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On the Nexus of Monetary Policy and Financial Stability: Novel Asset Market Monitoring Tools for Building Economic Resilience and Mitigating Financial Risks*

Enrique Martínez-García[†], Valerie Grossman[‡] and Lauren Spits[§]

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Abstract

In this note we argue that asset pricing bubbles are an important source of financial instabilities. First, the literature has tended to overlook bubbles and their consequences under the premise that they are hard to detect in real time. We suggest that novel statistical techniques allow us to overcome those prejudices as they provide valuable signals of emerging exuberance in real-time. Second, monetary policy has been slow to recognize that financial instability arising from bubbles can have adverse effects on the transmission mechanism of monetary policy itself and on the types of risks faced by policymakers. We argue that measuring and monitoring episodes of exuberance in housing—but also in other asset classes—can be useful not just for thinking about macroprudential strategies but also to conduct risk analysis for monetary policy.

JEL Classifications: D84, E52, E58, E61, G10, R31, R21

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The crux of the matter

Price stability remains a key mandate of monetary policy—sometimes the sole one—supported in many countries by means of a flexible inflation-targeting monetary policy framework. Before the 2007–09 Global Financial Crisis (GFC), financial stability was the realm of prudential regulation and supervision and not always within the central bank’s purview. Furthermore, prudential regulation and supervision of the financial system was predominantly focused on the stability of individual institutions (microprudential policies), with relatively limited attention paid to the stability of the financial system as a whole and to systemic financial risks.

This policy approach found its rationale within the class of New Keynesian models popularized in the ‘90s that continue to be at the core of mainstream central banking models to date. These macro models imply that monetary policy trade-offs between economic activity and inflation arise from nominal rigidities affecting the markets for goods and services. They also broadly suggest that price stability can keep output around its potential—where potential is defined as the output that would prevail absent all nominal rigidities. This, however, often is the case because those models tend to abstract from including realistic features of financial markets. This perception bias whereby monetary policy is studied largely in isolation from the functioning of the financial system is a legacy of the workhorse neoclassical model from which New Keynesian models evolved.

An increasing body of research has come to show that abstracting from financial considerations could lead to misleading inferences about monetary policy. First, because financial frictions and constraints are inherent features of the financial system that can amplify some of the adverse shocks that originate elsewhere in the economy.¹ Second, because there is evidence that negative shocks due to risks inside the financial system can have sizeable macroeconomic consequences beyond even the financial system. And, third, because there is increasing awareness that monetary and prudential policies—even if independent in their execution—are often interdependent in their effects.

Moreover, over time the financial system has evolved, becoming more complex and interconnected, making it increasingly more difficult to assess how shocks are propagated and how they affect financial stability and, importantly, the transmission mechanism of monetary policy. These shifts also aggravated an important gap in macroprudential policies aimed at strengthening the stability of the financial system

¹ On this point, see for example the seminal work of [Carlstrom and Fuerst \(1997\)](#) and [Bernanke, Gertler, and Gilchrist \(1999\)](#) or, more recently, the work of [Balke, Martínez-García, and Zeng \(2021\)](#).

as a whole and at mitigating systemic financial risks. With the benefit of hindsight, this gap in macroprudential policies became particularly glaring in the lead-up to the GFC.

Hence, how do we make sense of all of this for monetary policy? And what are we missing? I would argue that, to answer those questions, we can benefit from adopting a risk management perspective for the analysis of the interplay between monetary policy and financial stability. The three key steps of this risk management approach that I will discuss here are: (a) the identification of risks and vulnerabilities; (b) the analysis and assessment of risks and vulnerabilities; and (c) the strategies of risk mitigation and control to be put in place.

Identifying risks and vulnerabilities

What does identifying financial risks and vulnerabilities mean for monetary policy? Broadly, this refers to the process of identifying and assessing financial threats to monetary policy. In particular, I want to put the emphasis here on an important source of financial risks that often gets overlooked—expectations-driven asset price bubbles. These bubbles can generate adverse macroeconomic effects and result in financial instability disrupting the transmission mechanism of monetary policy (the famous “long and variable lags” between monetary policy actions and macroeconomic effects).

A defining moment

Let’s start with some definitions, though. The financial system, defined broadly, includes financial intermediaries, financial markets, payment systems and even the central bank. Financial instability is what happens to a fragile financial system when it is placed under pressure or crumbles as adverse risks (financial or otherwise) materialize.

Financial fragility refers to the propensity of the financial system or parts of it to become impaired, introducing in the economy nonlinearities affecting the propagation of shocks and/or sizable financial shocks, both with negative economic consequences. By contrast, a stable financial system is characterized by the resilience of the transmission mechanism and by its contribution to risk-sharing or mitigating shocks, even in the presence of financial frictions and constraints.

I distinguish financial instability from financial vulnerabilities as the latter refers explicitly to those features (or frictions) of the financial system that make it more fragile and prone to instability. A variety of measures of the financial conditions can serve as indicators of the near-term state of the financial cycle and can be determinants of the state of the business cycle. Financial conditions reflect episodes of

financial instability but are conceptually distinct from them or from financial vulnerabilities. A financial system may be vulnerable and become unstable irrespective of whether financial conditions are accommodative or restrictive.

Shifts in financial conditions caused by financial instability often materialize when it is already too late for preemptive action—hence, monitoring for signs of financial instability in real time (particularly those associated with asset price bubbles) is one of the challenges that we must tackle.

What do we know and what are we missing?

The current state of the theoretical and empirical literature can help us draw some lessons on the connection between financial vulnerabilities and the macroeconomy, and on how monetary policy affects those connections.² While significant knowledge gaps and blind spots remain in our understanding, the following five observations provide some common ground about what we do know and about what we don't know enough about (the known unknowns).

Observation 1: Financial vulnerabilities are a time-varying feature of the financial system, often related to frictions or constraints. The literature emphasizes that the financial system enables households and firms to borrow and lend, and to transform and manage risks and duration, thereby promoting economic activity. These economic benefits often depend critically on the financial system providing credit maturity and liquidity transformation. Financial vulnerabilities are time-varying, reflecting the evolving nature of the economy and of the financial system, but also the occasional impairment of the maturity and liquidity transformation functions whenever frictions—such as information asymmetries—or constraints on borrowing are binding.³

Observation 2: Financial vulnerabilities can build up in periods of economic expansion. Financial vulnerabilities often increase during economic expansions, with both risk taking and risk appetite rising. Financial frictions, constraints and time-varying beliefs may lead to an underestimation and/or underpricing of risk during the “good times.” This, in turn, may contribute to the procyclical nature of vulnerabilities. However, financial vulnerabilities evolve over time as noted in my previous observation, with the frequencies at which they change—which shape the financial cycle—potentially differing from

² A useful review of the current empirical and theoretical literature can be found in [Ajello et al. \(2022\)](#) and [Boyarchenko, Favara, and Schularick \(2022\)](#).

³ Other financial distortions may include incomplete or asymmetric information, liquidity constraints, funding constraints, moral hazard stemming from policy actions like bailouts, monitoring costs or costly state verification, incentives and principle-agent problems, regulatory arbitrage, etc.

those of standard international business cycles.⁴ Also worth noting is the fact that financial cycles, and housing cycles in particular, have become more integrated across countries in the post-Korean War period.

Observation 3: Financial leverage and indebtedness are key vulnerabilities and sources of financial instability. The current body of evidence suggests that credit growth fuels asset price booms and is a key risk factor that exacerbates the effects of shocks to economic fundamentals, beliefs and even for expectations-driven nonfundamental bubbles.⁵ The relationship between asset prices and credit growth is easily understood—increasing asset prices allows borrowers to pledge more collateral, and thus, loosen the borrowing constraints to increase debt until a shock (financial or otherwise) forces them to quickly deleverage, possibly triggering negative externalities or a domino effect on other debtors and financial institutions.

Observation 4: Financial crises are to some extent predictable outcomes of credit expansions, particularly when accompanied by asset price booms.⁶ A conventional interpretation is that the dynamics of a financial crisis arise due to the self-reinforcing loop described in my previous observation, because it impairs credit provision, lowers asset prices and aggravates the drag on economic activity of a shock. However, it is increasingly recognized that shocks originating from risks within the financial system can also have direct negative effects.⁷ Capital flows and exchange rates cannot be ignored either. Increased cross-border capital mobility can fuel domestic credit and asset price bubbles, while freely floating exchange rates can become a shock amplifier rather than a shock absorber when confronted with large and volatile capital flows.⁸

Observation 5: Monetary policy may affect the buildup of financial vulnerabilities. Through standard transmission channels, monetary policy affects asset prices, lending and risk taking within the financial system and through borrower balance sheets, contributing to the buildup of financial vulnerabilities. However, an accommodative monetary policy does not necessarily have to result in an asset price boom and/or an abnormal credit expansion. The evidence connecting monetary policy and things like

⁴ A discussion of the shifts observed in international business cycles since the '60s can be found in [Martínez-García \(2018\)](#).

⁵ See, for example, the analysis of the relationship between credit growth and international housing bubbles presented in [Martínez-García and Grossman \(2020\)](#).

⁶ See a discussion of crisis and an overview of the international evidence available since the '80s in [Martínez-García, Grossman and Mack \(2015\)](#).

⁷ As shown in detail in the work of [Balke, Martínez-García, and Zeng \(2021\)](#).

⁸ See [Borio, Shim, and Shin \(2023\)](#) for further details on this point.

incentives to take on leverage, engage in maturity and liquidity transformation, and affect asset valuations and mispricing is somewhat mixed. The causal relationship between monetary policy and financial vulnerabilities is difficult to disentangle and may depend on the structure of the financial system, including its regulatory environment, as well as on the state of the business cycle, the health of the financial sector and the constraints faced by policymakers (such as the zero lower bound constraint).

In summary, much of the literature focuses on the buildup and effects of leverage and indebtedness as a source of financial vulnerabilities when considering how those vulnerabilities relate to monetary policy. However, asset price expansions—accommodated by credit growth or not—can also arise from a nonfundamental mispricing of certain assets in the economy—that is, through expectations-driven asset pricing bubbles. What this does is lead to a misallocation of resources and investment, distort the price discovery process and result in costly boom-bust dynamics. Therefore, I want to emphasize in the remainder of this talk the importance of asset pricing bubbles as a source of vulnerabilities and financial shocks (through a disruptive bust in prices).

Even to this day, one of the underappreciated vulnerabilities we face arises from the emergence of exuberance in the U.S. and global real estate markets. It is precisely this concern that motivated the Federal Reserve Bank of Dallas to develop its [International House Price Database](#) for the monitoring of international housing markets back in 2011.⁹

Risk analysis and assessment

Risk analysis implies an assessment of the potential effects and outcomes of a given risk event materializing and, often, of the odds that such a risk event might occur. An evaluation of how to respond if those risks materialize is another important aspect of the risk analysis and assessment process. Central banks' risk analysis has shifted significantly over the past decades as financial vulnerabilities evolved and we gained a deeper understanding of how they relate to monetary policy.

In the run-up to the GFC, financial vulnerabilities and financial stability risks grew largely undetected, beneath the surface of inflation and output gaps that by all accounts appeared close to target. There was a sharp increase in the ratio of credit to GDP and in real estate prices—two important financial indicators signaling brewing financial risks. However, monetary policy remained largely independent from financial stability considerations under the premise that monetary policy should react to movements in asset

⁹ For more details on the Federal Reserve Bank of Dallas' International House Price Database, see [Mack, Martínez-García, and Grossman \(2019\)](#).

prices and credit aggregates only to the extent that those are reflected in the macro variables on which the central bank mandate is framed—inflation and often also economic activity. That approach was appealing, in part, because of the widely held view that the policy rate is simply too much of a blunt instrument to be an appropriate tool to respond to emerging financial risks.

The view that monetary policy's role was to respond to the macroeconomic consequences of financial instability if and when it materialized started to switch rapidly in the aftermath of the GFC. First, because the costs associated with the clean-up after the real estate bust preceding the GFC proved to be very large.¹⁰ Second, because policies aimed solely at cleaning up may have increased moral hazard in financial markets—raising incentives for risk taking, as rewards could be appropriated by individuals or corporations, while costs would be cushioned by policy and ultimately borne by the public. Finally, because the failure to fully recognize the financial vulnerabilities arising from earlier asset price bubbles has motivated novel research that has proven itself to be very useful to monitor the emergence of such asset pricing bubbles.

Increasingly, policymakers nowadays recognize the need to mitigate crisis risk proactively rather than only relying on cleaning up after a crisis. On the monetary policy front, price stability is no longer believed to be sufficient to ensure macroeconomic stability in the presence of financial vulnerabilities. And, on the prudential front, the emphasis has shifted toward complementing traditional microprudential policies aimed at individual institutions with macroprudential policy frameworks that include both cyclical instruments (countercyclical capital buffers, loan-to-value limits or dynamic loss provisioning, etc.) and other structural measures aimed to strengthen the resilience of the financial system and to contain systemic risks.

But there is still concern that even a stronger emerging combination of micro- and macroprudential policies may not suffice to contain financial stability risks—notably those arising from asset pricing bubbles. The often-heard argument is that it is simply too difficult to distinguish between fundamental-driven asset price movements and bubbles in real time to be able to do anything about it preemptively. A key contribution of the joint work that the Dallas Fed and Lancaster University have done on housing over the years through the website of the [International Housing Observatory](#) is precisely to challenge this claim. Our joint work has contributed to this by popularizing and extending novel techniques—based

¹⁰ The severity of the Global Financial Crisis required extraordinary monetary policy accommodation, all the more so when fiscal policy was constrained in the face of high and rising public debt burdens.

on recursive implementations of the right-tailed Augmented Dickey-Fuller test—that have proven to be successful at providing warning signs of exuberance in real time.¹¹

These statistical techniques allow us to incorporate warnings about bubbles in our financial stability analysis as well as in our analysis of risks to the macro and policy outlooks. Our own research and policy work has centered on housing, but these tools can be applied more generally to detect asset pricing bubbles across other asset classes.

Risk mitigation and monitoring

Mitigation of financial risks from the perspective of monetary policy refers to the methods and processes put in place to identify, monitor and evaluate financial vulnerabilities and the consequences derived from the different sources of financial instability. It also involves the features of the policy framework—strategy, tools and communication practices—deployed to address those financial vulnerabilities either before they arise or for the clean-up afterwards.¹² To be successful, risk management must adapt and evolve over time. Repeating and continually monitoring the performance of the methods and processes will help deal more effectively with known and unknown (or emerging) risks.

Relying on monetary policy actions to address financial vulnerabilities raises two major concerns. First, that highly expansionary monetary policy over a prolonged period could contribute to the buildup of financial vulnerabilities which is, in and of itself, undesirable. Second, that the feedback loop from these vulnerabilities may constrain future monetary policy options. If these vulnerabilities are significant, then the central bank may worry that the tightening of monetary policy necessary to bring down inflation to target can trigger financial instability—in other words, financial dominance may arise, compromising monetary policy’s ability to pursue its mandate and even fiscal stability.¹³

Instead, more efforts have gone into enhancing the resilience of the monetary policy frameworks and the layout of a more integrated policy approach (notably enhancing macroprudential policies to complement microprudential ones). The efforts have focused on avoiding the unsustainable buildup of

¹¹ For a description of the statistical toolkit and some important economic applications to housing, see [Pavlidis et al. \(2016\)](#) and [Pavlidis, Martínez-García, and Grossman \(2019\)](#). The statistical techniques can be implemented with the R package [exuber](#) easy to use, as illustrated in [Vasilopoulos, Pavlidis, and Martínez-García \(2022\)](#).

¹² The most common responses to financial risks include risk avoidance, risk reduction, risk sharing, risk transfers and risk cleanup.

¹³ See the related discussion on the constraints imposed on monetary policy by financial stability and the related concept of r-double-star in Akinci et al. ([2023a](#), [2023b](#), [2023c](#), [2023d](#)). When fiscal policy is not sound, fiscal dominance can become a concern for monetary policy and its credibility as well. We leave that concern duly noted but better left to be addressed at another time.

debt and leverage, as much of the empirical work I reviewed earlier has clearly documented their role on financial vulnerabilities.

- For macroprudential policy, it has often meant leaning against an unsustainable expansion of credit, inflation in asset prices and the excessive buildup of leverage—often targeted at the property sector. Capital flow management measures and even exchange rate interventions—all of which pose distortionary effects and long-term costs that would need to be weighed in—have occasionally been used to moderate asset price inflation, notably (again) in the real estate sector.
- For monetary policy, it starts by providing a credible anchor for price stability to achieve the central bank’s mandate—for many countries that means some form of flexible inflation targeting.¹⁴ Given the strategy, policy tools and communication practices that characterize the policy framework, monetary policy seeks to achieve three goals. First, to shift the current policy stance and the public’s expectations about the future path of policy. Second, to reduce monetary policy uncertainty to enhance the impact of the current and expected policy path. Third, to make financial markets less sensitive to subsequent news and more resilient to financial risks as well. This last point heavily depends on credible signaling through forward guidance and balance sheet policies and other communication practices (e.g., the Fed’s summary of economic projections or SEP).

Our argument is that asset price bubbles deserve greater attention as a source of financial vulnerabilities potentially unrelated to indebtedness. Our suggestion is twofold in this regard. First, there is scope to integrate novel techniques for monitoring asset markets for signs of exuberance in financial stability analysis and potentially even in the design of macroprudential policies. Second, understanding what we mean by an asset pricing bubble is crucial. Given that bubbles are expectations-driven, expanding the monitoring toolkit with our indicators can be beneficial by alerting economic agents of the risks and potentially also about the impact that this may have on the macro and policy outlooks.

What do we mean by bubbles?

The concept of a bubble is central to our understanding of asset pricing and price discovery failures in financial and money markets, but it is not always well-understood or recognized as part of the ecosystem of financial risks affecting the economy and monetary policy. The idea of a bubble is not new, but it is not always easy to define and even less so to identify.

¹⁴ For a more in-depth analysis of the inflation targeting regime and its performance, see [Duncan, Martínez-García, and Toledo \(2022\)](#).

The first observation that we should make about this is that bubbles are not inherently bad. In fact, bubbles play a beneficial role in well-functioning economic systems, helping us deal with dynamic inefficiencies. At the heart of the international monetary system that has come to prevail since the collapse of Bretton Woods lies fiat currency, which is nothing more than a bubble—an asset whose price is sustained by the faith and willingness of others to accept it and certain expectations about its value.¹⁵ It is for this reason that we consider fiat money as something akin to a social or public good—but one that can help the economy achieve a better allocation in some respect.

To be more precise, the value of fiat currency is extrinsic and completely based on the faith that economic agents have on it—in particular, it is based on the expectation that others will be willing to accept it as a token for goods and services rendered the same way as we are doing ourselves. However, fiat money can be sustainable and even desirable when it facilitates trades and exchanges that without it would simply not be possible. In other words, it can be sustained when the presence of the bubble helps address some form of static or dynamic inefficiency.

These types of bubbles are possible and can emerge in the form of monetary equilibria but tend to be fragile. Hence, often a commitment on the part of the central bank is needed to ensure its stability or, in other words, that the value of fiat money is kept stable, predictable and controllable. A binding, statutory mandate to pursue price stability can be one way to achieve that if the subsequent policy actions continue to support the faith of the public in the value of a stable currency.¹⁶ This is an important distinction because, in the absence of some clear anchor (rule-based or otherwise), the inherent fragility of expectations-driven bubbles can lead to unstable dynamics with very large and volatile movements in the value of the currency. In other words, the consequence of losing the nominal anchor is that the nominal price level becomes explosive, leading to episodes of high inflation or hyperinflation.

We must recognize that this fragility is an inherent problem not just of fiat money but of all asset price bubbles. In our work, we don't look at characterizing bubbles per se. We don't look at whether bubbles can help ease some dynamic inefficiency and, therefore, improve the functioning of the economic system. Instead, we simply focus on identifying signs that a bubble has become unstable and, therefore,

¹⁵ For further reference, see also [Santos and Woodford \(1997\)](#) and [Werner \(2014\)](#). A relevant discussion on the related concepts of inside and outside money can be found in [Lagos \(2010\)](#).

¹⁶ The gold standard would impose a disciplining mechanism requiring that the currency be backed by gold, constraining the money supply available. After the collapse of an international monetary system based on gold, different monetary policy regimes have emerged, with inflation-targeting becoming the most popular as it makes an explicit commitment to the stability of the value of fiat currency by targeting inflation to be low and stable.

explosive. For when one bubble is present and becomes explosive, it tends to lead to boom-bust dynamics that can be severe and costly and are an important source of instability for the financial system and the macroeconomy.¹⁷

Instability caused by a bubble generally leads to a significant misallocation of resources by interfering with the price signals that financial markets provide, resulting in both over-investment and under-investment in key sectors of the economy. An important source of global bubbles over the past three decades or so has been the real estate sector, but while this is our primary focus, it is by no means the only asset class where we find the emergence of bubbles having an impact.

The key idea that I want to emphasize here is that what we are trying to identify and what we are concerned about is not so much bubbles per se but explosive behavior arising from bubbles that can lead to instability and produce significant economic distortions. That is, I want to highlight those explosive bubbles that have the potential to produce boom-bust dynamics.

What we advocate for is the use of novel statistical techniques that help us detect the emergence of signs of exuberance in asset prices. In other words, that provide some early warning about the emergence of explosive behavior. These are the sorts of tests that we have extensively applied to research exuberance and its impact on house prices—through the work of the Federal Reserve Bank of Dallas’ [International House Price Database](#) in cooperation with researchers at Lancaster University to which I alluded before.¹⁸

Why does this research on detecting exuberance matter? It is relevant for several reasons: (a) because instability arising from bubbles has an impact on economic activity. When we subsequently review our recent evidence on the behavior of housing during the pandemic, it will become clear how this is important for the U.S. and the global economy; (b) and, most importantly, because we need to properly recognize that the identification of bubbles is a major concern in analyzing the vulnerabilities and sources of financial instability that can affect the economy.

¹⁷ Monetary policy can increase the appetite and risk-taking behavior and indebtedness when accommodative, leading to unsustainable credit growth and asset price runups. By contrast, monetary policy tightening can trigger a sharp reversal in risk appetite and result in more pessimistic expectations, which can lead to asset pricing busts, impairment of credit supply and financial failures.

¹⁸ The data are publicly available at the Federal Reserve Bank of Dallas’ [International House Price Database](#). Further analysis and novel developments can be found also through the website of the [International Housing Observatory](#).

We need to have a better understanding of when there is a risk of a bubble emerging in real time if we want to design policies that would be effective at preempting it and even at dealing with its consequences. But, most importantly, we can use these tools to complement our toolkit for monitoring financial stability and realigning market expectations.

An illustration: The pandemic housing boom experience

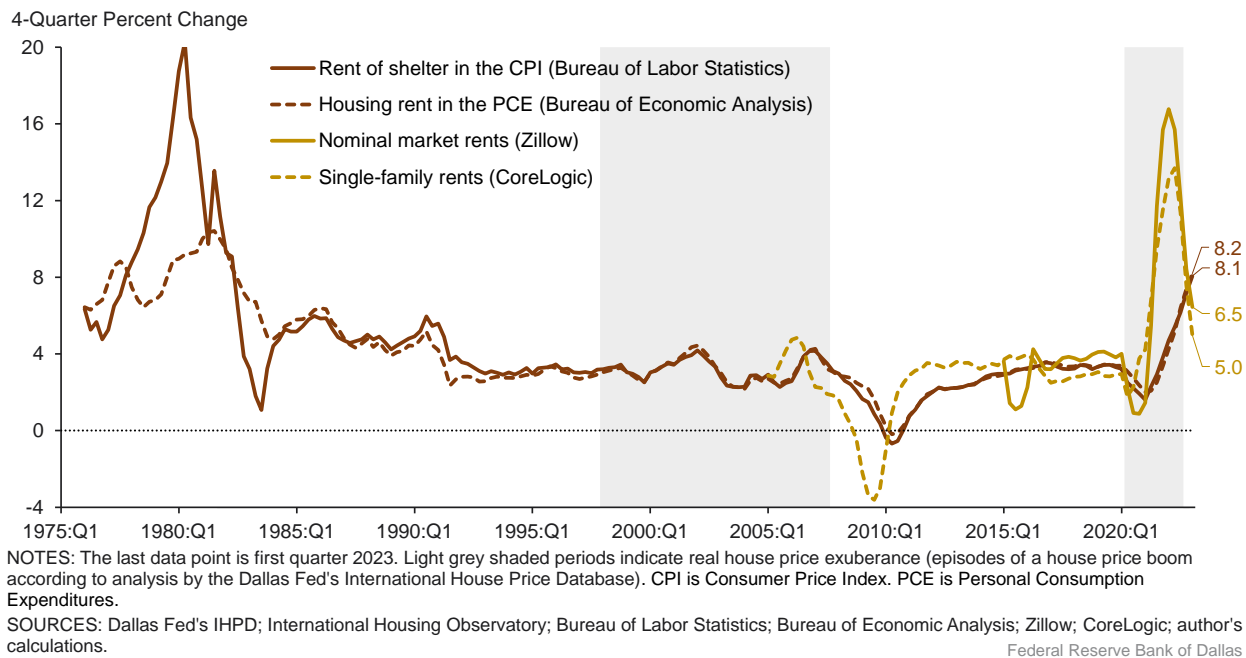
Based on our analysis of the evidence of exuberance in real time, there is strong evidence that the rapid acceleration in U.S. (and global) house prices during the pandemic displayed the characteristics of an expectations-driven explosive bubble—partly, the result of fear of missing out (FOMO).¹⁹ So, what does that mean for the U.S. economy and for risks to the outlook? I’m going to argue here that housing is a potential vulnerability for the U.S. economy, likely because the pandemic experience was the result of a bubble. And this is something that can be looked at through the prism of the dual mandate for monetary policy—in other words, this housing vulnerability can have an impact on both price stability as well as on full employment.

Let me try to articulate that idea starting with [Chart 1](#). The first thing I want to show here is the series for the four-quarter percentage change in the rental shelter component of the Consumer Price Index (CPI)—that’s the brown solid line. The brown dashed line is the housing rent component in the personal consumption expenditures (PCE). Both series reached around 8.2 percent in first quarter 2022. This is the largest rate of growth for both series since the mid-1980s. Rent inflation has been lagging house price growth, but it’s certainly adding to the inflationary pressures right now.

Tighter monetary policy and rising mortgage rates appear to be having an effect—slowing down house prices. That has started to spill over into a moderation of the growth rate of several indicators of market rents for housing. The solid gold line in [Chart 1](#) indicates the four-quarter change in the nominal market rent series from Zillow, while the dashed gold line is the four-quarter change in the single-family rent series computed by CoreLogic. Both series provide estimates of the going rates for renting.

¹⁹ Further discussion on this can be found in a succession of Federal Reserve Bank of Dallas publications on housing: [Martínez-García et al. \(2021\)](#), [Coulter et al. \(2022\)](#), [Martínez-García \(2022\)](#), and [Spits and Martínez-García \(2023\)](#).

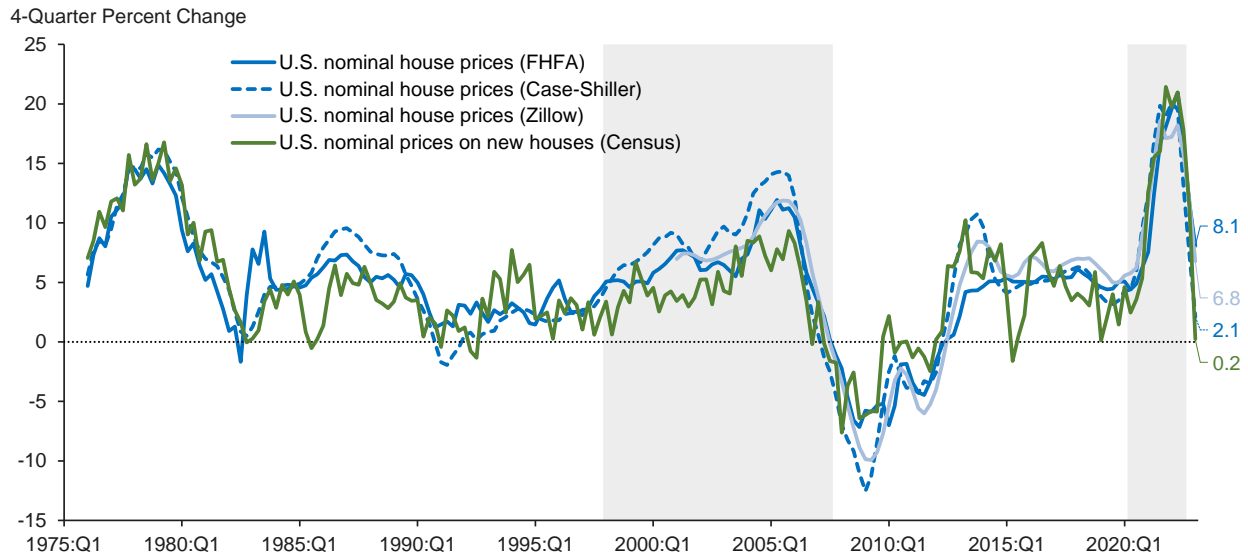
Chart 1. Housing rents continues to build inflationary pressures even though market rents are already rapidly cooling off



However, it takes time for the signs of moderation we see in market rents to slow down the rent measures in the PCE (or the CPI) as rental contracts tend to be signed over an extended period—most commonly with a 12-month duration. Accordingly, the market rent slowdown may take a while to ease the inflationary pressures we are seeing from rent inflation. Indeed, we may not see this housing rent component moderate until the second half of 2023 or likely later. In any event, market rents cooling off provides evidence that monetary policy tightening seems to be having the desired effect of helping quell inflation.

In [Chart 2](#) I illustrate that the house price series constructed by the Federal Housing Finance Agency (FHFA), Case-Shiller, Zillow or even the census provide a consistent signal of the strength of the run-up in prices during the pandemic. For further perspective, [Chart 3](#) shows how house prices—the blue line—have evolved over time in comparison with the rent of shelter in the CPI and the housing rent component in the PCE—the brown solid and dashed lines, respectively. This shows that the growth rate of housing rent tends to co-move with house price growth, but it often does so with a lag.

Chart 2. U.S. house prices have slowed down quite rapidly in first quarter 2023

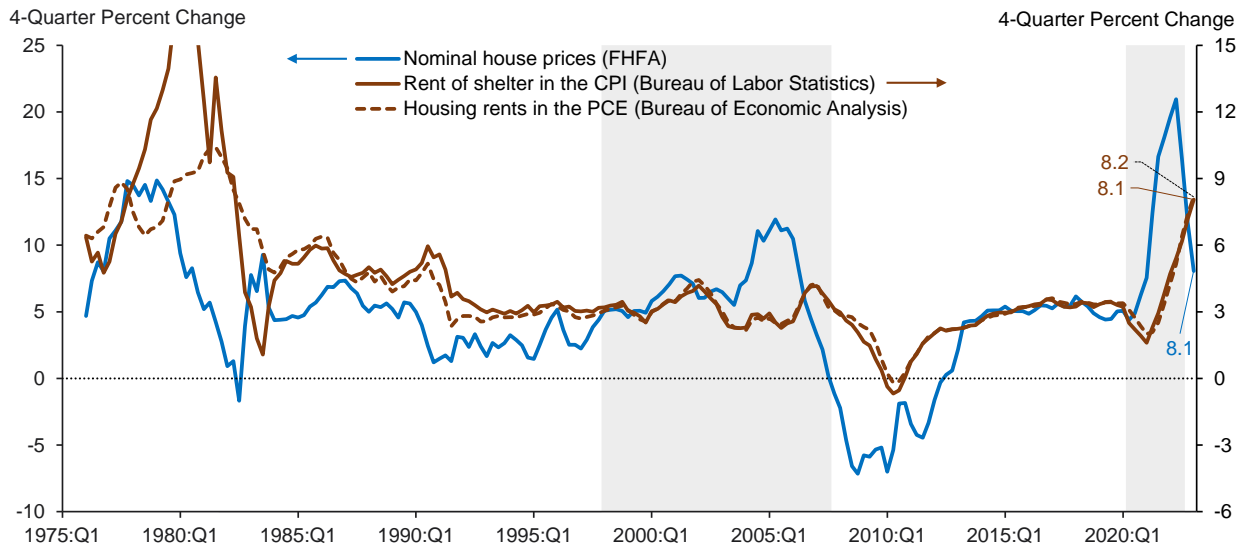


NOTES: Data are through first quarter 2023. Light grey shaded periods indicate real house price exuberance (episodes of a house price boom according to analysis by the Dallas Fed's International House Price Database).

SOURCES: Dallas Fed's IHPD; International Housing Observatory; Case-Shiller CoreLogic; Federal Housing Finance Agency; Census Bureau; Zillow; author's calculations.

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Chart 3. U.S. housing rents continue to rise, lagging house prices



NOTES: The last data point is first quarter 2023. Light grey shaded periods indicate real house price exuberance (episodes of a house price boom according to analysis by the Dallas Fed's International House Price Database). FHFA is Federal Housing Finance Agency. CPI is Consumer Price Index. PCE is Personal Consumption Expenditures.

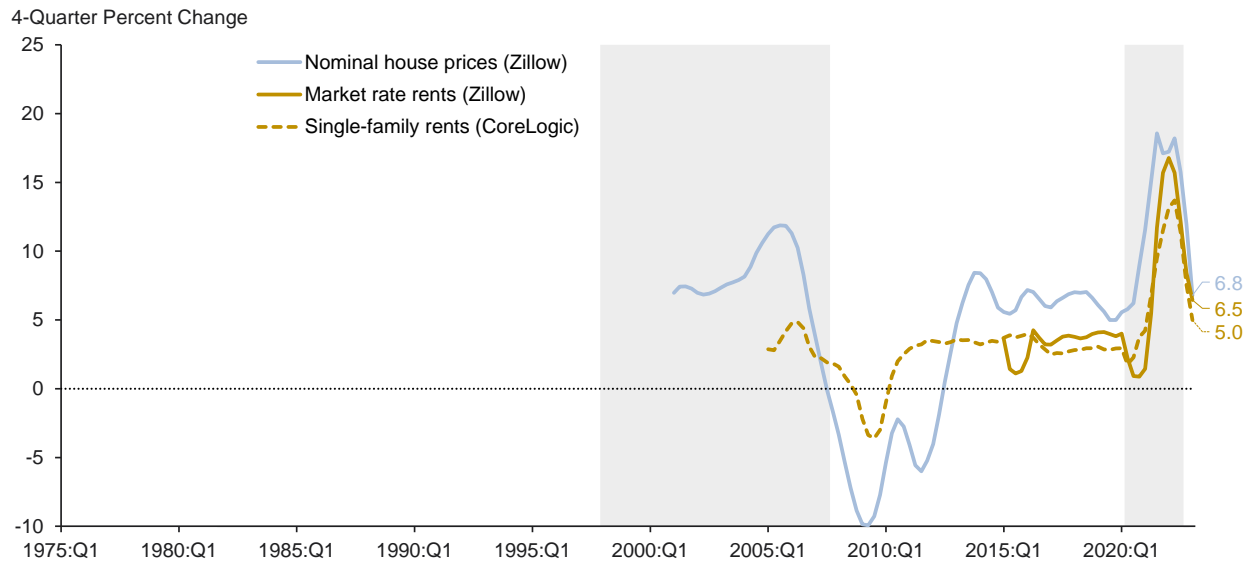
SOURCES: Dallas Fed's IHPD; International Housing Observatory; U.S. Bureau of Labor Statistics; U.S. Bureau of Economic Analysis; author's calculations.

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For completeness' sake, I also show in [Chart 4](#) the nominal house prices from Zillow—the light blue line—together with the market rents from Zillow and the single-family rents from CoreLogic—the gold

solid and dashed lines, respectively. This plot suggests that the same pattern of moderation or cooling off that we see in house prices is already being mimicked quite closely by the slowdown in market rents.

Chart 4. U.S. market rents for housing have slowed down noticeably as house prices also show signs of cooling down



NOTES: The last data point is first quarter 2023. Light grey shaded periods indicate real house price exuberance (episodes of a house price boom according to analysis by the Dallas Fed's International House Price Database).

SOURCES: Dallas Fed's IHPD; International Housing Observatory; Zillow; CoreLogic; author's calculations.

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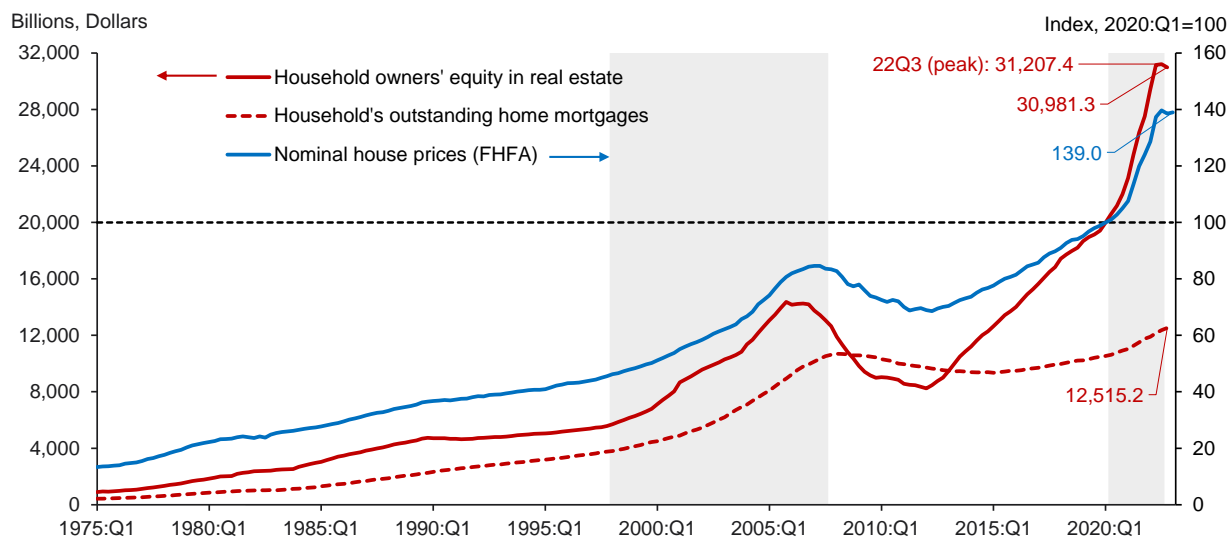
In short, all these data provide evidence that housing markets—for renting as well as for purchasing a house—are reacting already quite significantly to monetary policy tightening by cooling off, even if it will still take time for that to show up in the easing of inflation. This is, you could say, good news because if monetary policy is effective in battling inflation, it needs to do just that—moderate house prices and cool off housing rents.

That's one important part of the story—at least if we look at it through the lens of the Federal Reserve's dual mandate. The other part of the story is what impact the cooling off of the housing market might have on economic activity. There are no two recessions that are going to be equal. For starters, mortgage loan applications have been less sensitive to changes in mortgage rates than pre-GFC, in part reflecting some of the lessons learned and how the financial and banking system incorporated new regulations and adapted after the housing crisis that led to the GFC. That has resulted in tighter lending standards and

makes it less likely that we'll see another wave of foreclosures like what happened then. That may have contributed to slowing the recovery of the housing market post-GFC, but now the banking system appears to be in a stronger position and in better shape to withstand a potential house price correction. By contrast, problems have appeared elsewhere—particularly related to interest rate risk and liquidity risk—as the policy tightening started in March 2022 has made some of those fault lines of the banking system appear.

Household finances themselves appear to be in better shape, as I show in [Chart 5](#). Here I have plotted household owners' equity in real estate. That's the red line. I have also added a dashed red line with the value of home mortgages that households have. The blue line is the nominal house price index, which takes a value of 100 in first quarter 2020—marking the beginning of the pandemic.

Chart 5. U.S. household owners' equity wealth increased by an unprecedented \$11.2 trillion during the pandemic boom



NOTES: Last data point is fourth quarter 2022, except nominal house prices (FHFA) that extend to first quarter 2023. Light grey shaded periods indicate real house price exuberance (episodes of a house price boom according to analysis by the Dallas Fed's International House Price Database). SOURCES: Dallas Fed's IHPD; International Housing Observatory; Federal Housing Finance Agency; Board of Governors of the Federal Reserve System; author's calculations. Federal Reserve Bank of Dallas

My first observation based on this chart is that the value of home mortgages has increased quite modestly (relatively speaking) during the pandemic—and certainly not as much as it did during the

previous housing boom. That's an indication that household finances are, on average, less leveraged through mortgages. And arguably in a stronger position.

But if we look at household owners' equity in real estate, which is the interesting part of this graph, we will observe that it has increased quite robustly since around 2012. The value of all household owners' equity, however, jumped by a remarkable \$11.2 trillion during the pandemic (up to its peak in third quarter 2022). This is the largest increase that we've seen in this series in such a short period of time. In fact, it is unlike anything we have seen since the mid-1970s. And, most importantly, the lion's share of the increase, between 70 percent and 75 percent of the increase, can be attributed exclusively to valuation gains. In other words, household owners' equity has boomed during the pandemic because house prices have increased so much, not because the stock of housing in the U.S. has expanded much.

Still, while households seem to be in a better position and banks seem to have stronger balance sheets and higher lending standards than last time, there remains a significant macro risk in the housing market. A major house price correction will entail that a sizeable part of the real estate wealth that boosted households' finances during the pandemic may simply evaporate. For most households in the U.S.—and this is largely true across the income distribution—their house is their main wealth asset—their main source of wealth. So, going forward, the possibility of what economists call a negative wealth effect is an important concern that we must take into account.

This negative wealth effect refers to the idea that households hit by a severe price correction might encounter that the value of their house as collateral for borrowing is lower than it had been. This can limit their ability to borrow and have a restraining effect on aggregate demand. Households can also refrain from consuming or investing through the so-called confidence channel. Basically, what that entails is that, as their equity erodes from a correction in house prices, households start to view their financial situation as less buoyant than in the past. In that situation, households may prefer to pull back or postpone some of their consumption or investment plans.

What should we expect from the ongoing housing market cooling off? I think a reasonable baseline is one of moderation in house price growth and rent inflation. That helps ease inflationary pressures as the contribution of rents is expected to moderate with a lag, rather than immediately. The rent component of the PCE and the CPI is likely to moderate over time, as I discussed earlier. That is to say, tighter monetary policy is doing its job to quell inflation. That entails that housing demand and, with it, house price growth will have to moderate as well. Such a baseline scenario is consistent with a soft landing

where GDP growth falls below trend but gradually starts to bounce back as inflation gets nearer to the Federal Reserve’s 2 percent target.

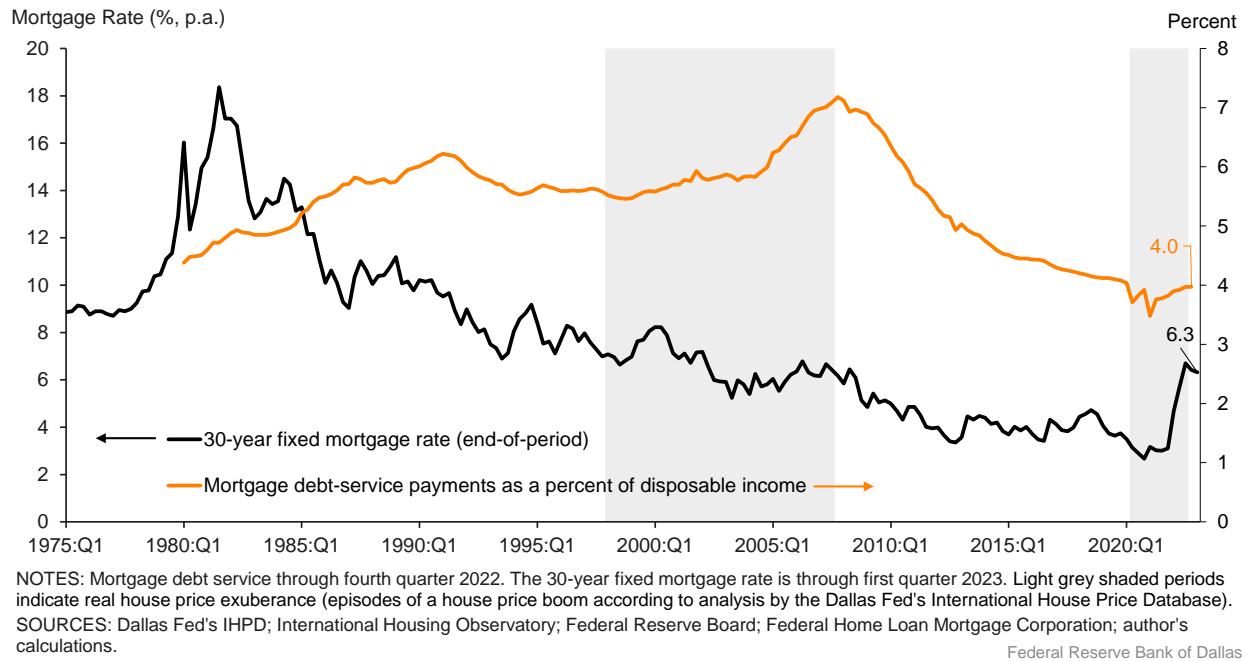
That baseline scenario would also imply a gradual unwinding of some of the excesses that have accumulated—or that have appeared—in the housing market in recent years, most notably during the pandemic. However, improvements in housing affordability would likely be limited and slow to come in this baseline scenario. Hence, housing unaffordability will likely remain a major challenge for the housing market and the U.S. economy over the medium term. To address this medium-term concern, consideration must be given to the demand and supply forces on which the market equilibrium hinges. Monetary policy does not have a toolkit well suited to play an active role there. But, when prices are stable, long-term interest rates tend to settle at moderate levels, so the goals of quickly restoring price stability and keeping long-term interest rates at moderate levels tend to go hand in hand.

Moreover, the price-to-rent ratio may gradually decline but still remains at historically elevated levels in this baseline scenario—suggesting that investors will continue to see housing as a growth investment opportunity that is expected to grow in value at a rate significantly above average returns. Growth assets provide a greater potential for future return through valuation gains and thus involve greater risk as well. The key risk for housing is that the realized or expected valuation gains do not continue indefinitely in the future, ending in a bust.²⁰

There are good reasons to think that this baseline scenario is not just plausible but likely. The unemployment rate is still fairly low. We also have evidence that mortgage debt service payments are less of a burden for the average household than they have been during the past four decades, even though mortgage rates have, as can be seen in the black line in [Chart 6](#), increased to levels not seen in a generation—to 6.3 percent by first quarter 2023. And reached peaks as high as 7 percent in October 2022. The orange line illustrates the share of mortgage debt service payments as a percent of the households’ disposable income. During fourth quarter 2022, the share of mortgage debt service payments was still below 4 percent. This is a historically low level and well below the range of 6 percent to 7 percent that we saw in the later stages of the previous housing boom.

²⁰ More so because a robust appreciation in house prices such as we saw during the pandemic (and the preceding housing boom) can become self-fulfilling for a while, giving rise to episodes of froth supported by FOMO; but those expectations-driven booms are eventually unsustainable (and must correct themselves sooner or later).

Chart 6. U.S. mortgage borrowing costs elevated but weakening overall household finances slowly



The larger mortgage rates now have had a limited impact on the finances of the average household so far; this, in part, reflects the unique characteristics of the U.S. mortgage market, which heavily relies on fixed-rate mortgages rather than adjustable-rate ones (even more so during the pandemic). However, while the average household is in better shape than it was in the past, there are segments of borrowers that are being impacted by the higher mortgage rates. Low-income households and first-time buyers are increasingly left out of the market, unable to afford the higher mortgage rates. The small fraction of adjustable-rate mortgages in the pool—less than 10 percent—are also starting to feel the pinch. However, this is more of a targeted than a broad concern for the mortgage market at this point. Add to that the extra layer of protection from the higher standards in lending that became the norm after the GFC.

Putting all these arguments together suggests that the tighter financial conditions of today don't appear severe enough to cause a large wave of foreclosures and the type of banking problems that we saw unfold during the previous housing crisis. It has been argued—and I tend to agree with it—that even the potential negative wealth effect that I envision in my risk scenarios will likely not pull as much of a punch this time as during the previous housing crisis; this is because households and the financial system appear to be, by and large, in better shape now.

However, we should not be overconfident based on these arguments. If anything, I would like to conclude by reiterating two key points. First, some of the patterns in the housing market that I have highlighted earlier are, indeed, in line with what we would expect given the recent tightening of monetary policy. Still, the current situation is unprecedented in other respects too. It remains to be seen how households—in particular—and the markets more broadly adjust in the baseline scenario if mortgage rates remain elevated at historically high levels (which we have not seen in a generation). It also remains to be seen what the longer-term implications for the market and for interest rates are going to be.

Second, while the baseline scenario appears to be plausible and likely with the data we currently have, it is worth considering what are some of the risks we face and the type of deviations from the baseline that we could expect if those risks materialize. In other words, from a risk management perspective, we should be asking ourselves: What are the potential consequences of errors we could be making in judging the impact that tighter financial conditions might have on the housing market?²¹

To conclude, all of this comes to show that careful empirical work and data-driven analysis are important to identify financial vulnerabilities—whether arising in the real estate sector or not. The significance of these novel techniques we favor—aimed at detecting explosive behavior in asset prices—for monetary policy and financial stability deserves further consideration.

²¹ An alternative risk scenario that I have in mind—the one that seems more concerning to me—is one where inflation remains stubbornly higher and monetary policy is tighter for longer than is currently anticipated. That increases the odds of a more severe drag on housing demand than we are expecting and, accordingly, can lead to a larger price correction. For further discussion of the main risk scenarios for U.S. and global housing, see [Martínez-García \(2022\)](#), and [Spits and Martínez-García \(2023\)](#).

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