Arizona Housing Affordability Update
February 2023

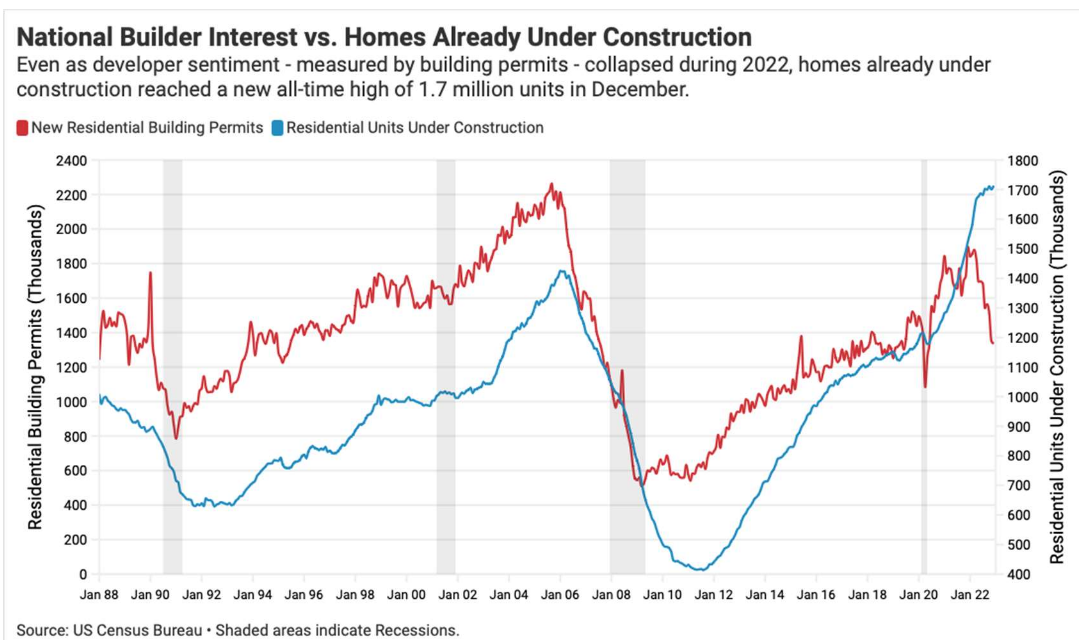
The ongoing housing recession continued for the seventh consecutive month in January. Since peaking in June, local home prices have fallen 10.3%. Ongoing rising interest rate pressures, a collapse in buyer interest, and lags in the construction and permit approval cycle will likely put continued downward pressure on prices over the next year. CSI estimates that home prices by various measures will continue falling over the next year.

Key Findings:

- **74,419 units:** The 2022 Arizona housing shortfall, a decline of 25% year-over-year. This large decline is likely a function of falling demand rather than rising supply – the underlying supply-side constraints that revealed themselves over the past few years remain.
- **-12.5%:** The decline in CSI's 'Homebuyer Misery Index' (now 91.6) since reaching an all-time peak value of 104.7 in June 2022. Index values above zero imply relatively more homebuyer misery than historically normal. Improving buyer conditions are due to prices (-10.3% from peak) and mortgage rates (-9.1% from peak).
- **1.7 million units:** Number of housing units currently under construction nationwide – the most ever. As these units enter the market during a period of falling demand, they will put continued downward pressure on home prices.
- **67 hours/month:** The amount of time the typical Arizona household needs to work to pay the monthly mortgage on an average home - +48% in the past year. This is still among the most expensive periods ever to buy a home in Arizona.

Housing Market Slowdown Comes Just As Construction Began to Catch up to Demand

During and after the 2008 'Great Recession', national new home construction tumbled, and recovery was slow. This phenomenon was particularly stark in Arizona, where permit activity fell from a 2005 peak of nearly 90,000 annual authorizations to just 12,600 in 2010. By 2019 Arizona was authorizing just 45,000 new units a year – about half its pre-Recession level.



Finally, following the 2020 pandemic and related restrictions, Arizona and the U.S. appeared to be on the cusp of a building boom. Indeed, CSI Arizona's initial report on the Arizona housing market based on May 2022 data described relatively "rapid home construction", and subsequent reports described a "nascent construction boom". Permit activity surged to the equivalent of an annualized 75,000 units/year being authorized for construction in Arizona by early 2022.

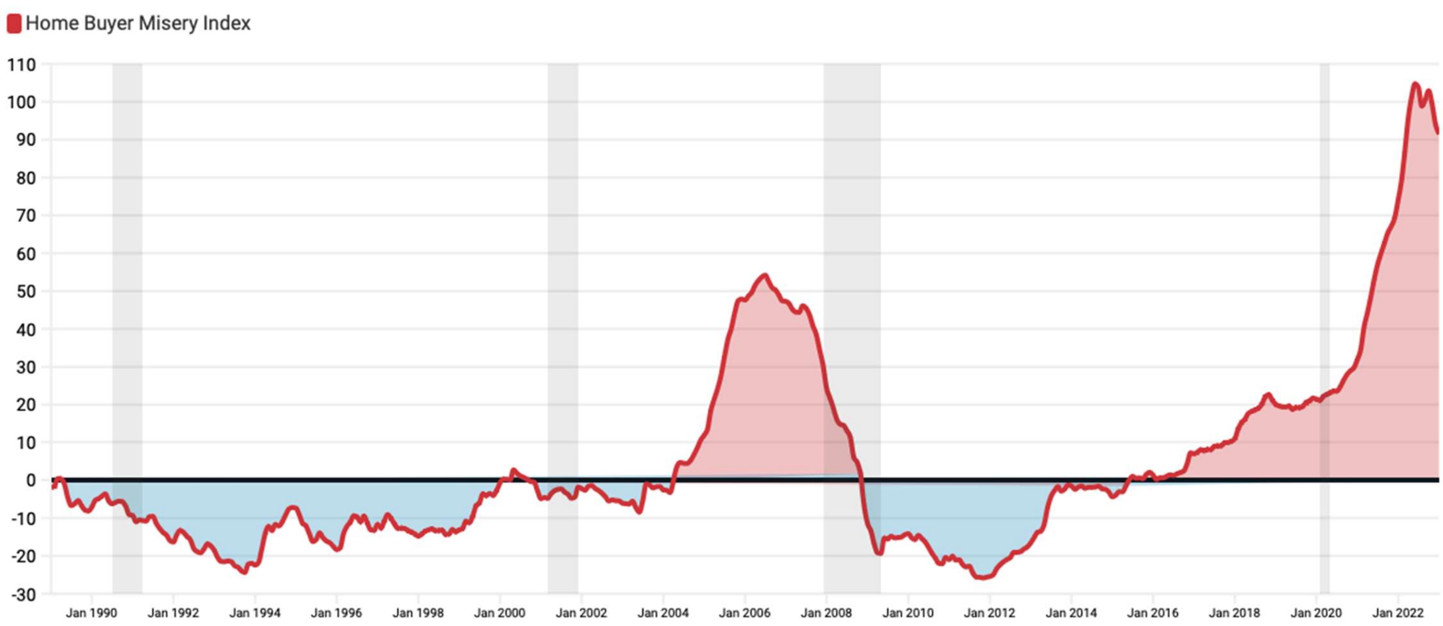
Since then, sentiment has collapsed – permit activity is slowing rapidly (down 30% from peak), and surveys of homebuyer and homebuilder confidence reflect the coolest sentiment since the Great Recession. However, supply and regulatory constraints (construction times have increased 25% since 2012[i]) have created a curious and unprecedented inversion, in that collapsing buyer and developer interest comes just as the home construction pipeline continues to peak. **More than 1.7 million homes are currently under construction in the United States (the most ever), and this supply will continue entering the market over the next 8 months even as demand evaporates.** That will exacerbate downward price pressures and could have broad consequences. Developers are likely to take substantial losses on these properties relative to expectations when development began.

Despite Falling Prices, Home Buyer Misery Remains Elevated by Rising Rates

In January, the Phoenix 'Misery Index' was 91.6 – a decrease of 2.7% from August and a decline of 12.5% from the all-time peak value of 104.7 reached in June.

Phoenix 'Misery Index' of Mortgage Rates & Home Prices

After peaking in June at a value of +104.7, the Misery Index has declined 12.5% to 91.6 in January. For context, the prior peak was 54.2, and the long-run average is set to zero.



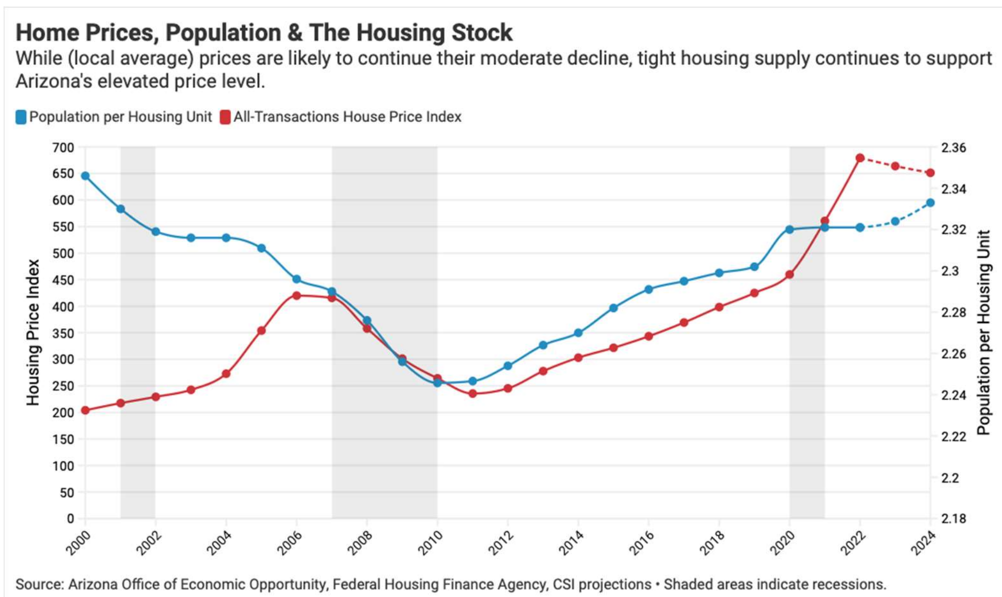
Source: S&P Dow Jones Indices, Primary Mortgage Market Survey • Shaded areas indicate Recessions.

Declining homebuyer misery (or improving buyer sentiment) is attributable to a combination of falling home prices (down 10.3% from their all-time peak set in June 2022) and falling interest rates (down 9.1% from their current-cycle peak set in October 2022). Still, conditions for homebuyers remain miserable relative to historical norms; the prior peak value (54.2 in July 2007) was nearly 70% lower than current levels.

As a reminder, the Misery Index sums normalized and equally weighted home prices and 30-year mortgage rates to measure effective costs of homebuying relative to historical levels. The long-run average of this sum, excluding outlying values, is defined to be zero or neutral buyer sentiment[ii]. Sustained values above zero (positive numbers) indicate periods of increased homebuyer misery; negative values indicate periods of decreased misery (a 'buyer's market'). The two periods of sustained positive homebuyer misery were the 2006 'housing bubble', and the current market.

To return to a long-run average level would require dramatic and improbable declines in both prices and mortgage rates. More likely, a 'new normal' will develop over time as the market adjusts to permanently increased homebuying costs (both in terms of prices and mortgage interest rates) relative to the previous thirty years.

Local Market Fundamentals in Arizona Suggest More Price Declines Coming

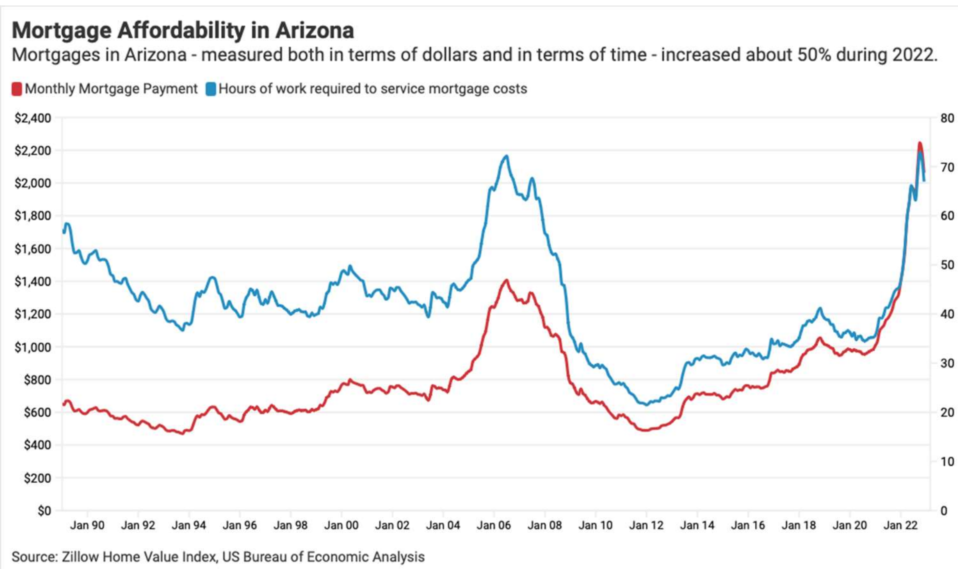


Historically, housing price changes have shown a strong relationship with both population – especially relative to available housing supply – and mortgage rates, or the costs of borrowing. Specifically, about half the variability in Arizona home price changes since 2000 can be explained by changes in the ratio of population to housing units, and the average interest rate on a new 30-year mortgage. When the population per housing unit ratio is high, or mortgage rates are low, prices tend to increase; when the reverse is true prices tend to fall. Over the observed 22-year window, in fact, there were only two periods that experienced marked deviation from this expected trend: 2005 and 2006, and 2021 through the first half of 2022. During both events, prices increased much more quickly than this simple model of supply and demand would have predicted. Correspondingly, subsequent price declines following the first marked deviation were larger than would have been expected based solely on relatively higher interest rates and low population per housing unit (or, alternatively, a high supply of housing relative to the state's population).

According to the All-Transactions House Price Index for Arizona[iii], home prices in 2021 were 22% higher than the year prior, and over the first six months of 2022 prices rose another 24% - for a cumulative increase of over 50% in just 18 months. Many of these gains can be explained by relatively rapid in-migration-driven population growth during the pandemic period, historically low interest rates, and a general shift in consumer demand for housing. Correspondingly, rising rates and a slowdown in homebuilding will lead to lower price growth. However, some of this rapid appreciation goes beyond what fundamentals – population and borrowing costs alone – would predict. That differential creates a "price gap" that appears to be rapidly correcting in the face of collapsing demand as the economic cycle peaks.

Given these trends in interest rates, homebuilding, and population growth, **CSI now anticipates that average home prices will continue slowly falling over the next 1-2 years, but with significant volatility around these averages depending on region**. To-date, home price declines have been closer to 4%, suggesting further declines are likely over the next 6-12 months. This analysis assumes both that homebuilding does not slow more over the next year than already observed and anticipated, and that average mortgage interest rates over the next year are 6.5%. Note also that this data considers *all homes* – including homes refinanced and not sold – and therefore is likely to be slower and smoother in adjusting to changing market conditions that observed market prices (homes sold and not simply appraised for refinance).

Mortgage Rates Began Falling in October 2022 When Mortgages Became Unaffordable



Even as prices began falling in July 2022, mortgage affordability – in terms of time and dollars – continued falling due to rapidly rising interest rates. In October, when mortgage rates peaked, a typical Arizona household would have needed to work a record 72.9 hours to afford a mortgage on an average home – an all-time high for Arizona's housing market back to at least 1989. This level is critical; given conventional mortgage guidelines, there is a ceiling on mortgage costs at *exactly* 72 hours of monthly work. Theoretically you cannot sustain a mortgage market where the typical household, buying an average home, needs to work more than 72 hours/month to service their mortgage costs (this is because underwriting guidelines recommend limiting mortgage costs to no more than 28% of household income).

As of December, at prevailing hourly Arizona wages, a typical household would need to work 67.0 hours per month (+48% year-over-year) to service an average mortgage at current prices and rates. This is a decline of 8% from the all-time high set in October of last year. Interestingly, over the same period Arizona home prices have fallen only 2.8%; the bulk of the improvement came from mortgage rates, which have fallen much more quickly than home prices.

Arizona Home Prices, Mortgage Payments, and Work Requirements

Date	Average Home Price	30-Year Mortage Rate	Mortage Payment	Average Wage Rate	Hours of Work Required	Year-Over-Year % Change
12/2015	$ 200,612	3.96%	$ 762.87	$ 23.23	32.84	7.18%
12/2016	$ 214,720	4.20%	$ 839.81	$ 24.07	34.89	6.24%
12/2017	$ 231,303	3.95%	$ 878.09	$ 25.42	34.54	-0.99%
12/2018	$ 250,253	4.64%	$ 1,030.82	$ 25.86	39.86	15.4%
12/2019	$ 266,889	3.72%	$ 985.17	$ 26.92	36.60	-8.19%
12/2020	$ 303,905	2.68%	$ 984.05	$ 27.92	35.25	-3.69%
12/2021	$ 386,609	3.10%	$ 1,320.37	$ 29.15	45.30	28.52%
12/2022	$ 414,226	6.36%	$ 2,064.14	$ 30.81	67.00	47.91%

Source: Bureau of Labor Statistics, Freddie Mac, Zillow Data

Arizona's Housing Supply Hasn't Kept Pace With Demand

Arizona's housing supply deficit in 2022 decreased to 74,419 units from just over 98,000 units in 2021 (-24.2%). The shortfall peaked in 2020 at 104,087 units – reflecting the rapid change in Arizona's housing market during the pandemic era driven by the combination of brisk in-migration, increased demand for housing during the nations experiment with stay-at-home orders, and the slowdown in permitting and homebuilding during 2020. Just to keep pace with natural population growth and historic household formation, the state needs to add roughly 47,300 new housing units annually; to close the shortfall in five years, this annual demand for new supply increases to 62,200 units.

As of December, Arizona will have permitted 60,400 new residential units for construction during 2022, and CSI projects that 53,209 finished housing units were added last year and 49,743 are expected during 2023. At this point, it is unlikely new supply alone will be added fast enough to eliminate the state's housing shortfall, and most of the improvement in the past year likely came from decreased demand for housing due to rising home prices and mortgage interest rates.

CSI Arizona's projected housing supply deficit exploits the historical correlation observed between the change in home prices and the effective housing vacancy rate (weighted across both the rental and owner-occupied housing stock)[iv]. Since 1986 the average effective vacancy rate for Arizona housing has been 5.00%. In 2009 – at the peak of the Great Recession and during a period of rapid home price depreciation – the vacancy rate reached its contemporary peak of 8.41%. In 2019, heading into the pandemic and the current period of unusually volatile home prices, vacancy rates were already relatively low at 2.88%. As of 2021 the rate had fallen to just 2.20% - the lowest Arizona vacancy rate on record and suggesting an extremely tight state housing market.

To estimate the housing deficit implied by deviations of county-by-county and statewide vacancy rates from their long-run average, CSI determined how many new housing units would need to be added to the

Arizona's Housing Shortage, By County, Since 2020

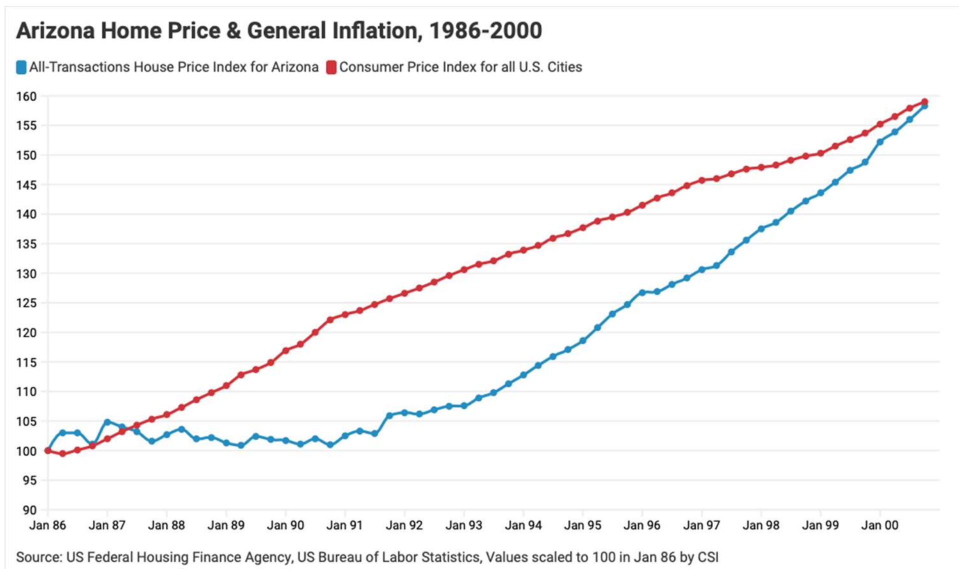
The large decline in the 2022 estimates is likely a function of falling demand more than rising supply.

County	2020 Deficit	2021 Deficit	2022 Deficit	Rank	Shortfall as % of Existing	5-year Construction Needed
Apache County	(957)	(1,092)	(894)	5	3.10%	60
Cochise County	(2,193)	(1,424)	(1,016)	7	1.72%	385
Coconino County	(2,467)	(1,538)	(1,057)	8	1.51%	756
Gila County	(967)	(1,172)	(949)	6	2.91%	261
Graham County	(272)	(404)	(309)	3	2.22%	130
Greenlee County	(63)	(111)	(80)	1	1.82%	2
La Paz County	(243)	(379)	(284)	2	2.08%	(58)
Maricopa County	(60,514)	(59,186)	(44,086)	15	2.38%	42,165
Mohave County	(3,652)	(4,756)	(3,980)	11	3.33%	2,385
Navajo County	(922)	(2,229)	(1,851)	9	3.26%	554
Pima County	(14,796)	(13,324)	(10,106)	14	2.13%	6,796
Pinal County	(6,767)	(5,311)	(4,204)	12	2.35%	5,112
Santa Cruz County	(537)	(666)	(541)	4	2.86%	245
Yavapai County	(5,226)	(5,125)	(4,330)	13	3.50%	3,094
Yuma County	(1,817)	(3,347)	(2,712)	10	2.89%	1,298
Arizona Shortage	(104,087)	(98,192)	(74,419)		2.37%	63,583

Source: US Census Bureau, CSI calculations existing stock to bring (assuming these new units immediately became available for purchase or rent) the local vacancy rate back up to 5.0%.

The core presumption is that at an effective average vacancy rate of 5.0% across the states housing markets, there is sufficient housing liquidity to give buyers necessary choice, but not so much as to prevent sellers from completing a timely sale. Home price appreciation during these times should be reasonable and constrained by prevailing inflation. When the vacancy rate is below this figure, we assume there is insufficient supply of willing home sellers relative to buyers, and prices will rise more quickly than general inflation. Conversely, when the reverse is true, we assume inflation-adjusted prices will fall. The intuition here is similar to the information revealed by unemployment rates in the labor market: generally, periods of low unemployment are marked by rapid wage increases, and the converse is associated with falling wages.

Vacancy rates are remarkably stable over time: 5.00% since 1986; 4.99% over the past 20 years; and 5.00% during the 15-year period from 1986 to 2000. **And during the 15-year period of 1986-2000, when the Arizona home vacancy rate exhibited about one-quarter of the volatility seen in the last 15 years about its 5.00% average, the state's home prices increased 58% - versus a 59% increase in general prices due to CPI inflation**. This fact is highly consistent with our theoretical expectation. Note that because the relationship is between the vacancy *rate* and the *rate of change* in home prices (and not the price level), periods of high volatility in vacancy rates (like the recent period of historically low rates) can produce price levels that persistently and dramatically diverge from trend (given by general price inflation).



[i] "New Residential Construction Length of Time". *U.S. Census Bureau*. Retrieved on October 19, 2022.

[ii] The simple average of normalized, summed mortgage rates and home prices is 104.6 for the period 1989-2022. Excluding values more than 2 standard deviations above or below this mean yields a value of 100.7, which we defined as zero – a point of neutral buyer sentiment relative to the modern norm.

[iii] "House Price Index". *Federal Housing Finance Agency*. Retrieved on October 19, 2022.

[iv] Herriges, Daniel. "What Vacancy Rates Tell You About a Housing Shortage (And What They Don't)". *Strong Towns*. August 31, 2020.