Evaluating the Real Estate Market

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Abstract

Most housing market reports are text heavy and reference point in time comparisons over such as year over year for insights. While these comparisons are important, they fail to provide full insight of the overall market trend. A time interval comparison might show a metric as reversing; however, when compared against the overall trend this momentary reversal may not be indicative of the overall trend nor represent a trend reversal. Therefore, homebuyers need to be informed of both trends and point comparisons, such that the market report enables them to dive deep to discover complex data-driven insights and understand the relationship between market metrics. With these capabilities homeowners can be more confident in their decision to purchase or wait.

Introduction

The first topic individuals associate with 2020 is COVID, but likely a subsequent topic is the abrupt change in the housing market. The customary cyclical housing market unexpectedly changed trends to become and stay a seller's market for two years and counting. Many Americans are struggling to find affordable houses and when they do, they are faced with short windows of opportunity, bidding wars, and rising interest rates.

While these trends persist across the United States, some states and regions such as Montana are facing the fall-out of increased demand and marketing prices more than others. As of Q4 2021, the Washington Post [7] reports Montana to be among the top five states with the sharpest prices increases with over a 24% price increase from August 2020 to August 2021. Therefore, this market has buyer, sellers, and investors all wondering if/when the house market will return to a buyer's market.

Being familiar in R and Tableau, this dashboard was created using Javascript and D3 as an additional challenge and learning opportunity. The goal of this project was to serve as an introduction to visualization creation in a web environment, provide a platform for easy integration of new data in the future, and deliver a housing market dashboard-feeling report that paints a clear picture of the current market trends in Montana.

Background

Most real estate market reports touch on only the most drastic changes moth-over-month or year-over-year. For example, the Rocket Homes Housing Market Report [4] for Helena, Montana shows metrics such as price, inventory, and listing age month-over-month. Gardner's quarterly Montana Real Estate Market Update [3] looks at home sales year-over-year and prices quarter-over-quarter.

Fewer reports show the trend or raw data over the past few years. For example, the U.S. Department of Housing and Urban Development's Housing Marketing Indicators Monthly Update [6] provides line and bar chart visualizations of metrics such as sales, price, and inventory. The historical data goes back several years and, in some cases, back to January 2001. While data from two decades ago may not be entirely relevant to a new home buyer trying to

evaluate when to buy a home, viewing the metric changes over the past few years paints a very clear picture of current trends and an even clearer picture of a possible trend reversal.

Despite the form of reporting or comparison, these reports provide insight into what metrics are most common and important to evaluating the real estate market. Most notably, these reports discuss price, inventory and sales.

Approach

Data sets for overall United States housing market trends are readily available. However, data sets by a specific city or county are more difficult to come by. As a result, the dashboard leverages Zillow Market Data [5] for metropolitan level metrics. For metrics not available at the metropolitan geography, the dashboard displays overall United States trends. While the overall United States metric trends are informative, the trends vary widely from state to state or even city to city. Therefore, it was imperative to use metropolitan level data wherever possible. For reference, the overall United States trends are included to compare against metropolitan trends.

The dashboard focuses on the housing market for single family and condos in major Montana metropolitan areas, as including all metropolitan areas would require an enormous amount of memory and would not be helpful for home buyers and investors interested in purchasing homes in Montana.

The housing marketing is known for having seasonal trends as the homeowners do not want to uproot children in school, nor do homeowners wish to move during the holidays. Yet, locations may have a unique trend. For example, Boykin [1] suggests homeowners refrain from moving during the extended winter in colder climates and in Phoenix individuals are looking to purchase in winter months due to a snow-bird effect. Therefore, all the data displayed in the dashboard is deconstructed to remove the seasonal trends and show only the overall trend. A

byproduct of this analysis step is that the first and last few observations in the time series are not displayed due to not having the needed subsequent observations to evaluate a trend.

The dashboard has six visualizations, five charts and year-over-year comparison tiles. The first visualization shows the United States pricing trends of listing price, sale price, and percent of listings with price reductions by week sourced from Zillow Market Data [5]. The listing price and sale price data appear as lines with reference to the left-hand y-axis labels and the percent of listings with price reductions are bars with reference to the right-hand y-axis. Upon hovering, the user can view the values at that specific date. The vertical line helps to visually align the data to reassure the viewer that the values displayed occurred on the same date. The purpose of this visualization was to provide general context of current prices and the likelihood of a buyer paying less than the asking price.
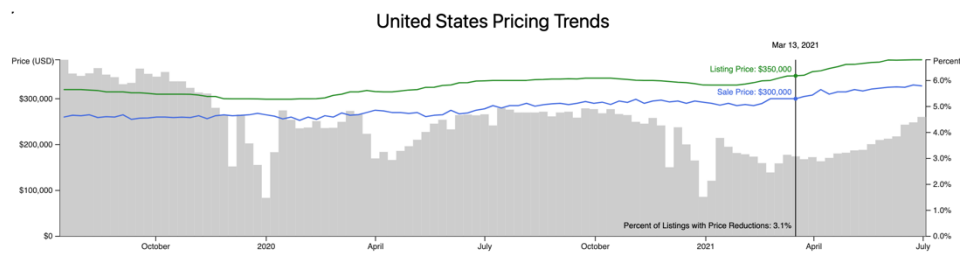

Figure A: United States Pricing Trends

The second visualization shows the United States delinquency and mortgage debt-to-income rate by end of quarter sourced from FRED [2] [8]. The mortgage delinquency rate appears as a line and describes the percentage of single-family home mortgages serviced through commercial banks that are delinquent. The mortgage debt-to-income ratio appears as bars with reference to the right-hand y-axis and describes the total mortgage payments divided by the total disposable personal income in the United States. Like Figure A, the hover text in Figure B displays the values for a specific date upon hovering. This visualization touches on the broader market, as a higher delinquency rate and mortgage debt-to-income are correlated. The greater the

debt-to-income ratio for a person purchasing a house, the more likely they are to default. A higher delinquency rate also typically signals a higher foreclosure rate, meaning a property may be available for purchase below market value.
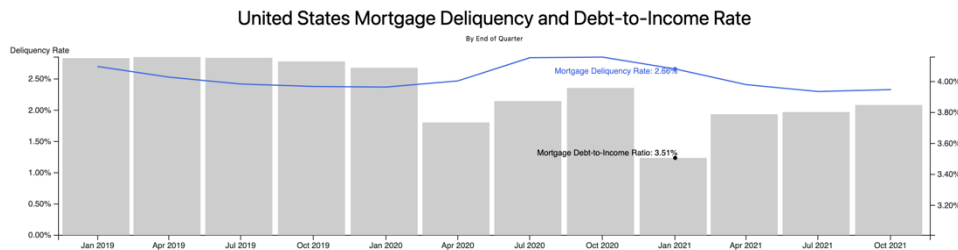

Figure B: United States Mortgage Delinquency and Debt-to-Income Ratio

The third visualization on the dashboard are the year-over-year comparison tiles and mark the start of the metrics displayed by the Montana metropolitan area. These tiles compare the number of homes on the market, the number of new homes, the number of homes with pending offers, and the Zillow Home Value Index (ZHVI) from the most recent observation to a year ago. The data for these tiles was sourced from Zillow Market Data [5]. Figure C shows the YoY comparisons for the United States; however, upon filtering, the tiles will update to the selected metropolitan area. The four tiles also update colors where more negative rates are deeper red and more positive rates are darker green. The colors help the user to visually compare the rates faster than by comparing using memory. At a single glance, the viewer can have a foundational understanding of the current market trends.
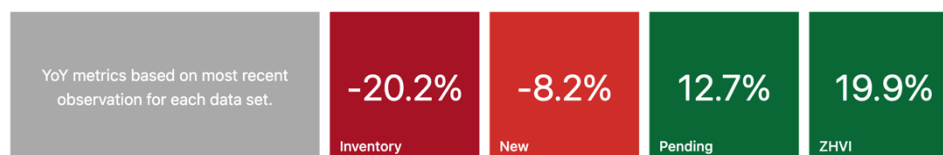

Figure C: YoY Comparison Tiles for the United States

The fourth visualization displays the Zillow Home Value Index for single family homes and condos by month for the selected metropolitan area as a bar chart, sourced from Zillow Market Data [5]. The ZHVI describes the home values and their change over time for homes in

the 35th to 65th percentile. This visualization underscores the value of displaying the data from

the past few years as the user can easily see how drastically home values have changed and use

this understanding to inform their interpretation of other metrics.
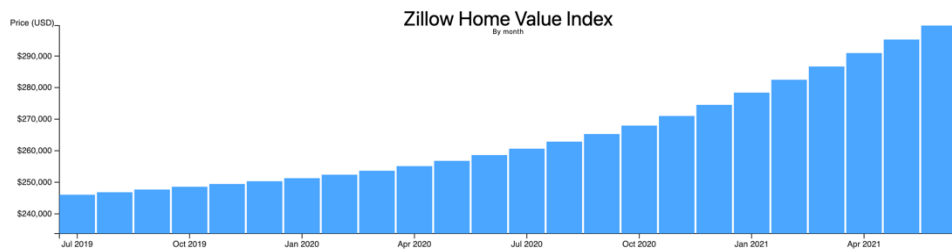

Figure D: Zillow Home Value Index (ZHVI) for the United States

The fifth visualization displays the inventory and sale volume for the selected

metropolitan area. Sourced from Zillow Market Data [5], the inventory data is by week and the

sale volume is by month. The different time intervals in the inventory and sale timeseries data

indicated that a line chart would be beneficial, as it would draw attention to the trend rather than

the differing time intervals. The sale data did not extend to Montana metropolitan areas but it is

displayed in this chart for the United States with the inventory for easier comparison.

Figure E: Inventory and Sale Volume for the United States

The last visualization shows the number of newly listed single-family homes and condos

with the number of homes with pending offers for the selected metropolitan area by week,

sourced from Zillow Market Data [5]. This visualization aims to provide another comparison to

evaluate the supply and demand of the housing market. The use of lines draw attention to points

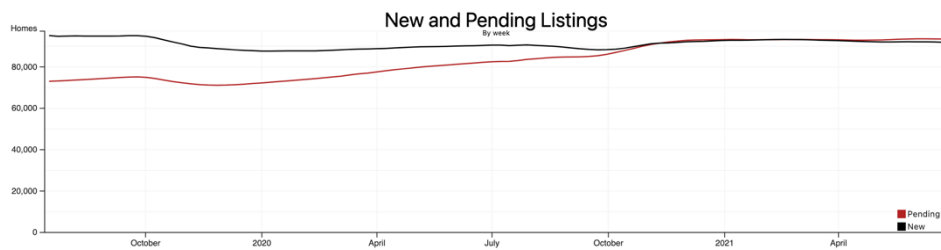of convergence and divergence in new and pending listing trends.

Figure F: New and Pending Listings for the United States

Figures D, E, and F are also filterable by minimum year. For example, if the user selects to filter to a minimum year of 2020, then Figures D, E, and F will update to display data from 2020 to now.

Results

Figure A suggests most of the increase in home prices occurred in 2021, as from June 2020 to June 2021 the average listing and sale price increased by nearly $40,000. In addition, Figure A shows an uptick in the percentage of homes that have price reductions in late June, which is mirrored in steady listing and sale prices. Therefore, buyers should watch to see if home prices continue to flatten or reduce in conjunction with an increase in price reductions, as this could signal the start of a transition to a buyer's market.

Figure B suggests that the onset of COVID in 2020 caused more delinquencies and mortgages proportionally ate up more of American's take-home money. However, since Q2 2020 the mortgage debt-to-income has remained substantially lower than pre-COVID, signaling the entrance of wealthier homebuyers or increased number of cash offers. Further investigation is needed to confirm one or either of these as the cause. However, for new home buyers this trend signals increased competition, as there are more home buyers in the market that likely can easily afford to pay the increased home price as a result of winning a bidding war.

Figure C, the comparison tiles show three common trends across all Montana metropolitan areas. First, the inventory is down anywhere between 19.2% in Bozeman to 37.6% in Helena. Second, in all metropolitan areas except Bozeman, the number of new homes is down between <0.1% in Billings to 90% in Helena. More research would be required, but if the viewer is familiar with Bozeman, they might hypothesize this is due to the increased construction efforts in Bozeman and lack thereof in other Montana cities. Third, the viewer will notice a YoY increase in the ZHVI across all metropolitan areas ranging from 15.4% in Billings to 50% in Kalispell. The number of homes with pending offers varies, where some metropolitan areas have seen an increase and others a decrease.

From the trend of decreasing supply seen in Figure C, the viewer would correctly expect to see the ZHVI increase in Figure D for all metropolitan areas. Similarly, the user could be correct to expect a downward trend in the inventory line in Figure E and the new listings line in Figure F.

A common theme seen in Figure F for all metropolitan areas is the number of houses with pending offers surpasses the number of new listings per week in late 2020. The degree of convergence or divergence of the lines change by metropolitan area, as Billings shows no recent convergence or divergence, whereas Bozeman shows a recent convergences and divergences. The homebuyer or investor should look for the divergence of pending and new listings such that pending listings are fewer than new, as this could signal the transition to a buyer's market.

Conclusion

This paper and dashboard explains and visualizes some of the most important metrics for evaluating the housing market, with a specific focus on enabling the viewer to review historical data to draw more complex conclusions and understand the relationship between metrics. This

dashboard helps the viewer arrive at data-driven conclusions on the state of the housing market and therefore make data-driven decisions of whether to purchase or invest in Montana metropolitan areas.

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