Exploring Housing Sales by Type of Property

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In recent years, the news has commented on the willingness of younger generations to move across the country (or even out of the country) for the potential to land a great paying job. Economists have weighed in and come to a consensus that moving often early in a career leads to higher wages. In this analysis, I explore how often a property is sold by housing type and by decade. I focus on single family homes (SFR), condominiums, and duplexes from 1960 to 2017.

I use US housing data obtained from CoreLogic, Inc. The data consists of a record for each time a property was sold with information on the parcel ID, sale date, US FIPS code, whether the purchase was made in cash or through a mortgage, the type of purchase, and the property type. I remove records with any of missing values. Additionally, I remove properties with only one record or properties with the only sale information prior to 1980. 1980 was the chosen cut-off date because duplexes only enter the dataset in 1975, and I wanted to have complete decades for comparison purposes. Finally, I keep only the records that pertain to single family homes, condominiums, and duplexes. The final dataset consists of 529,608 single family homes; 84,344 condominium records; and \_\_\_\_\_duplex records from 1980 to 2017.

Before examining the differences in the number of times a property is sold by property type, I graph the number of records I have for each property type and decade, below.



The number of records has increased dramatically between 1960 and 2010. Additionally, the ratio of condos and duplexes to SFRs has decreased over the decades.

To get an initial understanding of how long individuals hold on to particular property types, I examine the marginal survival function, graphed below.



Interestingly, the marginal survival function is not dramatically different between the housing types. In the first few years of ownership, condos are the least likely to be sold, whereas duplexes are the most likely to be sold. However, condos and duplexes swap places after about 8 years of ownership; the duplexes become the least likely to be sold but the condos are the most likely. After about 30 years of ownership, condos and duplexes are sold more often than single family homes.

To explore how often a property is sold, I fit a proportional hazards regression model for each of the housing types. Because there are 4 decades (1980 - 2010), all of the models are fit with 4 spline functions with the amount of time a property was owned as the dependent variable. Below is a graph comparing the baseline hazard function for each of the housing types.



The large fluctuations in the baseline hazard functions after about 20 years of ownership is not concerning; given the fact that few people own their properties that long, one person selling their property can greatly influence the function estimate. Interestingly, however, the baseline hazard function for condos is lower than the function for single family homes regardless of how long the individual has owned the property. On the other hand, duplexes are more likely to be sold at any point in time as one would expect. Additionally, the hazard functions increase with years for the single family homes and the condos, but the duplex hazard function does not. The duplex hazard function decreases steeply in the first few years, but after about 5 years, the likelihood of one selling the property stabilizes.

To get a better understanding of how likely individuals are willing to sell a property and how that changes over time, I examine the hazard function for each of the decades.



The hazard functions in 1980 appear to be the same as the baseline hazard functions, but the 1990, 2000, and 2010 are very different. The duplex hazard functions in 1990, 2000, and 2010 are below the single family home and condo hazard functions, which is further than what one would expect. However, the duplex hazard function still decreases over the first few years of ownership and stabilizes after about 5 years. Additionally, the condos were the least likely to be sold in the 80s, but are the most likely to be sold in the 90s, 2000s, and 2010s.

Overall, the type of property bought does seem to affect the probability that someone is going to sell their home on a particular day. Duplexes are more likely to be sold than houses and condos in the 80s but less likely in the 90s, 2000s, and 2010s. The hazard functions for single family homes and condos behave very similarly with condos having a slightly higher risk of being sold in the most recent decades. Additionally, the probability of a duplex being sold drops in the first few years of ownership but stabilizes, but the probability of a single family home or a condo being sold increases over the course of ownership at a fairly steady rate.