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# Housing Market Stability and Affordability in Asia- Pacific

Prepared by Pragyan Deb, Harald Finger,  
Kenichiro Kashiwase, Yosuke Kido, Siddharth Kothari,  
and Evan Papageorgiou, with inputs from Henry Hoyle  
and Anne Oeking

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# Acronyms and Abbreviations

ABS	Australia Bureau of Statistics
ADB	Asian Development Bank
AEs	Advanced Economies
BIS	Bank for International Settlements
bps	basis points
CPI	Consumer Price Index
DSTI	Debt Service to Total Income
EMDEs	Emerging Markets and Developing Economies
EMs	Emerging Markets
EU	European Union
FSB	Financial Stability Board
GDP	Gross Domestic Product
GFC	Great Financial Crisis
HaR	Housing Price-at-Risk
HH	Household
HPI	House Price to Income
HPR	House Price to Rent
HRS	Human Resource Services
LTV	Loan to Value
MPM	Macroprudential Measure
NPL	Nonperforming Loan
OECD	Organisation for Economic Co-operation
RBA	Reserve Bank of Australia
RBNZ	Reserve Bank of New Zealand
REINZ	Real Estate Institute of New Zealand
UN	United Nations

## Executive Summary

Housing markets in the Asia-Pacific region are at an important juncture. Having risen over the past decade and during the pandemic, housing prices now appear slated for a decline in many countries. Pronounced housing cycles, which Asia-Pacific has experienced repeatedly also in the past, come at a cost. The buildup of vulnerabilities in the upswing tends to come to the fore during downturns, often with marked impacts on the broader economy. High housing prices and the prospect of increasing mortgage rates, as central banks tighten monetary policy, also imply a significant deterioration in housing affordability.

Housing prices in many countries across the region now appear misaligned, with significant downside risk to prices in the period ahead. Price surges during the pandemic, especially in the region's advanced economies (AEs), were facilitated by low mortgage rates as central banks implemented very accommodative policy stances, along with country-specific demand and supply factors. This led to sizable price misalignment and a marked increase in downside risks to housing prices going forward, in the order of 5-20 percent in some countries. Rising interest rates will add to downside risks going forward. While the financial sectors of major AEs and emerging market economies (EMs) appear sound and would be expected to remain resilient under such shocks, close supervision is warranted for early identification of any pockets of risk.

With higher housing prices, housing affordability has become an increasing concern in the aftermath of the pandemic. Especially in the AEs, households have to stretch their wallets to be able to finance adequate housing, with an increasing share of them now overburdened by that cost. Adequate housing in many emerging market and developing economies (EMDEs) is also less affordable due to high housing prices, reflective of supply being unable to catch up with the rising demand of quickly growing populations. Poorer households in these countries are disproportionately affected.

To address the housing cycle and safeguard financial stability, macroprudential policies should be the first line of defense. Countries in the Asia-Pacific region by now have a broad toolkit at their disposal, and policies have proven effective at mitigating housing credit growth during upswings. Within the toolkit, demand-side measures, such as loan to value (LTV) and debt service to total income (DSTI) limits, have been more effective than capital-based tools, and the effect of policy tightening during upswings has been generally stronger than stimulatory effects of policy loosening during downturns. While macroprudential measures have been effective at targeting household credit growth, they only have a limited effect on housing prices on average, and only significantly so in regional EMs. Leakages of macroprudential measures are also of concern, and policymakers should widen the regulatory perimeter where needed.

Improving housing affordability requires a multi-faceted policy approach. Facilitating a stronger supply response will be key in many countries to address underlying imbalances. This includes reviewing land use regulations, increasing the focus on urban planning, incentivizing the use of idle land, and providing adequate social and affordable housing, both directly by the public sector and indirectly through incentives for private developers. But supply-side measures often take significant time to produce results, putting a premium on demand-side measures, which work more quickly. Such measures can include targeted government support, progressive taxation on property, targeted macroprudential policy to contain systemic risks while being mindful of its repercussions on lower-income households and owner-occupiers, and making use of targeted financing, insurance, and guarantee mechanisms.



# 1. Introduction

Housing markets in the Asia-Pacific region may be at an important juncture. Having experienced frequent and pronounced housing cycles over past decades, housing booms that were prevalent before and during the pandemic may be about to reverse amid stretched housing price valuations and rising interest rates. Since housing is the single most-important household asset and mortgages account for a large part of household liabilities, housing market developments are key for households and policymakers at the current macroeconomic juncture. Housing busts can create pronounced effects on the health of economies and take a toll on the livelihoods of households. And while some housing markets have seen rapid price increases for an extended period, increasingly rich housing price valuations have priced out many households who find themselves unable to afford housing given their level of income. The ongoing rise in mortgage rates in many countries will likely exacerbate affordability concerns.

These developments and concerns raise a number of important analytical questions, which we seek to address in this paper. These include questions about the determinants of housing prices in the region, the magnitude of current housing price misalignment, quantification of risks of housing market corrections, and the extent to which housing has become unaffordable. In addition, we also seek to address questions about how policymakers can support financial stability in the face of pronounced housing cycles, and how they can improve housing affordability. These questions are paramount for policymakers seeking to promote inclusive, sustainable growth.

To answer these questions, we first analyze housing price dynamics before and after the pandemic across countries in Asia-Pacific, against a backdrop of often pronounced housing cycles in past decades (Chapter 2). Chapter 3 then looks into the drivers and implications of the observed, pronounced housing price dynamics in the region. It aims at assessing the main factors that drove housing price surges during the pandemic, evaluating the magnitude of housing price misalignment based on different metrics, and then quantifying the risks of housing market corrections using housing price-at-risk analysis, including identification of key contributing factors driving these risks. This chapter also highlights concerns of housing affordability resulting from disproportionate increases in housing prices and from recent and expected policy rate increases by central banks countering inflation. Chapter 4 turns to policy options to safeguard financial stability in the face of housing cycles and to improve housing affordability. Chapter 5 concludes.

## 2. Housing Price Dynamics in Asia-Pacific

### A. Asia-Pacific Had a Pre-Pandemic Housing Boom

---

For nearly a decade between the end of the global financial crisis and the start of the COVID-19 pandemic, many housing markets in the region enjoyed a marked expansion, along with vigorous activity in construction and real estate amid sustained economic growth, reflecting in part country-specific housing market characteristics (Box 1). Reflecting growing housing demand, major AEs and EMs in the region saw rapid housing price increases, particularly in urban areas where housing supply is often more constrained. Many economies embarked on macroprudential policies to address financial stability concerns.<sup>1</sup>

### B. Many Housing Markets Further Strengthened during the Pandemic

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The pandemic introduced a structural shift to housing markets. Social distancing, lockdowns and other forms of movement restrictions mandated large sections of the labor market to telework or reduce their physical presence at established workplaces. This shift created housing demand for larger dwellings, often farther away from job centers. Travel restrictions temporarily shifted household consumption to accommodate more time spent at home, which may have also contributed to changes in housing demand.

COVID-19 response measures often supported housing markets. Large-scale fiscal measures, especially in AEs, supported household balance sheets and, in some countries, included support directly targeted at housing markets, including financial support for first-time home buyers or those who renovate their homes. Accommodative monetary policy helped compress mortgage rates to very low levels, spurring housing demand. Supply-side factors also contributed to housing price dynamics, as construction activity was constrained at the height of the pandemic.

The interaction of these forces caused housing prices to continue increasing during the pandemic-induced recession and the ensuing recovery in 2021 in AEs in the Asia-Pacific region. By contrast, in most regional EMDEs, the recession contributed to weaker housing demand, and housing prices plateaued around pre-pandemic levels, though often following a decade of fast price growth (Figure 1).

### C. The Post-Pandemic Phase Points to Housing Price Deceleration

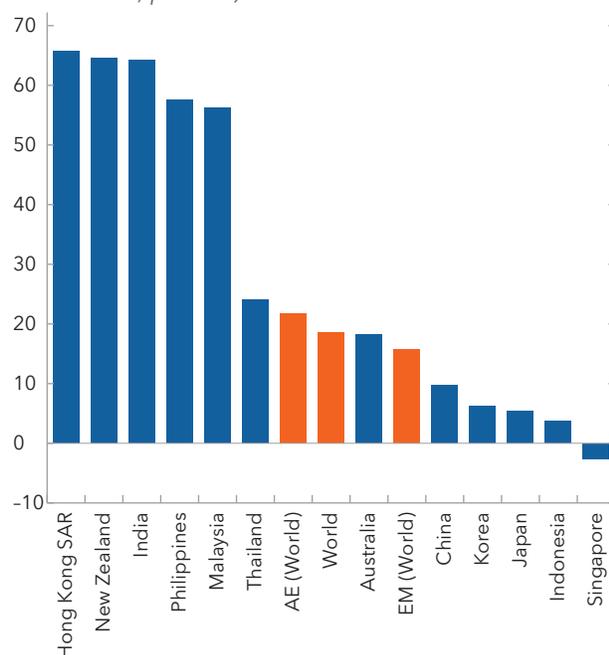
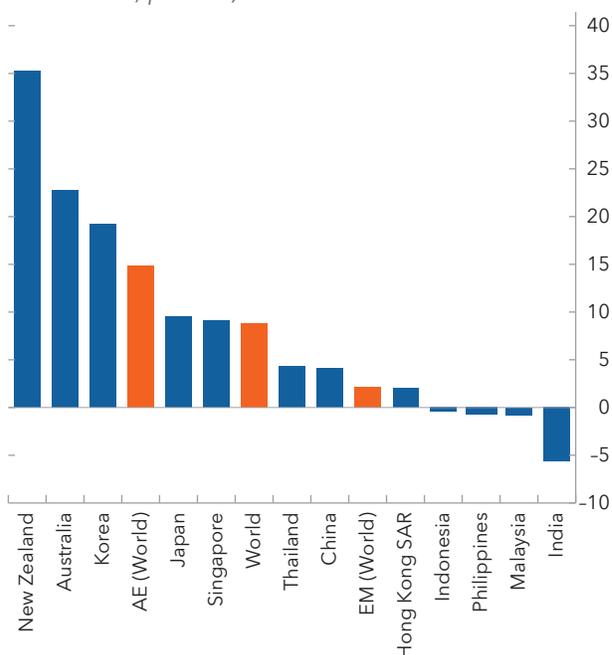
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The current phase poses significant challenges to housing markets. Withdrawal of monetary stimulus amid high inflation is having significant effects on housing prices in many AEs and major EMs. Tighter financial conditions are raising borrowing costs significantly, and, as a result, housing demand has started to cool off, with market corrections already underway in some economies.

In New Zealand, where real housing prices had increased most in Asia-Pacific during 2020-21 (nearly 35 percent), the central bank has raised the policy rate by 400 basis points since September 2021, and housing prices have already declined for two consecutive quarters, with the decline in 2022:Q2 having

---

<sup>1</sup> Unless noted otherwise, the analysis in this paper is based on Residential Property Price Indices compiled by the Bank for International Settlements, based on data reported by central banks. The data cover all types of dwellings in the whole country both in the new and existing dwelling markets and all types of dwellings. The series are indexed at 2010 = 100 and real values are deflated by the consumer price index. While compilation is generally based on the [Handbook on Residential Property Price Indices \(HRPP\)](#), there are some differences in terms of type of property, area covered, property vintage, priced unit, compilation method, and seasonal adjustment from country to country. For more details, see [BIS Collection and Publication of Residential Property Prices](#).

**Figure 1. Housing Price Dynamics Before and During the Pandemic****1. Many Regional Economies Had Large Real Housing Price Increases Prior to the Pandemic***(Real housing prices, change from 2011:Q1 to 2019:Q4, percent)***2. Housing Prices Have Surged in Advanced Asia-Pacific since the Start of the Pandemic***(Real housing prices, change from 2019:Q4 to 2021:Q4, percent)*

Source: Bank for International Settlements.

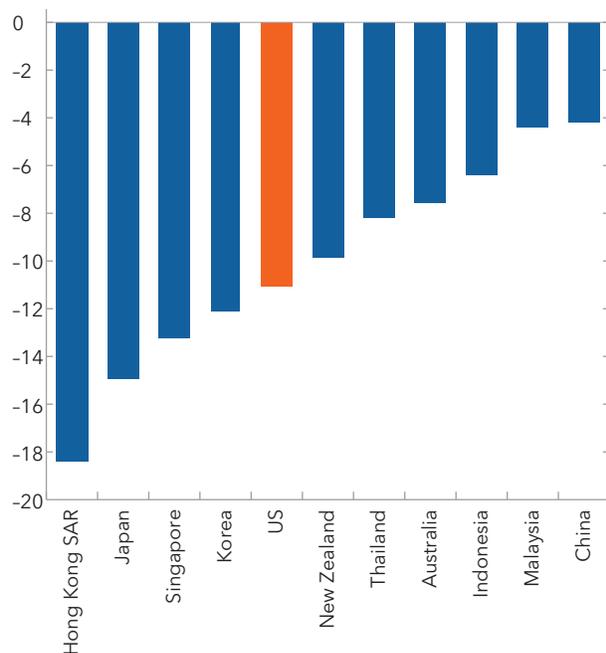
been the most pronounced since 2009.<sup>2</sup> Likewise, housing prices in Australia have started declining in recent months, led by major urban centers. In Korea, the monthly housing price index shows significant deceleration during the first half of 2022. Other anecdotal evidence suggests that housing prices may have started decelerating in Hong Kong SAR. In China, the property sector is in crisis following years of significant housing price growth and buildup of property developers' financial leverage (Box 2). Supply-side issues are also playing a role in some economies. In Malaysia, where a sizable supply overhang in residential properties remains following a housing boom in the early 2010s, housing prices now point to a secular deceleration. In the Philippines, residential vacancies, especially in Manila, have increased as demand from migrant workers has been slow to come back, cooling the housing market. The situation in India is however showing improvement, with a decline in the inventory overhang.

## D. The Asia-Pacific Region Is No Stranger to Pronounced Housing Cycles

While the recent experience pre- and post-COVID has featured significant housing price volatility, this follows several past housing market cycles in Asia-Pacific (and other regions) in the last few decades, some of them featuring sizeable contractions following earlier booms. The average amplitude of peak-to-trough real housing price adjustments over 1970–2021 varies from 4 percent in China to 18 percent in Hong Kong SAR

<sup>2</sup> Based on the CoreLogic housing price index, which is designed to provide an early indication of home price trends by following major markets of a given country, thereby enabling to send a signal of turning points sooner. As of early July 2022, the CoreLogic index shows the data through 2022:Q2, while internationally comparable indices by the Bank for International Settlements are available through 2021:Q4.

**Figure 2. Housing Cycles Tend to Be Larger in AEs**  
(The average amplitude of peak-to-trough adjustments, real housing prices, percent)



Source: IMF staff estimates.

Note: Housing cycles are identified by the Bry-Boschan Quarterly (BBQ) method.

(Figure 2).<sup>3</sup> Housing cycles tend to be larger in AEs, with Hong Kong SAR, Japan, Korea, and Singapore and having larger average peak-to-trough housing price declines than the United States (used here as a comparison). Developing economies in Asia-Pacific tended to have a smaller, but more frequent, housing cycles.

Some housing price adjustments were particularly sizable. Many economies have experienced contractions of 30 percent or larger, with Hong Kong SAR, Japan, and New Zealand having experienced adjustments comparable to, or larger than, the housing cycle in the United States in the 2000s (Table 1). The depth and the duration of housing market downturns can be influenced by interactions between macroeconomic conditions and financial markets (Claessens, Kose, and Terrones 2008), and the role of the credit channel is critical to understanding the propagation of housing market shocks to the economy (Bernanke, Gertler, and Gilchrist 1999).

**Table 1. Many Economies Have Experienced Long and Sizable Housing Market Corrections**

Real housing prices, largest peak-to-trough adjustments by economy, percent

	Peak	Trough	Duration (quarters)	Amplitude (percent)
China	2014:Q1	2014:Q4	4	-7.4
Australia	1981:Q2	1983:Q3	10	-13.7
Malaysia	1997:Q2	1999:Q1	8	-21.4
Singapore	2008:Q1	2009:Q2	6	-26.6
Indonesia	2003:Q3	2008:Q4	22	-27.2
Thailand	1997:Q2	1999:Q2	9	-32.0
Korea	1991:Q2	1996:Q3	22	-33.7
New Zealand	1974:Q3	1980:Q4	26	-38.2
United States	2006:Q1	2011:Q2	22	-39.1
Japan	1991:Q1	2006:Q3	63	-45.2
Hong Kong SAR	1981:Q1	1984:Q3	15	-51.0

Source: IMF staff estimates.

<sup>3</sup> The starting period of the time series varies across countries in the sample, ranging from Australia and New Zealand starting in 1970 to China starting in 2005.

## E. Housing Cycles Can Have Large Economic Impacts

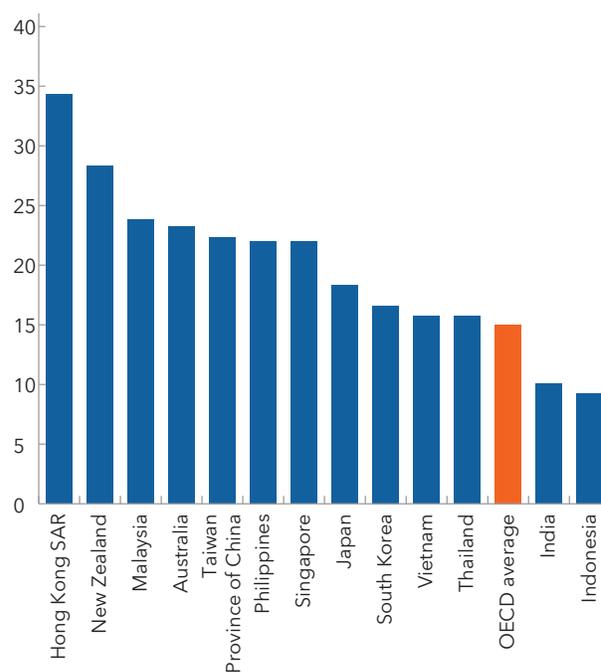
Pronounced housing cycles can have significant spillovers to the economy. While episodes of housing price corrections played out historically in many different shapes and degrees of severity, the more pronounced episodes—“housing busts”—have been associated with severe economic recessions in most cases. Since housing is typically the main source of households’ wealth and debt, sizable declines in housing prices during busts create severe repercussions to household balance sheets and cashflows, adversely impacting the economy through multiple channels. In particular, housing busts often lead to severe contraction in construction and its related sectors, following periods of rapid growth in construction during the preceding booms (Dell’Ariccia and others 2020). Housing, through its collateral role, can amplify business cycles as a financial accelerator (Aoki, Proudman, and Vlieghe 2004). Countries with a large decline in housing net worth tend to experience a sizable decline in employment (Mian and Sufi 2014) and consumption. Housing busts can also have adverse impacts on financial stability (Duca, Muellbauer, and Murphy 2010).

Empirical studies confirm the adverse impacts of housing busts. Claessens, Kose, and Terrones (2008) evaluated housing price dynamics and key macroeconomic indicators of OECD economies during 1970–2007 and showed that episodes of housing busts lowered real housing prices by nearly 30 percent over 4 to 5 years on average. Recessions associated with housing busts led to substantial output losses over a longer duration, compared to those without, driven by sizable declines in residential investment. When a recession is accompanied by a housing bust and a credit crunch, output losses can be even larger, highlighting potential amplification through the financial channel.

Housing costs account for a large part of living expenses in many countries in Asia-Pacific, and their fluctuations influence households’ well-being. When housing prices increase at a rapid pace, this worsens housing affordability, an important factor for economic inclusion and social mobility (Chetty, Hendren, Kline, and Saez 2014).

Housing market developments can also have an important impact on consumer price index (CPI) inflation. In Asia-Pacific, housing-related items account for 20 percent or more of the CPI basket in many economies, and this share is larger than the OECD average (Figure 3). Changes in housing costs also tend to have distributional impacts, as the share of housing in total living costs is often larger for lower-income households (see Figure 4 for New Zealand and Singapore as examples).

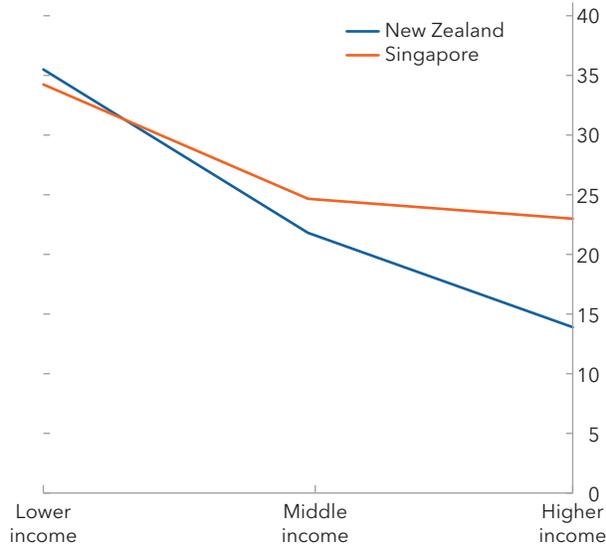
**Figure 3. Housing-Related Items Account for a Large Part of Household Living Costs**  
(Weights of housing items in CPI, 2020 or latest, percent)



Source: Haver Analytics.

**Figure 4. Housing Costs Tend to Be More Important for Lower-Income Households**

*(Weights of housing items in CPI, 2020 or latest, percent)*



Source: Haver Analytics.

### 3. Misalignment, Downturn Risks, and Implications on Affordability

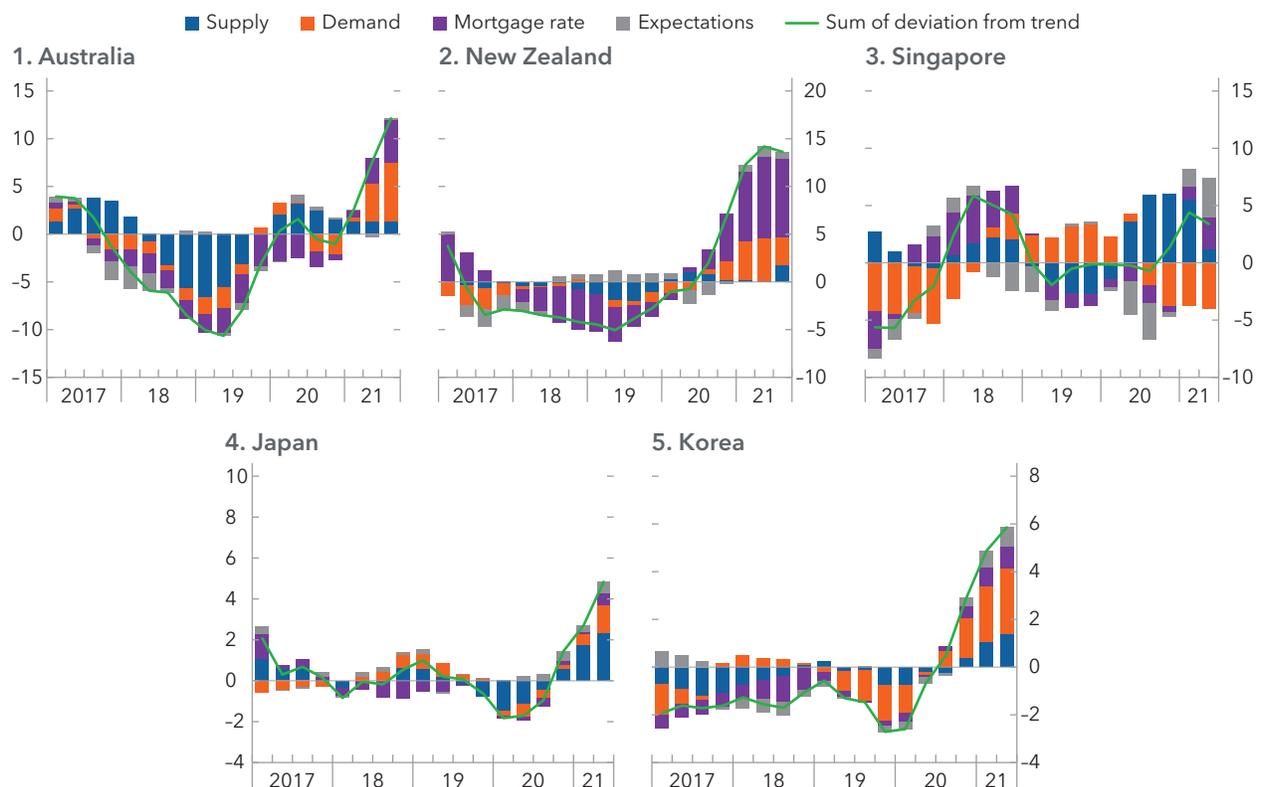
#### A. What Drove Housing Prices during the Pandemic?

To understand the current juncture and risks, it is necessary to first understand the drivers of the sharp housing price rise during the pandemic. We use a four-variable structural vector autoregression model based on Rubio-Ramirez and others (2010) with sign restrictions as employed by Ben-David and others (2019) to disentangle structural drivers affecting real housing prices (Annex 1 describes the methodology). Given the limited data availability in EMDEs, the analysis is applied to the AEs in Asia-Pacific.

While a combination of factors drove the recent increase in housing prices in the regional AEs, low mortgage rates associated with accommodative monetary policy stances played an important role (Figure 5). For example, in Australia and New Zealand, mortgage rate shocks associated with conventional and unconventional monetary policy tools introduced during the acute phase of the pandemic boosted housing prices,

**Figure 5. Low Mortgage Rates and Demand Shocks Have Driven Recent Housing Price Surges in Regional AEs**

*(Historical decomposition of real housing prices, year-over-year change, percent, deviation from trend)*



Source: Haver Analytics; and IMF staff estimates.

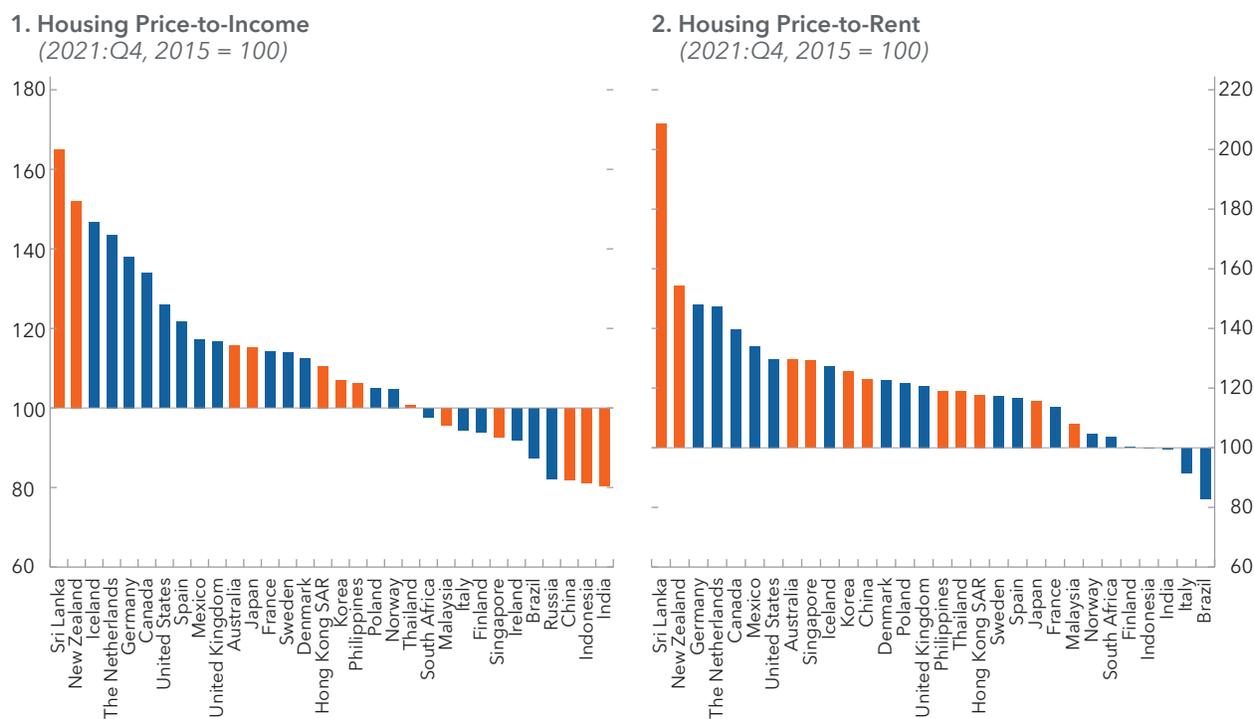
with strong demand also contributing to the increases.<sup>4</sup> In Japan and Korea, while the size of the increases has been somewhat smaller, supply shortages and stronger housing price expectations also contributed to the increase in housing prices. In Singapore, where contemporaneous demand has remained subdued, low mortgage rates and stronger expectations have been contributing to the increase in housing prices. Overall, while housing prices in Asia-Pacific naturally reflect country-specific conditions, they are also driven to a significant extent by common factors within the groups of regional AEs and EMs (Box 3). Among other factors, these may include the easing of international financial conditions during the pandemic.

## B. How Misaligned Are Housing Prices?

In line with rising prices, housing price valuations rose, and housing affordability deteriorated across OECD countries. Two commonly used metrics, the ratios of housing prices to income and rents, illustrate this point, with significant increases for most economies in the Asia-Pacific region, especially the AEs and Sri Lanka, since 2015 (Figure 6).

Assessing housing price misalignment requires comparing the deviation of these metrics to countries' underlying trends. However, the choice of the underlying trend is not clear a-priori (see Brunton 2021, ECB 2011, Philipponnet and Turrini 2017). While ratios such as housing price to income and housing price to rents are in theory bounded and should revert to their long-term average, they may deviate for long periods of time. However, for most economies, data are only available since the 1990s which may not be sufficient to

**Figure 6. Housing Price-to-Income and Price-to-Rent Ratios Have Increased Significantly**



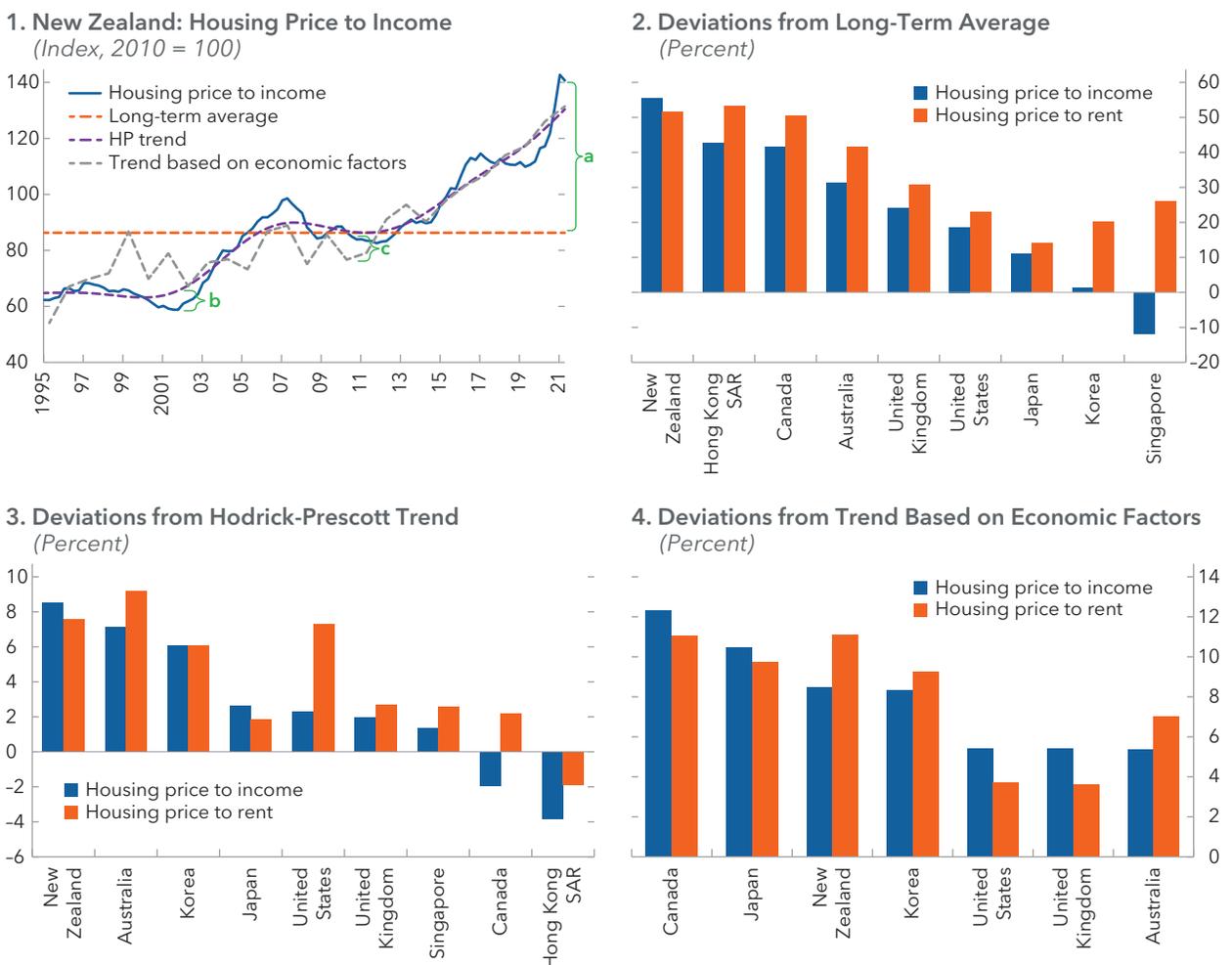
Sources: OECD; and IMF staff calculations.  
 Note: Orange bars denote economies in the Asia-Pacific region.

<sup>4</sup> Studies link the rapid increase in housing prices in New Zealand after the global financial crisis to population growth, declines in mortgage rates, land supply restrictions, and rising construction costs that have led to demand and supply imbalances (Fitchett and Jacob 2022, Stephens and others 2022).

capture the entire cycle and identify the true average value. In addition, there might be structural changes, especially in the EMs. To address these concerns, we capture the trend in housing variables using three methods and focus only on AEs (see Figure 7, panel 1):

- I. A long-term average computed over the entire sample period. This method implicitly assumes that housing price-to-income and housing price-to-rent ratios follow a mean-reverting pattern and that any deviation from this mean represents misalignment.
- II. A Hodrick-Prescott (HP) filter to remove the cyclical component. The HP filter gives more weight to more recent observations and hence better takes into account recent underlying structural trends. Hence it is likely to result in lower measured values for misalignment.
- III. A regression-based long-term trend that controls for fundamental economic factors driving demand and supply. This method captures misalignment that cannot be explained by fundamentals such as financial conditions (interest rates), supply of housing (lagged dwelling investment), lagged population growth, or economic conditions (GDP growth). The role of interest rates is particularly important here given the low interest rate environment in the pre-pandemic period.

**Figure 7. Prices Appear Misaligned in Advanced Asia-Pacific**



Source: IMF staff calculations.

Applying these methods suggests significant price misalignment in some regional AEs and international comparators (such as Canada, the United Kingdom, and the United States due to some similar characteristics), though size varies by choice of measures (Figure 7). Deviations from long-term average valuations are predictably much larger than the other measures given an upward trend in price ratios over the past two decades, as illustrated in the New Zealand example. While the HP filter results in lower measured values for misalignment, directionally, both measures give similar results, suggesting that prices are misaligned for most regional AEs, except those that had a relatively recent housing market correction. The regression-based approach, which focuses on misalignment that cannot be explained by fundamentals and is therefore not directly comparable with the other two purely statistical measures, also shows significant overvaluation for most AEs in Asia-Pacific. Overall, while point estimates can vary significantly across specifications and arriving at a degree of misalignment ultimately requires judgment, in sum, these estimates do point to significant overvaluation in a number of regional AEs. While this analysis is limited to AEs due to data constraints, it is worth noting that valuations are stretched also in some EMs, including China (Box 2).

### C. How Large Are Downside Risks to Housing Markets?

Misalignment in housing prices, combined with the expected rise in interest rates as central banks normalize monetary policy, suggests a significant risk of a correction in housing prices. To gauge the extent of downside risks to future housing prices, we employ housing price-at-risk analysis for a sample of regional AEs and EMs. This analysis also allows us to identify the largest contributing factors to these downside risks.

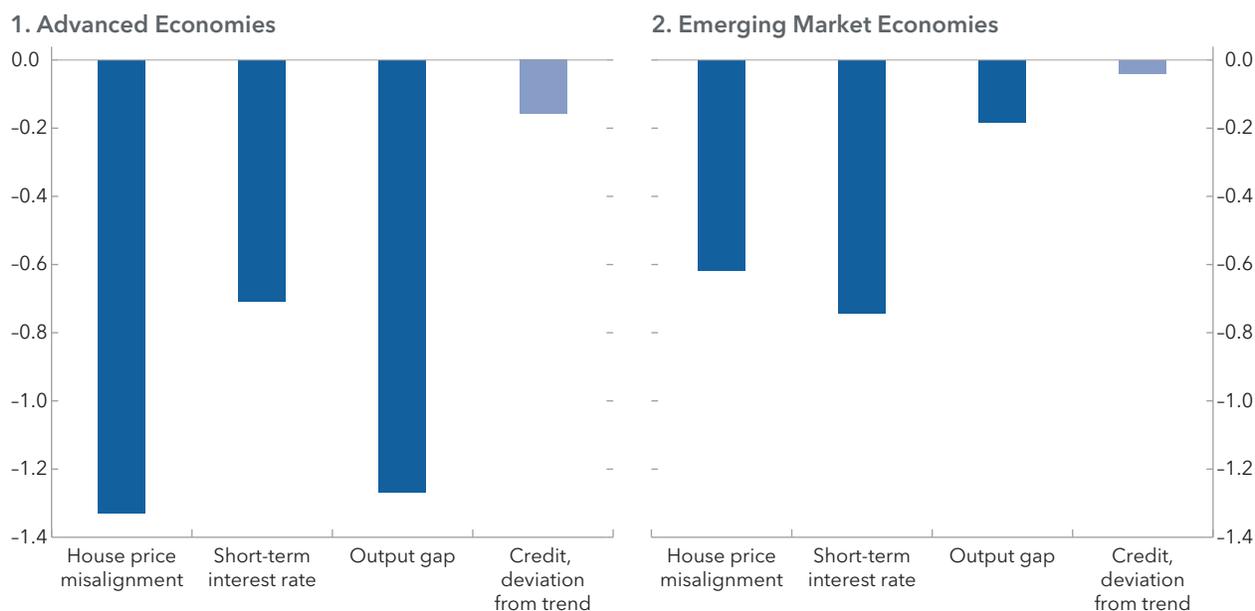
Housing price-at-risk is estimated using a panel quantile regression approach similar to IMF (2019) and Deghi and others (2020), where future changes in housing prices are regressed on past housing price growth and various fundamental factors. The analysis focuses on a sample of 12 regional economies. As housing market structures and price dynamics can be very different between AEs and EMs, the analysis is done separately for the two groups. To highlight downside risks, we focus on how various factors impact housing price growth at the 5th percentile but also report results for the median (see Annex 2 for details on methodology).

Regression results suggest that various factors can impact four- and eight-quarter-ahead housing price growth in Asia-Pacific, with some differences across AEs and EMs (Figure 8).<sup>5</sup>

- *Housing price misalignment*: As expected, an increase in housing price misalignment (as measured using deviation from HP-filter trend in house-price-to-income ratio) is associated with a significant increase in downside risks to housing prices, as prices are likely to correct back toward fundamentals in the future if they are misaligned. Quantitatively, a 1 percent increase in misalignment is associated with a 0.6 percent decline in four-quarter-ahead housing price growth at the 5th percentile in EMs, with the effect being almost twice as large in AEs.
- *Short-term interest rates*: A 100 basis point increase in short-term interest rates is associated with four-quarter-ahead housing price growth being about 0.7 percent lower in both AEs and EMs in Asia-Pacific (Figure 8). The negative effect of interest rates is larger at longer horizons (more than doubling in AEs at the eight-quarter horizon compared to four quarters ahead) and the effect in Asia-Pacific is bigger than in other regions (Annex Table 2.1). With central banks expected to tighten monetary policy significantly going forward, this trend suggests potential, large effects on housing prices in the future, especially at longer horizons.
- *Output gap*: Positive output gaps are associated with a decline in housing prices in the future as the economy reverts towards potential.

<sup>5</sup> Annex 2 has more detailed results, including impacts on median, comparison of Asian estimates to other regions, etc., impact at different horizons, etc.

**Figure 8. Greater Misalignment and Higher Interest Rates Can Add to Downside Risks to Housing Prices**  
(Coefficients from quantile regressions, dependent variable is four quarter ahead real house price growth)



Source: IMF staff calculations.

Note: Bars plot coefficients from a 5th percentile panel quantile regression of four-quarter-ahead housing price growth on fundamentals and lagged housing price growth. Coefficients on housing price misalignment, output gap and credit show the impact of a 1 percent increase in each variable, while the coefficient on short-term interest rate shows the impact of a 100 basis point increase. See Annex 2 for details on methodology and sample. Light-shaded bars indicate the coefficient is insignificant at 10 percent confidence level.

- *Household credit*: Deviations of household credit-to-GDP ratios from trend do not have a statistically significant impact on housing price-at-risk in EMs, and only impact AEs at longer horizons (Annex Table 2.1).
- *Housing price momentum*: Housing prices in Asia-Pacific also show persistence, with higher lagged housing price growth associated with higher price growth in the future.

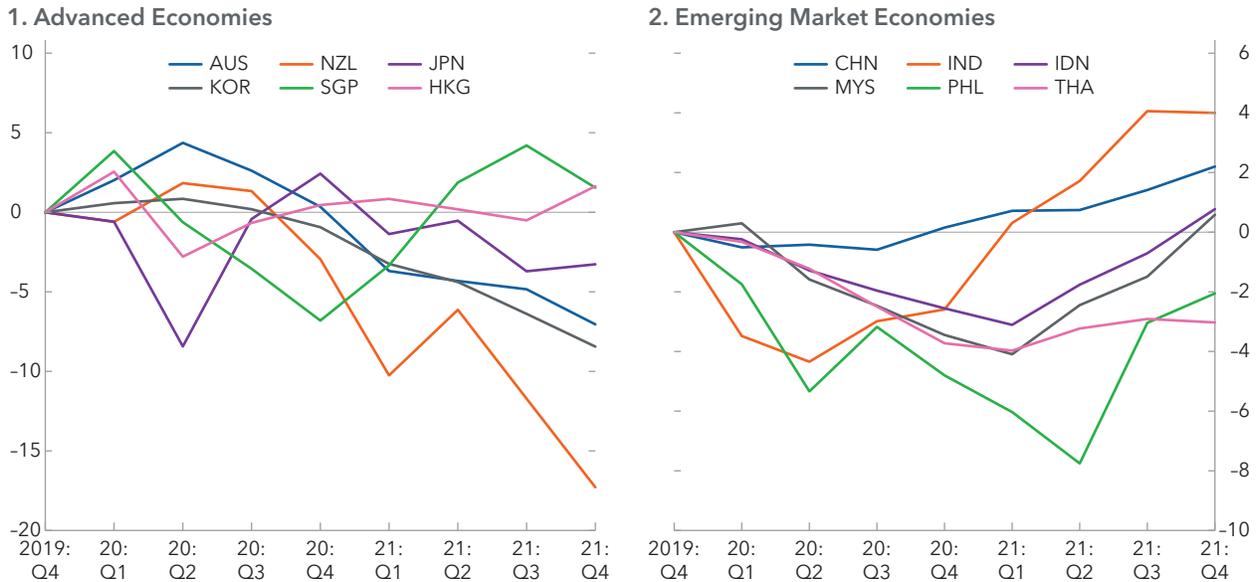
Overall, housing price-at-risk analysis suggests that since the start of the pandemic, downside risks to housing prices have risen significantly in many AEs. Figure 9 shows the change in the 5th percentile of house price growth since the start of the pandemic for each country in our sample, using fitted values from the quantile regressions. As of 2021:Q4, downside risks to housing price growth have increased significantly: four-quarter-ahead house price growth is predicted to be about 20 percentage points lower in New Zealand than it was at the start of the pandemic and about 10 percentage points lower in Australia and Korea. The deterioration in housing price-at-risk mainly reflects greater misalignment, with momentum effects from strong lagged prices mitigating the effects of misalignment to some extent (Figure 10).

By contrast, housing price-at-risk has changed much less in most EMs in Asia-Pacific. The smaller variation in risks in EMs could in part reflect differences in the structure of financial and mortgage markets in these countries, where mortgage credit and household debt tend to be lower, potentially leading to less volatile cycles. That said, household debt has been rising significantly in many regional EMs over the last decade (Box 5).

Rising interest rates going forward will add to downside price risks. Our analysis is based on data through 2021:Q4, when interest rates were still at very low levels for most countries in Asia-Pacific. However, with interest rates rising significantly in 2022, and with more hikes expected going forward, higher interest rates will add even further to downside risks to housing price growth compared to the levels shown in Figure 9. Figure 11 uses coefficient estimates from the panel quantile regressions to compute the further increase in

**Figure 9. Housing Price-at-Risk Has Deteriorated Significantly in Asia-Pacific, Especially in Advanced Economies**

(Change in four-quarter-ahead real house price growth between 2019:Q4 and 2021:Q4)

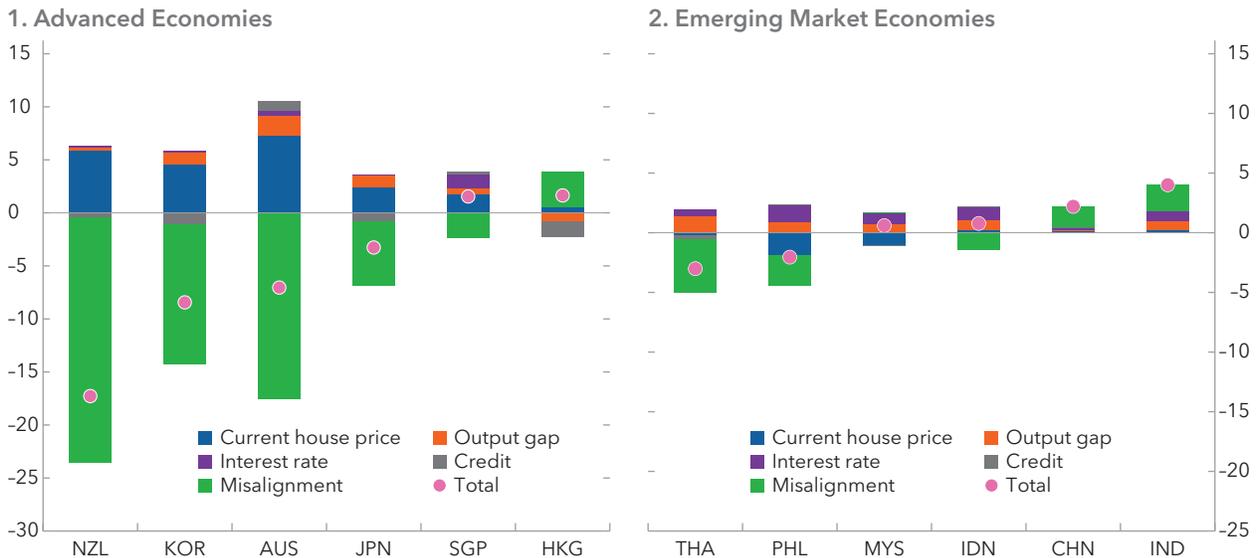


Source: IMF staff calculations.

Note: The panels in the figure show the change in fitted values for each economy from panel quantile regressions described in Annex 2. Negative values indicate that the 5th percentile house price growth has declined, implying an increase in downside risk to house prices. Country abbreviations are International Organization for Standardization (ISO) country codes.

**Figure 10. Price Misalignment Has Been the Primary Factor Increasing Downside Risks in Asia**

(Contribution to change in HaR between 2019:Q4 and 2021:Q4)



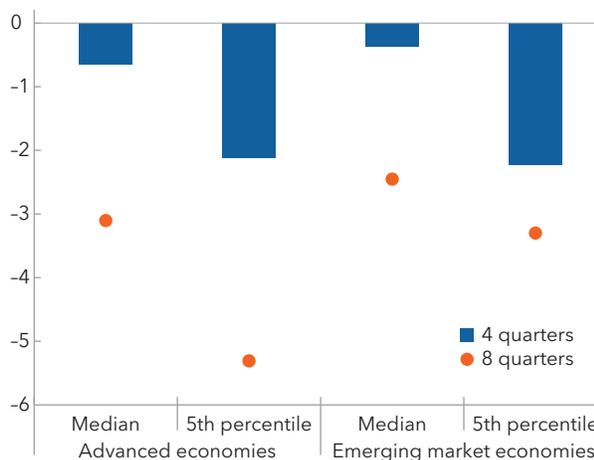
Source: IMF staff calculations.

Note: The panels in the figure show the change in fitted values for each economy from panel quantile regressions described in Annex 2. HaR = house prices at risk. Country abbreviations are International Organization for Standardization (ISO) country codes.

downside risks to housing price growth if short-term interest rates increase by 300 basis points. Higher interest rates can lead to significantly lower housing price growth, with the effects larger at longer horizons and in AEs.

Furthermore, higher interest rates have a bigger effect on housing prices at the 5th percentile compared to the median, indicating that higher rates add more to downside risks. In AEs, a 300 basis points increase in interest rates can further reduce eight-quarter-ahead housing price growth by more than 5 percent. The combination of falling housing prices and rising mortgage rates and debt service obligations puts a premium on closely monitoring the buildup of any financial sector vulnerabilities. The financial sectors of regional AEs and major EMs are largely resilient and are expected to remain solvent even under severe stress testing scenarios that assume a major housing market correction, sharp tightening in monetary conditions, or significant falls in household income (IMF Financial System Stability Assessments). Nonetheless, close financial sector supervision is warranted to assess bank resilience on an ongoing basis and identify any pockets of vulnerability. In some economies, this should include strengthening supervision with efforts to enhance data collection and analysis at granular levels. The robustness of vulnerability assessments should be tested against a combination of shocks, taking into consideration the exposure of household balance sheets to housing downturns and high interest rates, as some economies in the region face high and rising household debt as a share of GDP (Figure 12), with a sizable share linked to floating interest rates (Australia, Korea, New Zealand).

**Figure 11. An Increase in Interest Rates Can Further Increase Downside Risks to Housing Prices**  
(Impact of 300 basis points increase in short-term interest rate on housing price growth at different horizons, percent)



Sources: IMF staff calculations.

Note: The figures use the coefficient estimate on short-term interest rates from regressions reported in Annex Tables 2.1 and 2.2 to compute the impact of a 300 basis points increase in short-term interest rate on 4-quarter and 8-quarter-ahead housing price growth at the median and at the 5th percentile.

## D. How Much of a Problem Is Housing Affordability?

In addition to generating risks of a significant correction, the fast growth in housing prices in many Asia-Pacific countries also raises distributional concerns, particularly related to the affordability of housing.<sup>6</sup> In this section, we look directly at measures of housing affordability for AEs. For EMs, where comprehensive measures of housing affordability are unavailable, we focus on broad measures of housing adequacy to gauge the lack of affordability of adequate housing.

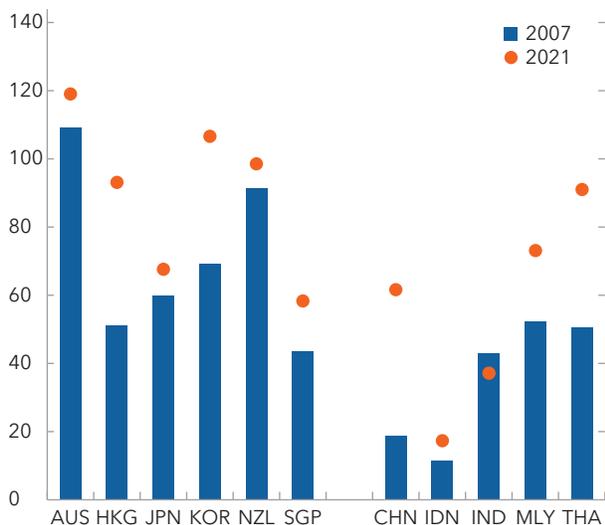
### Housing Affordability in Advanced Economies in Asia-Pacific

With housing prices outpacing income growth in many AEs in the region, affordability is becoming an increasing concern. A broad measure of housing affordability that applies to renters as well as homeowners is the share of household expenditure that is spent on housing and basic utilities (water, electricity, gas

<sup>6</sup> While the concepts of house price misalignment and sustainability discussed in the previous sections are related to housing affordability, they are not necessarily the same. For example, high foreign demand for housing or supply constraints due to zoning requirements may mean that house prices are sustainable from an economic perspective, but housing may still be unaffordable. As discussed in Chapter 4, macroprudential tools play an important role in dealing with sustainability concerns given its implications for financial stability, while structural and fiscal policies play a more significant role in addressing affordability issues.

**Figure 12. Household Debt Has Climbed to Historical Highs in Some Regional Economies**

**Credit to Households, 2007-21**  
(Percent of GDP)



Sources: Bank for International Settlements; and IMF staff calculations.

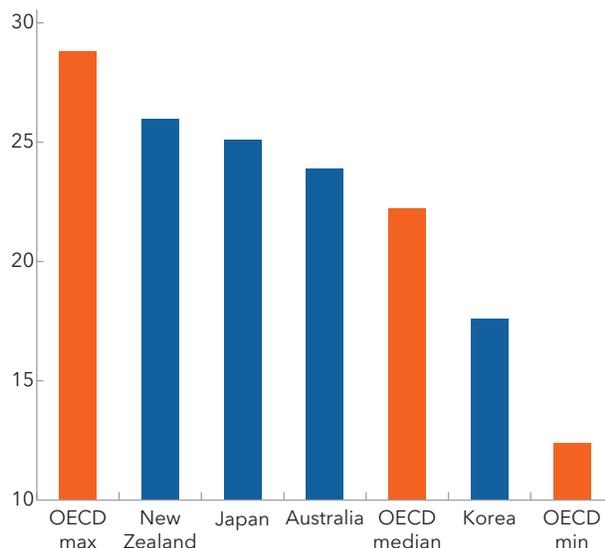
Note: Country abbreviations are International Organization for Standardization (ISO) country codes.

and other fuels). Figure 13 shows data for this metric for selected AEs in the region for which data are available.<sup>7</sup> Compared to the OECD average, housing-related expenditures form a higher share of total spending in Australia, Japan, and New Zealand, suggesting some affordability challenges in these countries.<sup>8</sup> Further, spending a large share of disposable income on housing-related expenditures is often considered to be a sign of unaffordable housing. In both Australia and Japan, the housing cost overburden rate, that is the share of the population spending more than 40 percent of its income on housing, is higher than the OECD average.

A significant concern going forward is that higher interest rates will make homeownership unaffordable for the average household due to rising mortgage payments. Figure 14 zooms in on this narrower measure of affordability of homeownership for Australia and New Zealand, where available data allow for detailed analysis. For the purposes

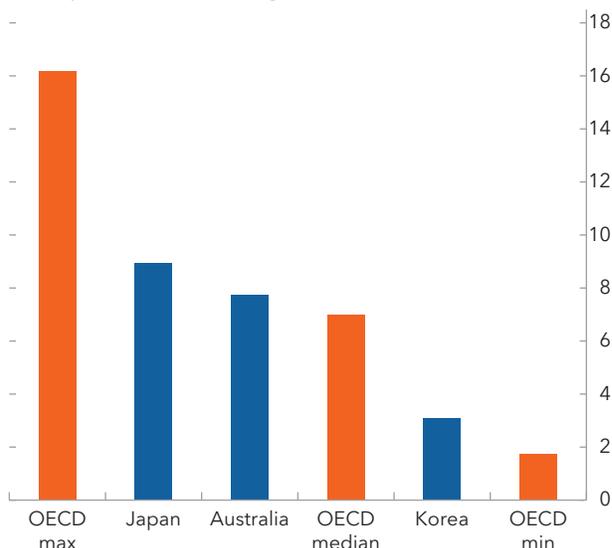
**Figure 13. Housing Affordability is a Concern in Several Advanced Economies in Asia-Pacific**

**1. Housing and Utilities Share**  
(Percent of total expenditure)



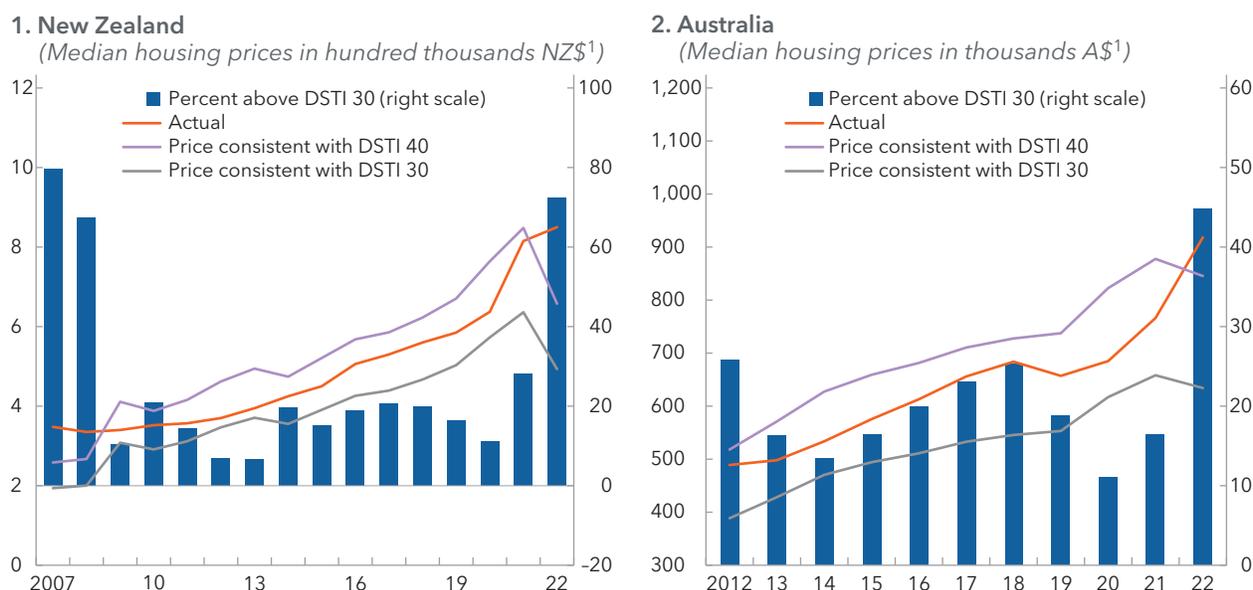
Source: OECD.

**2. Overburden Rate**  
(Share of population spending more than 40 percent on housing)



<sup>7</sup> Note that this analysis is based on aggregate figures for each country. Within countries, there are also often significant differences in affordability, with dynamic population centers often subject to significantly more pronounced affordability issues.

<sup>8</sup> Indices of rent-to-income ratios have decreased in many economies in recent years, including in Asia, suggesting that rental affordability may have improved, though from generally high levels.

**Figure 14. Increasing Housing Affordability Challenges in Australia and New Zealand**

Sources: Australian Bureau of Statistics; CoreLogic; Real Estate Institute of New Zealand; Reserve Bank of Australia; Reserve Bank of New Zealand; Stats NZ; and IMF staff calculations.

<sup>1</sup>Year ended in June. Blue bars denote the deviation of actual median housing prices from the 30 percent debt-service-to-income ratio benchmark for the median-income household.

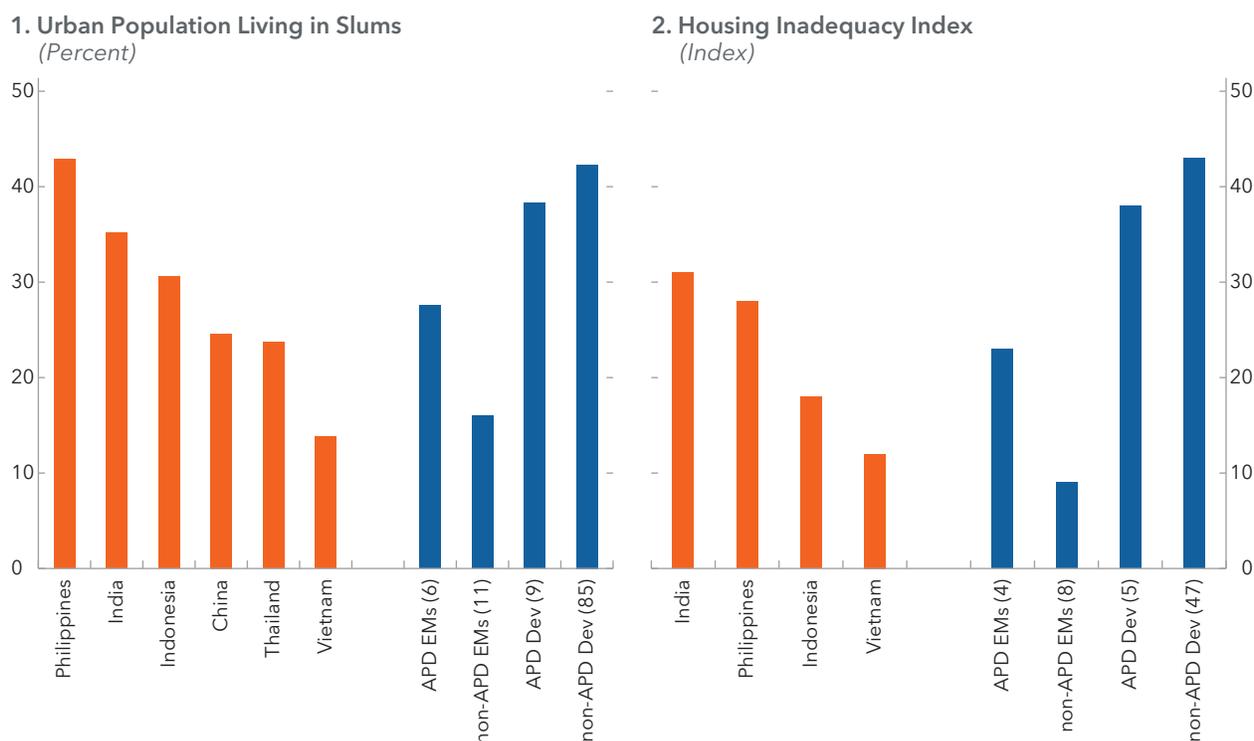
of this analysis, we proxy affordability using a borrowing capacity approach based on the maximum size of a mortgage loan attainable by a household to finance a home purchase given its income, the prevailing mortgage rate, and leverage requirements. This allows us to calculate whether median housing prices are above or below levels consistent with spending a reasonable share of median household income on mortgage payments.<sup>9</sup> The red graph lines in Figure 14 denote median housing prices. The gray graph lines denote the level of housing prices consistent with a debt-service-to-income ratio of 30 percent for the median-income household, while the blue bars denote the deviation of actual median housing prices from this benchmark. In both countries, an affordability gap opened in the 2010s, but low and declining interest rates kept it somewhat in check through 2021. However, as interest rates increase, affordability is declining rapidly, despite falling housing prices. In 2022, housing prices may be as much as 70 and 50 percent above what a median household can afford in New Zealand and Australia, respectively,<sup>10</sup> and the average household would need to spend more than 40 percent of its disposable income to afford housing priced at the median.

## Housing Quality in Emerging and Developing Economies

In Asia-Pacific EMDEs, the poor quality of housing, linked to the lack of adequate, affordable housing, remains a significant concern. A key target under the UN Sustainable Development Goals is to ensure access to adequate, safe, and affordable housing and basic services for all. Significant further progress needs to

<sup>9</sup> Attainable housing prices are estimated by using average annual household disposable income by fiscal year-end (end-June). Affordable housing cost is assumed to be in the conventional range of a DSTI ratio of 30 to 40 percent. The mortgage rate is the one-year fixed average residential mortgage rate (monthly), applying to a principal and interest loan of 30-year maturity. The mortgage is to finance up to a loan-to-value ratio of 80 percent with a down payment of 20 percent. Actual housing prices are the median value of dwellings in June of each year. For 2022, estimates are based on projected housing prices, average household disposable income, and interest rates.

<sup>10</sup> Based on a DSTI ratio of 30 percent. While a useful rule of thumb, note that this measure does not take into account income distribution (mortgage borrowers' incomes are typically higher than the average household) and liquidity buffers of individual households.

**Figure 15. Housing Quality Is a Challenge in EMDCs in Asia-Pacific**

Sources: Behr and others (2021); United Nations Human Settlements Programme; and World Bank, World Development Indicators. Note: In panel 1, United Nations Human Settlements Programme (UN-HABITAT) defines a slum household as a group of individuals living under the same roof in an urban area who lack one or more of the following: (1) durable housing of a permanent nature that protects against extreme climate conditions; (2) sufficient living space which means not more than three people sharing the same room; (3) easy access to safe water in sufficient amounts at an affordable price; (4) access to adequate sanitation in the form of a private or public toilet shared by a reasonable number of people; and (5) security of tenure that prevents forced evictions. In panel 2, inverse of the Adequate Housing Index in Behr and others (2021). The index is a composite index for 64 countries combining measures of (1) access to improved water; (2) access to improved sanitation; (3) adequate living space; (4) durable material and good structural quality; (5) security of tenure; (6) access to electricity; and (7) access to clean cooking.

be made to meet this target. On average, close to 30 percent of the urban population in regional EMs live in slums, well above the non-Asian average (Figure 15).<sup>11</sup> The share living in slums is even higher, at 40 percent, in Asia-Pacific developing countries (similar to the proportion in other regions).

Behr and others (2021) develop a broad housing inadequacy index that combines information on access to water, sanitation, and electricity with data on adequacy of living space, durability of the housing structure, and security of tenure. This broad measure also suggests significant scope to improve housing quality in Asia-Pacific—regional EMs do significantly worse than non-Asian peers on the housing inadequacy index (Figure 15).

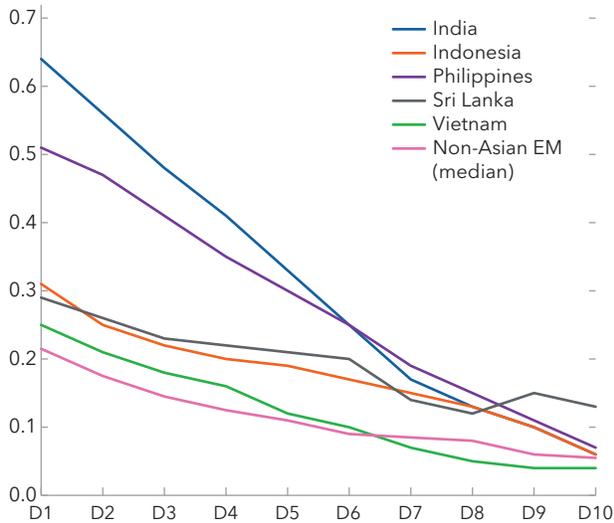
Furthermore, there is significant within-country heterogeneity in housing quality across income levels in countries in the region. Poorer households score significantly worse on the housing inadequacy index than richer households in the same country (Figure 16). Inequality in housing quality is particularly large in some countries, notably Bangladesh, India, Nepal, and the Philippines.

<sup>11</sup> UN-HABITAT defines a slum household as a group of individuals living under the same roof in an urban area who lack one or more of the following: (1) durable housing of a permanent nature that protects against extreme climate conditions, (2) sufficient living space which means not more than three people sharing the same room, (3) easy access to safe water in sufficient amounts at an affordable price, (4) access to adequate sanitation in the form of a private or public toilet shared by a reasonable number of people, and (5) security of tenure that prevents forced evictions.

**Figure 16. Significant Inequality in Housing Quality within Countries across Income Levels**

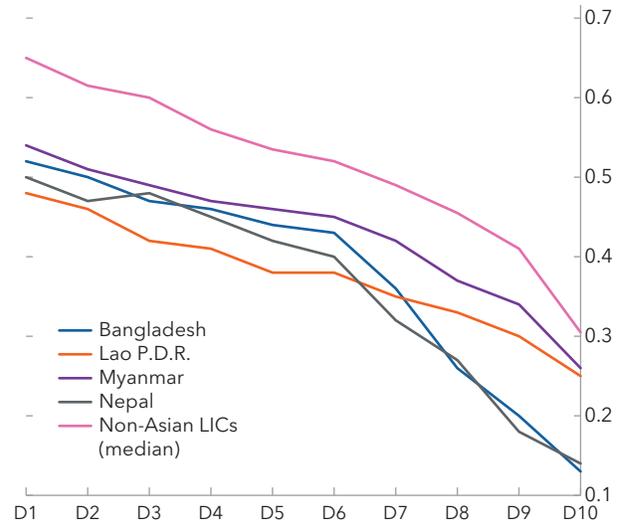
**1. Housing Inadequacy, EMs**

*(Inadequate housing index by income decile)*



**2. Housing Inadequacy, LICs**

*(Inadequate housing index by income deciles, low-income countries)*



Sources: Behr and others (2021); and IMF staff calculations.  
 Note: Horizontal axis shows income decile.

## 4. Policies to Safeguard Financial Stability and Promote Housing Affordability

### A. Policies to Safeguard Financial Stability

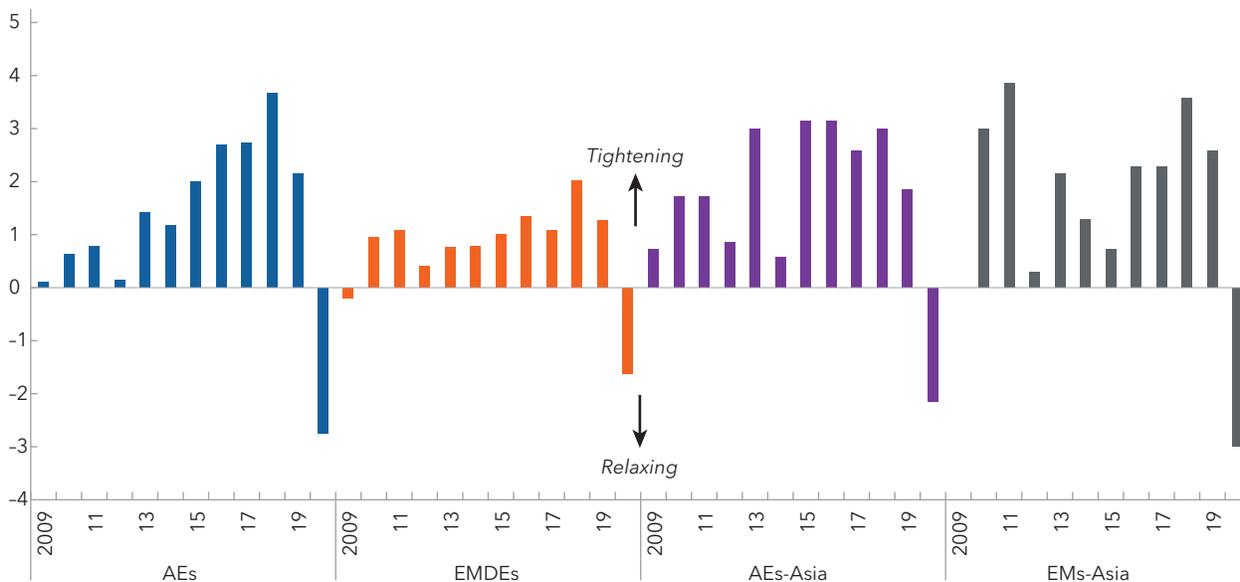
#### Implementation of Macroprudential Policy Tools

Since the GFC, AEs and EMs in Asia-Pacific, like in other regions, have made significant progress in gaining institutional knowledge for introducing macroprudential policy measures, with efforts to address risks and build resilience for safeguarding financial stability. Financial regulators in Asia-Pacific are now well equipped with macroprudential tools, including instruments for the household sector, such as loan-to-value ratio (LTV) restrictions, DSTI limits, loan restrictions, and capital-based tools (Box 4).

These tools have been increasingly deployed over the years, both in response to risks, but also as a means to enhance the toolkit and build resilience. Box 6 provides the example of a successful soft landing after a housing boom in Singapore. Figure 17 shows that after a long tightening cycle of macroprudential tools over the last decade, there was some reversal during the COVID-19 pandemic. During this phase, authorities eased restrictions, involving broad-based tools that aimed at temporarily reducing liquidity requirements during times of stress and releasing available capital buffers to support the functioning of the financial system and encourage banks to continue lending to the private sector (Figure 18). In some EMs, financial authorities relaxed restrictions on bank lending to households at the same time.

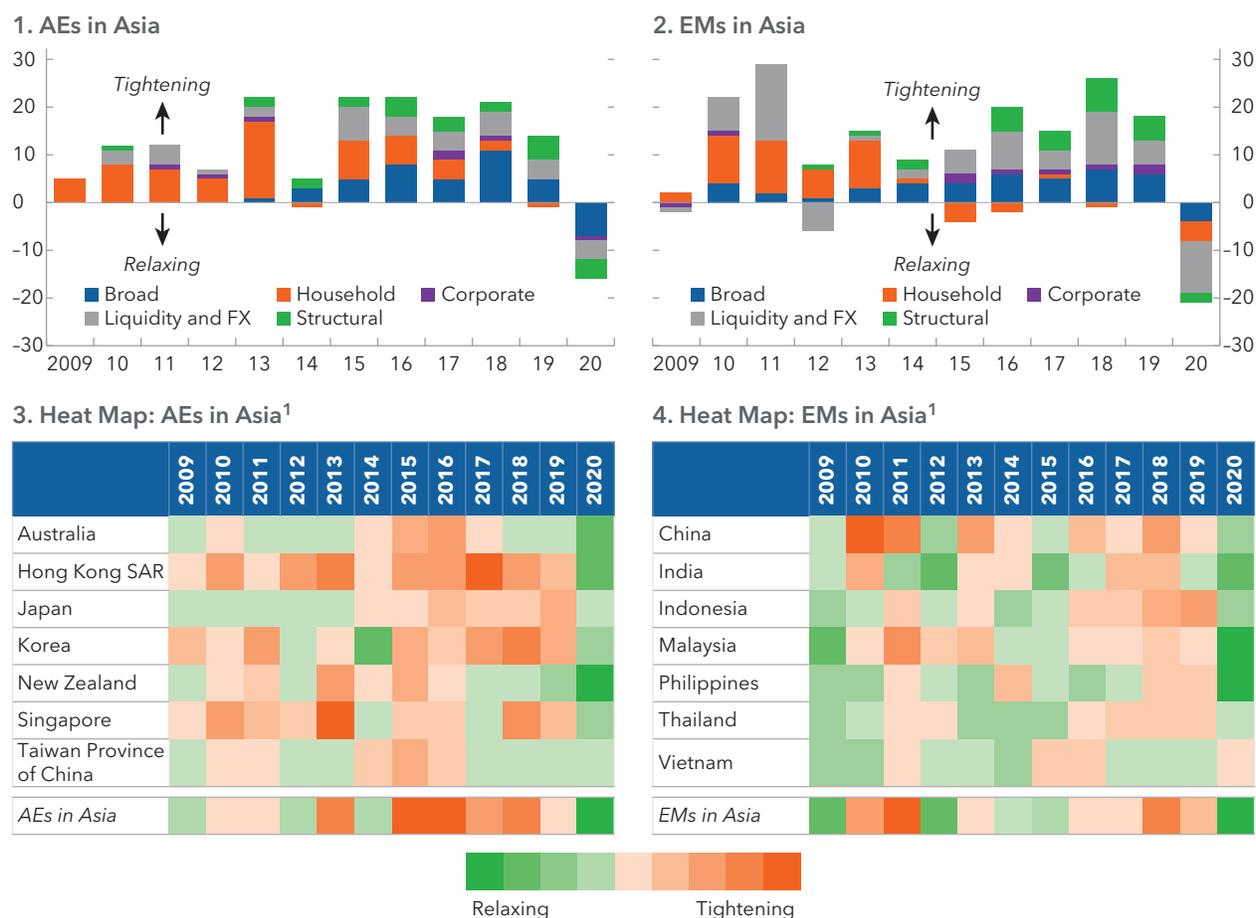
While the macroprudential dataset ends in 2020, subsequent evidence shows that, in 2021, many of the pandemic-related macroprudential support measures have been withdrawn (at least partly), and macroprudential policy has tightened again to tackle emerging risks, including from strong housing cycles (Australia, Korea, New Zealand). With housing cycles now increasingly turning again amid higher interest rates, there has been less macroprudential policy action so far in 2022.

**Figure 17. The COVID-19 Pandemic Ended a Decade of Macroprudential Tightening**  
(Average number of macroprudential tools deployed for a given year per country)



Sources: IMF Macroprudential Policy Survey (2020); and IMF staff calculations.

**Figure 18. Economies in Asia-Pacific Have Employed Various Macroprudential Policy Tools**  
(Number of macroprudential policy tools implemented on net, with tightening (+) and relaxing (-))<sup>1</sup>



Sources: IMF Macroprudential Policy Survey (2020); and IMF staff calculations.

<sup>1</sup>Based on the unweighted net sum of macroprudential policy measures (MPMs) deployed. The underlying value is equal to 1 (or minus 1) when a particular measure is tightened (or relaxed). Bar charts and heatmaps show the net value of deployed tightening minus loosening measures.

## Effectiveness of Macroprudential Policy Measures (MPMs)

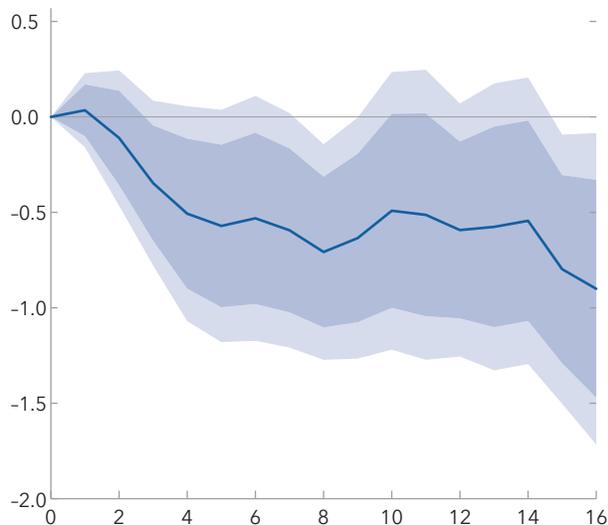
The effectiveness and impact of macroprudential policy measures have been analyzed and debated since the global financial crisis. There is now a large body of literature on the effectiveness of these tools, notably the work by the Alam and others (2019), which uses the IMF's comprehensive integrated Macroprudential Policy (iMaPP) database to study the impact of macroprudential policy tightening on credit growth and real housing price growth. We expand on this literature by focusing on Asia-Pacific using the latest version of the iMaPP database updated through 2020 and by employing local projection techniques to estimate the dynamic effects of macroprudential policy on the housing market. We find that macroprudential tools can be effective at addressing financial stability risks from the housing sector, by curtailing credit growth in general and to risky borrowers in particular, but the impact of macroprudential tools on housing prices is limited.<sup>12</sup>

The use of the local projection method allows us to explore how macroprudential policy affects household credit and prices over time. The analysis controls for initial macroeconomic conditions and accounts for how conditions evolve over the observation period, including the implementation of additional macroprudential measures (see Annex 3 for details on methodology). We estimate impulse response functions to a one

<sup>12</sup> See in particular, Kuttner and Shim (2013); Cerutti, Stijn and Laeven (2017); Richter, Schularick, and Shim (2019); and Ampudia and others (2021).

### Figure 19. Macroprudential Tightening Significantly Impacts Household Credit Growth

(Effect of one-standard-deviation tightening of macroprudential policy on household credit in Asia-Pacific, percentage points)



Source: IMF staff calculations.

Note: Impulse response functions are estimated using a sample of 12 regional economies using quarterly data over the period 2000–20. The graph shows the response and 90 and 75 percent confidence bands. The x-axis shows quarters after the event ( $t = 0$  is the quarter when the macroprudential tool is tightened).

quarters.<sup>13</sup> These results are broadly similar, though somewhat stronger, than for the wider global sample presented in Annex 3.

The role of MPMs is primarily to build resilience during booms, to moderate the ensuing cyclical downturn and limit systemic risk to the financial system (IMF 2011, 2013a; BIS 2011). Temporary macroprudential policy relaxation can be contemplated to limit the contraction of credit when financial conditions tighten and risks materialize (IMF 2014), as expected in several AEs facing rising interest rates coupled with falling housing prices. Nevertheless, it is necessary, even during a downturn, to maintain adequate macroprudential policy settings to ensure long-term sustainable market conditions. In addition, empirical results suggest that the effectiveness of relaxing MPMs in boosting household credit may be limited. Figure 20 separates out the impact of MPM tightening versus loosening, instead of using an aggregate measure of net tightening as in the previous analysis. We find that while MPM tightening has a statistically and economically significant effect on household credit (panel 1), the impact on MPM loosening, albeit in the right direction, is smaller and not statistically significant (panel 2).

Demand-side tools such as LTV or DSTI restrictions appear to be more effective in Asia-Pacific than capital-based tools. This finding emerges when isolating individual macroprudential tools instead of using the aggregate index as in the analysis. Figure 21 illustrates this finding, contrasting the impacts of strengthening LTV restrictions and of tightening sectoral capital requirements, with only the former having a significant impact on housing credit growth. These results also hold more broadly, in line with the existing literature, pointing to the relative effectiveness of other demand-side tools as well (notably DSTI restrictions). Evidence

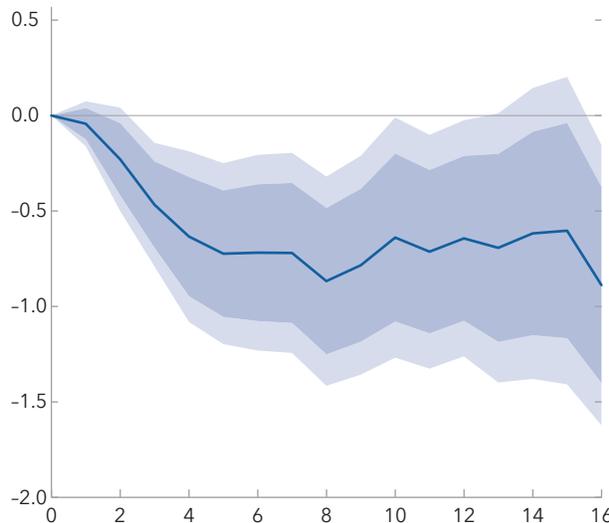
standard deviation policy shock over the period 2000–20 using quarterly data. The focus is on 12 large regional AEs and EMs, and Annex 3 provides additional results for a wider global sample of 42 countries.

We find that, on aggregate, macroprudential tightening significantly dampens household credit growth (Figure 19). This finding is based on an aggregate macroprudential index, which combines information on a variety of tools, including demand side instruments like the LTV and DSTI; tax measures; bank-capital-based measures like leverage ratios, countercyclical buffers, conservation buffers, and capital requirements; and other measures potentially affecting the supply of loans like reserve requirements, liquidity requirements, limits to FX positions, limits to the loan to deposit ratio, and limits to foreign currency loans. We find that this aggregate macroprudential policy index has a statistically significant impact on household credit growth. In particular, a one-standard-deviation tightening of the index is associated with 0.5–1 percentage point lower household credit growth. Measures tend to affect credit growth gradually, with most of the impact having materialized after about five

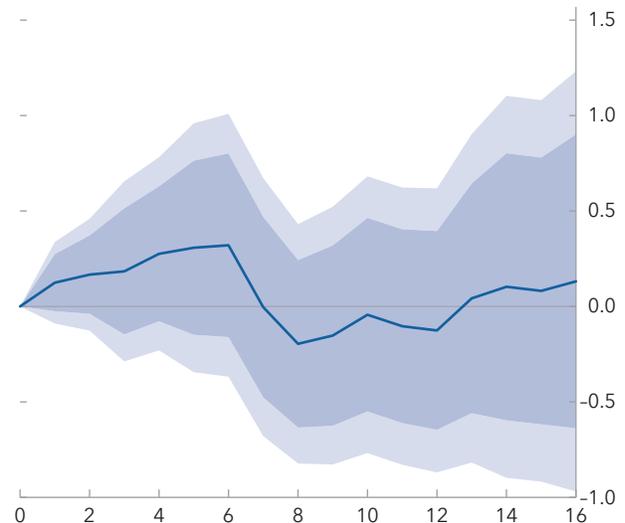
<sup>13</sup> Note that the specification already controls for any additional measures and macroeconomic developments in the interim and should therefore be interpreted as the effect of the initial tightening at date 0.

**Figure 20. The Impact of MPM Tightening vs. Loosening is Asymmetric, with Larger Effects of Tightening**  
(Effect of one-standard-deviation tightening/easing of MPMs on household credit, percentage points)

**1. Asia: Household Credit Response to MPM Tightening**



**2. Asia: Household Credit Response to MPM Loosening**

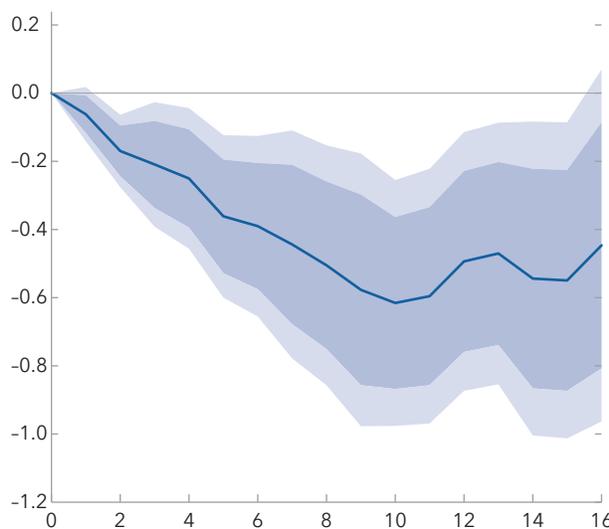


Source: IMF staff calculations.

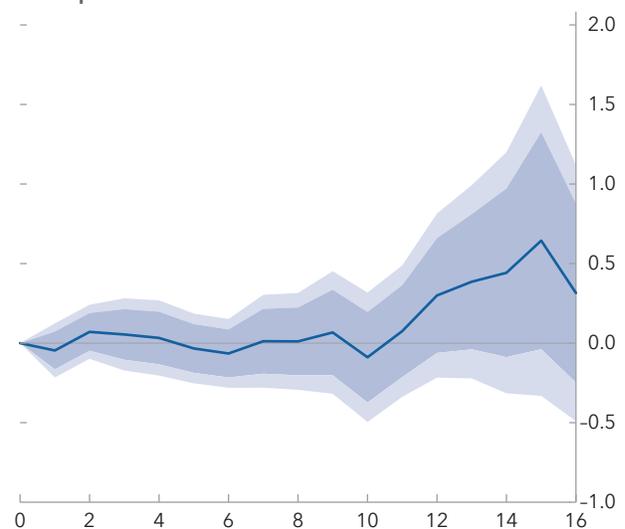
Note: Impulse response functions are estimated using a sample of 12 economies in Asia-Pacific using quarterly data over the period 2000–20. The graph shows the response and 90 and 75 percent confidence bands. The x-axis shows quarters after the event, with  $t = 0$  is the quarter when the macroprudential tool is tightened or eased. MPMs = macroprudential policy measures.

**Figure 21. Demand-Side Tools Appear To Be More Effective than Capital-Based Tools**  
(Effect of one-standard-deviation tightening of selected MPMs on household credit, percentage points)

**1. Asia: Household Credit Response to LTV Tightening**



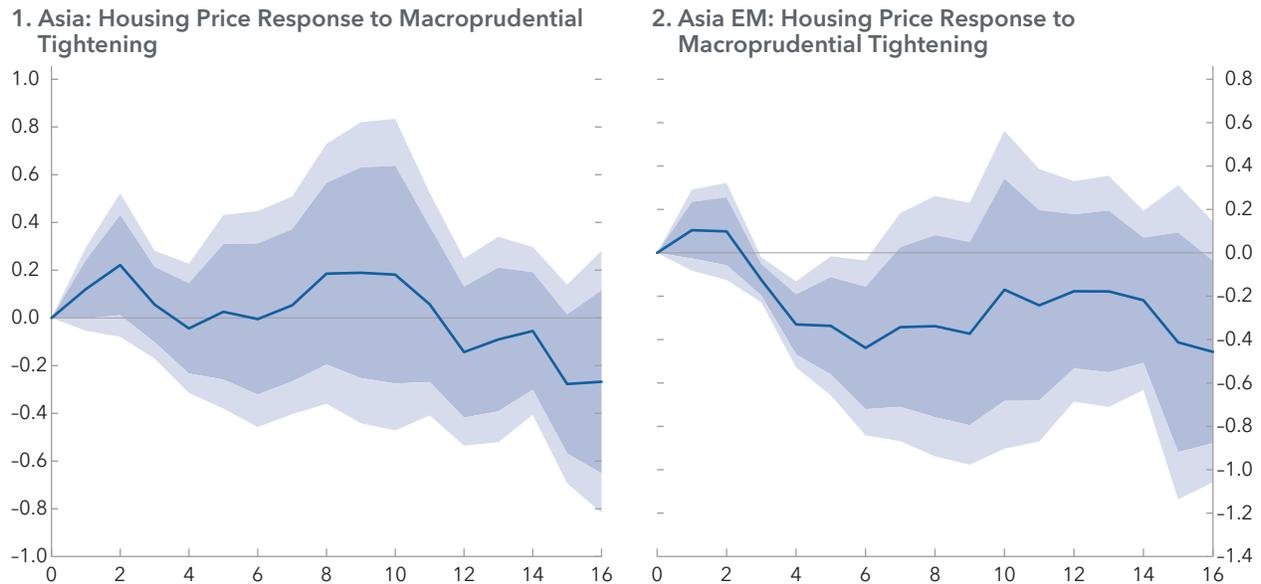
**2. Asia: Household Credit Response to Capital Requirements**



Source: IMF staff calculations.

Note: Impulse response functions are estimated using a sample of 12 economies in Asia-Pacific using quarterly data over the period 2000–20. The graph shows the response and 90 and 75 percent confidence bands. The x-axis shows quarters after the event, with  $t = 0$  is the quarter when the macroprudential tool is tightened. MPMs = macroprudential policy measures.

**Figure 22. Limited Impact of Macroprudential Tightening on Housing Prices**  
(Effect of one-standard-deviation tightening of MPM on housing prices, percentage points)



Source: IMF staff calculations.

Note: Impulse response functions are estimated using a sample of 12 economies in Asia-Pacific using quarterly data over the period 2000-20. The graph shows the response and 90 and 75 percent confidence bands. The x-axis shows quarters after the event, with  $t = 0$  is the quarter when the macroprudential tool is tightened.

from loan-level analysis suggests that this is likely because LTV or DSTI limits directly curb lending to higher-risk borrowers, whereas the link between capital requirements and lending decisions is less direct and hence weaker (Allen and others 2020, de Araujo, Barroso, and Gonzalez 2020). That said, these policies also tend to worsen housing affordability concerns, by disproportionately limiting access to credit for lower income households, putting a premium on designated policies to strengthen affordability.

While the impact of MPMs on credit is substantial and economically significant, the impact on housing prices per se is more limited (Figure 22). Our results do not show a significant impact of MPMs on real housing prices on average for the overall sample in Asia-Pacific, and while there is a statistically significant effect in regional EMs, it is not large and relatively short-lived. This is consistent with the literature, which finds that, although macroprudential policy is effective at building resilience and reduce risks for the banking sector, its role in affecting the housing price cycle is more limited.<sup>14</sup>

### Potential Leakages of MPMs

The effectiveness of macroprudential policies should not be taken for granted. Policy leakages often exist and can undermine the effectiveness, and thus policymakers need to assess and address the potential for such leakages ex ante (IMF-FSB-BIS 2016). Leakages can occur in the presence of imperfect regulation and enforcement, regulatory arbitrage, or other regulatory circumvention schemes. The growing presence of shadow banking in many regional economies as well as interconnectedness of banks and other financial intermediaries imply the potential for policy leakages.

Broadly, leakages can exist in domestic markets and across international borders (“spillovers”). Based on evidence from more than 6,000 estimates, Araujo and others (2020) find the existence of leakages and spillovers which reduce the transmission of the micro-level effects of macroprudential policy on bank lending

<sup>14</sup> Deghi and others (2020) and IMF (2019) show that macroprudential measures can however help reduce downside risks to future housing prices. This is consistent with macroprudential policy measures leading to the accumulation of buffers reducing housing prices-at-risk.

to aggregate credit. Households, for example, can take consumer loans from nonbank financial institutions (NBFIs) to finance the down payment for a home purchase necessary to meet LTV limits applied to banks (Cizel and others 2019). Households might be able to borrow beyond LTV limits from NBFIs that fall outside of a regulatory perimeter to enforce implementation of macroprudential policies. International spillovers of macroprudential policies are more prevalent in economies with more developed or open financial systems (Cerutti, Dagher, and Dell’Ariccia 2015). International spillovers vary considerably across different macroprudential policy tools and are heterogeneous across banks (Buch and Goldberg 2016). In particular, based on some evidence, tightening of capital requirements may encourage nonbanks to borrow from branches of foreign banks where local capital requirements do not apply. Tightening of lending standards (for example, LTV ratios for home purchase), in contrast, does not precipitate such behaviors from nonbanks since the same lending standards tend to be applied to all loan products sold in a given country. However, tightening of reserve requirements shows inconclusive results due to challenges in identifying their effects in isolation from changes in monetary policies (Reinhardt and Sowerbutts 2015).

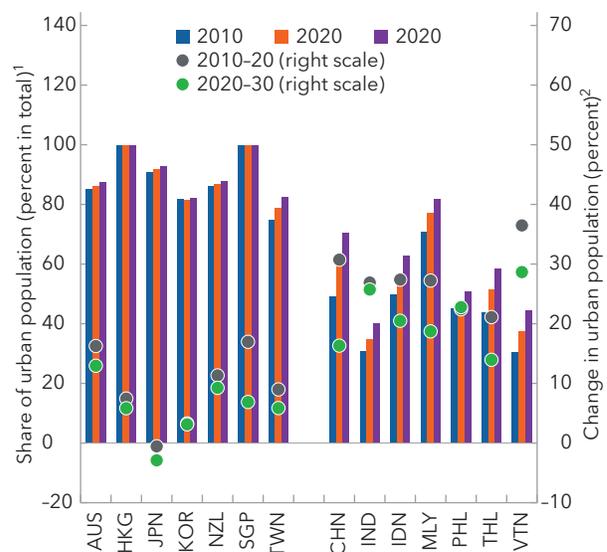
Given the evidence of potential leakages and spillovers of MPMs, policymakers should consider strategies to address them *ex ante*. Expanding the scope of application to include nonbanks and foreign providers of credit in a domestic financial market is an important consideration. Reaching jurisdictional reciprocity agreements (BCBS 2010) and greater host control over foreign affiliates (CGFS 2012, IMF 2014) offers options to policymakers to address international spillovers of macroprudential policies.

## B. Policies to Promote Affordability

Housing affordability and access to adequate housing in Asia-Pacific have been deteriorating over time, resulting from disproportionate increases in housing prices for a prolonged period (Chapter 3). Excessive housing price increases affect people at all levels of social and economic development and create growing challenges for young and even middle-income households (UN-HABITAT 2021). High mortgage rates resulting from monetary policy tightening also deteriorate housing affordability as financing and debt servicing costs rise. A higher lending rate also negatively affects construction of housing. As macroeconomic policies influence an intricate balance of demand and supply conditions in housing markets (Chapter 2), policymakers need to pay close attention to implications of their decisions on housing affordability.

Housing affordability has a direct link to housing inequality, which can be a dominant factor perpetuating socioeconomic inequality and tends to be more pronounced in urban areas (HRC 2020; Aizawa, Helble, and Lee 2020). The high speed of urbanization seen over the last decades particularly in emerging Asia-Pacific has led to among the worst housing shortages in the world (Sharma and others 2021). As urban populations in Asia are expected to further increase (Figure 23), and housing affordability remains an important concern (Angel 2012, Yoshino and Helble 2016, World Bank 2014), policymakers should take a multifaceted approach to tackle this issue, in line with the United Nations

**Figure 23. Concentration of Urban Population Is Expected to Increase in the Coming Decade**



Sources: UN (2018); and IMF staff.

Note: Country abbreviations are International Organization for Standardization (ISO) country codes.

<sup>1</sup>Bars show the share of urban population in percent of total.

<sup>2</sup>Dots show the change in urban population during the specified periods in percent, plotted against the right scale.

General Assembly's call to ensure adequate housing for all citizens. Policy options include structural supply side measures, demand-side policies that directly support households by making housing more affordable, and financing measures. These policy measures can also be effective when housing markets confront tightening monetary policy, which deteriorates housing affordability.

## Structural Supply-Side Policy

Housing supply constraints are prevalent across urban and rural settings, but constraints are often more severe in urban areas where jobs are located, pushing up housing prices. Poorer households are often priced out of attractive areas and pushed to cheaper housing on the outskirts of metropolitan areas, with long commutes and less desirable schools for their children. Studies show that children who grow up in high-opportunity communities have better economic outcomes as adults, which is one factor in the persistence of inequality across generations. In rural areas, private investment and access to credit are often more limited, and housing construction costs tend to be high due to transportation costs, limiting the supply of available housing. Supporting the supply of quality, affordable housing in both urban and rural settings with public investment in physical and social infrastructure can help reduce poverty and improve access to equal opportunities.

## Reform Land Use Regulations

Zoning restrictions can be an important factor limiting the supply of housing where it is most needed. Local zoning regulations may prohibit developing higher-occupancy buildings in existing housing zones or may limit the supply of land available for greenfield development. Reforming land use regulations becomes imperative in local jurisdictions that have tight zoning and usage regulations. When incentives of local government are not aligned with national housing policy priorities, central government may need to take policy action. For example, in 2021, New Zealand amended its Resource Management Act to allow for higher-density housing construction without requiring local government resource consents and put in place a Housing Acceleration Fund with significant resources to provide funding at the local level for the development of enabling infrastructure needed for housing developments.

## Promote Productive and Efficient Use of Idle Land

Promoting the use of idle land can help mitigate supply shortfalls. Introducing taxation, for example, can encourage landowners to make productive use of idle land. Land value taxation, which levies tax only on the value of the underlying land (not on the value of any buildings or other improvements made to the parcel), would be an efficient form of taxation, encouraging local land development while discouraging urban sprawl (Dye and England 2010). Regional examples include the Philippines and Thailand. Thailand implemented a new Land and Building Tax in 2020, which imposes taxation on land for different uses with the maximum tax rate ranging from 0.15 percent for agricultural use to 1.2 percent for empty or unused land. To promote construction of housing that would address local supply shortages, this type of measure can be combined with financing measures for landowners to make necessary investments for productive use.

## Provide Adequate Social and Affordable Housing

The relative size of the social housing sector has been shrinking in recent years in many OECD countries, with average spending as share of GDP having declined by two-thirds from levels observed two decades ago (OECD 2020). While similar data for the Asia-Pacific region is sparse, social housing remains an important part of the growing affordability concerns in many countries in the region. The public sector should step up its efforts in the provision of social housing to address these concerns in a targeted way, in cooperation with the private sector and civil society organizations where appropriate. While local governments are often involved in development of social housing, central governments can provide funding or financial incentives to local authorities to develop social housing for the poorest households. For example, Australia

improved funding agreements with states and territories in 2018: under the National Housing and Homeless Agreement (NHHA), the Commonwealth Government provides funding to subnational governments to improve access to affordable, safe, and sustainable housing for people experiencing homelessness and those at risk of homelessness.

Public housing more broadly can play an important role to make affordable housing available to the population. In Singapore, about 80 percent of households reside in public housing, built and managed by the Housing and Development Board (HDB) (Phang and Helble 2016). HDB receives subsidies of about 0.25 percent of GDP (2017). In other countries, new private housing projects must have specified shares of affordable housing units (Malaysia) and social housing for workers (Vietnam).

### Tax and Financing Incentives

While direct provision of social and public housing by governments continues to play a critical role, budgetary considerations often imply constraints. Some governments instead provide incentives to private developers with low-interest loans, subsidies, and tax credits. These incentives could reduce costs up front for developers and stimulate construction of affordable housing (ADB 2019). For example, in Malaysia, the National Affordable Housing Policy (NAHP), implemented in 2019, provides incentives and tax exemption for affordable housing construction to bring down the construction cost, with the aim of reducing housing prices for low-income households (Liu and Ong 2021).

### Map Well-Planned Urbanization for Adequate Housing

Structural supply-side policies need to be supported by well-integrated urban planning, especially where urban populations are growing fast. Considerations should include proximity to jobs, safe water and sanitation, accessibility to transportation networks, good education, and access to social and health services.

### Demand-Side Policy

As structural measures to increase housing supply take time to yield results, there may be a case for targeted demand-side measures to improve housing affordability for targeted segments of the population, such as low-income households or aspiring first-time home buyers.

### Provide Targeted Government Support

Options include providing housing vouchers or housing subsidies to low-income households to make housing more affordable and offering grants, tax relief, or accommodative financing terms to first-time homeowners (Australia, Malaysia, New Zealand, Thailand). As these policies tend to increase the demand for housing, thus possibly exacerbating the existing housing market imbalances, these interventions need to be well-targeted and limited to supporting specific disadvantaged groups.

### Use Progressive Taxation

Some countries use progressive rates of property purchase taxes (or stamp duties) to slow property price inflation (Sharma and others 2021). In Asia, Hong Kong SAR, Malaysia, and Singapore have a progressive structure applied to stamp duties on the purchase price or market value of properties, which can help ease affordability pressures at the lower end of the price range.

Depending on local circumstances, governments can consider transforming stamp duties to recurrent property taxes, which can be more efficient (more stable tax base and greater ease for workers to relocate) while making residential property more affordable at the time of purchase. For example, the Australian state of New South Wales plans to give first home buyers the option to pay recurrent annual land taxation in lieu of the regular stamp duty at the time of purchase, lowering the up-front costs of home purchases with the aim of boosting home ownership.

Property tax reform can also include modifying the rate structure to address housing affordability concerns. Instead of applying a single rate, principles of progressive taxation can be applied to property taxes. That way, the burden of property taxation would fall more heavily on high-income households who tend to purchase more expensive homes.

### Implement Well-Targeted Macroprudential Policies

Macroprudential policies, including LTV or DSTI limits, can be used to address overheating of housing markets, but at the same time they may adversely affect affordability, as purchasers face tighter limits on their maximum loan size. While the primary objective of macroprudential policy is financial stability, its use can be targeted to limit affordability repercussions for certain groups, such as lower-income households (unless loans to the latter are seen as a disproportionate source of financial risk). For example, the LTV ratio can be tightened only for targeted types of borrowers that are likely to pose significant financial risks.<sup>15</sup>

Macroprudential policies that address purchases for investment and speculation could also keep overall housing prices in check. In this context, fiscal authorities could impose capital gains taxes at a high rate on properties not occupied and resold quickly (ADB 2019), or property holding taxes (Korea) to limit speculative housing demand.

### Financing Policy

The access to, and the cost of, housing finance are also contributing factors to housing affordability (UN-HABITAT 2011). Limited availability of formal financing, for example, may exacerbate housing unaffordability. Low- and middle-income households are disproportionately affected, as they often confront a widening gap between high prices of housing and low income. Financial mechanisms for housing are underdeveloped in many economies in Asia-Pacific (Sharma and others 2021), and even where financing is generally available, it is often inaccessible and unaffordable for low-income households. Policies that target this gap can improve inclusiveness in housing markets and help all households secure quality housing regardless of their standing in income distributions.

### Introduce Supportive Financing Mechanisms

A number of economies in the Asia-Pacific region have government housing finance agencies that provide affordable loans and/or mortgage insurance to households, with an additional aim of developing domestic mortgage bond markets. The agencies also provide finance to developers. Examples include Cagamas Berhad in Malaysia, the Housing Development Board in Singapore, and the Government Housing Bank (GHB) in Thailand, which provide housing finance to low- and middle-income households at subsidized interest rates. In the Philippines, community-led housing finance is available through the Community Mortgage Program (CMP), a form of microfinance program launched by the National Home Mortgage Finance Corporation (UN-HABITAT, 2011). In Singapore, the government has set up a mandatory national saving vehicle, called Central Provident Fund (CPF), which provides tax exemption on interest earnings and can be used for home purchases.<sup>16</sup> Similar schemes exist in China, Indonesia, and the Philippines, where employees make regular mandatory contributions from their paychecks to save for home purchases (ADB 2019).<sup>17</sup> In addition, many Asian economies also provide mortgage insurance or guarantees, enabling aspiring home buyers to enter the housing market more easily (China, Hong Kong SAR, India, Malaysia, Philippines, Thailand).

<sup>15</sup> For example, in 2019 the Bank of Thailand (BOT) lowered the maximum LTV ratio to 80 percent for borrowers seeking residences valued above THB10 million (USD315,000). The BOT also set a maximum LTV ratio of 80-90 percent for second mortgages and 70 percent for subsequent mortgages to limit financial risks from mortgages for investment properties.

<sup>16</sup> The CPF requires employees to contribute 20 percent of their monthly salary, while employers contribute a further 17 percent. It has helped nearly 95 percent of employees aged 21 and older to own public housing.

<sup>17</sup> For example, Indonesia launched a mandatory saving scheme (Tapera) in 2020, requiring employees contribute 2.5 percent of their monthly salaries, matched by a 0.5 percent contribution by employers.

## 5. Conclusion

Housing markets in Asia-Pacific have been volatile, driven by often long and sustained housing price cycles. The current phase may well prove to be another turning point for many countries, with post-pandemic housing price surges now increasingly at risk of reversing in a context of slowing growth and rising interest rates.

Indeed, housing prices seem misaligned especially among the region's AEs, raising the specter of price corrections. Our analysis finds that the magnitude of housing price misalignment and borrowing costs are among the key drivers of housing price-at-risk. While measures of housing price-at-risk have deteriorated more in the region's AEs than in its EMDEs, both groups will face rising downside risks stemming from higher interest rates going forward. Our model-based analysis shows that a high magnitude of price misalignment, when combined with the impacts of high policy rates, can lead to a sizable price correction, nearly comparable to past episodes of housing busts. High household debt in many economies in Asia-Pacific can amplify the effects of housing corrections on the real economy and potentially on financial sector stability. While the financial sectors of major AEs and EMs in Asia-Pacific appear relatively sound and resilient at the current juncture, safeguarding housing and financial stability remains a critical task ahead.

In tandem with rising housing prices before and after the pandemic, housing affordability has also suffered. An extended period of rapid increases has propelled housing prices out of reach for many households across economies in the Asia-Pacific region. With rising inflation and interest rates, households face a double shock to their budgets. High mortgage payments, driven by high housing purchase prices and rising interest rates, and high cost of living point to a deterioration of housing affordability, which was already stretched before the pandemic. Since housing is a key determinant for health and education, and housing inequality can lead to perpetuating socio-economic inequality, restoring housing affordability and, especially in EMDEs, improving access to adequate housing, need to be priorities for policymakers in the region.

Safeguarding financial stability and improving housing affordability will require a multipronged approach:

- Macroprudential policies are of foremost importance to maintain financial stability. Well-designed measures can help build resilience during booms and limit systemic risk to the financial system during the downturns. Our analysis highlights the effectiveness of macroprudential policies by limiting household credit growth, though the full effect can take more than a year to materialize. Targeted use of LTV and DSTI restrictions is particularly effective in constraining credit demand by borrowers with high-risk profiles, thereby limiting banks' risk exposure. That said, in line with the literature, we find only limited effectiveness of macroprudential measures in dampening housing price growth, with significant (yet small) effects only in the regional EM sample. Refining macroprudential policy tools to limit their leakages and target cross-border spillovers can raise effectiveness of these policies. Expanding the scope of application to include non-banks and foreign providers of credit in domestic financial markets is an important consideration in this regard.
- Implementation of macroprudential policies must be well calibrated. Their role is primarily to build resilience during booms, whereas relaxation during downturns may not exert a symmetric response on credit growth, and reasonable minimum standards need to be maintained also in downturns to safeguard against the build-up of systemic risks. Macroprudential policy also needs to be well-coordinated with monetary and fiscal policy and take in consideration high levels of household debt, tightening financial conditions, deteriorating real wage growth, and, in many cases, scarring effects of the pandemic.

- Addressing housing affordability is equally important. Structural supply side policies will likely need to be the main vehicle to restore affordability over the longer term such that supply can catch up with risen demand. These policies include reforms to land use regulations such as planning and zoning, promotion of productive use of idle land, and provision of tax incentives for home builders. These should be complemented by stronger focus on provision of adequate social and affordable housing. As supply-side measures tend to take significant time to take effect, demand-side and financing measures can be important to alleviate pressure points in the near term. These can include vouchers, grants, tax relief, low-interest loans, and mortgage insurance or guarantees. Since these policies tend to increase housing demand, thus possibly exacerbating imbalances, interventions need to be well-targeted at priority groups such as low-income households or aspiring first-time buyers.

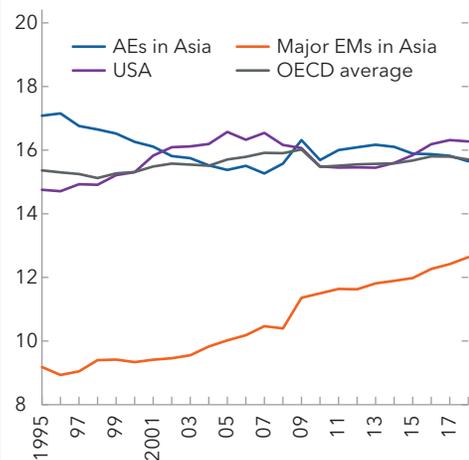
### Box 1. Construction, Real Estate, and Housing Markets in Asia-Pacific

Construction and real estate are among the main drivers of economic growth in Asia-Pacific (Box Figure 1.1). While their contributions to growth vary across the economies, these sectors' significance has grown rapidly in both AEs (Australia, Hong Kong SAR, and New Zealand) and EMs (China, Indonesia, and Malaysia). In particular, EMs in the region, starting from a low base, have experienced rapid growth in the value added of construction and real estate services over the past decades. Growth in housing-related activities picked up further over the 2010s, driven mainly by rapid growth of housing demand for both residence and investment, but also in part reflecting government efforts to address affordability concerns and increase home ownership (Chapter 4). In other regional economies, construction and real estate have been growing broadly in line with the overall economy, except in India, where housing-related activities slowed significantly during 2010s, and in Vietnam, where manufacturing has been growing more rapidly than housing.

Activities in construction and real estate have further room to grow in ways to improve home ownership in Asia-Pacific, which remains relatively low in some countries (Box Figure 1.2), compared to the home-ownership rate of 70 percent in the EU. Young generations and low- and middle-income households are increasingly priced out of housing markets. For example, Korea has experienced a sharp fall in home ownership among people aged 40 or younger. A difference in the rate of home ownership across generations becomes increasingly apparent (Japan, Korea, New Zealand), directly contributing to a generational wealth gap. The COVID-19 pandemic may have widened the generational divide at the disadvantage of younger generations that have not yet built a career with income security needed to finance a house purchase (Thailand). More broadly, housing loans constitute the largest component of household liabilities, and households in Australia, Hong Kong SAR, Korea, Malaysia, and Thailand have seen rapid growth in mortgage debt over the past decade.

Trends in housing markets are reflective of country-specific housing market characteristics, with a few emerging trends. A major such trend has been the urbanization of middle- and low-income countries across Asia-Pacific and the provision of greater incentives for homeownership since the Asian financial crisis. Urban expansion and renewed availability of credit have reshaped housing

**Box Figure 1.1. Value Added in Construction and Real Estate Services (Percent of GDP)**



Sources: OECD Stat; and IMF staff calculations.

**Box Figure 1.2. Home Ownership in Asia-Pacific Has a Significant Room to Grow**



Sources: Statista; propertyguru.com.my, globalpropertyguide.com; indiahousing.in; pubMed.gov; and chfs.swufe.edu.cn.

<sup>1</sup>Among millennials.

**Box 1. Construction, Real Estate, and Housing Markets in Asia-Pacific** *(continued)*

markets, particularly in capitals and other large cities of China, Indonesia, and elsewhere (see Ronald and Doling 2014, World Bank 2015, and UN 2018). Another significant driver of housing market developments is demographics, which influence long-term macroeconomic trends (such as labor supply and potential growth) and alter supply and demand for housing (Arestis and Gonzalez-Martinez 2017). Legal and institutional factors, such as property rights, financial deepening, and prevalence of corruption (Glindro and others 2011), have also been found to have significant effects on transaction volumes and housing prices in a set of nine Asia-Pacific economies (Australia, China, Hong Kong SAR, Korea, Malaysia, New Zealand, Philippines, Singapore, and Thailand). Other policy settings, such as preferential capital gains tax treatments or differentiated rental laws, have created a trend in the emergence of a large rental market by homeowners, such as in New Zealand. Foreign demand for housing has also played a role in some economies such as Australia, Hong Kong SAR, New Zealand, and Singapore, and has at times given rise to policy measures differentiating by residency of homeowners. Finally, cyclical factors, such as financial conditions, and structural factors, such as the role of financial deepening and access to financing for real estate purchases, have also shaped housing markets and at times fueled housing booms, with greater differentiation between AEs and EMs (see also Box 5 for the role of mortgages in household debt).

## Box 2. China's Property Sector Crisis

Real estate has been an important driver of China's economic expansion for much of the decade before the pandemic. The sector accounts for about 20 percent of China's GDP,<sup>1</sup> of which about

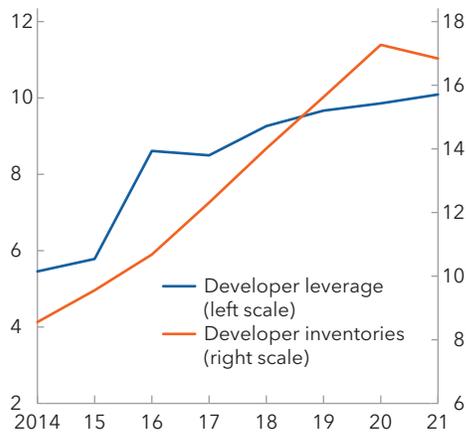
three-quarters are construction and one-quarter real estate services, and for a significant share of employment. Property is ubiquitous as a source of wealth and collateral. Almost 90 percent of urban households are homeowners, many owning multiple homes, with housing representing about 80 percent of urban households' assets. Land sales account for 40 percent of local government revenues (15 percent net of land development investment), while mortgages and developer loans account for roughly 30 percent of total bank loans.

The sector's importance reflects China's high savings rate and close links between property developers and local governments. On the demand side, China's massive household savings are linked to precautionary motives given the still relatively underdeveloped social protection systems and limited alternative investment options. On the supply side, the real estate developer sector borrowed heavily to speculate on land and expand construction rapidly, supported by regional governments that relied heavily on land sales for fiscal revenue and allowed private housing investment to function as a key countercyclical policy tool in the years after the GFC. Developer leverage rose as the sector accumulated significant inventories of land and unfinished housing (Box Figure 2.1).

Home prices have risen significantly since the GFC, creating affordability challenges (Box Figure 2.2). Home prices more than doubled since 2010, with average home prices now about 15–20 times disposable income in some smaller cities, well above the ratio in the largest cities in AEs. In China's largest cities, the home price-to-income ratio is closer to 40 times, with demand in these cities underpinned by stronger population and income growth. While financial risks from these valuations are mitigated by relatively low mortgage loan-to-value ratios, the authorities recently stepped up their regulatory efforts to address high prices and excess investment-related demand by targeting excessive risk-taking in the developer sector.

### Box Figure 2.1. China: Rising Developer Leverage

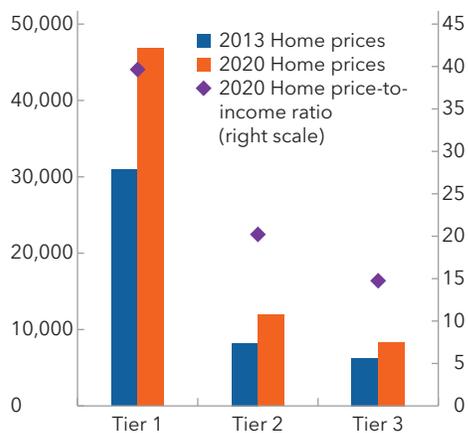
(Leverage: assets/common equity; inventories in percent share of GDP)



Sources: Capital IQ; and IMF staff calculations.  
Note: Data for 2021 are based on H1 data as many large developers have not released audited H2 data.

### Box Figure 2.2. China: Affordability Challenges Amid High Home Prices

(RMB per square meters; ratio of home prices to income)



Sources: WIND; and IMF staff calculations.  
Note: Price data are based on average sales prices at the city level. Data represent a median ratio by tier. Tier 2 and 3 cities represent a selection of cities based on the WIND 100-city housing price data set. Average home size is estimated as 60 square meters.

<sup>1</sup> Other estimates suggest an even larger share but account for gross output instead of value added and include infrastructure construction.

### Box 2. China's Property Sector Crisis *(continued)*

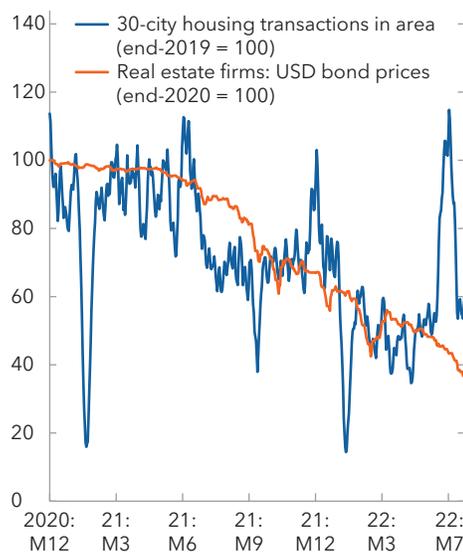
Severe financial strains have since emerged in the sector, threatening housing market stability. Rules to reduce developer leverage that took effect in late 2020 exposed fragilities in the sector's high growth, high-turnover, high-leverage business model, which relied on pre-sales of unfinished homes as a key form of financing. After a large developer's default in late 2021 imperiled the completion of more than a million pre-sold houses, liquidity pressures spread through the sector as banks cut lending and homebuyers sharply slowed purchases of pre-sold homes, with pre-sales funds dropping by 40 percent in mid-2022 compared to a year earlier. Amid a negative feedback loop between weak sales, developer liquidity pressures, and a growing stock of unfinished housing facing completion risks, offshore bond prices now imply a significant likelihood of defaults by most large private developers (Box Figure 2.3).

Amid developer strains and slowing sales, housing activity has slowed but broader macro-financial spillovers have been muted. Property investment, land purchases, and housing starts have contracted sharply, suggesting construction activity will decline in coming years. The contraction of land sales has led to a sharp decline in local government fiscal revenue. But as of yet, efforts to restructure distressed developers have been limited, delaying pressures on bank asset quality and collateral valuations. Home values have adjusted only modestly, in part reflecting local government policies regulating price declines. These factors have so far contained larger spillovers to consumption and financial sector balance sheets but have exacerbated the weakness in home sales.

The unresolved stresses in the sector, however, still pose significant risks to economic and financial stability. Financial conditions for developers have continued to tighten over recent months, including as some homebuyers with mortgages secured against still-unfinished housing threatened to withhold payments to banks, highlighting risks to banks' mortgage portfolios. Prolonged weakness in home sales risks deflationary pressures that would challenge efforts to maintain stable home prices, raising the risk of a disorderly market adjustment. Yet a scenario of slow-moving housing market adjustment would also be costly. Property-related spending would face protracted pressures, local government finances would remain weak amid depressed land sales, and the financial system would face a credit risk overhang.

Further policies are urgently needed to address the crisis and create an orderly transition for the sector. The authorities have introduced measures to boost financing, reduced mortgage rates and eased city-level home purchase restrictions, but additional action is required to address the negative feedback loop between developer stress and weak homebuyer confidence. A successful approach should begin with prompt action on developer restructuring, supported by central government-led efforts to protect presale homeowners from the risk of developer failure and strengthen housing

**Box Figure 2.3. China: Stress in the Property Market**  
(Units)



Sources: Bloomberg Finance L.P.; WIND; and IMF staff calculations.

**Box 2. China's Property Sector Crisis** *(continued)*

market surveillance frameworks. Macroprudential and macroeconomic policy support should be readied to avoid disorderly declines in housing market demand and facilitate balance sheet repair. Medium-term structural policies to limit risk-taking, boost household savings vehicles, and improve affordable housing will also support gradual housing market transformation.

### Box 3. Synchronization and Decoupling in Regional Housing Markets

Housing prices in regional economies may move in tandem because of synchronous supply and demand factors or diverge due to country-specific drivers (IMF 2018). Possible common factors may include global change in costs of construction, as well as global financial conditions such as interest rates, risk premiums, and risk-taking of global investors.

To analyze synchronization of housing prices in the region, a dynamic factor model proposed by Kose and others (2003) is employed (Equation B2.1). In this model, regional common factor  $F_t^{Asia}$  drives synchronization of regional housing markets, while factors specific to AEs and developing economies,  $F_t^{AE}$  and  $F_t^{EM}$ , generate comovement within countries of similar income levels. Their contributions to housing market fluctuations can be obtained from simple variance decomposition (Equation B2.2).

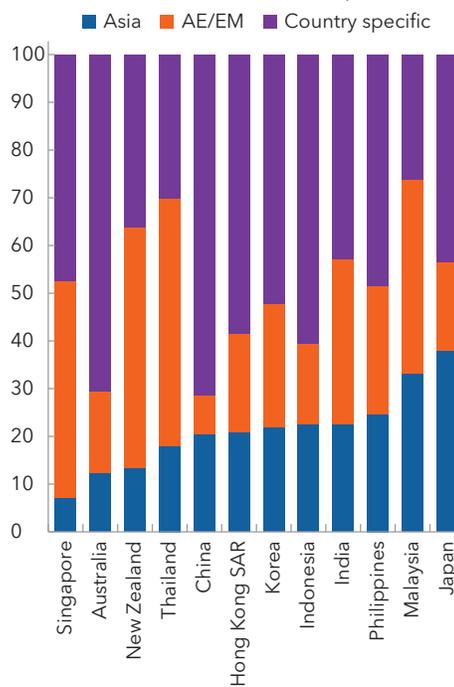
$$Y_{i,t} = c + \beta_{i,Asia} F_t^{Asia} + \beta_{i,AE} F_t^{AE} + \beta_{i,EM} F_t^{EM} + \varepsilon_{i,t} \quad (B2.1)$$

$$Sync_i^{Asia} = \frac{(\beta_{i,Asia})^2 \text{var}(F_t^{Asia})}{\text{var}(Y_{i,t})}, \quad Sync_i^{AE} = \frac{(\beta_{i,AE})^2 \text{var}(F_t^{AE})}{\text{var}(Y_{i,t})}, \quad Sync_i^{EM} = \frac{(\beta_{i,EM})^2 \text{var}(F_t^{EM})}{\text{var}(Y_{i,t})} \quad (B2.2)$$

The variance decomposition shows that generally about half of the variation in housing prices is driven by region- or income-specific factors, though this share varies among countries (Box Figure 3.1). The Asia-Pacific common regional factor, which captures regional financial conditions or the regional business cycle, accounts for part of the housing price fluctuations, with relatively larger contributions in Japan and Malaysia. Income-specific factors also play a role in synchronization, explaining a significant share of housing price fluctuations especially in Malaysia, New Zealand, Singapore, and Thailand. These results underscore the importance of taking into consideration external factors affecting domestic housing markets. That said, for many countries, country-specific factors remain the most important drivers, and their roles are particularly important for large economies with relatively closed capital markets, such as China and Indonesia.

A similar approach is employed to analyze city-level synchronization within a country, using Australia's city-level data as an example (Box Figure 3.2).<sup>1</sup> While the national common factor, which reflects national economic and financial conditions, plays a very important role in many cities, including the main population centers, Sydney and Melbourne, city-specific idiosyncratic factors play a larger role in less central places. This suggests that region-specific measures, especially in supply policies, may be needed to formulate housing policies.

**Box Figure 3.1. Housing Price Synchronization in Asia: APD Countries**  
(Contribution to total variation, percent)

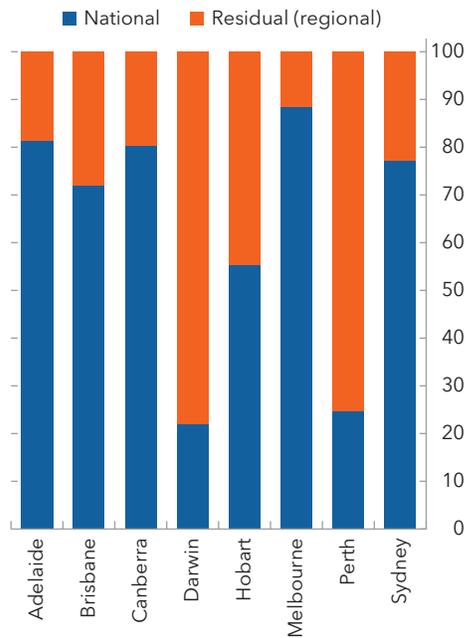


Source: IMF staff calculations.

<sup>1</sup> The dynamic factor model for the city-level analysis includes a national common factor and region-specific factor.

### Box 3. Synchronization and Decoupling in Regional Housing Markets *(continued)*

**Box Figure 3.2. Australia: City-Level Housing Price Synchronization**  
(Contribution to total variation, percent)



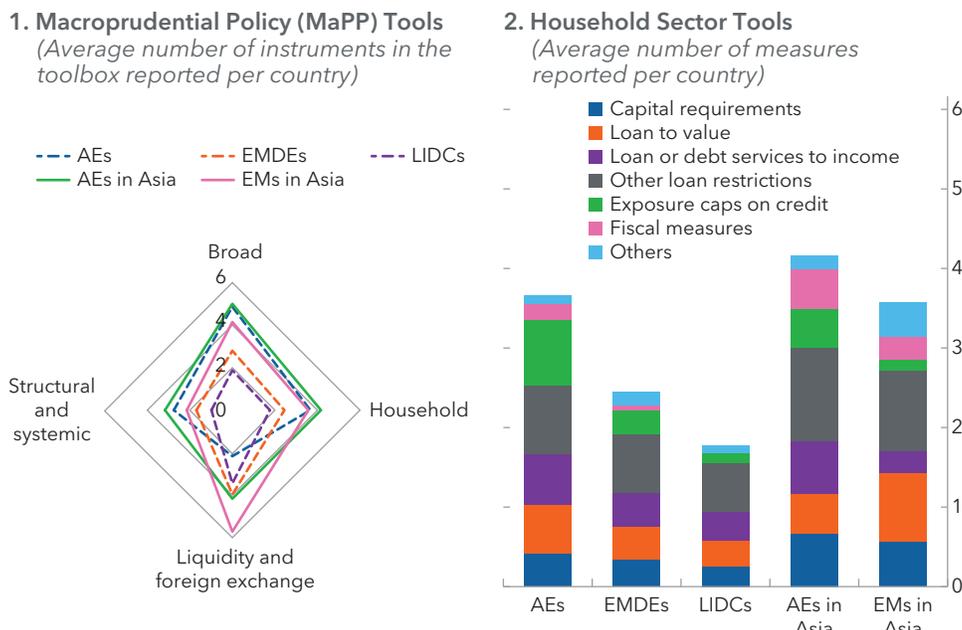
Source: IMF staff calculations.

### Box 4. Macprudential Policy Toolkits in Asia-Pacific

In the aftermath of the GFC, many countries across the globe, including in Asia-Pacific, introduced frameworks and tools aimed at limiting systemic risks that could otherwise disrupt the provision of financial services and damage the real economy (IMF-FSB-BIS 2016). Policymakers increasingly looking into how macroprudential regulation can best target specific sources of systemic risks to safeguard financial stability, and a comprehensive set of macroprudential policy tools has since been developed and deployed.

In this context, AEs and EMDEs in Asia-Pacific also introduced a number of macroprudential policy tools to their toolkits (Box Figure 4.1), including broad-based policy measures (for example, countercyclical capital buffer, capital conservation buffer, loan loss provision), household sector tools (for example, LTV ratio, DSTI ratio, exposure caps on household credit), liquidity tools (for example, liquidity coverage ratio, loan-to-deposit ratio, reserve requirements, limits on foreign exchange position), and tools to address systemic and structural risks (for example, capital and liquidity surcharges, limits on the size of certain exposures). Financial regulators in Asia-Pacific are well equipped to address systemic risks with various tools, with focused attention by the EMs to address liquidity risks and foreign exchange exposure, and in some AEs on housing-related risks. In some economies, fiscal authorities have also taken a role, for example by raising stamp duties on foreign purchase of residential property for investment reasons to address financial stability and/or housing affordability concerns (Australia, Hong Kong SAR, and Singapore).

**Box Figure 4.1. Asia-Pacific’s Economies Are Well-Equipped with Macroprudential Policy Tools**

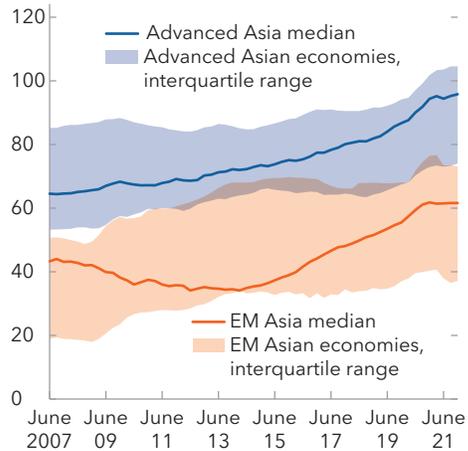


Sources: IMF Macroprudential Policy Survey 2020; and IMF staff calculations.

### Box 5. Housing and Household Debt in Emerging Market Economies

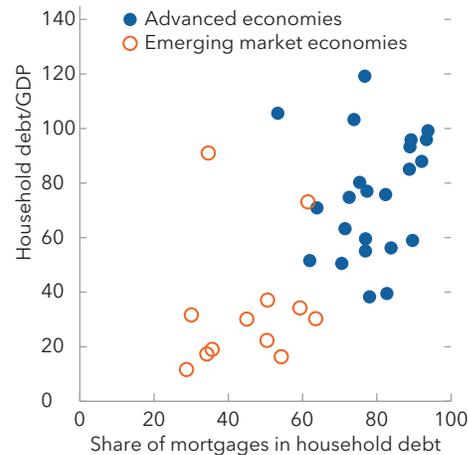
While Asia-Pacific AEs traditionally had more developed housing and financial markets, and, partly as a consequence, higher household debt, Asia-Pacific EMs have also experienced growing household

**Box Figure 5.1. Household Debt in Asia**  
(Percent of GDP)



Sources: Bank for International Settlements; and IMF staff calculations.

**Box Figure 5.2. Household Debt and Share of Mortgages**  
(Percent; as of 2022:Q1 or latest available)



Sources: Bank for International Settlements; national authorities; and IMF staff calculations.

debt. Efforts to improve households' access to financial services for housing purchases in EMs are paying off. Although EM households usually have a higher cost of funding and credit has traditionally been more difficult to access than in AEs, household debt has increased in recent years in countries such as China, Malaysia, and Thailand, thanks to efforts to develop the financial sector along with accommodative financial conditions (Box Figure 5.1). Household debt has also risen in a number of AEs, including Hong Kong SAR and Korea.

The uptake of debt used for housing purchases—typically mortgages—within household debt varies considerably across countries. Mortgages are generally the bulk of a household's debt in most AEs, but in EMs, including in Asia-Pacific, they are typically a smaller share of household liabilities (Box Figure 5.2). However, even though EM households borrow to finance durable goods purchases such as autos, or other uses, such as smoothing out short-term consumption (via unsecured credit) or funding SME activities, they also finance housing purchases via non-mortgage borrowing. For instance, using survey-based data for Bangladesh, China, India, the Philippines, Thailand, and South Africa, Badarinsa, Balasubramaniam, and Ramadorai (2019) find that, like in AEs, the largest share of household wealth of these economies is stored in physical assets—primarily real estate—but they are not broadly collateralized against mortgage debt (except in China).

There are several reasons for the relatively smaller prevalence of mortgages in EMs. These include the level of financial sector development and its capacity to intermediate appropriately long-term credit, the legal framework and capacity of the legal system to provide clear processes for the protection of lenders (limited enforceability) and borrowers (recourse), the limited existence of credit bureau information systems (including for collateral verification), and fewer government policies including subsidy schemes and incentives (such as mortgage interest deductibility).

ment policies including subsidy schemes and incentives (such as mortgage interest deductibility).

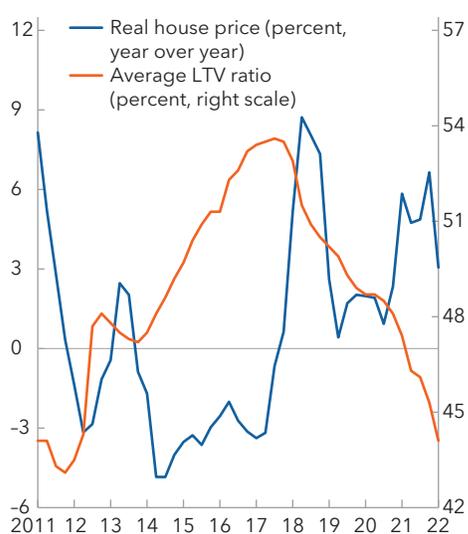
**Box 5. Housing and Household Debt in Emerging Market Economies** *(continued)*

Deeper mortgage markets provide many benefits but also risks. Benefits include improved saving and investment opportunities for households and welfare creation, that can also extend to greater community investment, higher school attainment, lower crime, and higher social capital (see Cerutti, Dagher, and Dell’Ariccia 2015). By contrast, unproductive use of housing debt, including for investment or speculation purposes, and an unsustainable pace of credit expansion can be a source of significant macroeconomic and macro-financial vulnerabilities. Other downsides can include reduced labor mobility as consequence of higher homeownership, along with fiscal and structural inefficiencies with respect to tax preferences, such as mortgage interest deductibility, which is not well targeted and tends to amplify wealth inequality. Thus, while financial deepening is a welcome goal for EMs, it needs to be done in a way that avoids potentially costly pitfalls.

## Box 6. Successful Soft Landings: The Singapore Example

While housing booms have often ended in busts, soft landings are possible. Financial authorities have gained institutional knowledge of macroprudential policy implementation with various tools at their disposal (Chapter 4). Identifying the root cause of housing market imbalances and targeting them with macroprudential policy tools have proven effective in smoothing volatility in housing demand and limiting the buildup of financial sector vulnerabilities. In addition to the broad range of macroprudential tools affecting the financial sector, authorities have also employed tax measures to limit housing purchases for investment and speculative reasons. Some economies have introduced and raised stamp duties on property purchases by foreigners to limit systemic financial risks.

**Box Figure 6.1. Macroprudential Tightening Helped to Mitigate the Housing Cycle**



Sources: Haver Analytics; and IMF staff calculations.

Note: LTV = loan-to-value.

The case of Singapore is illustrative of successful efforts at a soft landing (Box Figure 6.1). The country has one of the highest home ownership rates, with dichotomous housing markets comprising owner-occupied and rental public housing<sup>1</sup> along with private housing. The role of nonresidents in the housing market is particularly important in driving housing prices in Singapore's relatively small market. The Monetary Authority of Singapore (MAS) has been implementing a set of well-targeted macroprudential policies in a preemptive way to smooth cycles for credit and housing prices (IMF 2013b, 2015). The MAS introduced a holding period for the imposition of seller's stamp duty (SSD) in 2010 and increased it during 2011-12 to limit speculative demand. The policy was complemented by lower LTV limits and an additional buyer's stamp duty (ABSD) to limit demand in the real estate market. In 2012, a loan tenure cap was introduced, and long tenure loans became subject to lower LTV limits. In 2013, the MAS lowered LTV limits further, raised ABSD rates, and introduced a total debt

servicing ratio (TDSR) framework. In 2015-16, large supply of new homes came on stream, helping to balance the market. The combination of credit and fiscal-based measures along with land use policies to increase housing supply, have proven effective in controlling the volume of property transactions, property prices, and the quality of mortgage loans (Seng, Lim, and Siang Leng 2015).

The authorities remain active in housing policies as they see risks to financial stability arising from excessive increases in housing prices (IMF 2022). In 2021:Q4, the MAS tightened TDSR and LTV limits and raised ABSD rates. It continues to calibrate a comprehensive set of MPMs, standing ready to use them in a countercyclical manner as needed. Efforts are also being ramped up to increase housing supply.

<sup>1</sup> In Singapore, about 4 in 5 people live in public housing ("HDB flats") developed by the Housing & Development Board (HDB), the country's public housing authority. HDB flats are sold to individuals (thus "owner-occupied") who meet eligibility criteria (citizenship, income ceiling, family, and age, among other factors). However, its occupancy is bound by a 99-year lease, and the flat can be sold on the private resale market under certain restrictions.

## Annex 1. Housing Price Decomposition

Empirical estimates for the drivers of real housing prices are based on a structural vector autoregression with theoretically motivated sign restrictions sign restrictions based on Rubio-Ramirez and others (2010). We start with a reduced-form Vector Autoregression model given below:

$$Y_t = c + \beta_1 Y_{t-1} + \dots + \beta_4 Y_{t-4} + \varepsilon_t$$

where  $Y_t$  is a vector of four endogenous variables related to housing: (1) real housing price growth, (2) residential investment as a percent of GDP, (3) the linear-detrended mortgage rate, and (4) the vacancy rate.<sup>1</sup>  $\beta_i$  is a 4×4 matrix for time-invariant parameters for the lagged endogenous variables,  $\varepsilon_t$  is a 4-vector of reduced-form residuals. We impose theoretical motivated sign restrictions to identify four structural shocks: housing supply shock, housing demand shock, mortgage rate shock, and expectations. The identification scheme follows a discussion by Ben-David and others (2019). For example, positive supply shocks, which are associated with an increase in housing supply, reduce housing prices while boosting residential investment. By contrast, positive housing demand shocks are identified as shocks that lead to an increase in real housing prices, investment, and mortgage rates. Positive mortgage rate shocks are associated with lower housing prices and investment. In addition, expectation shocks associated with a change in expected demand of housing in the future are identified using a vacancy rate and other variables. The sign restrictions are applied in the first two quarters after the shocks.

Using identified structural shocks, we compute a historical decomposition of housing price changes. The model is estimated with a Bayesian approach similar to Rubio-Ramirez and others (2010) using quarterly data from 2005:Q1–2021:Q2 for Australia, Japan, New Zealand, and Singapore and 2009:Q1–2021:Q2 for Korea.

**Annex Table 1.1. Identification of Structural Shocks**

	Housing Supply Shock	Housing Demand Shock	Mortgage Rate Shock	Expectation Shock
Real Housing Prices	–	+	–	+
Residential Investment/GDP	+	+	–	+
Mortgage Rate (detrended)	n.a.	+	+	n.a.
Per capita Housing Stock	+	–	n.a.	+

Source: IMF staff estimates.

<sup>1</sup> As for the vacancy rate, housing stock-to-population data are used for New Zealand and the (inverse of) domestic supply-demand conditions of real estate sector from Takan survey is used for Japan due to data constraints.

## Annex 2. Housing Price-at-Risk

Housing price at risk is estimated using panel quantile regression following IMF (2019) and Deghi and others (2020). We estimate the equation

$$\Delta Y_{c,t}^h = \alpha_{c,h}^\tau + \beta_h^\tau X_{c,t} + \varepsilon_{c,t}^{\tau,h}$$

where  $\Delta Y_{c,t}^h$  is the h quarter ahead (4 or 8 quarters) percent change in real housing prices in country c at time t,  $X_{c,t}$  independent variables which predict future housing price risks,  $\tau$  is the percentile for which the quantile regression is estimates (5th percentile and median), and  $\alpha_{c,h}^\tau$  are country fixed effects. Data on real housing prices is taken from BIS.

The main independent variables we include in the regression are: (1) housing price misalignment measured using deviation from HP-filter trend in house-price-to-income ratio (HPI data from IMD SPR Risk Tracker); (2) short-term interest rates from CEIC; (3) output gap based on a linear interpolation from annual data from the *World Economic Outlook*<sup>2</sup>; (4) household credit to GDP from BIS, detrended using country-specific linear trends; and (5) lagged housing price growth from BIS. Global financial conditions were also considered as an additional explanatory variable but were generally insignificant, especially after the inclusion of domestic short-term interest rates in the model.

Our main analysis is for a sample of six AEs (Australia, Hong Kong SAR, Japan, Korea, New Zealand, Singapore,) and six EMs (India, China, Malaysia, Indonesia, Thailand, Philippines), but we also compare our results for Asia-Pacific to a broader sample of countries for which house price data are available from BIS with the world sample consisting of 27 AEs and 15 EMs. As housing market structures and price dynamics can be very different between AEs and EMs, the analysis is done separately for the two groups.

Annex Table 2.1 shows our main quantile regression results for the 5th percentile, while Annex Table 2.2 shows results for the median. Columns 1 and 2 show results for regional AEs for four-quarter and eight-quarter-ahead housing price growth, respectively, while columns 3 and 4 do the same for the broader AE sample. Columns 5 and 6 are for regional EMs while columns 7 and 8 are for the broader EM sample.

<sup>2</sup> Results are broadly similar if the output gap is estimated using an HP filter on quarterly GDP data. However, due to the unique nature of the pandemic and its impact on potential output, a standard filter is likely to give biased estimates for the output gap during the pandemic. Hence we use interpolated WEO output gap data as our baseline.

Annex Table 2.1. House-Price-At-Risk: 5th Percentile Panel Quantile Regressions

Variables	(1)		(2)				(3)				(4)				(5)				(6)				(7)				(8)			
			Advanced Economies		Emerging and Developing Economies																									
			Asia		World		World		World		World		World		World		World		World		World		World		World		World			
	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead				
House price misalignment	-1.329*** (0.205)	-1.818*** (0.263)	-1.244*** (0.0990)	-2.065*** (0.139)	-0.618** (0.253)	-0.998*** (0.308)	-0.743* (0.435)	-1.100** (0.521)	-0.183 (0.436)	-1.601*** (0.606)	-0.0396 (0.154)	-0.487*** (0.0539)	-0.0431 (0.167)	-0.649*** (0.236)	-1.126*** (0.165)	-1.860*** (0.387)	-1.323*** (0.264)													
Short-term interest rate	-0.707** (0.307)	-1.770*** (0.401)	-0.298*** (0.0988)	-0.578*** (0.143)	-0.743* (0.435)	-1.100** (0.521)																								
Output gap	-1.267*** (0.326)	-1.080** (0.439)	-0.660*** (0.106)	-0.950*** (0.156)	-0.183 (0.436)	-1.601*** (0.606)																								
Hh credit, deviation from trend	-0.158 (0.132)	-0.480*** (0.181)	-0.209*** (0.0339)	-0.487*** (0.0539)	-0.0396 (0.154)	-0.431 (0.167)																								
Current house price growth	0.385*** (0.115)	0.434*** (0.148)	0.612*** (0.0593)	0.809*** (0.0809)	0.242 (0.163)	0.662*** (0.211)																								
Observations	588	564	2,432	2,324	383	359																								

Source: IMF staff calculations.  
Standard errors in parentheses  
\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Annex Table 2.2. House-Price-At-Risk: Median Panel Quantile Regressions

Variables	(1)		(2)		(3)		(4)		(5)		(6)		(7)		(8)	
			Advanced Economies		World		World		Emerging and Developing Economies		Asia		Asia		World	
	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead	4 Quarters Ahead	8 Quarters Ahead
House price misalignment	-1.376*** (0.0929)	-1.923*** (0.106)	-1.235*** (0.0438)	-2.171*** (0.0581)	-0.978*** (0.0809)	-1.397*** (0.120)	-0.978*** (0.0809)	-1.397*** (0.120)	-0.978*** (0.0809)	-1.397*** (0.120)	-0.977*** (0.0588)	-1.757*** (0.104)	-0.977*** (0.0588)	-1.757*** (0.104)	-0.977*** (0.0588)	-1.757*** (0.104)
Short-term interest rate	-0.215 (0.140)	-1.035*** (0.163)	-0.113*** (0.0437)	-0.215*** (0.0603)	-0.120 (0.139)	-0.818*** (0.201)	-0.120 (0.139)	-0.818*** (0.201)	-0.120 (0.139)	-0.818*** (0.201)	0.0812 (0.0709)	0.439*** (0.117)	0.0812 (0.0709)	0.439*** (0.117)	0.0812 (0.0709)	0.439*** (0.117)
Output gap	-0.806*** (0.149)	-0.904*** (0.177)	-0.469*** (0.0468)	-0.894*** (0.0652)	-0.352** (0.139)	-1.258*** (0.234)	-0.352** (0.139)	-1.258*** (0.234)	-0.352** (0.139)	-1.258*** (0.234)	-0.694*** (0.0841)	-1.928*** (0.151)	-0.694*** (0.0841)	-1.928*** (0.151)	-0.694*** (0.0841)	-1.928*** (0.151)
Hh credit, deviation from trend	-0.140** (0.0597)	-0.413*** (0.0727)	-0.116*** (0.0150)	-0.327*** (0.0227)	0.0413 (0.0488)	0.0786 (0.0645)	0.0413 (0.0488)	0.0786 (0.0645)	0.0413 (0.0488)	0.0786 (0.0645)	-0.150*** (0.0371)	-0.366*** (0.0581)	-0.150*** (0.0371)	-0.366*** (0.0581)	-0.150*** (0.0371)	-0.366*** (0.0581)
Current house price growth	0.435*** (0.0522)	0.553*** (0.0596)	0.615*** (0.0262)	0.959*** (0.0340)	0.469*** (0.0519)	0.822*** (0.0816)	0.469*** (0.0519)	0.822*** (0.0816)	0.469*** (0.0519)	0.822*** (0.0816)	0.595*** (0.0375)	1.100*** (0.0696)	0.595*** (0.0375)	1.100*** (0.0696)	0.595*** (0.0375)	1.100*** (0.0696)
Observations	588	564	2,432	2,324	383	359	383	359	383	359	932	872	932	872	932	872

Source: IMF staff calculations.  
Standard errors in parentheses  
\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

## Annex 3. Estimating the Impact of MPMs

Measuring causal effects of macroprudential policy is challenging since policy actions are often a result of macroeconomic developments, resulting in endogenous responses. Ideally, the analysis requires construction of a measure of macroprudential policy shocks that are exogenous with respect to the current and lagged real variables, are uncorrelated with other shocks, and are unexpected. Given the cross-country nature of this analysis, it is not feasible to gather qualitative information to disentangle policy interventions that target the financial cycle without being driven by concerns about growth (or inflation). Hence, for the purpose of this analysis, we rely on the local projection method proposed by Jordà (2005) to estimate the dynamic effects of macroprudential policy on household credit and housing prices using the following equation:

$$HC_{i,t+h} = u_i + \alpha_h iMaPP_{i,t} + \sum_{\ell=1}^L \psi_{h,\ell} \Delta HC_{i,t-\ell} + \sum_{\ell=1}^L \gamma_{h,\ell} \Delta iMaPP_{i,t-\ell} + \sum_{\ell=1}^L \psi_{h,\ell} \Delta HC_{i,t+\ell} + \sum_{\ell=1}^h \gamma_{i,\ell} \Delta iMaPP_{i,t+\ell} + \sum_{\ell=0}^h \psi_{i,\ell} X_{i,t+\ell} + I_t + \varepsilon_{i,t+h}$$

where,  $HC_{i,t+h}$  is household credit (or housing prices), in country  $i$  at date  $t$

$iMaPP_{i,t}$  is macroprudential policy (see below)

$X_{i,t+\ell}$  is a vector of macroeconomic controls – GDP growth and policy interest rates,

$I_t$  are the time fixed effects controlling for global (common) factors

$u_i$  are country-fixed effects to account for time-invariant country-specific characteristics

The analysis controls for the past and future path of macroprudential policy as well as macroeconomic developments to address endogeneity concerns. Including lags and leads of the dependent variable (credit growth or housing prices) helps with identification. Our results continue to hold if the macroprudential policy index is purged of variation due to credit growth (see Brandao-Marques and others 2020).

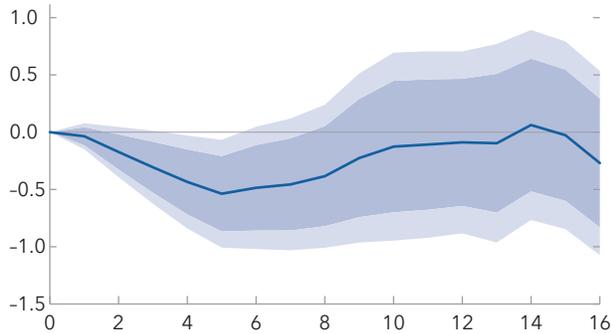
Information on the use of macroprudential policy tools is derived from the latest version of the IMF comprehensive database (iMaPP) database updated through 2020. The aggregate iMaPP index used in our baseline specification is constructed as a sum of policy action indicators from 17 types of instruments, each taking the value +1 for tightening, -1 for loosening, and 0 for no change or neutral action. The instruments consist of demand instruments—limits on LTV and DSTI ratios; supply measures—limits to credit growth, loan loss provisions, loan restrictions, limits to the loan-to-deposit ratio, and limits to foreign currency loans; general supply tools—reserve requirements, liquidity requirements, and limits to FX positions; and capital instruments—leverage limits, countercyclical buffers, conservation buffers, and capital requirements. Other specifications explore the impact of individual instruments such as capital requirements and LTVs. In the case of LTV, instead of a dummy, a simple average of regulatory LTV limits is used. See Alam and others (2019) for further details.

Impulse response functions are estimated for an unbalanced panel of up to 42 countries over the period 2000–20 using quarterly data (Annex Figure 3.1). However, the focus in the main text is on 12 economies from the Asia-Pacific region.<sup>3</sup> Data on housing prices are available from the OECD and BIS, while macroeconomic controls are taken from the IMF World Economic Outlook database.

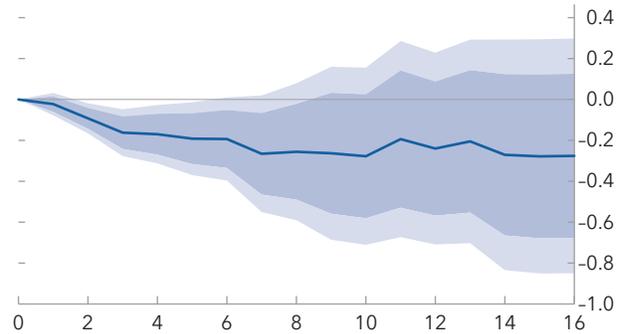
<sup>3</sup> Specifically, Australia, China, Hong Kong SAR, India, Indonesia, Japan, Korea, Malaysia, New Zealand, the Philippines, Singapore, and Thailand.

**Annex Figure 3.1. Impact of Macroprudential Policies—Global Sample**

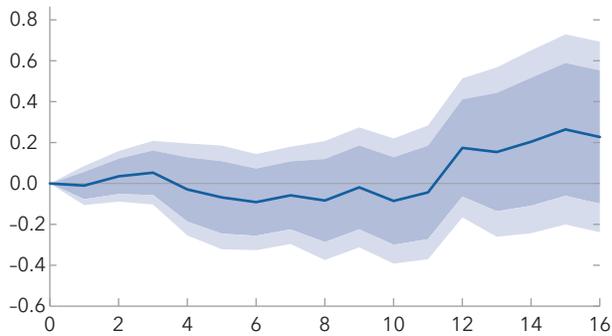
**1. All: Household Credit Response to Macroprudential Tightening**



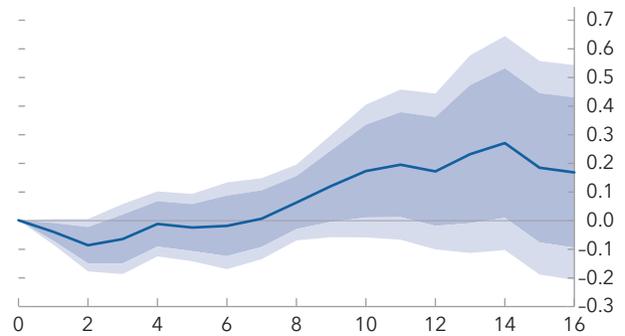
**2. All: Household Credit Response to LTV Tightening**



**3. All: Household Credit Response to Capital Requirements**



**4. All: Household Credit Response to Tax Measures for Macroprudential Purposes**



Source: IMF staff estimates.  
 Note: LTV = loan-to-value.

## References

- Aizawa, Toshiaki, Matthias Helble, and Kwan Ok Lee. 2020. "Housing Inequality in Developing Asia and the United States: Will Common Problems Mean Common Solutions?" *Journal of Policy Development and Research* 22 (2).
- Alam, Zohair, Adrian Alter, Jesse Eiseman, RG Gelos, Heedon Kang, Machiko Narita, Erlend Nier, and Naixi Wang. 2019. "Digging Deeper—Evidence on the Effects of Macroprudential Policies from a New Database." IMF Working Paper No. 2019/066, International Monetary Fund, Washington, DC.
- Allen, J., Grieder, T., Peterson, B. and Roberts, T. 2020. "The Impact of Macroprudential Housing Finance Tools in Canada." *Journal of Financial Intermediation* 42: 100761.
- Angel, Shlomo. 2012. *Planet of Cities*. Cambridge, MA: Lincoln Institute of Land Policy.
- Aoki, Kosuki, James Proudman, and Gertjan Vlieghe. 2004. "House Prices, Consumption, and Monetary Policy: A Financial Accelerator Approach." *Journal of Financial Intermediation* 13 (October) 414–35.
- Ampudia, Miguel, Marco Lo Duca, Mátyás Farkas, Gabriel Perez-Quiros, Mara Pirovano, Gerhard Rünstler, and Eugen Tereanu. 2021. "Avoiding a Financial Epidemic—The Role of Macroprudential Policies." Research Bulletin No. 87.3, European Central Bank, Frankfurt.
- Araujo, Juliana Dutra, Manasa Patnam, Adina Popescu, Fabian Valencia, and Weijia Yao. 2020. "Effects of Macroprudential Policy: Evidence from Over 6,000 Estimates." IMF Working Paper 67, International Monetary Fund, Washington, DC.
- Arestis, Philip, and Ana Rosa Gonzalez-Martinez. 2017. "Importance of Demographics For Housing in the OECD Economies." *Bulletin of Economic Research* 69 (1).
- Asian Development Bank (ADB). 2019. *Asian Development Outlook 2019 Update: Fostering Growth and Inclusion in Asia's Cities*. Manila.
- Badarinza, Cristian, Vimal Balasubramaniam, and Tarun Ramadorai. 2019. "The Household Finance Landscape in Emerging Economies." *Annual Review of Financial Economics* 11 (1): 109–29.
- Bank for International Settlements (BIS). 2011. *Macroprudential Policy Tools and Frameworks: Progress Report to G20*. Basel.
- Basel Committee on Banking Supervision (BCBS). 2010. "Guidance for National Authorities Operating the Countercyclical Capital Buffer." Basel.
- Behr, Daniela M., Lixue Chen, Ankita Goel, Khondoker Tanveer Haider, Sandeep Singh, and Asad Zaman. 2021. "Introducing the Adequate Housing Index." World Bank, Washington, DC.
- Ben-David, Itzhak, Pascal Towbin, and Sebastian Weber. 2019. "Inferring Expectations from Observables: Evidence from the Housing Market." National Bureau of Economic Research Working Paper No. 25702.
- Bernanke, Ben, Mark Gertler, and Simon Gilchrist. 1999. "The Financial Accelerator in a Quantitative Business Cycle Framework." In *Handbook of Macroeconomics*. Amsterdam: North-Holland.
- Brandao-Marques M. L., Gelos M. R., Narita M. M., and Nier E. 2020. "Leaning Against the Wind: A Cost-Benefit Analysis for An Integrated Policy Framework." IMF Working Paper No. 2020/123, International Monetary Fund, Washington, DC.
- Brunton, Matthew. 2021. "Measures for Assessing the Sustainability of House Prices in New Zealand." RBNZ Analytical Notes, Reserve Bank of New Zealand, Wellington.

- Buch, Claudia, and Linda Goldberg. 2016. "Cross-Border Prudential Policy Spillovers: How Much? How Important? Evidence from the International Banking Research Network." NBER Working Paper Series 22874, National Bureau of Economic Research, Cambridge, MA.
- Cerutti, Eugenio, Stijn Claessens, and Luc Laeven. 2017. "The Use and Effectiveness of Macroprudential Policies: New Evidence." *Journal of Financial Stability* 28: 203-224.
- Cerutti, Eugenio, Jihad Dagher, and Giovanni Dell'Ariccia. 2015. "Housing Finance and Real Estate Booms: A Cross-Country Perspective." IMF Staff Discussion Note 15/12, International Monetary Fund, Washington, DC
- Chetty, Raj, Nathaniel Hendren, Patrick Kline, and Emanuel Saez. 2014. "Where is the Land of Opportunity? The Geography of International Mobility in the United States." *Quarterly Journal of Economics* 129 (4).
- Cizel, Janko, Jon Frost, Aerdt Houben, and Peter Wierdsma. 2019. "Effective Macroprudential Policy: Cross-Sector Substitution from Price and Quantity Measures." *Journal of Money, Credit and Banking* 51 (5).
- Claessens, Stijn, Ayhan Kose, and Marco E. Terrones. 2008. "What Happens During Recessions, Crunches and Busts?" IMF Working Paper, International Monetary Fund, Washington, DC.
- Committee on the Global Financial System (CGFS). 2012. "Operationalising the Selection and Application of Macroprudential Instruments," CGFS Papers No. 48 (Basel: Committee on the Global Financial System).
- de Araujo, D.K.G., Barroso, J. B. R. B., and Gonzalez, R. B. 2020. Loan-to-Value Policy and Housing Finance: Effects on Constrained Borrowers. *Journal of Financial Intermediation* 42: 100830.
- Deghi, Andrea, Mitsuru Katagiri, Sohaib Shahid, and Nico Valckx. 2020. "Predicting Downside Risks to House Prices and Macro-Financial Stability." IMF Working Paper 20/11, International Monetary Fund, Washington, DC.
- Dell'Ariccia, Giovanni, Ehsan Ebrahimy, Deniz Igan, and Damien Puy. 2020. "Discerning Good from Bad Credit Booms: The Role of Construction." IMF Staff Discussion Note, International Monetary Fund, Washington, DC.
- Duca, J. V., Muellbauer, J., and Murphy, A. 2010. "Housing Markets and the Financial Crisis of 2007-2009: Lessons for the Future." *Journal of Financial Stability* 6 (4): 203-17.
- Dye, Richard, and Richard England. 2010. "Assessing the Theory and Practice of Land Value Taxation." Lincoln Institute of Land Policy, Cambridge, MA.
- European Central Bank. 2011. "Tools for Detecting a Possible Misalignment of Residential Property Prices from Fundamentals." *Financial Stability Review*, June 2011.
- Fitchett, Hamish, and Punnoose Jacob. 2022. "How Do We Stack Up? The New Zealand Housing Market in the International Context." RBNZ Analytical Note Series, AN2022/06, Reserve Bank of New Zealand, Wellington.
- Glindro, Eloisa T., Tientip Subhanij, Jessica Szeto, and Haibin Zhu. 2011. "Determinants of House Prices in Nine Asia-Pacific Economies." *International Journal of Central Banking* 7 (3): 163-204.
- Human Rights Council (HRC). 2020. "Guidelines for the Implementation of the Right to Adequate Housing." United Nations General Assembly, New York.
- International Monetary Fund (IMF). 2011. "Macroprudential Policy: An Organizing Framework-Background Paper." Washington, DC.
- International Monetary Fund (IMF). 2013a. "Key Aspects of Macroprudential Policy." IMF Policy Paper, Washington, DC.

- International Monetary Fund (IMF). 2013b. "Singapore—Staff Report for the 2013 Article IV Consultation." IMF Country Report No.13/328, Washington, DC.
- International Monetary Fund (IMF). 2014. "Staff Guidance Note on Macroprudential Policy." Washington, D.C.
- International Monetary Fund (IMF). 2015. "2015 Article IV Consultation—Press Release; Staff Report; and Statement by the Executive Director for Singapore." IMF Country Report No.15/199, Washington, DC.
- International Monetary Fund (IMF). 2018. "House Price Synchronization: What Role for Financial Factors?" Chapter 3 in *Global Financial Stability Report*, Washington, DC, April.
- International Monetary Fund (IMF). 2019. *Global Financial Stability Report*. Washington, DC, April.
- International Monetary Fund (IMF). 2022. "2022 Article IV Consultation—Press Release; Staff Report; and Statement by the Executive Director for Singapore." IMF Country Report No.22/233, Washington, DC.
- International Monetary Fund, Financial Stability Board, Bank for International Settlements (IMF-FSB-BIS). 2016. "Elements of Effective Macroprudential Policies: Lessons from International Experience." Washington, DC.
- Jordà, Òscar. 2005. "Estimation and Inference of Impulse Responses by Local Projections." *American Economic Review* 95 (1): 161–82.
- Kose, M. Ayhan, Christopher Otrok, and Charles H. Whiteman. 2003. "International Business Cycles: World, Region, and Country-Specific Factors." *American Economic Review* 93 (4): 1216–39.
- Kuttner, Kenneth N., and Ilhyock Shim. 2013. "Can Non-Interest Rate Policies Stabilise Housing Markets? Evidence from a Panel of 57 Economies." BIS Working Paper 433, Bank for International Settlements, Basel.
- Laeven, Luc, and Fabian Valencia. 2018. "Systemic Banking Crises Revisited." IMF Working Paper, WP/18/206. International Monetary Fund, Washington, D.C.
- Liu, Jian, and Huay Ying Ong. 2021. "Can Malaysia's National Affordable Housing Policy Guarantee Housing Affordability of Low-Income Households?" *Sustainability* 2021 (13): 8841.
- Logan, Lorie K. 2019. "Liquidity Shocks: Lessons Learned from the Global Financial Crisis and the Pandemic." Remarks at the 2021 Financial Crisis Forum, Panel on Lessons for Emergency Lending, virtual, August 11.
- McDonald, Chris. 2015. "When is Macroprudential Policy Effective?" BIS Working Paper 496, Bank for International Settlements, Basel.
- Mian, Atif, and Amir Sufi. 2014. "What Explains the 2007–2009 Drop in Employment?" *Econometrica* 82 (6).
- Organisation for Economic Co-operation and Development (OECD). 2020. "Social Housing: A Key Part of Past and Future Housing Policy." Employment, Labour, and Social Affairs Policy Briefs, Paris.
- Phang, Sock Yong, and Matthias Helble. 2016. "Housing Policies in Singapore," In *The Housing Challenge in Emerging Asia: Options and Solutions*, edited by N. Yoshino and M. Helble. Tokyo: Asian Development Bank Institute.
- Philipponnet, N. and Turrini, A. 2017. "Assessing House Price Developments." EU (No. 048). Directorate General Economic and Financial Affairs (DG ECFIN), European Commission, Brussels.
- Reinhardt, Dennis, and Rhiannon Sowerbutts. 2015. "Regulatory Arbitrage in Action: Evidence from Banking Flows and Macroprudential Policy." Staff Working Paper 546, Bank of England, London.

- Richter, Björn, Moritz Schularick, and Ilhyock Shim. 2019. "The Costs of Macroprudential Policy." *Journal of International Economics* 118: 263–82.
- Ronald, Richard, and John Doling. 2014. "The Changing Shape of the East Asian Housing Model." In *Housing East Asia: Socioeconomic and Demographic Challenges*, edited by J. Doling and R. Ronald. London: Palgrave Macmillan.
- Rubio-Ramirez, Juan F., Daniel F. Waggoner, and Tao Zha. "Structural Vector Autoregressions: Theory of Identification and Algorithms for Inference." *The Review of Economic Studies* 77 (2): 665–96.
- Seng, Wong Nai, Aloysius Lim, and Wong Siang Leng. 2015. "Using Macroprudential Tools to Address Systemic Risks in the Property Sector in Singapore." *SEACEN Financial Stability Journal* 5.
- Sharma, Manoj, Sung Su Kim, Hyungchan Lee, and Jung Won Sonn. 2021. "Affordable Housing Policies in the United Kingdom and Their Lessons for Developing Asia." ADB Briefs 190, Asian Development Bank, Manila.
- Stephens, Dominick, and others. 2022. "Assessment of the Housing System: With Insights from the Hamilton-Waikato Area." Ministry of Housing and Urban Development, Reserve Bank of New Zealand, and the Treasury. Housing Technical Working Group, Wellington.
- United Nations Human Settlements Programme (UN-HABITAT). 2011. "Affordable Land and Housing in Asia." Adequate Housing Series 2, Nairobi.
- United Nations Human Settlements Programme (UN-HABITAT). 2021. "The Role of Land in Achieving Adequate and Affordable Housing." Nairobi.
- United Nations (UN). 2018. *World Urbanization Prospects: 2018 Revision*. New York.
- World Bank. 2014. "Access to Affordable and Low-Income Housing in East Asia and the Pacific." Sustainable Development Department—East Asia and Pacific Region. Washington, DC.
- World Bank. 2015. "East Asia's Changing Urban Landscape: Measuring a Decade of Spatial Growth." Urban Development Series, Washington, DC.
- Yoshino, Naoyuki, and Matthias Helble. 2016. *The Housing Challenge in Emerging Asia: Options and Solutions*. Tokyo: Asian Development Bank Institute.



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