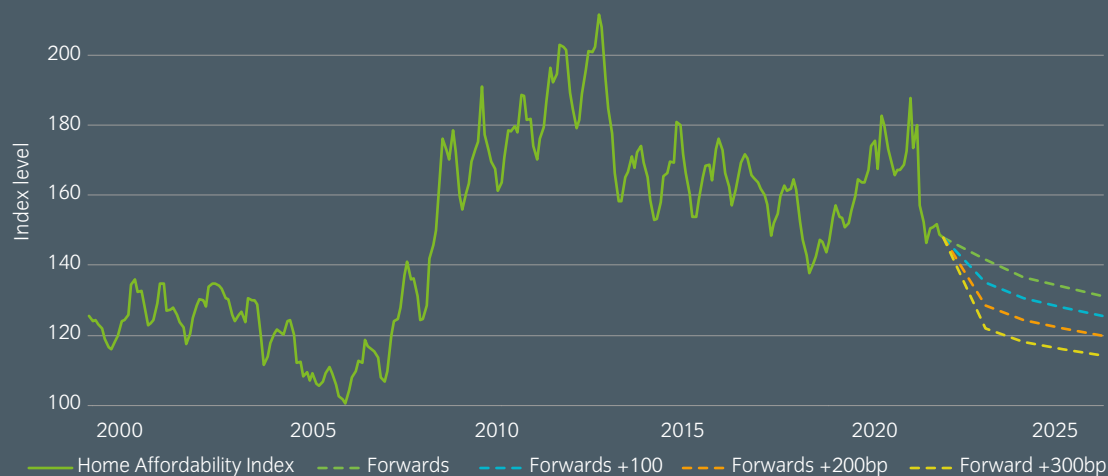## AFFORDABILITY: RISING RATES ARE A HEADWIND, BUT LEVERAGE METRICS ARE LOW

Consumers have the ability as well as the willingness to purchase new homes. Consumer leverage metrics indicate there is significant of room for housing demand to be realized, with mortgage debt as a percentage of home values around 40-year lows (Figure 10).

Figure 10: Consumer leverage metrics are attractive, leaving room for mortgage debt[8]
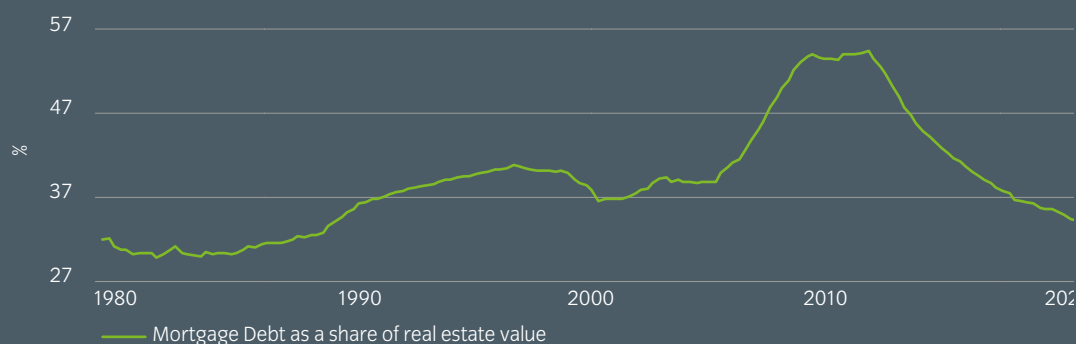
However, the boom is unlikely to continue at the current pace, given rising rates and the strength of the rally making homes less affordable, based on our index[9] (Figure 11).

Figure 11: Affordability is one headwind for the housing market[9]

MODELING CPI USING RENTS

Based on our view that the housing market is well supported, we have created four scenarios based on different home price, mortgage rates and disposable income trajectories.

1 CENTRAL CASE

We expect solid but slowing house price growth, with interest (and thus mortgage) rates rising and levelling off in 2023 with disposable income moderating due to fiscal drag.

2 HIGHER PEAK CASE

Home prices and wage growth rise faster than our central case, prompting faster Fed hikes, which moderates home prices and wage growth in 2023.

3 INCOME SPIRAL CASE

A higher-octane version of the previous scenario, with home prices rising at the recent pace and incomes also spiralling higher, forcing sharper Fed rate rises.

4 DOWNSIDE CASE

Home price appreciation stops in January 2023 and per capita incomes grow more slowly, leading rates to rise slower.

Figure 12: Modeling the impact of house prices on rents[10]

End 2022	Model inputs (from current level)			Model output	
	Home prices appreciation	Disposable income per capital	30-year mortgage rate	Implied rental inflation	Implied Core CPI (model - 1%)
Central case	12.0%	3.0%	4.0%	4.1%	3.1%
Higher peak case	15.0%	5.0%	4.3%	4.3%	3.3%
Income spiral case	15.0%	5.5%	4.5%	4.7%	3.7%
Downside case	10.0%	3.0%	4.0%	4.1%	3.1%

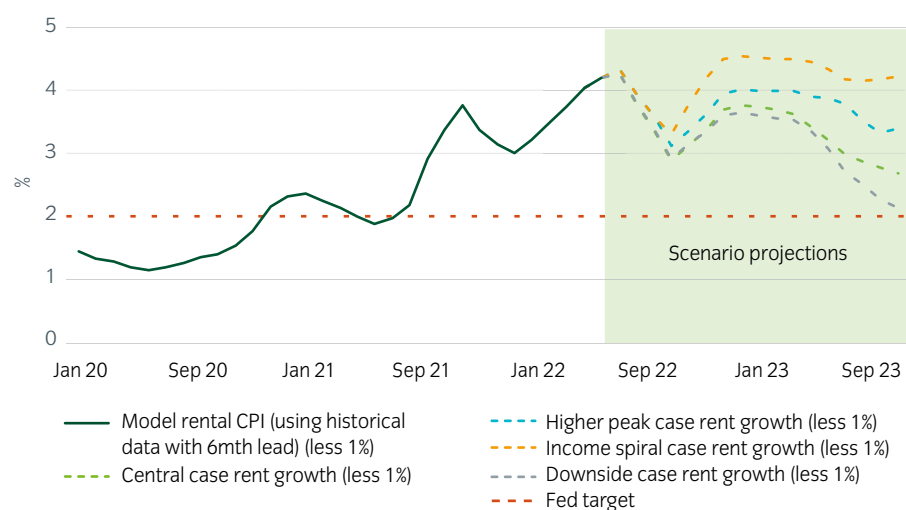| End 2023	Model inputs (from end-2022)			Model output	
	Home prices	Disposable income per capital	30-year mortgage rate	Implied rental inflation	Implied Core CPI (model - 1%)
Central case	9.2%	3.0%	4.0%	3.7%	2.7%
Higher peak case	12.2%	4.5%	4.5%	4.4%	3.4%
Income spiral case	15.0%	6.0%	5.3%	5.2%	4.2%
Downside case	4.3%	2.8%	3.8%	3.1%	2.1%

[10] Source: FRED, Insight calculations, February 2022. WHERE MODEL OR SIMULATED RESULTS ARE PRESENTED, THEY HAVE MANY INHERENT LIMITATIONS. MODEL INFORMATION DOES NOT REPRESENT ACTUAL TRADING AND MAY NOT REFLECT THE IMPACT THAT MATERIAL ECONOMIC AND MARKET FACTORS MIGHT HAVE HAD ON INSIGHT'S DECISION-MAKING.

Under all scenarios, we find that rental inflation would remain stable but above 4% at the end of 2022. Using our rule of thumb (rents roughly running ~1% above Core CPI) this implies inflation above the Fed's target for the rest of the year. Looking further ahead, we find CPI would begin to converge to the Fed's target by the end of 2023. However, our higher peak and income spiral cases show little convergence.

CONCLUSION: THE FED MAY BE POWERLESS TO PREVENT CPI FROM REMAINING ABOVE-TARGET OVER THE MEDIUM TERM

Using our rule-of-thumb of rental inflation tracking ~1% above CPI, our model implies stable but above-target CPI until 2024 (Figure 13). For inflation to return to target, non-shelter CPI will need to run slower than the pre-COVID norm.

Figure 13: Insight's projections show CPI stable but persistently above-target in all scenarios[10]

Legend:
- Model rental CPI (using historical data with 6mth lead) (less 1%)
- Central case rent growth (less 1%)
- Higher peak case rent growth (less 1%)
- Income spiral case rent growth (less 1%)
- Downside case rent growth (less 1%)
- Fed target

There may be little the Fed can do to stem the tide. If house prices continue to rise at a strong pace, this will help drag rents up. If the Fed instead raises rates enough to contain the housing market, it will still likely result in higher mortgage rates and therefore higher rental yields.

To slow rental inflation through higher Fed policy rates, rents need to feel a greater headwind from house prices and disposable incomes than they feel from higher mortgage rates. Our housing affordability index suggests that this would require the Fed to raise rates by up to 100bp to 200bp above current market expectations, which we see as unlikely. As such, regardless of Fed policy, the trajectory of the housing market may lead to structurally above-target inflation for some time, but not extreme inflation or hyperinflation.

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