

# Multifamily Rental Housing, Socio-Economic and Demographic Factors, and Foreign Capital Flows – A ZIP Code Level Analysis

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## Abstract

This study investigates how location of US multifamily rental housing (MFRH) properties can impact on their investment performance. MFRH units are owned by companies and rented to households, including low and moderate-income households. In particular, we look at property performance characteristics such as occupancy rate, net operating income (NOI) and loan delinquency and assess how those are affected by within city variation of socio-economic and demographic factors. Such factors include household income, house prices, foreign capital flows into real estate, demographic factors such as age, race, ethnicity. We use data on securitized commercial mortgage loans between 1999 and 2016 in order to assess the relationship between property performance indications and the local economy. While the MFRH market provides opportunities for property investors and it should be better understood from an investor point of view, MFRH rental stock also is an important component of the alternatives to homeownership for households and is worthy of studying from this perspective as well highlighting the contribution of this study.

**Keywords:** Multifamily housing loans, net operating income, delinquency, occupancy, zip-level analysis, foreign capital flows, demographics, socio-economic factors.

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## **1. Introduction**

This study investigates how location of US multifamily rental housing (MFRH) properties can impact on their investment performance. MFRH units are owned by companies and rented to households, including low and moderate-income households. In particular, we look at property performance characteristics such as occupancy rate, net operating income (NOI) and loan delinquency and assess how those are affected by within city variation of socio-economic and demographic factors. Such factors include household income, house prices, foreign capital flows into real estate, demographic factors such as age, race, ethnicity. Unlike the single-family housing market, the MFRH sector has been under-researched, mostly due to data limitations, with only a handful of studies which look at the dynamics of MFRH loans. In this study, we use data on securitized commercial mortgage loans between 1999 and 2016 in order to assess the relationship between property performance indications and the local economy.

Understanding the dynamics on the MFRH market would provide valuable insights for both property investors and policy advisors. This research sheds light on issues related to housing affordability as such should be assessed at regional level and they vary considerable across ZIP codes with households in large metropolitan areas (MSAs) facing the need to switch from owning to renting. The rental market in the large MSAs has considerably grown in the last few years and the rental housing stock has grown much faster (10 percent us between 2006 and 2014 (Furman Center, 2016)) than the ownership stock. While the MFRH market provides opportunities for property investors and it should be better understood from an investor point of view, MFRH rental stock also is an important component of the alternatives to homeownership for households and is worthy of studying from this perspective as well.

The question which we investigate is how regional variation in demographic and economic factors such as income, age, race, house prices, foreign capital flows into real estate affect the performance

of multifamily housing investment looking at NOI, occupancy rate and loan delinquency across different ZIP codes and over time.

## **2. Literature review and theoretical underpinning**

Overall, the literature assessing the multifamily housing sector has been scarce. In an early study Archer et al. (2002) find that the market is different from the single-family market with loan-to-value (LTV) ratios not been the main driver of multifamily mortgage defaults but instead property characteristics and the ZIP code location play a major role. Agarwal et al. (2012) investigate if the negative spillover effects from subprime mortgage originations result in higher default rates in the surrounding area but do not find evidence for that. Fernandes and Artes (2016) in turn find that accounting for spatial dynamics of small and medium sized companies' loans improves credit scoring models.

As we are looking at the effects of demographic factors on property performance such as occupancy rate NOI, delinquency, we need to consider their variation within city and across time. If these factors are correlated with demand, then they should have an impact on the occupancy rate of a given property. Similarly, current NOI, of which rental income for the building is an important component, may be impacted by relative demographic shifts. Previous work has shown changes in MSA level property values and NOI are important factors in predicting mortgage default (Seslen and Wheaton, 2010). If the within-MSA characteristics are negatively associated with building occupancy and NOI, two measures of property financial health, it follows that they may be negatively associated with the ability to make required debt service payments on time, leading to an increase in the probability of delinquency.

Economic forces vary both at regional level as well as within regional level; properties allocated in ZIP codes with low household income relative to other zip codes in that MSA may be associated with

lower occupancy rate and hence a decline in NOI. A drop in both of those performance indicators can lead to higher delinquency triggered by low income. This we refer to as the affordability channel. Another way in which regional economic drivers may affect MFRH performance is through the valuation channel. This channel operates through regional variations of residential house prices that can affect vacancy rates and NOIs and subsequently delinquency of loans of these multifamily properties. Lastly, another channel at hand is through foreign capital flows. Areas with high foreign capital inflow into multifamily housing may also distort local housing dynamics if foreign capital inflow is concentrated in particular segments of an MSA (e.g. additional capital from foreign investment disproportionately flows into high income zip codes within a city) thus leading to regional variations in vacancy rates, NOIs and loan delinquency.

## **Data**

For the proposed analysis, we combine a number of datasets. We use Trepp loan level data including loan characteristics and property characteristics of multifamily loans securitized as commercial mortgage backed securities (CMBS). The timeframe for the data is 2000-2016. In particular, we collected data on the occupancy rate, loan delinquency, NOI, loan history, property age, loan-to-value (LTV) ratios, etc. We combine the loan data with demographics and economics data from the IRS, US Census, and the American Housing Survey which we collect at the ZIP code level. Such data includes household income, house prices, demographic distributions such as age, race, etc. In addition, data for the cross-border capital flows into multifamily housing are obtained from Real Capital Analytics (RCA).

## **Methodology**

We match annual measures of demographic variables (including, but not limited to race, gender, household composition, income, employment, and homeownership rates) with annual records for US apartment buildings whose primary source of financing is a mortgage that is securitized in a non-agency CMBS. We then classify each observation by each of these measures in quartiles by zip code.

We do the same for annual changes in these variables. We then estimate a panel regression model, controlling for observable loan, property, and MSA level variables, to see the impact of the level or change in level of demographic and financial variables on our variables of interest, including current NOI, occupancy rate, and delinquency status. As an example, we are interested if the zip code level income (or change in income) impacts our variables of interest. However, we are specifically interested in these differences within MSAs to compare how changes in zip code level demographic characteristics impact the performance of MFRH properties located in different areas within a given MSA. We estimate an unbalanced panel (new loans will enter and many existing loans will exit the sample over this time horizon).

Specifically, we will estimate a random-effects unbalanced panel regression:

$$Y_{it} = \beta X_{it} + \theta Y_{zt} + \alpha + u_{it} + \varepsilon_{it}$$

Where  $X$  is a vector of control variables by loan  $i$  (only one loan is observed for each property) and time  $t$ , and  $Y$  is a vector of demographic and financial flow variables by zip code and year,  $\alpha$  is the unknown intercept,  $u$  is the between-entity error and  $\varepsilon$  is the within-entity error. For NOI and occupancy rate, we estimate a continuous outcome and for delinquency, using a binary outcome and therefore specifying this model as a logistic regression. After estimating the baseline model for delinquency, we consider the competing risks of delinquency and prepayment (Ambrose and Sanders 2003, Ciochetti et. al 2002).

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