CSC343 Phase 3 Discussion

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Many websites state that household debt-to-income, interest rate and unemployment rate are three factors that can affect the housing price index. We analyzed historical data extracted from Trading Economics and want to find the exact relationship between household debt-to-income, interest rate, unemployment rate and housing price index. The followings are our analysis results.

The household debt-to-income and housing price index are in a positive correlation. We've calculated the correlation coefficient between household debt-to-income and housing price index, and it is about 0.976, which is pretty close to 1. Also, as you can see in the scatter-plot of household debt-to-income and housing price index shown below (Figure 1), these two variables are evenly distributed along the linear regression line. This means when household debt-to-income increases, the housing price index always increases as well.

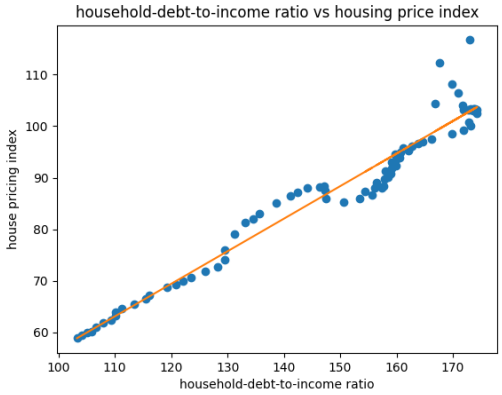

Figure 1: The scatter-plot of Household Debt-to-income and Housing Price Index

After we find out that there's such a strong positive correlation between household debt-to-income and housing price index, we come up with the idea of generating a linear model for these two variables. It took us a lot of effort to find the housing market data in phase 1, but it is much easier to collect the household debt-to-income data from

many open sources. Then, if there's a linear model between these two variables, we can always use the household debt-to-income data to predict the future housing market. The linear model we generate is :

$$HousingPriceIndex = 0.631 * HouseholdDebtToIncome - 6.340$$

Therefore, we can insert the household debt-to-income value of that quarter into this linear model and get a general value of the housing price index of the corresponding quarter to predict the housing market.

The interest rate and housing price index are in a negative correlation. We've calculated the correlation coefficient between the interest rate and housing price index, which is about -0.651. A negative correlation coefficient indicates a negative correlation relationship between these two variables. You can see in the following scatter-plot of interest rate and housing price index (Figure 2), the interest rate increases from nearly 0 to 6, while the housing price index decreases from 120 to 60. This means when the interest rate increases, the housing price index decreases simultaneously.

Figure 2: The scatter-plot of Interest Rate and Housing Price Index

Since we've analyzed that the interest rate and housing price index have a relatively obvious negative correlation, we also decide to derive a linear model for these two variables. Because we believe that the interest rate value can be collected much easier from our daily life than household debt-to-income. Therefore, with the linear model of interest rate and housing price index, we can get a general idea of the housing price index even when we deposit money to the bank. The linear model we generate is :

$$HousingPriceIndex = -7.066 * InterestRate \ + \ 100.095$$

Therefore, we can insert the interest rate value of that month into this linear model to get a general value of the housing price index. Then use this housing price index to

predict the housing market.

The unemployment rate and housing price index have a very weak negative correlation. We've calculated the correlation coefficient between the unemployment rate and the housing price index, which is only -0.054, which is pretty close to 0. This means the unemployment rate and housing price index are in a negative relationship, but the unemployment rate has a tiny impact on the fluctuation of the housing price index. You can see in the following scatter-plot of unemployment rate and housing price index (Figure 3), data are not distributed with any patterns. Therefore, we can conclude that the housing price index decreases with little possibility when the unemployment rate increases.

Since the correlation between the unemployment rate and the housing price index is weak, we will not derive a linear model for these two variables because the unemployment rate value will not provide a meaningful and accurate prediction for the value of the housing price index.

Figure 3: The scatter-plot of Unemployment Rate and Housing Price Index

In conclusion, among all three factors we analyzed through this project, household debt-to-income impacts the housing market the most. Interest rate impacts the housing market in the second place, and the unemployment rate has nearly no impact on the housing market.