

UBS Global Real Estate Bubble Index

2022



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UBS Global Real Estate Bubble Index

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Editorial

Dear reader,

In many cities, there is not enough housing supply. And by its very nature, housing supply cannot be expanded at will in the short term. Thanks to urbanization, this means property prices should rise significantly in the long run—more or less summing up the common narrative on the value growth of urban homes. The strong real estate boom of the last decade underlines this credo once again. However, if urban residential rents are used as a benchmark, the supposed scarcity effect evaporates: rents have only risen hand in hand with local wages over the same period.

The main reason for the exorbitant increases in home prices thus lies elsewhere. Indeed, the property market has long been supported by one major buttress in particular: central banks. Ultra-low financing conditions and demand outpacing construction have led to increasingly optimistic price expectations among buyers. Even the most buoyant expectations have been exceeded in some cases in recent times. As a result, the imbalances have become increasingly severe.

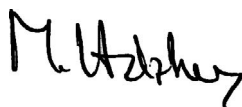
But the picture is quickly changing. Interest rates—and in turn, financing costs—have climbed in recent months to combat elevated inflation. At the same time, several shocks have rocked financial markets worldwide. Consequently, the willingness to pay for owner-occupied homes is likely to take a hit. In cities with strong population growth, such an adjustment could manifest in the form of a prolonged stagnation in nominal purchase prices. But as real estate markets rarely trend sideways, this is not the most likely outcome.

With the *UBS Global Real Estate Bubble Index* we keep you up-to-date on the latest developments across global urban housing markets. Sao Paulo is the first South American market to be included in our report.

We wish you an interesting and informative read.



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Key results

Strong house price growth

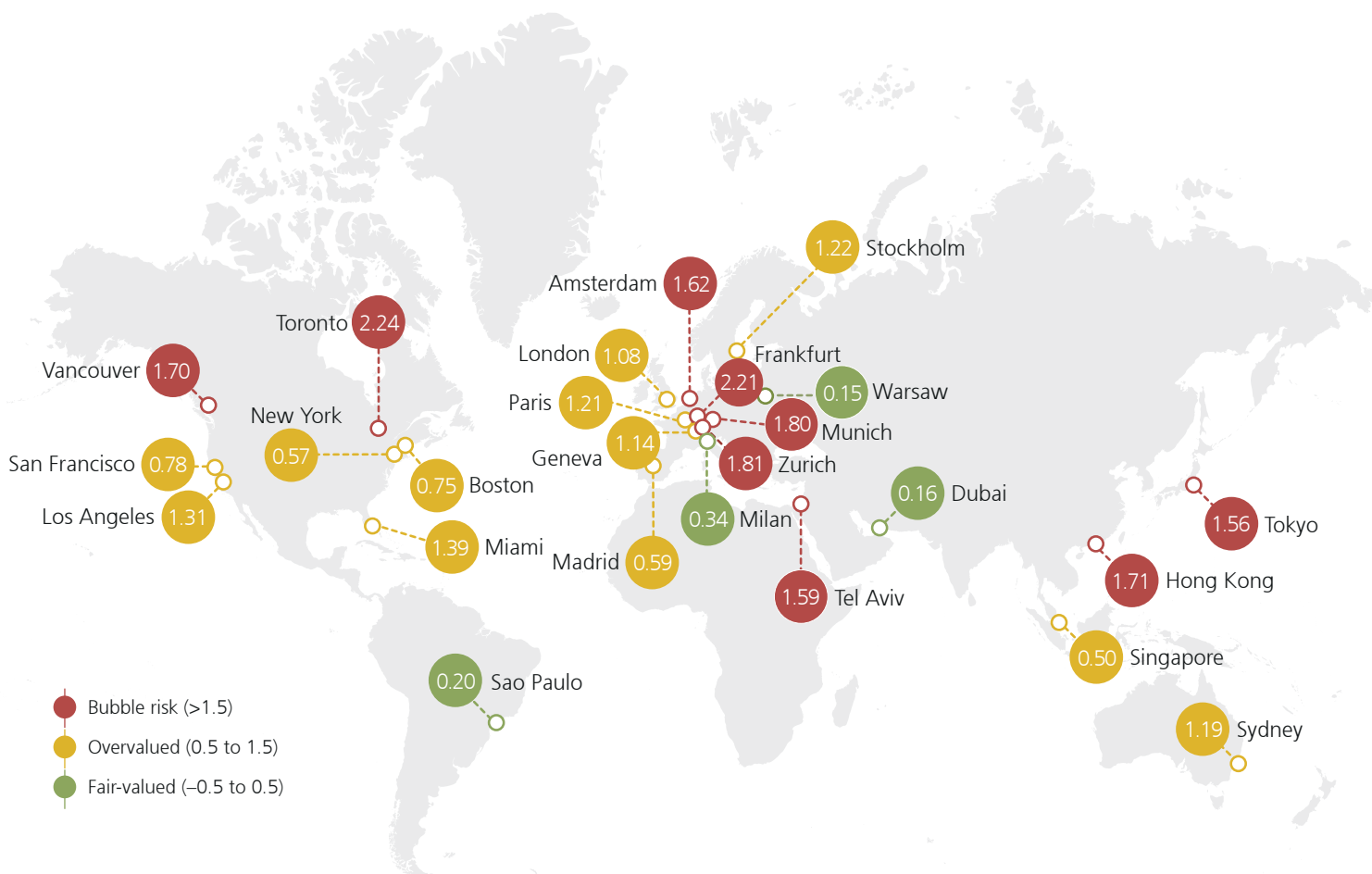
Nominal house price growth in the cities analyzed accelerated to 10% from mid-2021 to mid-2022, representing the highest increase since 2007. Four US cities—Miami, Los Angeles, San Francisco, and Boston—are among the top five with the fastest-growing prices.

High imbalances in Canada and Europe

Imbalances are sky-high in both analyzed Canadian cities, with Toronto topping the index. Valuations in Frankfurt, Zurich, Munich, and Amsterdam also show elevated risks in Europe. In contrast, there is no bubble risk in the US cities.

Affordability to the fore

Since last year, mortgage rates have almost doubled on average across the cities analyzed. Alongside increased prices, this makes city housing much less affordable. A skilled service sector worker can afford roughly one-third less housing space than before the pandemic.



Household leverage on the rise

In almost all cities, households have been leveraging up. Outstanding mortgages recorded the strongest increase since 2008. Debt-to-GDP is on the rise as well, reflecting the cheap financing conditions and weak economic growth since the pandemic.

Urbanization back on track

People have returned to the cities. Strong household formation and unaffordable owner-occupied housing drove demand for rental units. As a result, rents grew by 7% on average last year, making up all rental losses accumulated during the first year of pandemic.

Gloomy prospects

Higher interest rates, inflation, turmoil in the financial markets, and deteriorating economic conditions are putting the housing boom under pressure. In a majority of cities with high valuations, price corrections have either already begun, or are expected to start in the coming quarters.

At the tipping point

Imbalances in global metropolitan housing markets are highly elevated and prices are out of sync with rising interest rates. Against this backdrop, Toronto and Frankfurt top this year's *UBS Global Real Estate Bubble Index*, with both markets exhibiting pronounced bubble characteristics. Risks are also elevated in Zurich, Munich, Hong Kong, Vancouver, and Amsterdam. Notably, Tel Aviv and Tokyo join the group of cities in the bubble risk zone for the first time since we began to publish this report in 2015.

In the US, all five analyzed cities are in overvalued territory with the imbalance more pronounced in Miami and Los Angeles than in San Francisco, Boston, and New York. Housing market imbalances remain high in Stockholm, Paris, and Sydney despite some cooling, while risk valuations are unchanged from last year in Geneva and London. Both those cities rank in overvalued territory as well. Other housing markets with signs of overvaluation include Madrid and Singapore. Sao Paulo—an addition to this year's index—is fair-valued alongside Milan and Warsaw. And despite a buoyant year, Dubai's housing market is in fair-valued territory too.

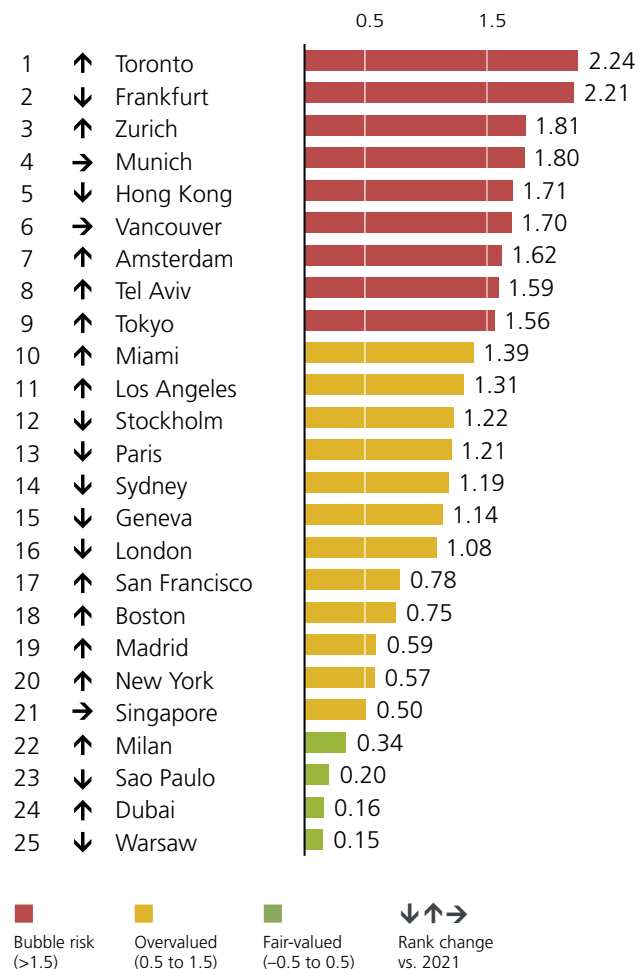
Valuations at peak level

Nominal house price growth in the 25 cities analyzed accelerated to almost 10% on average from mid-2021 to mid-2022, the highest increase since 2007. In fact, all but three cities—Paris, Hong Kong, and Stockholm—saw their house prices climb. The highest regional price growth of more than 15% in nominal terms was recorded in the North American cities. On top of this, an acceleration in the growth of outstanding mortgages was evident in virtually all cities, and for the second year in a row, household debt grew significantly faster than the long-term average. The lending boom was conspicuously strong in the Middle East, the US, Canada, and Australia. Since the pandemic we observe an increase in aggregate household debt relative to economic output in many of the analyzed economies.

Even though current valuations are elevated, index scores have not increased on average compared to last year. Strong income and rental growth have mitigated the imbalances. Housing prices in non-urban areas have increased faster than in cities for the second consecutive year. Additionally, price growth has slowed significantly in inflation-adjusted terms. House price growth was outpaced by consumer prices in 10 out of 25 markets analyzed.

UBS Global Real Estate Bubble Index

Index scores for the housing markets of select cities, 2022



Source: UBS

For an explanation, see the section on Methodology & data on page 22.

Identifying a bubble

Price bubbles are a recurring phenomenon in property markets. The term “bubble” refers to a substantial and sustained mispricing of an asset, the existence of which cannot be proved unless it bursts. But historical data reveals patterns of property market excesses. Typical signs include a decoupling of prices from local incomes and rents, and imbalances in the real economy, such as excessive lending and construction activity. The *UBS Global Real Estate Bubble Index* gauges the risk of a property bubble on the basis of such patterns. The index does not predict whether and when a correction will set in. A change in macroeconomic momentum, a shift in investor sentiment or a major supply increase could trigger a decline in house prices.

Revival of urban demand

Rents are higher than before the pandemic in every city analyzed with the exception of Tokyo, as the decline in 2020 was followed by a significant recovery in recent quarters. On average, rents in all cities rose by virtually the same pace as in pre-pandemic years—a clear sign that the urbanization trend has not slowed down.

This was most pronounced in the US cities, Dubai, and Singapore, where the significant increase in rents arose from solid growth in demand for housing—driven by higher immigration or strong household formation after the pandemic. Nevertheless, house prices have continued to rise faster than rents in most cities.

Rising rates bring imbalance to the fore

As a result of low interest rates, home prices have continuously drifted apart from incomes and rents over the past decade. In current cities in the bubble risk zone, prices have climbed by an average of 60% in inflation-adjusted terms during this period, while real incomes and rents have increased by only about 12%.

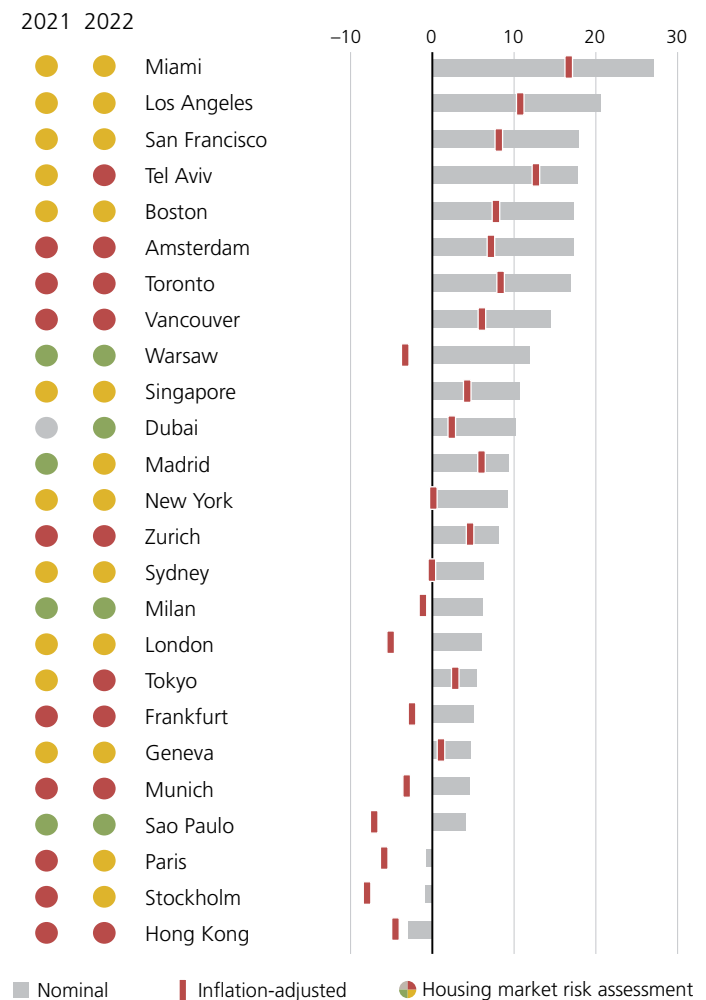
Mortgage rates have almost doubled on average across all cities analyzed since their lowest point in mid-2021. Combined with increased real estate prices, the amount of living space that is financially affordable for a skilled service worker is, on average, one-third lower than it was right before the pandemic. Such a household can now only finance around 50 square meters of living space. In addition, inflation and asset losses due to turmoil in the financial markets are reducing household purchasing power, which curbs demand for additional living space. Housing is thus also becoming less attractive as an investment, as borrowing costs in many cities exceed the yields of buy-to-let investments.

Game over

The robust labor market therefore remains the last pillar of support for the owner-occupied housing market in most cities. With a deterioration of economic conditions, this too is at risk of faltering. Indeed, we are witnessing the global owner-occupied housing boom finally under pressure, and in a majority of the highly-valued cities, significant price corrections are to be expected in the coming quarters.

Strong nominal price growth

Residential price growth rates, as of 2nd quarter 2022, year-over-year in %

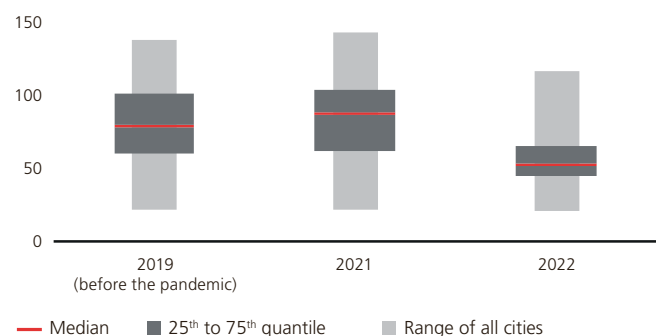


■ Nominal ■ Inflation-adjusted ● Housing market risk assessment

Source: see page 23.

Collapse in financial affordability

Financially affordable* living space for a skilled service worker near the city center, in square meters



Source: UBS * Mortgage payments and amortization do not exceed one third of income (at 80% loan-to-value).

Regional focus

Eurozone

Frankfurt and **Munich** exhibit the biggest risks of a property bubble among the Eurozone markets covered in this report (see spotlight Frankfurt p. 15). Both German cities have seen property prices more than double in nominal terms over the last decade, though growth has cooled to around 5% between mid-2021 and mid-2022 from double-digit levels. In Munich, the housing market is supported by an ultra-low vacancy rate and a growing work force, but the rather subdued German economic outlook presents a drag on housing demand. Higher mortgage rates have already worsened affordability: a skilled worker from the service sector can now buy an apartment with one room less in Munich on average than before the pandemic.

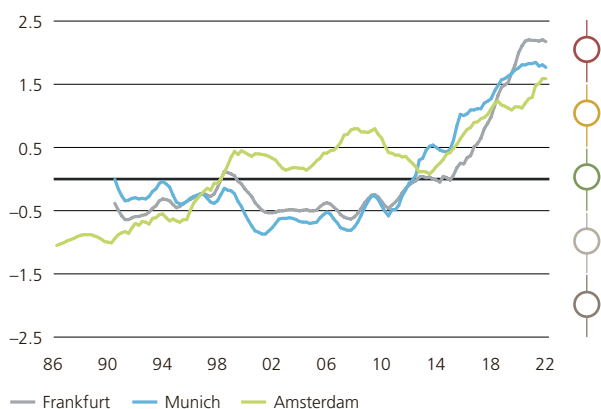
Amsterdam's housing market saw the strongest price growth among Eurozone cities analyzed at 17% between mid-2021 and mid-2022 in nominal terms. This comes as nominal property prices have doubled within the last ten years. Demand has seen less of a drag from the recent rise in mortgage rates, which have increased by less than in other Eurozone countries. Overall, bubble risk has increased only marginally as well, with the city's price growth roughly in line with the national average. Moreover, nominal rents and incomes have also climbed, although not at the same pace as property prices.

In **Madrid**, property price growth has accelerated since the onset of the pandemic. The Spanish capital is now in overvalued territory, though a skilled service worker can still buy the most living space there among all Eurozone markets in the study.

Alongside the post-pandemic economic recovery and lower interest rates, fiscal incentives to renovate buildings have also supported price growth in **Milan** after a decade of stagnating prices. Continuation of these incentives, the nearly completed extension of the underground railway, and the Olympic games in 2026 all contribute to sustaining valuations in the medium term.

Housing in **Paris** is an outlier among the Eurozone markets covered. Nominal property prices stagnated between mid-2021 and mid-2022 and significantly trailed the country average. Rents were flat over the same period and incomes recovered slightly. This has pushed the French capital out of the bubble risk zone, though the housing market can still be considered overvalued. Paris remains the least affordable Eurozone market in the study.

Historical development of index scores



Source: UBS



Source: UBS

Rest of Europe

Index scores have stagnated or decreased in most European cities outside the Eurozone. But there is a wide variance between individual markets from a risk perspective. For example, while Zurich is deeply in bubble territory, Warsaw qualifies as fair-valued.

For **Zurich**, the combination of negative interest rates and strong economic and population growth have triggered excessive price increases over the last few years. The price-to-rent ratio has reached elevated levels that are out of sync with interest rates firmly in positive territory (see spotlight Zurich p. 16).

This holds for **Geneva**, too, although the city has lagged behind Zurich both in terms of price and population growth as people move to more affordable regions. However, the housing shortage will likely persist, as the building applications for new apartments have fallen to the lowest level in over a decade.

In contrast to Switzerland, tighter monetary policy has had an immediate effect on **Stockholm**'s housing market. A large number of potential buyers now do not qualify for the high mortgage loan amounts. A subsequent price slump of more than 10% in the second quarter of this year has wiped out all gains accumulated since summer 2021, pushing the index score out of the bubble zone and into overvalued territory. Further monetary tightening and subdued population growth weigh on the price prospects. That said, demand for owner-occupied housing is likely to strengthen again as soon as affordability improves. The overregulated and undersupplied rental market is not a viable alternative for many prospective owners.

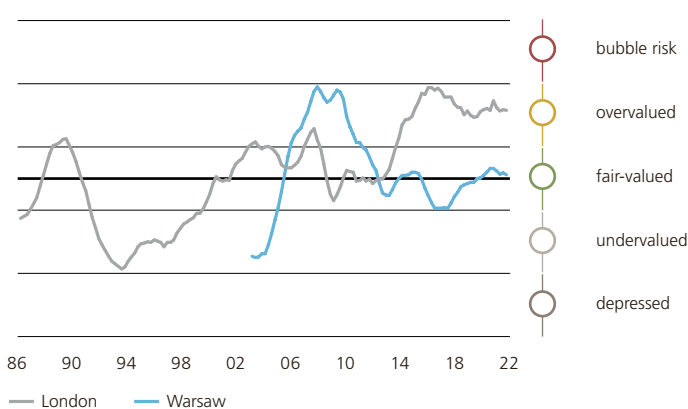
London's housing market is in overvalued territory. Prices are now 6% higher than a year ago, supported by a structural shortage of housing amid increasing post-pandemic demand. But the index score has remained stable over the last quarters. Rents have surged as would-be buyers face difficulties finding appropriate properties. Moreover, housing prices in the city still lag the nationwide average (see spotlight London p. 17).

Since 2018, housing prices in **Warsaw** have climbed by 10% annually driven by unprecedented excess demand. The city has had one of the strongest job markets in Eastern Europe, with the boom luring new citizens and buy-to-let investors. The market is still fair-valued at this stage, but housing has become increasingly unaffordable given the high prices and rapidly rising mortgage rates. And as consumer prices surge, purchasing property loses its priority for many. This should put some pressure on future price increases.

Historical development of index scores



Source: UBS



Source: UBS

United States

US cities have seen much stronger price growth since the onset of the pandemic compared to previous years. Historically low mortgage rates, combined with strong income growth and household formation, have boosted demand. Despite this strength, however, imbalances did not rise further for several reasons.

First, price changes (except in Miami) trail the nationwide average. Second, rents have recovered from their pandemic-induced weakness, rising nearly as fast as house prices in the last four quarters. Third, income growth has been exceptionally strong and is keeping pace with rents. That said, strained affordability will likely take its toll in all markets analyzed, and we believe the price boom will weaken.

New York exhibited the lowest price growth since mid-2021 of all US cities analyzed. It continues to trail more affordable tax-, business-, and regulatory-friendly cities and states. Regardless, the city remains the least affordable among US cities covered (see spotlight New York p. 18).

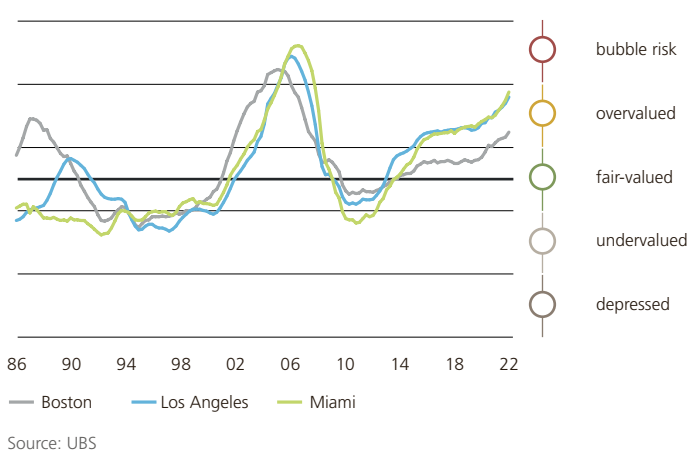
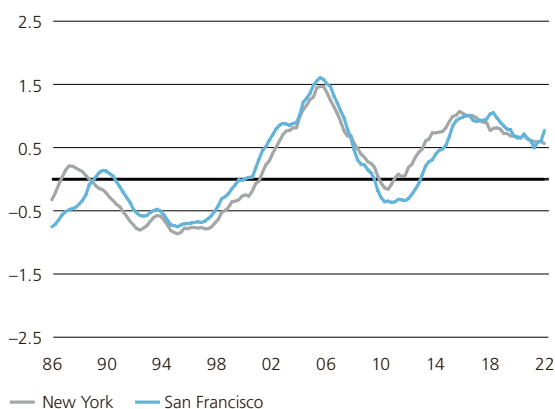
San Francisco recorded strong price increases, ending a period of weakness since 2018. However, rents are still lower than pre-pandemic levels. Considering subdued hiring in the tech industry and the prospect of continued remote and hybrid work models, the outlook for house prices in San Francisco is the most subdued among US markets covered.

Boston benefited from the highest income growth of all cities in the study on the back of its strong and diverse economy. Imbalances remained roughly unchanged compared to last year. However, higher income cannot offset the impact of higher interest rates and rising house prices on affordability. The potential implementation of rent control in the city also adds a degree of uncertainty to the for-sale housing market.

Los Angeles saw house prices rise in line with the booming US market, driven by its strong labor market and structural housing undersupply. But imbalances are high and have increased further since last year with unaffordability reaching near all-time peaks.

Miami continues to benefit from substantial inwards migration and strong foreign investor interest. It recorded the strongest annual house price and rental growth rates among all cities in the study. Prices are almost 50 percent above pre-pandemic levels, pushing the city further into overvalued territory. Although affordability in Miami has worsened sharply since 2019, we believe it remains reasonable compared to the other US cities analyzed.

Historical development of index scores



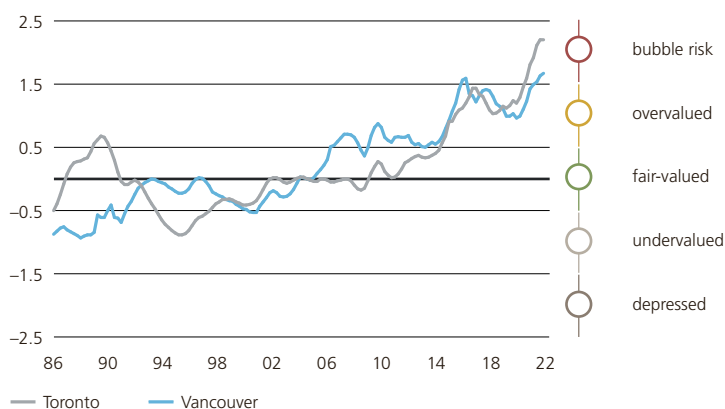
Canada

Real house price levels in **Vancouver** and **Toronto** have more than tripled in the last 25 years. An urban housing shortage amid strong population growth and falling mortgage rates are typically seen as the two main culprits of the long-term property bonanza in both Canadian cities. High investment demand has also added significantly to the price increases. The index has been flashing warning signals in the last couple of years.

The most recent housing frenzy that began in 2019 as mortgage rates fell has continued into 2021. Property price growth in Vancouver and Toronto accelerated to its highest rate in five years, with house prices now respectively 14% and 17% higher than a year ago. Up-sizing during the pandemic on the back of strong income growth has done its part in pushing up demand. Households have also been leveraging up at the fastest pace since before the financial crisis. And although the rental market is running hot with rents climbing by more than double their five-year average rates, they could not keep up with the pace in the owner-occupied market. Bubble risk for both Canadian cities is again highly elevated.

The housing boom has become more of a countrywide phenomenon and is therefore hardly driven by a shortage of construction. In such overheated markets, with already very stretched housing affordability, the recent rate hikes by the Bank of Canada could be the last straw that broke the camel's back. New buyers and owners during mortgage renegotiations not only need to pay higher interest rates but are also required to provide more income to qualify for a mortgage. Price correction is already in the making.

Historical development of index scores



Source: UBS

Asia Pacific

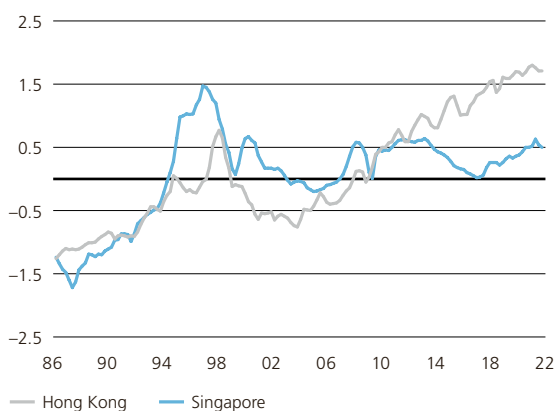
A 15-year secular boom once saw **Hong Kong** record the strongest price growth among all cities in the study. However, this phase ended in mid-2019. Since then, the market has broadly stagnated as the lack of affordability, economic woes, and pandemic restrictions all took a major toll on demand. Despite several big transactions in the luxury market, Hong Kong recorded a nominal price correction of roughly 4% between mid-2021 and mid-2022. This marks the weakest growth rate of all cities analyzed and means imbalances have somewhat declined. Nevertheless, the market remains in bubble risk territory as household leverage rose and rents fell by more than prices. Looking ahead, higher mortgage rates and a weakened economic outlook will likely lead to further property deflation. In the medium term, an eventual economic recovery in Mainland China could become a new tailwind.

In **Singapore**, housing market imbalances began rising in 2018 as strong foreign demand supported price growth—the city-state notably enjoys a firm international position as a business hub. Between mid-2021 and mid-2022, house prices in Singapore added another 11% to their gains. However, the market remains in only slightly overvalued territory as high rental demand has prevented a larger increase in imbalances (see spotlight Singapore p. 19).

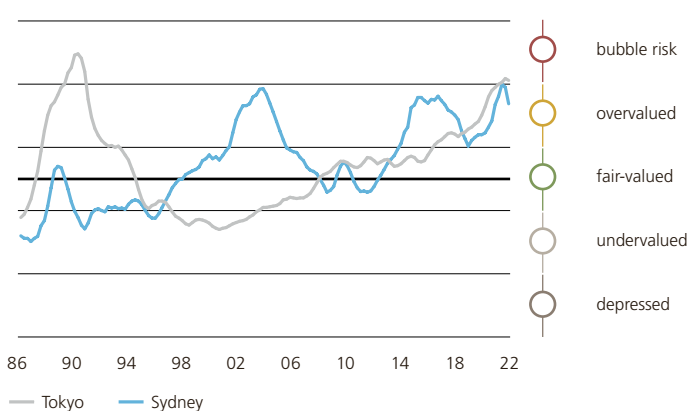
Real estate prices in **Tokyo** have increased almost continuously for over two decades—including during the pandemic—bolstered by attractive financing conditions and population growth. During this period, imbalances have reached the bubble risk threshold from undervalued 20 years ago. Indeed, the housing market in the Japanese capital has noticeably decoupled from the rest of the country as affordability continues to fall. But signs of weakening have emerged of late: price growth halved to 5% in year-over-year terms and lagged the nationwide average for the first time since a decade.

The housing market in **Sydney** has remained outside bubble risk territory since a cooldown in 2018 and 2019. However, accommodative monetary policy and improved housing affordability once again ignited the market in subsequent years. Prices surged altogether by more than 30% in 2020 and 2021 which sparked another increase in imbalances before the tightening of lending standards last year and before aggressive interest rate hikes sharply reduced affordability this year. According to the Reserve Bank of Australia, interest rate hikes have reduced the maximum mortgage loan amount that a household can obtain by a fifth. Consequently, prices have already dropped by more than 5% during the second quarter of 2022.

Historical development of index scores



Source: UBS



Source: UBS

Middle East

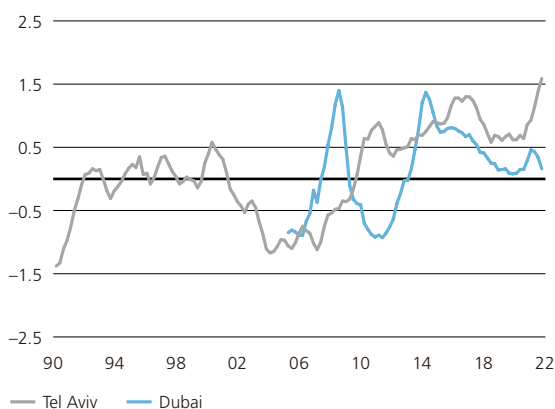
Nominal house prices in **Tel Aviv** have roughly tripled between 2001 and 2017. Rents almost kept pace with the price increases, reflecting a fundamental housing shortage. Higher mortgage rates and stretched affordability did cause a brief period of correction, but by 2019, the market was back in another explosive phase of price growth. Between mid-2021 and mid-2022 alone, prices climbed by 18%, the highest rate since 2010. And outstanding loan volumes shot up by 18% as well, the fastest pace in 25 years. Consequently, the market ranks in bubble risk territory. A discussed relaxation of the maximum loan-to-value ratio for first-home buyers would heat up the market even more. However, the probability of a sharp but short-lived correction is high if mortgage rates rise further.

Dubai's housing market has been on a roller coaster ride over the past two decades and is highly correlated to the development of oil prices. This time is not different. As oil prices surged, housing prices increased too by 10% between mid-2021 and mid-2022. The post-pandemic economic recovery and immigration growth supported these dynamics. Rents have even outpaced home price growth over the last four quarters. Accordingly, the market is fair-valued (see spotlight Dubai p. 20).

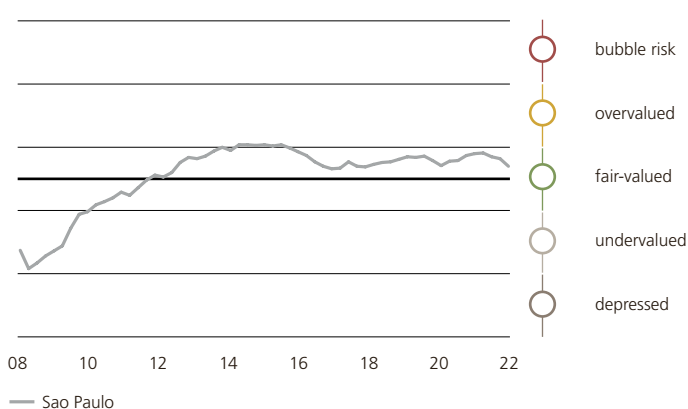
Brasil

The housing boom in **Sao Paulo** came to an end in 2014 as Brazil slid into a recession. The market weakness has been amplified by a strong supply expansion against the backdrop of falling interest rates. The pandemic and the rise of remote work from outside the city have also led to an increasing number of unsold inventories. In total, house price dynamics remained subdued in a low-single digit area. Inflation-adjusted prices are roughly 25% lower than in 2014 and the market is fair-valued. But in the last few quarters, price growth has picked up slightly. And despite the recent sharp rise in interest rates, demand for new mortgages has stayed robust. More upside for real estate could be in the cards as the end of the monetary tightening cycle nears and the economic outlook remains solid.

Historical development of index scores



Source: UBS



Source: UBS

Global cities' benchmarks

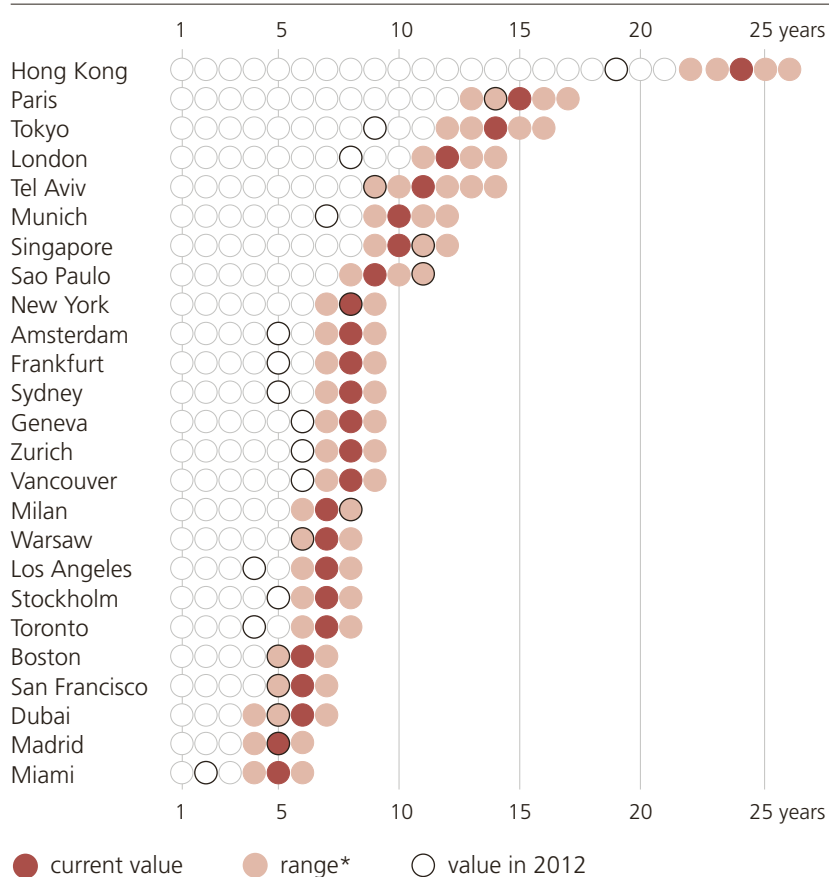
Price-to-income

Buying a 60 square meter (650 square foot) apartment exceeds the budget of those who earn the average annual income in the skilled service sector in most world cities. In Hong Kong, even those who earn twice that income would struggle to afford an apartment of that size. House prices have also decoupled from local incomes in Paris, Tokyo, London, and Tel Aviv, where price-to-income multiples exceed 10 by far. Unaffordable housing is often a sign of strong foreign investment demand, tight zoning, and strict rental market regulations. If investment demand weakens, the risk of a price correction increases and prospects for long-term appreciation shrink.

By contrast, housing is relatively affordable in Miami, Madrid, Dubai, San Francisco, and Boston, which limits the risk of a price correction in those cities. Given relatively high incomes, purchasing a 60 square meter apartment is also relatively feasible for residents of Los Angeles, Milan, Geneva, or Zurich.

For homebuyers, affordability also depends on mortgage rates and amortization obligations. If interest and amortization rates are relatively high, the burden on monthly income can be heavy even in cities with low price-to-income multiples like in the US. Conversely, elevated purchase prices can be sustained with low interest rates and no requirement of full amortization, as seen in regions like Switzerland and the Netherlands.

The number of years a skilled service worker needs to work to be able to buy a 60m² (650 sqft) flat near the city center



Source: UBS. Remark: For an explanation, see the section on Methodology & data on page 22. The data is not comparable with previous years due to a comprehensive data revision * Uncertainty range due to differing data quality

Price-to-rent

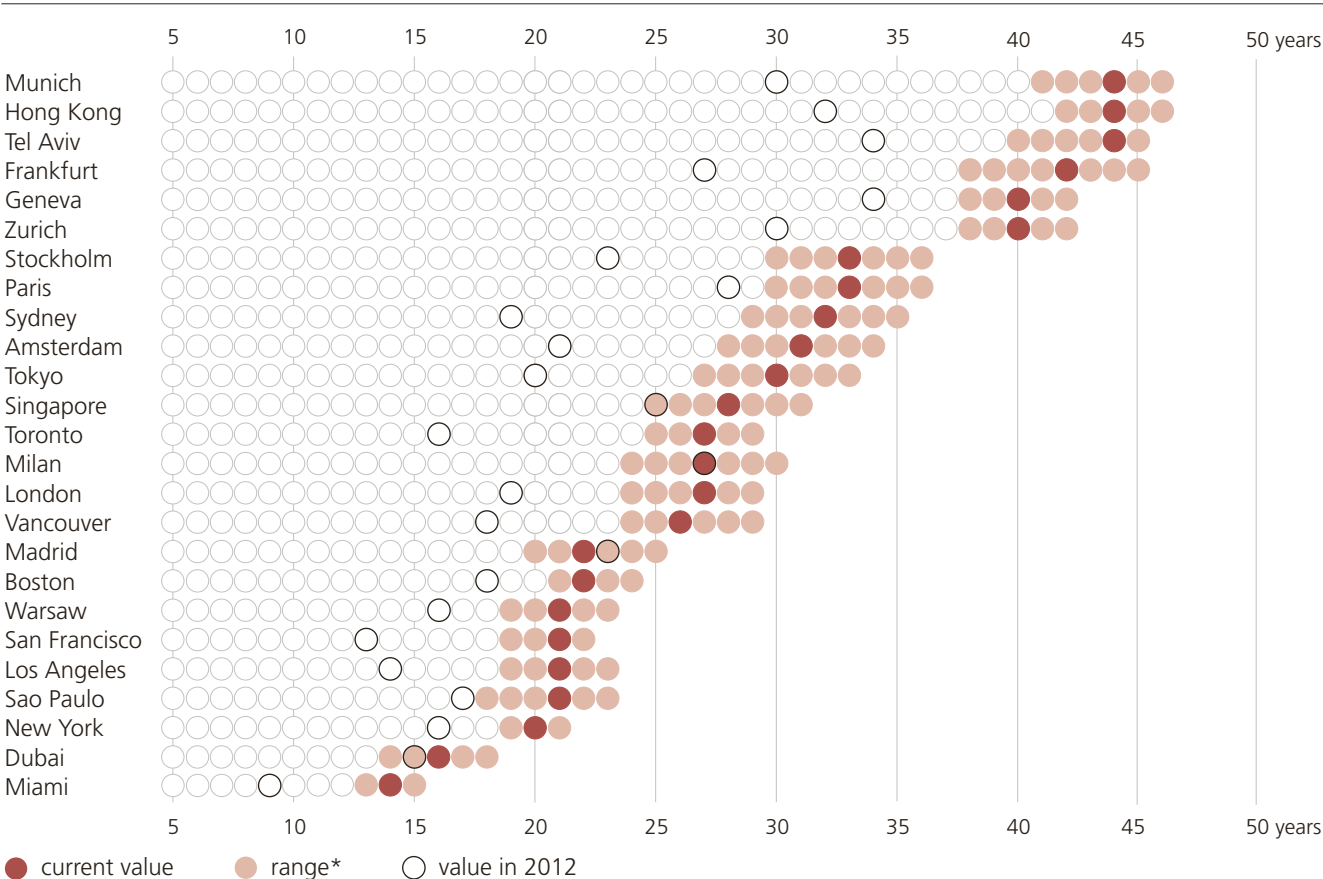
Munich, Hong Kong, and Tel Aviv have the highest price-to-rent ratios, followed by Frankfurt, Geneva, and Zurich. Extremely high multiples indicate an excessive dependence of housing prices on low interest rates. Almost half of the covered cities have price-to-rent multiples above or close to 30. House prices in all these cities are vulnerable to a sharp correction should interest rates continue to rise.

Price-to-rent multiples in some US cities have recently increased despite a strong inflation in rents. Nevertheless, Boston, San Francisco, Los Angeles, New York, and Miami exhibit the lowest multiples among the markets analyzed. These reflect, among other things, higher interest rates

and relatively mild regulation of the rental market. Conversely, rental laws in France, Germany, and Sweden are strongly pro-tenant, preventing rentals from reflecting true market levels.

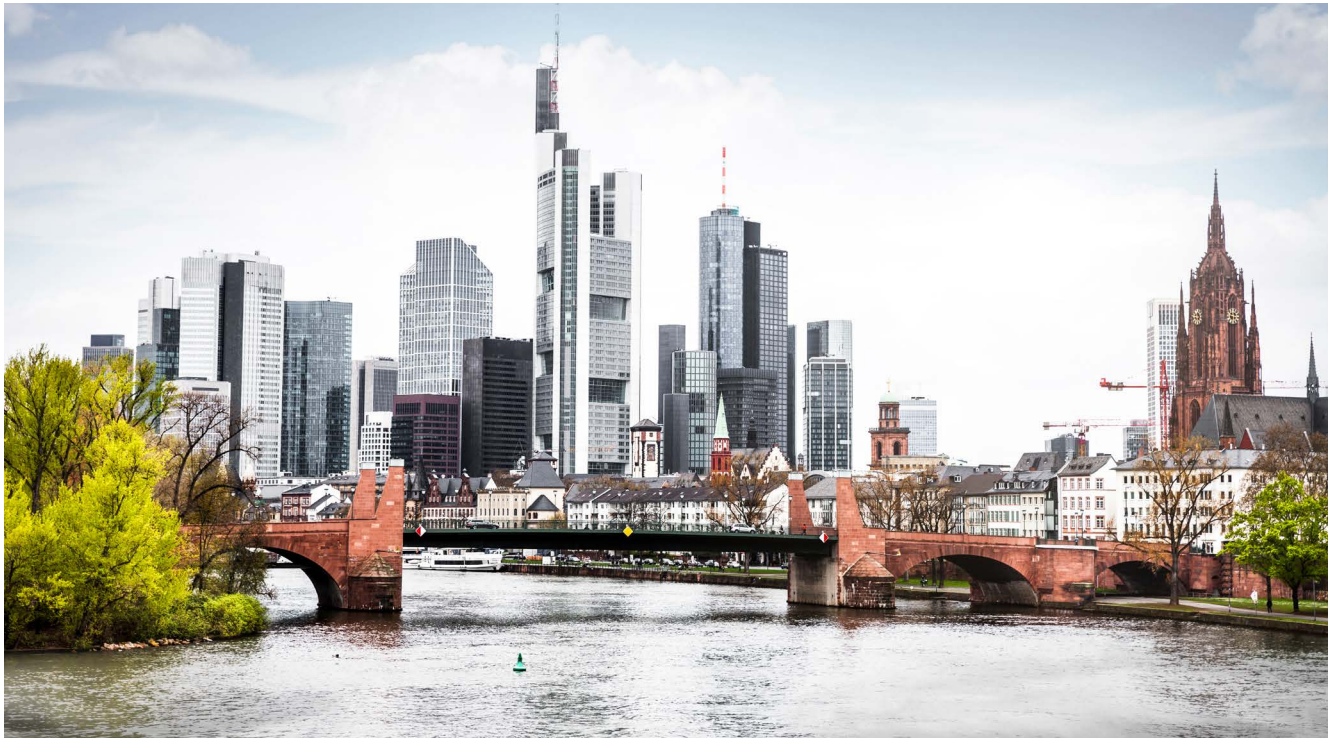
However, stratospheric price-to-rent multiples not only reflect low interest rates or strong rental market regulation, but also expectations of rising prices, as is the case in Zurich and Munich. Investors anticipate being compensated with capital gains for very low rental yields. If these hopes do not materialize and expectations deteriorate, homeowners in markets with high price-to-rent multiples are likely to suffer significant capital losses.

The number of years a flat of the same size needs to be rented out to pay for the flat



Source: UBS. Remark: For an explanation, see the section on Methodology & data on page 22. The data is not comparable with previous years due to a comprehensive data revision * Uncertainty range due to differing data quality

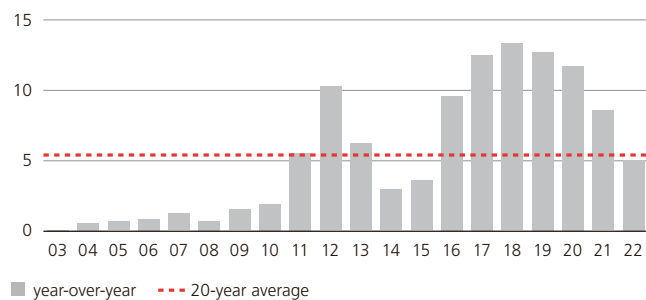
Frankfurt



Slowdown in the making

Annual house price growth rates

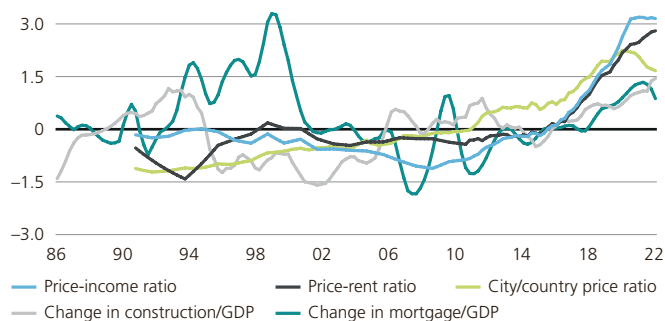
Nominal in %, as of 2nd quarter



Source: UBS. See page 23.

Development of sub-indices

Standardized values



Source: UBS

Double-digit price gains have come to a halt in Frankfurt's housing market. Nominal property prices rose by 5% between mid-2021 and mid-2022—just half the average growth rate of the past five years as well as the national average. The recent cooling masks a stunning rise: Frankfurt's nominal housing prices are currently still more than 60% above their levels five years ago. In this period, price growth has significantly outpaced income and rental growth in a major decoupling from fundamentals. Investment demand has played a crucial role in driving up prices. While the market imbalances have slightly decreased of late, Frankfurt's housing market remains in **bubble risk** territory.

Notably, the vacancy rate is extremely low. But new construction has accelerated in recent years. That comes as the population in Germany's financial center has stagnated since the pandemic. It was primarily the tendency toward smaller household sizes that kept absorption strong. As new construction is likely to remain at current levels, the housing shortage may ease over time.

The combination of rising financing costs and little economic growth in 2023 should deflate some of the market exuberance. Currently, a skilled service worker can finance 40% less living space on average than before the pandemic. Additionally, buy-to-let investments are becoming increasingly unattractive lowering demand for properties-for-sale.

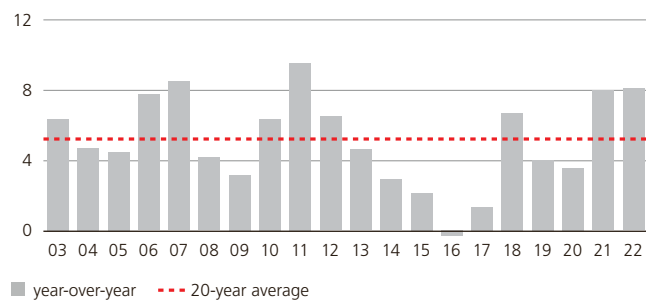
Zurich



Exuberance amid strong fundamentals

Annual house price growth rates

Nominal in %, as of 2nd quarter



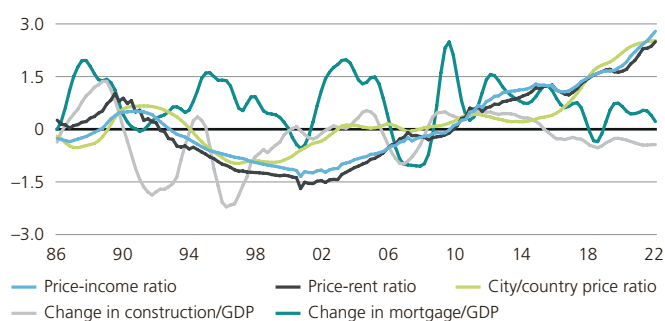
Source: UBS. See page 23.

Home prices in the Zurich economic region have gained roughly 20% since the start of the pandemic, slightly outpacing the national average. The market is in **bubble risk** zone.

The demand-driven shortage of housing in urban areas has intensified with the strong economy, and vacancy rates have fallen to a record low. But even though asking rents have increased by a relatively high 7% since early 2020, they have not kept pace with the owner-occupied segment. This highlights the role of continued strong investment demand in a negative-rate environment as an important driver of the price trend. Overall, the relationship between purchase prices and rents is out of balance.

Development of sub-indices

Standardized values



Source: UBS

The high purchase prices will be subjected to a reality check by the interest rate hikes of the Swiss National Bank. Demand for buy-to-let purchases is likely to collapse, as borrowing costs at a loan-to-value ratio of 60% already eat up most of the net rental income. Also, from a pure cost perspective, renting is significantly cheaper than buying at currently elevated interest rates. As rates rise further, the supply of property for sale is likely to increase in the medium term as well.

Home prices should therefore return to a level justifiable by fundamentals. But thanks to the continued strong population growth in the Zurich economic area, such an adjustment may take place over time without a correction in nominal prices.

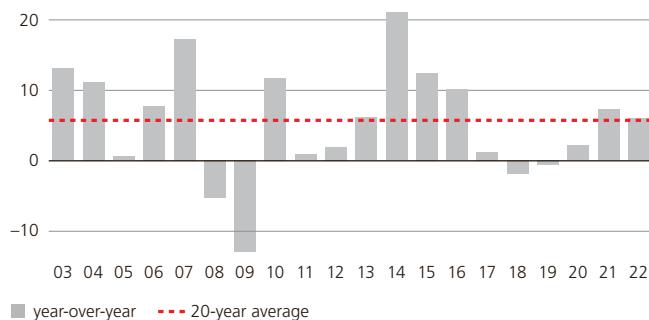
London



Rocky road

Annual house price growth rates

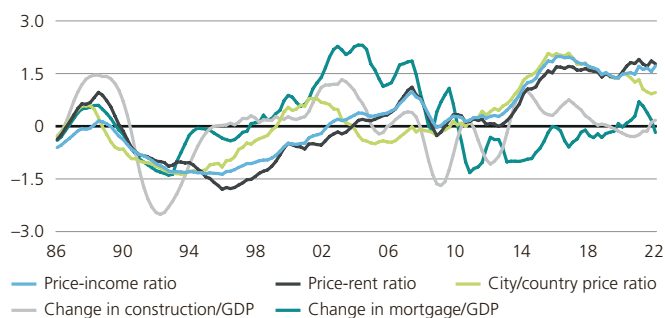
Nominal in %, as of 2nd quarter



Source: UBS. See page 23.

Development of sub-indices

Standardized values



Source: UBS

London's housing market has left behind a period of drought with a third consecutive year of price growth. Between mid-2021 and mid-2022 nominal prices recorded a 6% gain, slightly topping its long-term average of 5%. Prime property prices also continued to recover as international demand tends to increase when searching for safe-haven assets is high on the agenda.

Overall, the structural imbalance between strong demand and restricted supply growth supports London's housing prices. A small pickup in construction activity is unlikely to bring much supply relief. However, average market rents have rebounded strongly over the past year as some would-be buyers fail to find suitable properties and business tenants return after the pandemic. In sum, the risk of a real estate bubble in London has slightly decreased compared to a year ago, but still leaves the housing market in **overvalued** territory.

Looking forward, abolishing the interest rate criteria for mortgage affordability should lead to a modest increase in borrowing, which could boost both demand and prices. However, several storm clouds cap the potential for high future price growth. Mortgage rates have tripled from their lows in mid-2021, increasing the cost of owning property. The ending of the stamp duty holiday will likely reduce housing demand as well. And while the weak British pound makes properties in the city look attractive to foreign buyers, they will keep in mind that currency depreciation has eradicated a big portion of capital gains in the past.

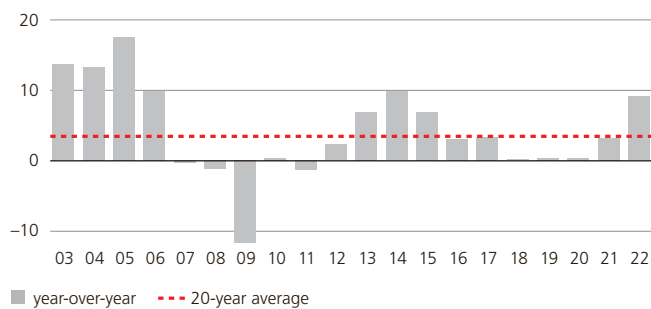
New York



Headwinds persist

Annual house price growth rates

Nominal in %, as of 2nd quarter



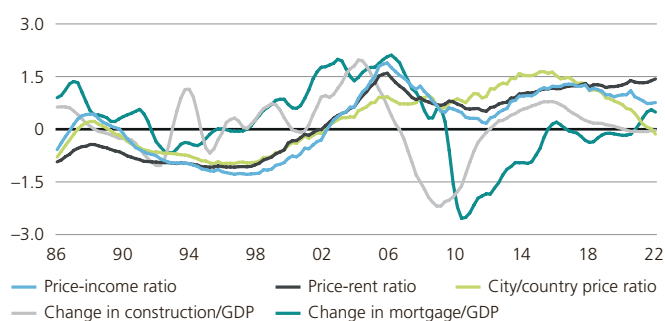
Source: UBS. See page 23.

Price growth in New York's for-sale market amounted to almost 10% in nominal terms, that merely matches the inflation rate and still trails other US metropolitan centers. Price growth was even lower in Manhattan and in the luxury segment. This keeps New York's housing market in slightly **overvalued** territory.

The residential market has left the depths of the pandemic-induced downturn behind in both for-rent and for-sale segments. Sales activity has recovered and even climbed slightly above its pre-pandemic level. Tenants returned to the city in force as pandemic-related restrictions began easing. Within a year, vacancy rates dropped significantly and apartment rents shot up by more than 20% in central locations like Manhattan, Brooklyn, and Queens, as reported by real estate firm Douglas Elliman.

Development of sub-indices

Standardized values



Source: UBS

Concerns about a recession and a slowdown in hiring, with potential layoffs in high-paying industries such as financial services and technology, do not bode well for housing demand. In combination with sharply increased mortgage rates, house prices are at risk of pulling back. The number of contracts signed has already eased over recent months. In addition, the slump in financial asset prices will likely further pressure apartment prices, particularly in the luxury segment.

However, the downside for the broader market is limited in the medium term as there is no supply increase in the cards for Manhattan anytime soon. Expiring developer incentive programs and the introduction of some pro-tenant rental law changes may slow construction activity and keep rents elevated.

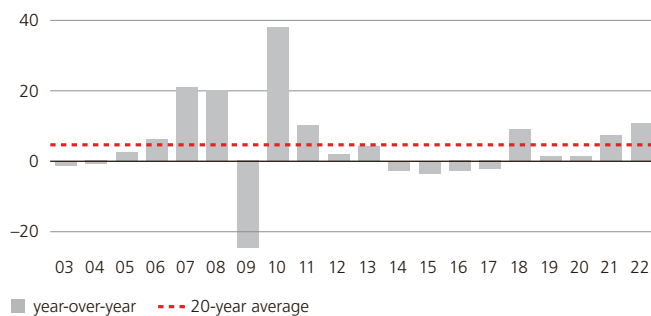
Singapore



In high demand

Annual house price growth rates

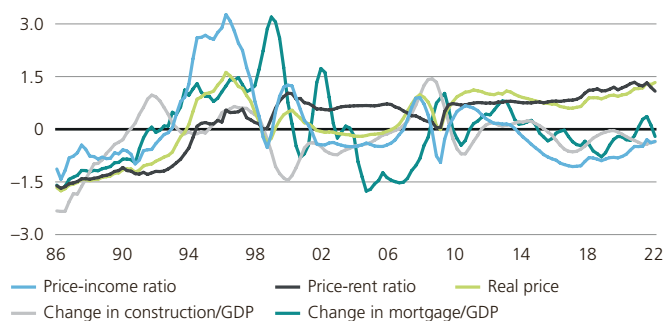
Nominal in %, as of 2nd quarter



Source: UBS. See page 23.

Development of sub-indices

Standardized values



Source: UBS

Residential house prices in Singapore increased by almost 11% in nominal terms between mid-2021 and mid-2022, representing the strongest growth rate in more than a decade. However, rental price growth has accelerated even more, leaving mid-2022 rents 16% above their mid-2021 levels. Following construction delays, pent-up demand for housing space from the pandemic and strong expat interest are driving prices up. Singapore's housing market remains in slightly **overvalued** territory, virtually unchanged from last year.

The government has introduced several cooling measures in the last few months to prevent excessive borrowing and the real estate market from overheating. These include higher stamp duties on secondary and subsequent residential properties and tighter lending standards for private and public properties. Also, the government has announced efforts to increase the supply of housing to meet strong demand.

Singapore benefits from its long-standing position as a strong business hub and a safe haven for wealthy investors. However, following construction delays, three times more units should be completed in 2022 and 2023 than in the previous two years. Moreover, rising mortgage rates will have a dampening impact on demand.

As a consequence, we expect market sentiment to weaken. But, given the lack of housing speculation and continued foreign demand growth, a price correction in nominal terms is unlikely in the short run.

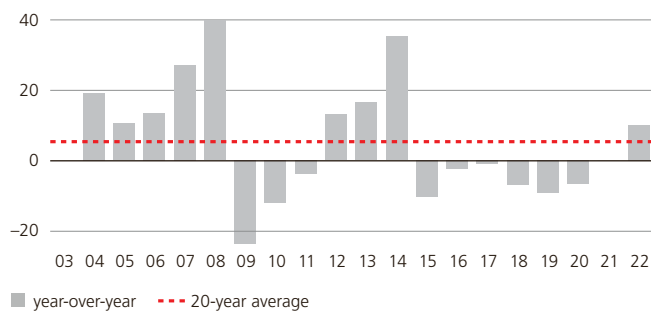
Dubai



Taking off (once again)

Annual house price growth rates

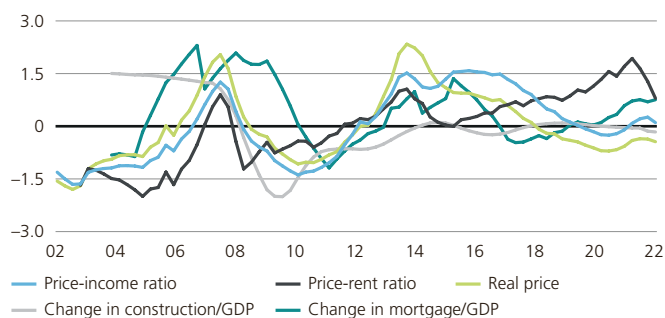
Nominal in %, as of 2nd quarter



Source: UBS. See page 23.

Development of sub-indices

Standardized values



Source: UBS

Dubai's two-decade property roller coaster continues to chug along. After seven years of falling housing prices, Dubai's housing market rebounded to a nominal price growth of 10% between mid-2021 and mid-2022. Growth was even stronger in the prime market. However, the market is now only back to its 2019 price level, and still 25% below its 2014 peak. The Dubai housing market is in **fair-valued** territory.

The post-pandemic reopening of the economy and surging oil prices have propelled the recovery. Disposable income growth has now turned positive for the first time since the beginning of the pandemic.

Looking ahead, the market is likely to benefit from a new visa program with looser residence requirements for skilled professionals and new regulations increasing transparency of transactions. Dubai is already attracting more skilled and wealthy migrants from other regions, where the investment climate has become less favorable. This population inflow has impacted both the prime owner-occupied and the rental market. Rents bottomed out last year and have climbed by 22% since mid-2021. As these new tenants settle in, they will eventually become potential buyers.

House price growth is likely to remain high in the coming quarters, but growth rates will gradually recede amid higher financing costs. In the long term, with existing oversupply and new construction continuing to outstrip population growth, Dubai's real estate ride will most likely remain bumpy.

Global cities' overview

Rank	City	UBS Global Real Estate Bubble Index							Real price growth		Real rental growth	
		Total	Sub-indices						Annualized, in %		Annualized, in %	
		Score	Assessment	Price / Income	Price / Rent	City / Country ¹	Mortgage ²	Construction ²	Last year	Last 10 years	Last year	Last 10 years
1	Toronto	2.24	●	●	●	●	●	●	8.6	7.1	3.8	1.7
2	Frankfurt	2.21	●	●	●	●	●	●	-2.4	6.5	-6.2	1.9
3	Zurich	1.81	●	●	●	●	●	●	4.6	3.7	-0.3	1.0
4	Munich	1.80	●	●	●	●	●	●	-2.9	6.4	-6.1	2.4
5	Hong Kong	1.71	●	●	●	●	●	●	-4.3	2.4	-1.6	-0.9
6	Vancouver	1.70	●	●	●	●	●	●	6.4	5.6	1.2	1.8
7	Amsterdam	1.62	●	●	●	●	●	●	7.5	5.9	-3.6	1.8
8	Tel Aviv	1.59	●	●	●	●	●	●	12.9	5.4	-0.1	2.7
9	Tokyo	1.56	●	●	●	●	●	●	2.9	5.0	-11.8	1.0
10	Miami	1.39	●	●	●	●	●	●	16.8	8.1	12.9	3.4
11	Los Angeles	1.31	●	●	●	●	●	●	10.9	6.2	5.0	2.3
12	Stockholm	1.22	●	●	●	●	●	●	-7.8	4.6	-3.1	1.1
13	Paris	1.21	●	●	●	●	●	●	-5.7	1.1	-4.2	-0.5
14	Sydney	1.19	●	●	●	●	●	●	0.1	5.5	-0.3	0.4
15	Geneva	1.14	●	●	●	●	●	●	1.2	1.6	-2.9	0.1
16	London	1.08	●	●	●	●	●	●	-5.0	2.7	-2.9	-0.8
17	San Francisco	0.78	●	●	●	●	●	●	8.4	5.1	2.7	0.5
18	Boston	0.75	●	●	●	●	●	●	7.8	4.0	4.5	2.1
19	Madrid	0.59	●	●	●	●	●	●	6.3	2.2	5.4	2.5
20	New York	0.57	●	●	●	●	●	●	0.4	1.8	-2.2	-0.5
21	Singapore	0.50	●	●	●	●	●	●	4.5	0.9	9.7	-0.1
22	Milan	0.34	●	●	●	●	●	●	-0.8	-1.4	-4.0	-1.3
23	Sao Paulo	0.20	●	●	●	●	●	●	-7.0	-1.6	-4.3	-3.4
24	Dubai	0.16	●	●	●	●	●	●	2.5	0.0	13.3	-0.9
25	Warsaw	0.15	●	●	●	●	●	●	-1.9	2.2	0.9	-0.1

- Bubble risk (above 1.5 standard deviations)
- Overvalued (between 0.5 and 1.5 standard deviations)
- Fair-valued (between -0.5 and 0.5 standard deviations)
- Undervalued (below -1.5 standard deviations)

¹ Price ratio. For Hong Kong, Singapore and Dubai real prices.

² Compared to GDP, annual change

Source: UBS

Methodology & data

UBS Global Real Estate Bubble Index

The *UBS Global Real Estate Bubble Index* traces the fundamental valuation of housing markets and the valuation of cities in relation both to their country and to economic distortions (lending and building booms). Tracking current values, the index uses the following risk-based classifications: depressed (score below -1.5), undervalued (-1.5 to -0.5), fair-valued (-0.5 to 0.5), overvalued (0.5 to 1.5), and bubble risk (above 1.5). This classification is aligned with historical bubble episodes.

The index score is a weighted average of the following five standardized city sub-indices: price-to-income and price-to-rent (fundamental valuation), change in mortgage-to-GDP ratio and change in construction-to-GDP ratio (economic distortion), and relative price-city-to-country indicator. The price-city-to-country indicator in Singapore, Hong Kong, and Dubai is replaced by an inflation-adjusted price index. The approach cannot fully account for the complexity of the bubble phenomenon. We cannot predict if or when a correction will happen. Hence, “bubble risk” refers to the prevalence of a high risk of a large price correction.

The sub-indices are constructed from specific city-level data, except for mortgage-to-GDP and construction-to-GDP ratios, which are calculated on the country level. In most cases, publicly available data is used. But in a few cases, the data consists of, or is supplemented by, additional sources, including the results of the UBS Prices and Earnings survey. The index length varies by city depending on data availability. The longest data series starts in 1980, the shortest in 2009. For time series shorter than 30 years, the coefficient of variation of an equivalent indicator on the country level is used as a floor value to calculate the volatility of the city-level indicator (subject to availability). We also took into account the availability of data when deciding which cities to include in the index. We considered the importance of the city for global financial markets and residential real estate investments. Please see the description of data sources on page 23.

The weights of the sub-indices are determined using factor analysis, as recommended by the OECD Handbook on Constructing Composite Indicators (2008). Factor analysis weights the sub-indices to capture as much of the common underlying bubble risk information as possible. As the drivers of bubbles vary across cities, this method results in city-specific weights on sub-indices. To prevent overweighting country level variables and to increase the comparability of cities, the deviation from the average weight across all cities is limited. So fixed weights that approximate the average factor analysis weight of single indices across the cities complement the calculation. The final weights are subject to minor changes when new data enters the calculation or past data is revised.

Benchmarking

The analysis is complemented by a city benchmarking using current price-to-income (PI) and price-to-rent (PR) ratios. The PI ratio indicates how many years a skilled service worker needs to work to be able to buy a 60 square meter (650 square foot) flat near the city center. The PR ratio signals how expensive owner-occupied homes are relative to rental apartments. The higher the ratios, the more expensive buying becomes. Earnings data is taken primarily from the UBS Prices and Earnings survey and from official statistical sources. Real estate prices and rents vary widely near the city center. Our estimates are cross-checked, validated using different sources, and are updated and challenged on an annual basis. However, we also specify an uncertainty range due to the differing quality of data sources.

Data sources

	As of	Price Index (City)	Rent Index (City)	Income Index (City)	Price Index (Country)	Mortgage, Construction, GDP, Inflation (Country)
Amsterdam	2022Q2	CBS, Maastricht University	NVM, UBS P&E	UBS P&E, CBS	CBS, FED Dallas	DNB, CBS, EUKLEMS, Bloomberg
Boston	2022Q2	FHFA	CBRE, FED St. Louis	BEA	FHFA	FED, BEA, Bloomberg
Dubai	2022Q2	Reidin, BIS	Reidin, UBS P&E	UBS P&E, Bloomberg	–	Central Bank UAE, Dubai Statistics Center, Bloomberg
Frankfurt	2022Q2	Bulwiengesa	Bulwiengesa, OECD	Destatis, UBS P&E, OECD	FED Dallas	Deutsche Bundesbank, Destatis, EUKLEMS, Bloomberg
Geneva	2022Q2	Wüest Partner	Statistique Genève	FTA, FSO	Wüest Partner	SNB, SECO, FSO
Hong Kong	2022Q2	RVD	RVD	Census and Statistics – Department Hong Kong, Bloomberg	–	Census and Statistics Department Hong Kong, HKMA, Macrobond, Bloomberg
London	2022Q2	Nationwide	ONS, UBS P&E	ONS	Nationwide	BoE, ONS, EUKLEMS, Bloomberg
Los Angeles	2022Q2	FHFA	CBRE, FED St. Louis	BEA	FHFA	FED, BEA, Bloomberg
Madrid	2022Q2	BoS	Ayuntamiento de Madrid	INE	BoS	INE, BoS, EUKLEMS, Bloomberg
Miami	2022Q2	FHFA	CBRE, FED St. Louis	BEA	FHFA	FED, BEA, Bloomberg
Milan	2022Q2	Nomisma	Nomisma, OECD	Dipartimento delle Finanze, UBS P&E	FED Dallas	Banca d'Italia, Hypostat, Istat, EUKLEMS, Macrobond, Bloomberg
Munich	2022Q2	Bulwiengesa	Bulwiengesa, OECD	Destatis, UBS P&E, OECD	FED Dallas	Deutsche Bundesbank, Destatis, EUKLEMS, Bloomberg
New York	2022Q2	FHFA, S&P/Shiller	CBRE, CoStar, FED St. Louis	BEA	FHFA	FED, BEA, Bloomberg
Paris	2022Q2	BIS, CGEDD	Insee	Insee, Bloomberg, UBS P&E	FED Dallas	BdF, Insee, EUKLEMS, Macrobond, Bloomberg
San Francisco	2022Q2	FHFA	CBRE, FED St. Louis	BEA	FHFA	FED, BEA, Bloomberg
Sao Paulo	2022Q2	Fipe	Fipe	Fundação Seade	Fipe	Banco do Brasil, IBGE, Bloomberg
Singapore	2022Q2	Government of Singapore	Government of Singapore, UBS P&E	Government of Singapore	–	Government of Singapore, Bloomberg
Stockholm	2022Q2	Statistics Sweden, Valueguard	Statistics Sweden, UBS P&E	Statistics Sweden, UBS P&E	Statistics Sweden	Statistics Sweden, Bloomberg
Sydney	2022Q2	REIA, ABS	REIA, NSW Government, UBS P&E	ABS, UBS P&E	FED Dallas	ABS, RBA, Bloomberg
Tel Aviv	2022Q2	CBS	CBS, UBS P&E	CBS, UBS P&E	FED Dallas	Bol, Bloomberg
Tokyo	2022Q2	The Real Estate Transaction Promotion Center, Haver Analytics	Miki Syoji, Official Statistics of Japan	INDB, Tokyo Metropolitan Government, UBS P&E	FED Dallas	ESRI, EUKLEMS, Bloomberg
Toronto	2022Q2	Sauder School of Business UBC, Bloomberg	Canadian Housing Observer, Sauder School of Business UBC	Statistics Canada	FED Dallas	Statistics Canada, BoC, Bloomberg
Vancouver	2022Q2	Sauder School of Business UBC, Bloomberg	Canadian Housing Observer, Sauder School of Business UBC	Statistics Canada, Government of British Columbia	FED Dallas	Statistics Canada, BoC, Bloomberg
Warsaw	2022Q2	National Bank of Poland	National Bank of Poland	Statistics Poland	National Bank of Poland	National Bank of Poland, Statistics Poland, Bloomberg
Zurich	2022Q2	Wüest Partner	Statistik Stadt Zürich	FTA, FSO	Wüest Partner	SNB, SECO, FSO

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