

# **Toward an Understanding of Fannie Mae's Penetration of the Multifamily Housing Finance Market**

by

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## **Abstract**

Fannie Mae, its regulator, and interested academics and policy makers are able to track the geographic distribution of its multifamily portfolio. However, formally assessing Fannie Mae's market penetration, defined as the number of loans in a market divided by the total number of multifamily properties in the market, requires the ability to measure the universe of multifamily properties in that market. The purpose of this study is to provide a framework for assessing and explaining Fannie Mae's penetration in the multifamily housing market with a focus on the small loan segment of the market. We combine loan holdings from Fannie Mae with data from the Florida Department of Revenue (FDOR), as well as demographic and other information from the American Community Survey. The FDOR data permit us to identify the number and location of the universe of multifamily properties in the state of Florida. Overall, our unconditional descriptive statistics, graphs, and maps reveal that, relative to the universe of FDOR multifamily properties, Fannie Mae's Florida portfolio consists of units that are significantly larger, newer, and somewhat more valuable on a per unit basis. Our conditional multivariate logistic regression results largely confirm our unconditional results. In addition, we find considerable differences in the magnitude and significance of estimated coefficients in the small property subsample relative to the large property subsample. This highlights the importance of distinguishing between large and small properties when evaluating Fannie Mae's penetration in local markets. It is important to note, however, that a lack of penetration in a local market by Fannie Mae does not imply the multifamily market is underserved. The lack of Fannie Mae financing could be more than compensated for by local lenders.

## **Toward an Understanding of Fannie Mae’s Penetration of the Multifamily Housing Finance Market**

### **1. Introduction**

Multifamily housing is generally defined as a rental property having five or more dwelling units. According to the Joint Center for Housing Studies of Harvard University, multifamily properties provide housing for approximately 17 million U.S. families. At the end of 2012Q1, outstanding mortgage debt on U.S. multifamily properties totaled \$844 billion (Board of Governors of the Federal Reserve System, June 7, 2012, Table L.219, page 105).<sup>1</sup> Fannie Mae and Freddie Mac held in portfolio or had securitized \$352 billion (42 percent) of the outstanding \$844 billion multifamily mortgage debt (Board of Governors of the Federal Reserve System, June 7, 2012, Table L.219, page 105).<sup>2</sup>

Fannie Mae’s multifamily business primarily purchases permanent multifamily loans, which are held in portfolio or securitized, although it also provides some limited financing for other acquisition, development, construction and rehabilitation projects. According to Fannie Mae, its multifamily business “is focused on providing workforce housing,” defined by Fannie Mae as “high quality, affordable housing to families with annual incomes at or below the median income of the areas where they live” (Fannie Mae, May 1, 2012, pg. 1). At year-end 2010, 87 percent of Fannie Mae’s \$186 billion multifamily mortgage loan portfolio was backed by properties with monthly rent expenses equal to no more than 30 percent of the tenant’s monthly income (Fannie Mae, December 1, 2010, pg. 2). Approximately 49 percent of multifamily units financed by Fannie Mae served families earning less than 80 percent of area median income (AMI), meeting the Federal Housing Finance Agency’s (“FHFA”) affordable housing goal requirement for Fannie Mae and Freddie Mac (Fannie Mae, December 1, 2010, pg.31). Moreover, 48 percent of the multifamily units financed by Fannie Mae were in designated underserved markets (Fannie Mae, December 1, 2010, pg.31).

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<sup>1</sup> In contrast, there was \$10.2 trillion of outstanding mortgage debt on single-family homes and rental properties with 1-4 units, \$131 billion of outstanding debt on farm properties, and \$2.2 trillion of outstanding mortgage debt on office, retail, industrial, hospitality and other commercial properties.

<sup>2</sup> U.S. chartered depository institutions held \$245 billion (29 percent), state and local governments held (\$69 billion (8 percent), and life insurance companies held \$50 billion (6 percent) of the \$844 billion of outstanding multifamily mortgage debt.

While serving the broad multifamily market, Fannie Mae has also historically maintained dedicated staff and mortgage product offerings for “small” loans and subsidized affordable housing. In fact, Fannie Mae aims to serve “every market, every day” (Fannie Mae, November 5, 2010, pg. 3). In general, the market defines small loans in one of two ways. The first is based on the number of units contained in the mortgaged property; up to 50 units is considered a small property. Others in the industry define a small loan as one with a principal balance of \$3 million or less in most markets.<sup>3</sup> As of year-end 2011, Fannie Mae estimated that small loans accounted for approximately 16 percent of their book of business based on remaining principal balance, but 69 percent by number of loans (Fannie Mae, May 1, 2012, pg. 9).

Recent data from the Federal Financial Institution Examination Council (FFIEC) reveals that, in June of 2010, the top five multifamily lenders among FDIC-insured banks and thrifts accounted for 35 percent of total multifamily debt outstanding. The remaining 65 percent of outstanding multifamily debt was spread among almost 6,000 FDIC-insured institutions.<sup>4</sup> This market fragmentation of 65 percent of the debt makes small loans more expensive to originate and underwrite than larger multifamily loans. Moreover, this fragmentation creates a unique challenge for Fannie Mae, which operates exclusively as a secondary market liquidity provider with relatively few dedicated origination partners. In fact, Fannie Mae’s Delegated Underwriting and Servicing (DUS)® business model is unique in the commercial mortgage industry. The standard industry practice in the non-agency multifamily mortgage market is for a multifamily loan purchaser to re-underwrite each mortgage (or pool of mortgages) before acquisition in the secondary mortgage market. In contrast, originating lenders under Fannie Mae’s DUS model are pre-approved and given the authority to underwrite and close loans that meet Fannie Mae’s underwriting guidelines. Fannie Mae is then obligated to purchase the loan(s). In exchange for the delegated authority, DUS lenders are required to share in the risk of credit losses throughout the life of the mortgage.<sup>5</sup>

Fannie Mae recognizes that, in many cases, the minimum DUS capital and infrastructure requirements dissuade or disqualify local and regional lenders from participating in their DUS program (Fannie Mae, November 5, 2010, pg. 6-7). This likely hinders Fannie Mae’s ability to

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<sup>3</sup> The cutoff is generally \$5 million or less in high cost markets such as New York City or Los Angeles.

<sup>4</sup> These data are obtained from the FFIECs June 2010 data: [www.ffiec.gov](http://www.ffiec.gov).

<sup>5</sup> Generally, DUS lenders are required to retain one-third of the underlying credit risk on each loan sold to Fannie Mae (Fannie Mae, May 1, 2012, pg. 8). DUS lenders must also secure their risk sharing obligations by posting collateral.

penetrate the small loan market in many geographical areas. Expanding small loan acquisitions beyond current DUS flow would require Fannie Mae to develop hundreds of small loan relationships with local and regional institutions (Fannie Mae, November 5, 2010, pg. 7).

The fragmentation within the small loan origination network also contributes to a more challenging economic cost structure for originating lenders. Because the cost to underwrite, originate, and service a multifamily loan varies little with loan size, small loans tend not to offer economies of scale to dedicated multifamily originators.

Finally, with a loan origination platform based on the sharing of credit losses, Fannie Mae is limited in its ability to expand past its current origination relationships if, indeed, Fannie Mae's goal is to expand small loan purchases. Although Fannie Mae's small loan team has focused on expanding its small loan relationships, local and regional financial institutions active in the business have historically been unwilling or unable to participate in a credit loss sharing arrangement—as many of these lenders are traditional originate-and-hold banks (Fannie Mae, 2011a).

An additional feature of the small multifamily loan market is that such loans tend to be concentrated in large metropolitan areas with relatively high house prices and low homeownership rates. For example, as of June 2010, 27 percent of Fannie Mae's small multifamily loans were backed by properties in Los Angeles; 22 percent were in New York City (Fannie Mae, 2011a). This geographical concentration surely reflects the market expertise of its network of DUS lenders and the economies of scale associated with originating loans in densely populated markets with low homeownership rates. However, it does raise questions about portfolio diversification (Fannie Mae, November 5, 2010, pg. 16).

Although Fannie Mae and its regulators are able to track the geographic distribution of its multifamily portfolio, formally assessing its penetration in a market requires the ability to measure the universe of multifamily properties in that market. That is, if penetration is defined as the number of Fannie Mae financed loans in a market divided by the total number of existing multifamily properties in the market, we must be able to measure the denominator of the penetration ratio, as well as the numerator. The purpose of this study is to provide a framework for assessing Fannie Mae's penetration in the multifamily housing market with a focus on the small loan segment of the market.

We combine loan holdings from Fannie Mae with data from the Florida Department of revenue (FDOR). The FDOR data permit us to identify the number and location of all multifamily properties in the state of Florida. In total, 28,352 parcels are identified in the 67 counties of Florida as non-condominium multifamily properties having five residential units or more. Data provided to the authors by Fannie Mae contain records for the 834 Florida properties which contain five or more units for which it held loans as of June 2011. Excluding senior housing properties and manufactured housing, we were able to match 688 of the Fannie Mae property records to the FDOR database using common addresses or latitude and longitude. To obtain county-level and census tract-level information on important demographic variables, this initial dataset is merged with data from the American Community Survey. Finally, to quantify the conditional (marginal) contribution of our explanatory variables, we also specify and estimate multivariate logistic regression models of the probability that a Florida property will be financed by Fannie Mae. The logistic regression model is first estimated using the 21 counties (out of a total of 67) in Florida for which a sufficient number of Fannie Mae financed properties is available. We also re-estimate our logistic regression models using only data from the seven largest counties.

Overall, our unconditional descriptive statistics and graphs reveal that, relative to the universe of FDOR multifamily properties, Fannie Mae's Florida portfolio consists of units that are significantly larger, newer, and somewhat more valuable on a per-unit basis. We also find some graphical evidence of a relation between Fannie Mae's penetration in a market and a number of county-level and census tract-level variables. Our conditional logistic regression results indicate strongly that the age of a Florida property is negatively and significantly related to the probability of Fannie Mae financing.<sup>6</sup> The probability of Fannie Mae financing is significantly greater for larger properties, even when controlling for county, census tract, and other property-level characteristics. Allowing for differences in the marginal effects of our explanatory variables on the probability of Fannie Mae financing reveals a number of interesting results. In particular, our results strongly suggest that the variables that explain the probability of Fannie Mae financing vary significantly by property size.

The remainder of the paper proceeds as follows: Section 2 describes the sources of data employed in the study and provides descriptive statistics and analysis of the overall dataset.

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<sup>6</sup> This result may not be generalizable to many larger, supply constrained markets.

Section 3 explains our logistic regression model and provides descriptive statistics for the data set used in our regression analysis. Section 4 contains the empirical results. Finally, Section 5 summarizes our findings and their implications.

## **2. Data**

This study combines three sets of data: (1) property level data from the property tax assessment files of Florida's 67 counties, (2) Fannie Mae data on Florida rental apartment properties for which it holds loans, and (3) county-level and census tract-level information from American Community Survey data on demographics, the housing stock, homeownership, and household income. The Florida property tax data are provided annually by each county Property Appraiser to the Florida Department of Revenue (FDOR). Each county is required by statute to annually submit its property tax roll to the FDOR for auditing purposes. These rolls provide information on the two most recent sale transactions of each property, a number of property descriptors, including year built and number of units, the owner's name and occupancy status (i.e., whether the owner lives in the home), the physical address of the property, and a land use code which enabled us to identify multifamily properties. Also included is the county tax assessor's estimate of the "just" value of the property, which by statute is the county's estimate, based on the best available data, of what the property would sell for January 1 of the tax roll year.<sup>7</sup> In addition to the tax rolls, FDOR provided digitalized parcel identification maps for each county, which enabled us to accurately calculate lot size and precisely determine the property's location. In the aggregate, the FDOR data contain records for the more than 8 million real estate parcels in the state of Florida.

The FDOR data used here are as of June, 2011. In total, 28,352 parcels are identified in the 67 counties of Florida as non-condominium multifamily properties having five residential units or more. These parcels constitute the universe of multifamily properties in Florida and are

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<sup>7</sup> Per Florida Statute 193.011, the county property appraiser for each county is responsible for placing "just" values on each parcel within the jurisdiction annually. The terms just value and market value are used interchangeably. The level of assessment for Florida properties is 100%. In addition to determining just values, the property appraiser must also administer "assessed" values. Assessed values are those values resulting from the administration of the provisions of Florida Statute 193 as they relate to Amendment 10 (homestead properties), Amendment 1 (non-homestead properties), agricultural classification and other uses. Each of these special property types has its own set of rules regarding the way it is assessed. Depending upon the specifics of the parcel, the just and assessed values may be equal or the just value may be higher than the assessed value. In no case shall the assessed value be higher than the just value.

used as the primary database for this study; properties securing Fannie Mae multifamily loans are a subset of the 28,352 multifamily properties.

Data provided to the authors by Fannie Mae contain records for the 944 Florida properties for which it held loans as of June 2011. The properties securing these 944 loans have five or more rental residential units. Excluding 110 senior housing properties and manufactured housing, we were able to match 688 of the Fannie Mae property records to the FDOR database using common addresses or latitude and longitude. Both the Florida property tax data and the Fannie Mae data contain selected property characteristics. However, to maintain consistency in comparisons of Fannie Mae and non-Fannie Mae properties, we have relied on the property characteristics contained in the larger FDOR database. The resulting database was then merged with data from the American Community Survey to obtain county-level and census tract-level information on population, housing density, median rent and house prices, as well as other variables that describe the housing and demographic characteristics of the census tract in which the property is located.

Figure 1 plots the percentage of FDOR and Fannie Mae financed properties by the number of units.<sup>8</sup> Fifty-four percent of FDOR properties, which include Fannie Mae financed properties, contain 5-10 units. In sharp contrast, just 12 percent of Fannie Mae financed properties contain 5-10 units. Eighteen percent of DOR properties contain 11-20 units; the corresponding percentage for Fannie Mae financed properties is just eight percent. Thus, 72 percent of FDOR properties contain 5-20 units; however, just 20 percent of Fannie Mae's Florida portfolio consists of 5-20 unit properties. Clearly, Fannie Mae's multifamily portfolio in Florida is more heavily concentrated in larger properties.

Figure 2 plots the percentage of small (5-50 unit) FDOR and Fannie Mae properties by number of units. Sixty-four percent of small FDOR properties contain 5-10 units. In contrast, just 38 percent of small Fannie Mae financed properties contain 5-10 units. Thus, within the small property segment, Fannie Mae's portfolio is more heavily concentrated in properties with 11-50 units than is the universe of small properties in Florida. The percentage of large (51-plus units) FDOR and Fannie Mae properties by number of units is displayed in Figure 3. Nine percent of large DOR properties contain 51-60 units. The corresponding percentage for the large properties

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<sup>8</sup> In 2001, Fannie Mae changed the definition for its small loan portfolio to focus on loan size rather than number of units. However, information on the existence and size of outstanding mortgage loans is not available in the FDOR database.

in the Fannie Mae portfolio is five percent. The remainder of Figure 3 reveals that, relative to the Fannie Mae multifamily portfolio, large Florida DOR properties are more heavily concentrated in properties with 51-120 units.

Finally, Figure 4 plots the penetration of Fannie Mae in the Florida market by property size, where penetration is defined as the number of Fannie Mae financed properties divided by the total number of multifamily properties contained in the FDOR database. As of 2011, Fannie Mae had financed only one percent of 5-20 unit properties in Florida, two percent of 21-30 unit properties, three percent of 31-50 unit properties, and nine percent of 51-100 unit properties. Fannie Mae's penetration among larger properties (greater than 101 units) ranges from 13 to 16 percent. This figure clearly reveals that Fannie Mae is providing significantly more liquidity for originators of loans secured by larger multifamily properties.

Another important characteristic of a multifamily portfolio is the age of the underlying properties. Figure 5 plots the percentage of FDOR and Fannie Mae properties by year in which the property was built. Thirty-four percent of FDOR properties were built prior to 1961. In sharp contrast, just seven percent of Fannie Mae financed properties were constructed prior to 1961. Nineteen percent of FDOR properties were built during 1961-1970; the corresponding percentage for Fannie Mae properties is a roughly similar 15 percent. Overall, Figure 5 indicates that the vintage of Fannie Mae's portfolio is significantly younger than the universe of multifamily properties in Florida.

The percentage of small (5-50 unit) FDOR and Fannie Mae properties by vintage is plotted in Figure 6. Forty-one percent of small FDOR properties were constructed prior to 1961; just 17 percent of small Fannie Mae financed properties are of the same vintage. In contrast, 36 percent of small FDOR properties were built between 1961 and 1975; the corresponding percentage for small Fannie Mae properties is 56 percent. Thus, a large percentage of Fannie Mae's small property portfolio was constructed prior to 1976.

Figure 7 plots the percentage of large (51-plus units) FDOR and Fannie Mae properties by vintage. Twenty-two percent of large FDOR properties were built prior to 1961; the corresponding percentage for the large Fannie Mae portfolio is just two percent. Thus, the stock of large multifamily properties in Florida is substantially newer than the stock of small apartment properties. Whereas just 27 percent of Fannie Mae's small multifamily portfolio was constructed after 1975, 73 percent of its large Florida properties were built after 1975. Overall, Figures 6 and



7 also reveal that Fannie Mae's multifamily portfolio in Florida is considerably newer than the universe of Florida multifamily properties.

The penetration of Fannie Mae in Florida by property vintage is displayed in Figure 8. As of 2011, Fannie Mae had financed just one-to-four percent of Florida multifamily properties constructed before 1996. At approximately 10 percent, Fannie Mae's largest penetration of the Florida market is in properties constructed between 1996 and 2005.

A final property characteristic we highlight is market value per unit. The percentage of FDOR and Fannie Mae multifamily properties by estimated market value per unit is displayed in Figure 9. Thirty percent of FDOR properties have an estimated market value per unit equal to \$20,000 or less; 21 percent of FDOR properties have an estimated per unit value greater than \$20,000 but less than \$30,000. The corresponding percentages for the Fannie Mae portfolio are 25 percent and 28 percent, respectively. Overall, Figure 9 reveals that Fannie Mae's Florida portfolio is slightly more skewed toward higher value properties than the universe of Florida multifamily properties. However, these differences between the universe of Florida properties and Fannie Mae properties in per unit market values appear (at least unconditionally) to be much smaller than differences in property size and age.

Figure 10 plots the penetration of Fannie Mae in Florida by market value per unit. Fannie Mae has financed zero to four percent of Florida units with an estimated market value per unit equal to \$350,000 or less. However, Fannie Mae has financed 11 percent of Florida properties with per unit values between \$350,000 and \$400,000 and between \$500,000 and \$600,000. Moreover, they have financed 33 percent of properties with estimated per unit values between \$600,000 and \$700,000. Figure 10 provides strong unconditional evidence that Fannie Mae's Florida portfolio is tilted toward higher value properties. Overall, Figures 1-10 document that, relative to the universe of Florida DOR properties, Fannie Mae's Florida portfolio consists of units that are significantly larger, newer, and somewhat more valuable on a per unit basis.

#### *Fannie Mae's Market Penetration by County*

The statewide analysis provided above, while informative, may be masking interesting geographic patterns in the data. We therefore now turn to an analysis of the distribution of FDOR and Fannie Mae financed properties in Florida by county. Figure 11 plots the total number of

properties, both large and small, in each of Florida's 67 counties.<sup>9</sup> Twenty-nine percent of FDOR multifamily properties, or 6,395 in total, are located in Miami-Dade County. Broward County contains 3,223 properties, which is 15 percent of the Florida total. Palm Beach, Pinellas (St. Petersburg), Duval (Jacksonville), Hillsborough (Tampa), and Orange (Orlando) County contain seven, six, five, five, and four percent, respectively, of the total multifamily stock. Overall, these seven large counties contain 70 percent of Florida's multifamily properties (not units).

How does the geographic distribution of Fannie Mae's Florida portfolio compare to the distribution of the universe of properties? The number of both large and small properties in Fannie Mae's portfolio in each of Florida's 67 counties is displayed in Figure 12. Fifteen percent of Fannie Mae financed properties, or 123 in total, are located in Broward County. Miami-Dade County contains 88 Fannie Mae financed properties, which is 10 percent of the Fannie Mae Florida total. Hillsborough (Tampa) and Orange (Orlando) Counties each contain 10 percent; Palm Beach, Pinellas (St. Petersburg), and Duval (Jacksonville) County each contain seven percent of Fannie Mae's portfolio. It is important to note that although 29 percent of FDOR properties are located in Miami-Dade County, only 10 percent of Fannie Mae's properties are located in this County. This may suggest that Fannie Mae is underserving apartment owners and investors in Miami-Dade County. Alternatively, it may suggest that there are sufficient alternative sources of financing in Dade county, so that this is not an underserved area in terms of availability of financing. In contrast, the percentage of its Florida portfolio in Hillsborough and Orange Counties are larger than the percentage of FDOR properties located in these two counties, suggesting an "over penetration" of these two markets.

We next turn our attention to the distribution of FDOR properties and Fannie Mae's portfolio *within* the seven major counties listed above. These seven counties collectively contain 65 percent of Fannie Mae's Florida portfolio. The four bar clusters in Figures 13-19 represent four counts of apartment properties. The yellow bar is the number of small apartment properties (5-50 units) finance by Fannie Mae. The red bar is the number of larger properties financed by Fannie Mae. The blue and green bars represent, respectively, the total number of large and small (5-50 unit) apartment properties from the FDOR database. The actual FDOR property counts have been divided by ten in order to show them alongside the much smaller Fannie Mae

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<sup>9</sup> To avoid a scaling problem with the vertical axis in Figure 11, the number of small properties in Miami-Dade County (5,862) and Broward County (2,861) are excluded from the graph.

numbers. The bar clusters represent aggregations at the integer Census Tract level. That is, where a Census Tract had “decimal” subdivisions, the subdivisions have been re-aggregated to the integer level.

*Broward County.* Total larger apartment properties (blue) are clearly concentrated in the western part of the Broward County’s developed area, the suburbs.<sup>10</sup> In particular, note the high concentrations of large apartments in Coral Springs, Sunrise, Lauderdale Lakes, Weston, and Pembroke Pines. In contrast, large apartment properties are scarce in almost all areas of the coastal communities, including Pompano Beach, Ft. Lauderdale and Hollywood. Not surprisingly, therefore, large apartments financed by Fannie Mae tend also to be in the western suburban communities noted.

Small apartment properties have the reverse pattern. With only two exceptions (the Coral Springs area and one tract in Sunrise) the totals of small apartment properties in the western suburbs is less than the total of large apartment properties, usually by a large difference. It is interesting that in both of these exception locations, Fannie Mae has a relatively large number of small property loans. Small apartment properties generally are overwhelmingly concentrated in the older, coastal cities. It is no surprise, then that small properties financed by Fannie Mae are also concentrated in the coastal cities. But there, the concentration of “Fannie Mae” properties in the city of Ft. Lauderdale relative to Hollywood and Pompano Beach is notable.

*Duval County.* In the Jacksonville area (Figure 14), we observe concentrations of small apartment properties in, and just south of, the city center, as well as in the older, coastal cities of Neptune Beach and Jacksonville Beach. However, there are essentially no small Fannie Mae financed properties in the county. Large Fannie Mae financed properties are concentrated in the south and east areas, in relatively middle and higher income areas. One exception to this general pattern is a collection of large Fannie Mae financed properties on the north side on I-95, half way to 295 by-pass.

*Hillsborough County.* Small Fannie Mae financed properties in the Tampa area (Figure 15) are concentrated in the McDill Airforce Base area, and in the north and northwest. Large Fannie Mae financed properties are concentrated in the north, northwest and east of I-75 (e.g.,

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<sup>10</sup> The vast census tract on the left side of the map, showing no roads, is the wetlands that bound development in the county.

Brandon and Valrico). These large Fannie Mae financed properties are distributed roughly in proportion to all large apartment properties.

*Miami-Dade County.* Overall, Miami apartment properties are heavily concentrated in central Miami, extending north and west from there (Figure 16). Interestingly, there are very few large apartment properties in any part of the county; Miami is very different from several of the other large counties that are less dense and that contain a relatively newer stock of multifamily housing than Miami (see, for example, Orange County below). Given the absence of large properties in this county, it is not surprising that Fannie Mae has financed few properties with more than 50 units. The large Fannie Mae financed properties that we do observe are located in the North Miami area. Although there are a large number of small multifamily properties in Miami, a disproportionately small number of these have been financed by Fannie Mae, and these are concentrated on the north side of Miami and on the barrier islands. As noted above, 29 percent of FDOR multifamily properties are located in Miami-Dade County; however, just 10 percent of Fannie Mae financed properties in Florida are located in this County. The lack of “red” and “yellow” in Figure 16 visually depicts the relative absence of Fannie Mae financing in this county.

*Orange County.* Whereas Miami-Dade County’s multifamily housing stock consists largely of small properties, Orange County’s (Orlando) multifamily stock consists primarily of large apartment properties, which are largely oriented to the I-4 corridor. This can be seen in Figure 17 where blue bars (large properties) dominate largely nonexistent green bars (small properties). This dominance of larger properties reflects, at least in part, the younger age of the Orange County multifamily stock and the reduced density relative to Miami. As reported above, the percentage of Fannie Mae’s Florida portfolio in Orange County (10 percent) is larger than the percentage of FDOR properties located in this county (4 percent), suggesting an over penetration of this market. However, the share of Fannie Mae financed properties varies substantially across census tracts.

*Palm Beach County.* The percentage of Fannie Mae’s Florida portfolio in Palm Beach County (10 percent) is equal to the percentage of FDOR properties in the county. There is a relatively strong representation of both large and small Fannie Mae properties in Boca Raton and Delray Beach in the southern part of the county. Overall, large apartment properties are concentrated in the I-95 corridor north of West Palm Beach, as is Fannie Mae’s large property

portfolio. Small multifamily properties are concentrated in coastal areas and just south of Palm Beach. Small Fannie Mae financed properties are concentrated on the coast but in the southern half of the county; more specifically on the south side of West Palm Beach, Lake Worth, and Lantana. A smaller number of small Fannie Mae financed properties are scattered down the west side of the county in the urban area slightly east of the Florida Turnpike.

*Pinellas County.* Pinellas County's is densely developed with a relatively older housing stock. As is characteristic of other such counties in Florida, small multifamily properties provide a large percentage of multifamily units. The dominance of small properties is apparent along the entire western portion of the county that fronts the Gulf of Mexico. There is a relatively strong concentration of large Fannie Mae financed properties in the county, especially in the northern half. Small Fannie Mae financed properties are concentrated in two areas: central St. Petersburg and the Clearwater area. This roughly reflects the concentrations of all non-beach small apartment properties.

Additional maps for the seven largest Florida counties that contain important demographic characteristics of the county and census tracts, but that are not reported or discussed for space reasons, reveal a number of interesting relations between the location and concentration of Fannie Mae properties and these demographic characteristics. For example, we find some graphical evidence of a relation between Fannie Mae's penetration in a census tract and the following variables: the percentage of household heads under 35 years of age; the percentage of household heads that are unmarried; and the percentage of households with annual income less than \$25,000.<sup>11</sup> The density of housing development and median rents at the county level also appear to be associated with the location and concentration of Fannie Mae properties. Although maps can be useful tools in the analysis of Fannie Mae's market penetration, quantifying these important relationships requires multivariate regression analysis.

### **3. Logistic Regression Model and Data**

The unconditional analysis presented above in the form of graphs and maps suggests Fannie Mae's penetration of the Florida market varies significantly by property size, age, the per-unit value of the property (to a certain extent), as well as by county and census tract demographic variables. However, this unconditional analysis does not adequately control for or isolate the

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<sup>11</sup> 2005-10 ACS data for Florida show that renter households tend to form a bi-modal income distribution, divided roughly at \$25,000.

potential influence of county and census tract-level variables on the probability that a property will carry Fannie Mae financing. Therefore, we now turn to a multivariate regression analysis of the probability that a Florida property will be financed by Fannie Mae. The logistical regression model we employ takes the form

$$Fannie_i = b'x_i + \mu_i$$

$$Fannie_i = b'x_i + \mu_i$$

where  $Fannie_i$  is a binary variable indicating whether property  $i$  has been financed by Fannie Mae,  $b'$  is a row vector of coefficients,  $x_i$  is a vector of variables that explains the existence of financing by Fannie, and  $\mu_i$  is the random error term. The vector  $x_i$  contains characteristics of the county and census tract in which the property is located, including county population (*POP*), the number of owner and renter-occupied housing units per square mile in the county (*SQMILE*), and the median rent (*RENT*) and house price (*HPRICE*) in the county. At the census tract level,  $x_i$  contains the percentage of all household heads under the age of 35 (*HH<35*), the percentage of unmarried household heads (*SINGLE*), the percentage of households headed by a female (*HHFEM*), and the percentage of households with annual incomes equal to or less than \$25,000 (*HHI≤25*).

Finally, at the individual property level,  $x_i$  also contains the three variables examined in our unconditional analysis: the effective age of the property (*AGE*), the number of apartment units in the property (*UNITS*), and the market value of the property as estimated by the county tax assessor (*VALUE*). According to Clapp and Giaccotto (1992, p. 301), estimates of value produced by property tax assessors “summarize into a single number the locational and structural characteristics of a real property” and therefore capture the effects of omitted site, structure, and locational characteristics on the probability that a property will be financed by Fannie Mae. In addition, county fixed-effects are included for the seven largest counties to capture any unobserved characteristics of these counties that may affect the probability of Fannie Mae financing.

The logistic regression equation is first estimated using the 21 counties for which a sufficient number of Fannie Mae financed properties is available. These 21 counties contain 90 percent of Florida multifamily properties. We also estimate the logistic regression equation using data from only the seven largest counties: Broward (Ft. Lauderdale), Duval (Jacksonville),

Hillsborough (Tampa), Miami-Dade, Orange (Orlando), Palm Beach, and Pinellas (St. Petersburg). These seven counties contain 70 percent of Florida multifamily properties.

The FDOR database contains records for 27,750 Florida multifamily properties in the 21 counties that indicate whether the property is large (51-plus units) or small (5-50 units). However, approximately 5,000 of these property records do not indicate the exact number of units contained in the property; these observations were therefore deleted.<sup>12</sup> Our final regression sample contains 19,309 properties. Table 1 displays the number of small and large multifamily properties and units in our regression data set. Data are provided for the 21-county subsample as well as for our subsample of the seven largest counties. The number and percentage of these properties financed by Fannie Mae are also included.

Of the 19,309 total properties, 3,463 (18 percent) are large properties and 15,846 (82 percent) are small properties. By comparison, loans on large multifamily properties accounted for 16 percent of Fannie Mae's U.S. portfolio as of year-end 2011; small loans accounted for 84 percent (Fannie Mae, May 1, 2012, pg. 9). Thus, the distribution of large and small loans in our Florida sample is very similar to the distribution of Fannie Mae's U.S. portfolio. The 19,309 properties in our FDOR database contain 901,540 units, 709,805 (79 percent) of which are in large properties. The remaining 191,734 units (21 percent) are contained in small properties. Fannie Mae has financed 619 properties and 98,991 units in our 21-county FDOR subsample. This represents 3.2 percent of total properties and 11.0 percent of total units.

As displayed in the right-hand panel of Table 1, the seven largest counties in Florida contain 15,246 of the 19,309 total properties and 681,463 of the 901,540 units in our regression sample. It is important to note that the percentage of multifamily properties and units financed by Fannie Mae are essentially the same in both the 21-county and seven-county subsamples.

Table 2 presents descriptive statistics for the explanatory variables used in our logistic regression analysis. The first four columns contain the mean, standard deviation, minimum, and maximum of these variables in the 21-county subsample; the corresponding statistics for the seven largest counties are reported in columns 5-8 of Table 2.

County-level data are reported in the top panel of Table 2. The average county population in the 21-county sample averages 1,507,738 and ranges from just 159,978 to 2,496,435. Total housing units per square mile of land area average 560 per county and range from 99 to 1,839.

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<sup>12</sup> From FDOR land use codes, it is clear that about 80 percent of the omitted cases are properties with 5-9 units.

Housing density by county varies substantially. Median monthly rent averages \$996 across the 21 counties with a minimum mean of \$816 and a maximum mean of \$1,133. Finally, the median house price is \$233,130 with a low of \$148,600 and a high of \$357,400. As expected, mean population, housing units per square mile, median rent, and median house price are all higher in the subsample of the seven largest counties.

Turning to our census tract-level variables in the middle panel of Table 2, the mean percentage of household heads under the age of 35 is 23.4 percent in the 21-county sample but varies from zero to 90.9 percent. Sixty-six percent of households are headed by a non-married individual, but this percentage also displays substantial variation by census tract. On average, 15.2 percent of households are headed by a female, and 36.1 percent of households have adjusted gross income less than \$25,000. The standard deviation and range of these census tract-level variables is also significant. Interestingly, the descriptive statistics for these four census tract-level variables in the seven-county sample vary very little from the 21-county sample.

The bottom panel of Table 2 contains descriptive statistics for our set of property-level explanatory variables. The average effective age of all properties in the 21-county sample is 39; the corresponding age of Fannie Mae Financed properties is 28 years. Thus, on average, Fannie Mae finances relatively newer properties, which is consistent with the data displayed in Figure 5. The mean number of units in the 21-county sample is 47; in contrast, Fannie Mae has financed properties with an average of 160 units. This is consistent with the distribution of properties by vintage displayed in Figure 1. The mean number of units, as expected, varies significantly across the 21-county sample. Finally, the mean market value per unit is \$42,820 and ranges from \$305 to \$3,163,790. The mean value per unit of properties financed by Fannie Mae is a similar \$43,810. Again, the county, census tract, and property-level characteristics of the seven-county subsample are very similar to the larger 21-county sample.

#### **4. Logistic Regression Results**

Table 3 contains logistic regression results for our 21-county sample, with parameter estimates, p-values of the associated z-statistics, and measures of goodness of fit, including the p-value of the chi-squared statistic and the pseudo R-squared. Model 1 contains county, census-tract, and property-level variables, including the number of units in the property entered as a continuous variable. In model 2, we replace number of units with a dummy variable (*SMALL*)



that is set equal to one if the property contains 5-50 units; zero otherwise. Models 1 and 2 are non-interaction models, which ignore potential discontinuities in the effects of the explanatory variables depending on whether the property is large or small. Finally, Model 3 is a full interaction model with the dummy variable *SMALL* interacted with all explanatory variables in order to examine the incremental slope effects of the property being small instead of large. All three models contain fixed-effects for the seven largest counties. The -2 log-likelihood statistics are significant for all three models.

Turning first to our county-level variables in Model 1, population (*POP*) is not significantly related to the log-odds ratio, hereafter referred to as simply the “probability,” of Fannie Mae financing. However, the number of total housing units per square mile (*SQMILE*) and median county house price (*HPRICE*) are positively and significantly related to the probability of Fannie Mae financing. Thus, all else equal, Fannie Mae appears to be more active in dense, high price, counties. The estimated coefficient on median rent, however, is negative and significant, which suggests Fannie Mae is less active in more expensive rental markets.

The estimated coefficient on the percentage of households headed by a non-married individual (*SINGLE*) cannot be distinguished from zero. However, the estimated coefficients on the remaining census tract control variables are highly statistically significant. As the percentage of households headed by a female (*HHFEM*) or by an individual less than 35 years of age (*HEAD<35*) in the census tract increases, the probability of Fannie Mae financing also increases. However, Fannie Mae is less likely to have financed the property if it is located in a census tract with a high percentage of households earning less than \$25,000 per year (*HHI≤25*).

The estimated coefficient on effective age (*AGE*), the first of our property-level characteristics, is negative and highly significant. This conditional regression result is consistent with the unconditional distribution and penetration of Fannie Mae financed properties by vintage displayed in Figures 5 and 9. In Model 1, the estimated coefficient on market value (*VALUE*) cannot be distinguished from zero suggesting that, conditional on the inclusion of the county’s median house price, the inclusion of the property’s estimated market value provides no additional explanatory power. Finally, the estimated coefficient on number of units (*UNITS*) in Model 1 is positive and highly significant. Thus, consistent with the unconditional data plotted in Figures 1-4, Fannie Mae’s Florida multifamily portfolio is skewed to larger properties, even when controlling for county, census tract, and other property-level characteristics.

Inspection of Figures 1 and 4 revealed that the unconditional distribution and penetration with respect to property size of Fannie Mae financed properties is highly non-linear. Therefore, in Model 2 we replace the continuous size variable, *UNITS*, with the dichotomous variable, *SMALL*. The results of this substitution are noteworthy. First, the explanatory power of the overall model is significantly increased. Second, the estimated coefficient on *SMALL* is negative and highly significant, confirming the unconditional results that smaller properties are less likely to carry Fannie Mae financing. Moreover, the substitution of *SMALL* for *UNITS* changes the coefficient estimates and statistical significance of several control variables. In particular, the estimated coefficient on *HPRICE*, *HHFEM*, and *HEAD<35* are no longer statistically significant. In contrast, the estimated coefficient on *VALUE* is now negative and highly significant (p-value=0.011). This suggests that when differences in the intercept are allowed for small versus large properties, the marginal effect of county and census-tract level variables on the probability of Fannie Mae financing are muted.

Model 3, the interaction model, also includes the shift variable *SMALL*. However, we include in addition variable interactions of *SMALL* with each of the other explanatory variables. This interactive specification permits us to separately examine the coefficient estimates and their statistical significance for small and large multifamily properties. Allowing for differences in marginal effects on the probability of Fannie Mae financing reveals a number of interesting results.

First, the positive effect of housing density on the probability of Fannie Mae financing appears to be driven by large properties because the estimated coefficient on *SQMILE* is not distinguishable from zero among small properties. Second, the positive effect of the percentage of households with a head younger than 35 years of age is driven by small properties; the estimated coefficient on *HEAD<35* cannot be distinguished from zero in our sample of large properties. Third, the negative effect associated with the census tract containing a greater percentage of households with incomes less than \$25,000 is clearly driven by the small-property subsample.

Finally, the estimated effect of our property-level variables also varies substantially between the small- and large-property subsamples. In particular, the negative relation between *AGE* and the probability of financing is driven by the large property subsample. The estimated coefficient on *AGE* in the small property subsample, although similar in magnitude to the large

property subsample, cannot be distinguished from zero. This result may be driven, at least in part, by the reduced variability in age among larger properties relative to smaller properties. Columns three and four in Table 3 also reveal that the positive influence of *VALUE* on the probability of Fannie Mae financing is driven by smaller properties. Overall, the results presented in Table 3 strongly suggest that the variables that explain the probability of Fannie Mae financing vary significantly by property size.

As discussed previously, 79 percent of the multifamily properties and 76 percent of the units in our 21-county regression sample are located in one of the seven largest Florida counties. Nevertheless, to ensure our results are representative of the seven largest counties, we re-estimate our logistic regression models using only data from the seven largest counties. Although not separately tabulated, these results are very similar to the results for our 21-county sample. In particular, property age remains negatively related, and number of units positively related, to the probability of Fannie Mae financing. The estimated coefficient on the market value of the property is also consistently significant. In addition, we find considerable differences in the magnitude and significance of estimated coefficients in the small property subsample relative to the large property subsample. This again highlights the importance of distinguishing between large and small properties when evaluating Fannie Mae's penetration in local markets.

## **5. Conclusion**

Although it provides mortgage financing to the broad multifamily market, Fannie Mae has developed and refined a platform for providing financing, and thereby liquidity, to the small loan market. In fact, Fannie Mae aims to serve “every market, every day” (Fannie Mae, 2011a). As of year-end 2011, Fannie Mae estimated that small loans accounted for approximately 16 percent of their book of business based on remaining principal balance, but 69 percent by number of loans.

Fannie Mae, its regulators, and interested academics and policy makers are able to track the geographic distribution of its multifamily portfolio. However, formally assessing Fannie Mae's penetration, defined as the number of loans in a market divided by the total number of multifamily properties in the market, requires the ability to measure the universe of multifamily properties in that market. The purpose of this study is to provide a framework for assessing Fannie Mae's success in penetrating and providing liquidity to the multifamily housing market

with a focus on the small loan segment of the market. We combine loan holdings from Fannie Mae with data from the Florida Department of revenue (FDOR). The FDOR data permit us to identify the number and location of the universe of multifamily properties in the state of Florida.

The FDOR data used here are as of June, 2011. In total, 28,352 parcels are identified in the 67 counties of Florida as non-condominium multifamily properties having five residential units or more. These parcels constitute the universe of multifamily properties in Florida and are used to provide the total unit counts needed for the denominator of Fannie Mae's penetration ratio. Data provided to the authors by Fannie Mae contain records for the 834 Florida properties for which it held loans as of June 2011. The properties securing these 834 loans have five or more rental residential units. Excluding senior housing properties and manufactured housing, we were able to match 688 of the Fannie Mae property records to the FDOR database using common addresses or latitude and longitude. Overall, our unconditional descriptive statistics and graphs reveal that, relative to the universe of FDOR multifamily properties, Fannie Mae's Florida portfolio consists of units that are significantly larger, newer, and somewhat more valuable on a per-unit basis. This does not, however, suggest that Fannie Mae is not providing liquidity to the multifamily market with a focus on relative affordability. To assess the geographic patterns in our data, we also examine the distribution of FDOR and Fannie Mae financed properties in Florida by county. Overall, the seven largest Florida counties contain 70 percent of Florida's multifamily properties (not units). We also map the distribution of FDOR and Fannie Mae financed properties by census tract in each of the seven largest counties.

Our unconditional analysis suggests Fannie Mae's penetration of the Florida market varies significantly by property size, age, and to a certain extent, by the per-unit value of the property. We also find some graphical evidence of a relation between Fannie Mae's penetration in a market and a number of county-level and census tract-level variables. However, this unconditional analysis cannot quantify the marginal effects of important variables on the probability that a property will carry Fannie Mae financing. Therefore, we also specify and estimate multivariate logistic regression models of the probability that a Florida property will be financed by Fannie Mae. To obtain county-level and census tract-level information on population, housing density, median rent and house prices, as well as other variables that describe the housing and demographic characteristics of the census tract in which the property is located, our initial database is merged with data from the American Community Survey. The

logistic regression model is first estimated using the 21 counties (out of a total of 67) in Florida for which a sufficient number of Fannie Mae financed properties is available. We also re-estimate our logistic regression models using only data from the seven largest counties.

Our conditional logistic regression results strongly suggest that that age of the property is negatively and significantly related to the probability of Fannie Mae financing. The estimated coefficient on number of units is positive and highly significant. Thus, Fannie Mae's Florida multifamily portfolio is skewed to larger properties, even when controlling for county, census tract, and other property-level characteristics. This positive relation between property size and the probability of Fannie Mae financing is robust to the replacement of number of units with a dichotomous variable that is set equal to one if the property contains 5-50 units.

Allowing for differences in the marginal effects of our explanatory variables on the probability of Fannie Mae financing reveals a number of interesting results. In particular, the estimated effect of our property-level variables varies substantially between the small- and large-property subsamples. The negative relation between *AGE* and the probability of financing is driven by the large property subsample. Results from our fully interactive specification also reveal that the positive influence of the property's market value on the probability of Fannie Mae financing is driven by smaller properties. Overall, our results strongly suggest that the variables that explain the probability of Fannie Mae financing vary significantly by property size.

It is important to note that a lack of penetration in a local market by Fannie Mae does not imply the multifamily market is underserved. The relatively lack of Fannie Mae financing could be more than compensated for by other lenders. Unfortunately, we do not have access to the sources of financing, or lack thereof, for properties not financed by Fannie Mae. Obtaining such data on all properties would permit a valuable extension of the current paper

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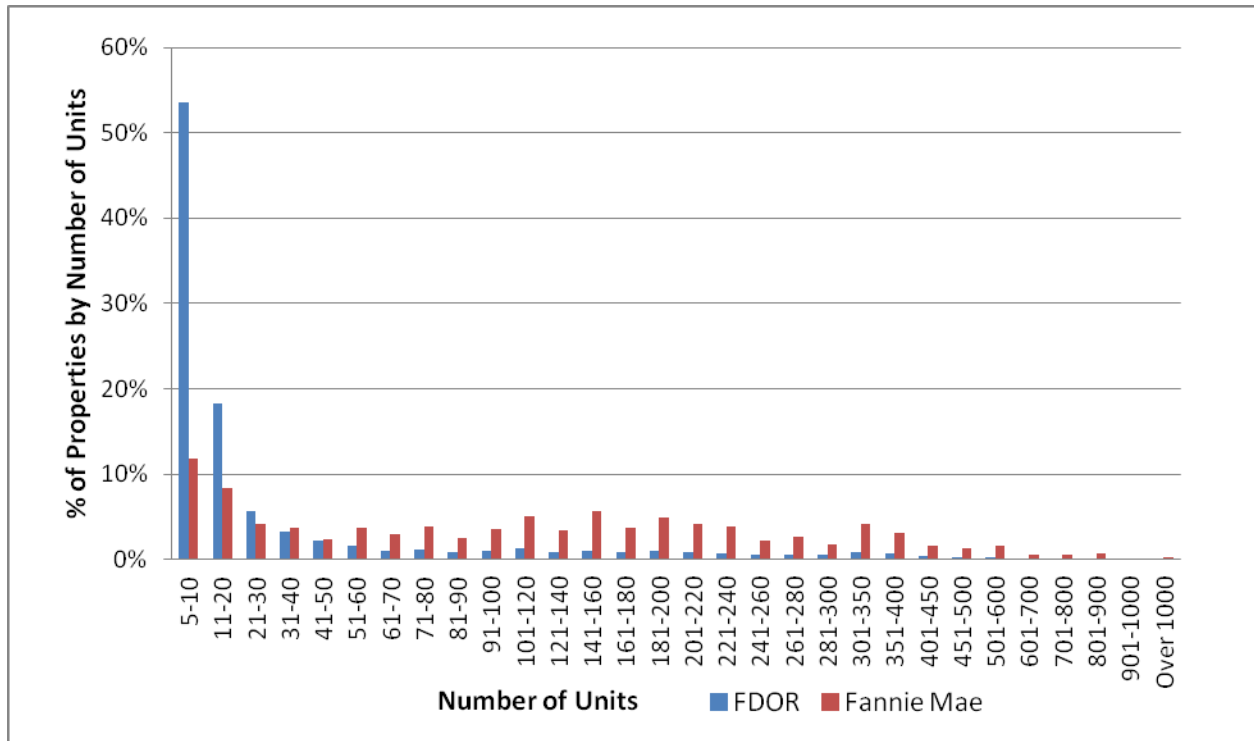
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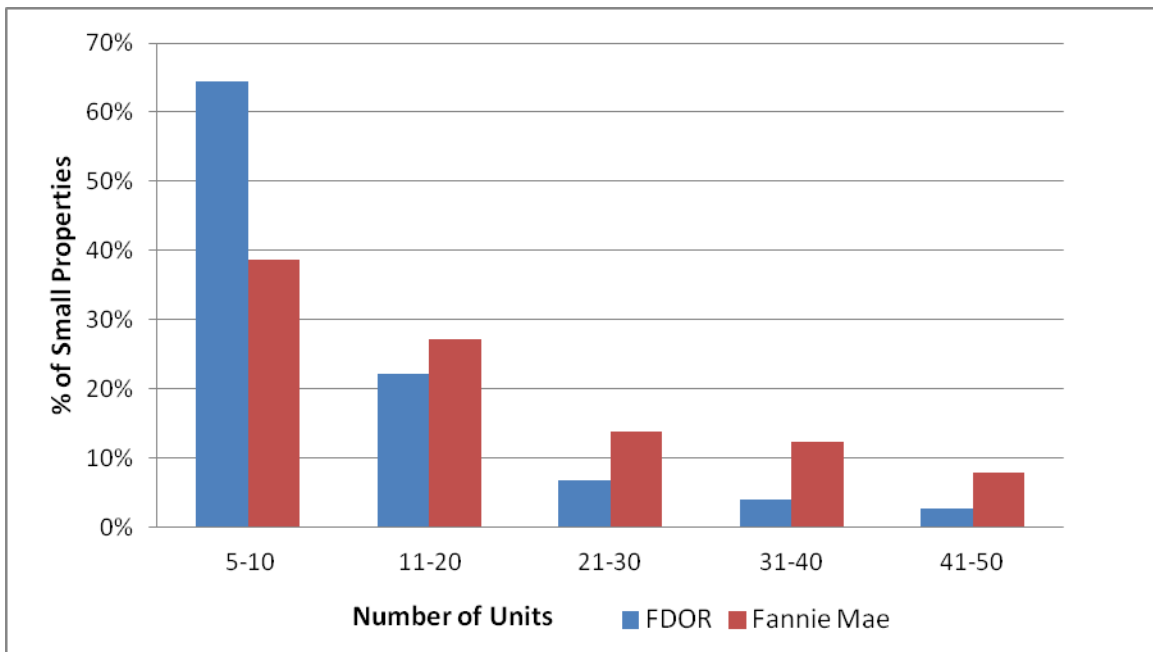
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**Figure 1. FDOR and Fannie Mae Properties by Number of Units – All Properties**



This figure plots the percentage of FDOR and Fannie Mae-financed properties by number of units. The universe of multifamily properties was obtained from the Florida Department of revenue (FDOR). The FDOR data are as of June, 2011. In total, 28,352 parcels were identified in the 67 counties of Florida as non-condominium, multifamily properties having five residential units or more. Data provided by Fannie Mae contain records for the 834 Florida properties for which it held loans as of June 2011. The properties securing these 834 loans have five or more rental residential units. Excluding senior housing properties and manufactured housing, we were able to match 688 of the Fannie Mae property records to the FDOR database using common addresses or latitude and longitude; 619 of the properties are located in our 21 county sample; 469 are located in our sample that contains the seven largest counties.

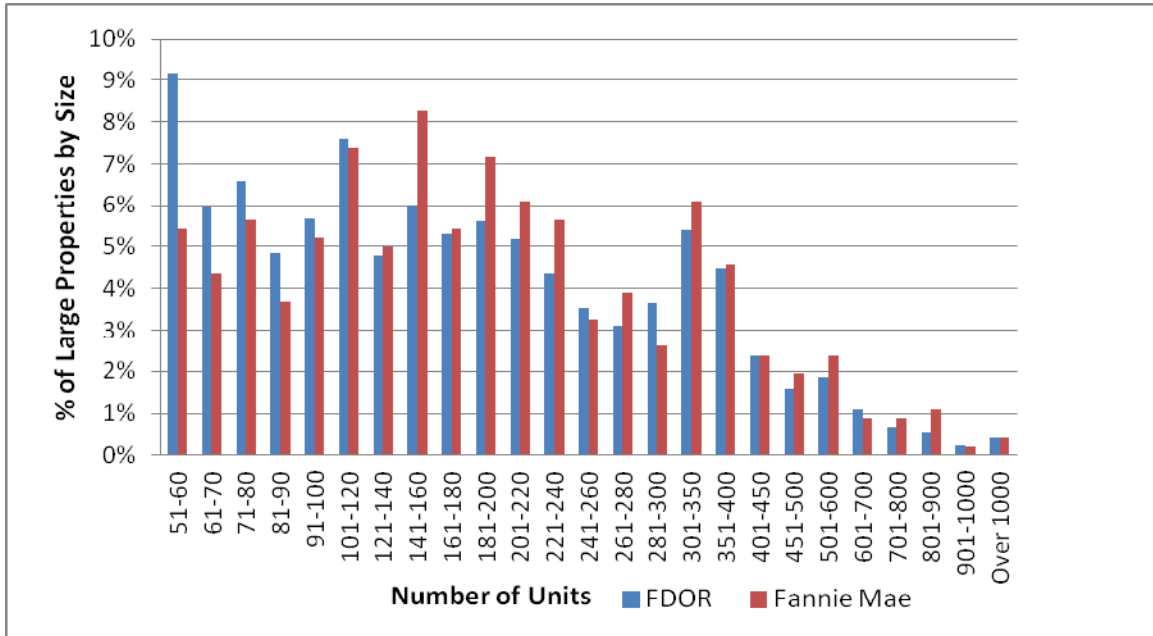
**Figure 2. Small FDOR and Fannie Mae Properties by Number of Units**



This figure plots the percentage of 5-50 unit FDOR and Fannie Mae properties by number of units. The universe of multifamily properties was obtained from the Florida Department of revenue (FDOR). The FDOR data are as of June, 2011. In total, 28,352 parcels were identified in the 67 counties of Florida as non-condominium, multifamily properties having five residential units or more. Data provided by Fannie Mae contain records for the 834 Florida properties for which it held loans as of June 2011. The properties securing these 834 loans have five or more rental residential units. Excluding senior housing properties and manufactured housing, we were able to match 688 of the Fannie Mae property records to the FDOR database using common addresses or latitude and longitude; 619 of the properties are located in our 21 county sample; 469 are located in our sample that contains the seven largest counties.

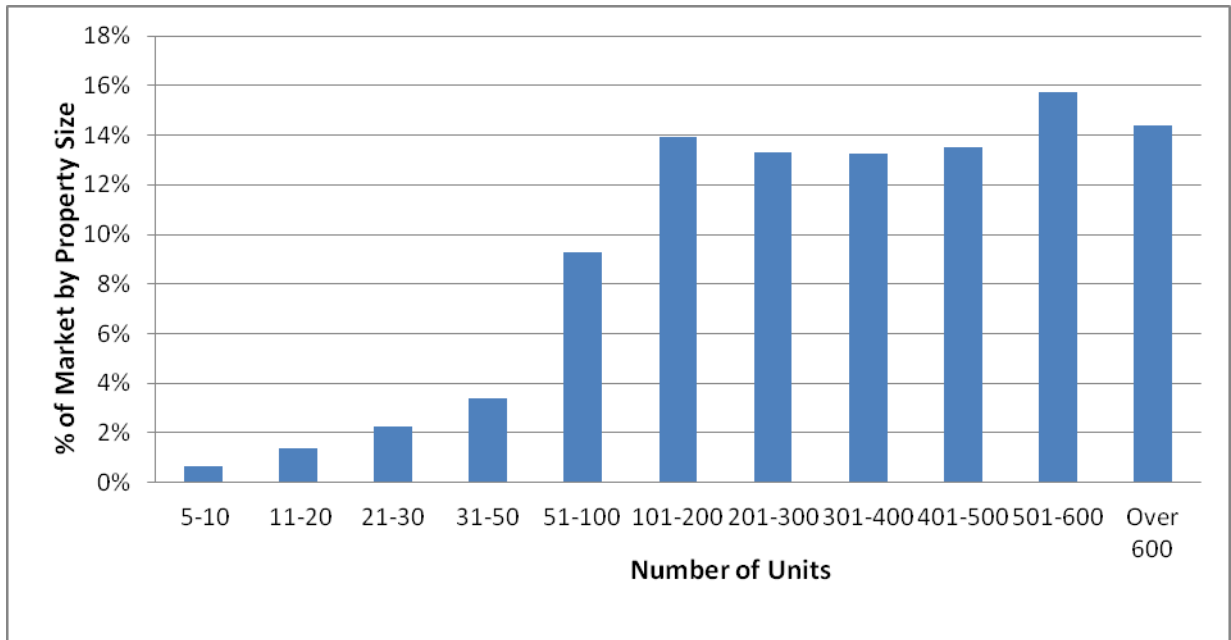


**Figure 3. Large FDOR and Fannie Mae Properties by Number of Units**



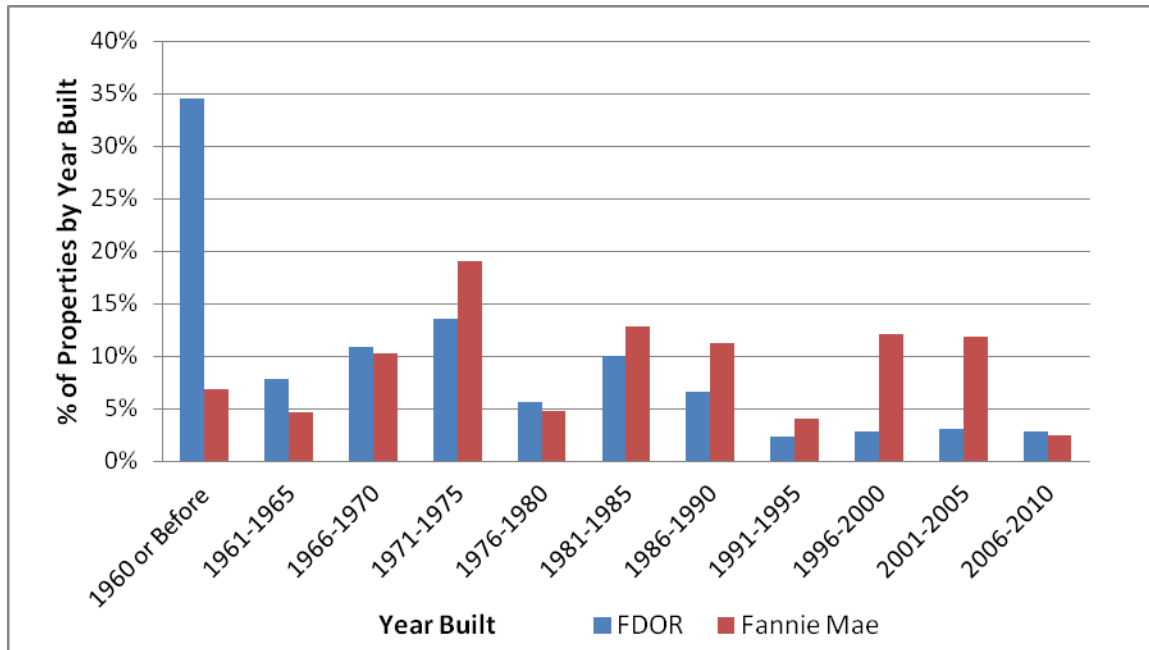
This figure plots the percentage of large (50+ unit) FDOR and Fannie Mae properties by number of units. The universe of multifamily properties was obtained from the Florida Department of revenue (FDOR). The FDOR data are as of June, 2011. In total, 28,352 parcels were identified in the 67 counties of Florida as non-condominium, multifamily properties having five residential units or more. Data provided by Fannie Mae contain records for the 834 Florida properties for which it held loans as of June 2011. The properties securing these 834 loans have five or more rental residential units. Excluding senior housing properties and manufactured housing, we were able to match 688 of the Fannie Mae property records to the FDOR database using common addresses or latitude and longitude; 619 of the properties are located in our 21 county sample; 469 are located in our sample that contains the seven largest counties.

**Figure 4. Fannie Mae Market Penetration Ratio in Florida by Number of Units**



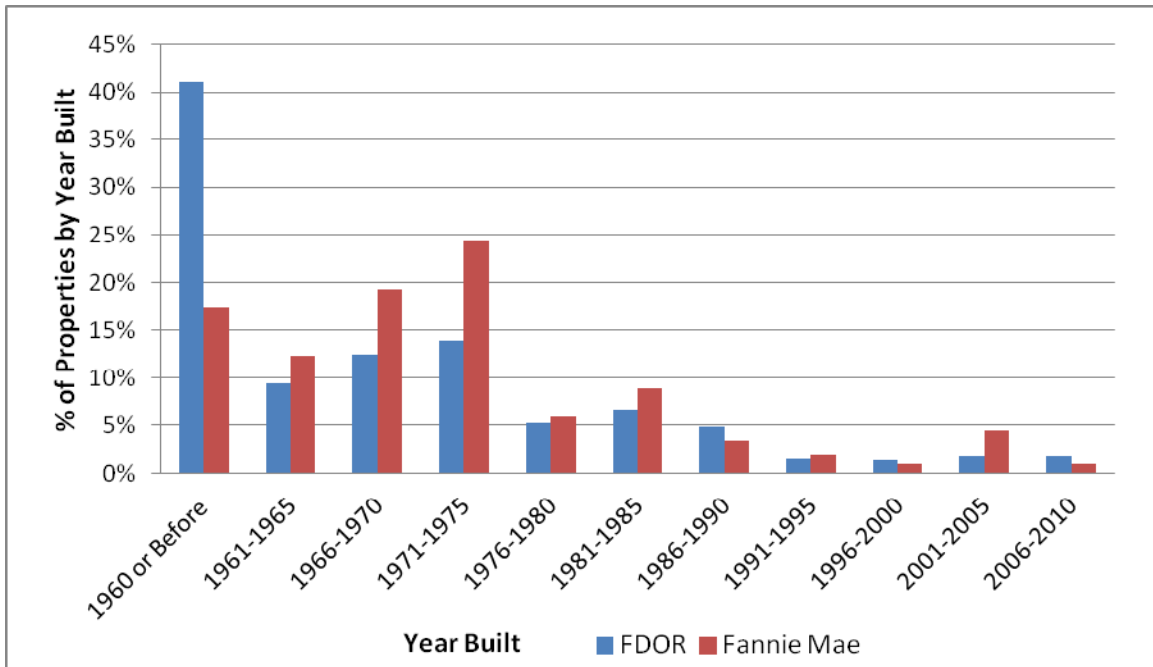
This figure plots the penetration of Fannie Mae in the Florida market by property size, where penetration is defined as the number of Fannie Mae-financed properties divided by the total number of multifamily properties contained in the FDOR database. The FDOR data are as of June, 2011. In total, 28,352 parcels were identified in the 67 counties of Florida as non-condominium, multifamily properties having five residential units or more. Data provided by Fannie Mae contain records for the 834 Florida properties for which it held loans as of June 2011. The properties securing these 834 loans have five or more rental residential units. Excluding senior housing properties and manufactured housing, we were able to match 688 of the Fannie Mae property records to the FDOR database using common addresses or latitude and longitude; 619 of the properties are located in our 21 county sample; 469 are located in our sample that contains the seven largest counties.

**Figure 5. FDOR and Fannie Mae Properties by Year Built—All Properties**



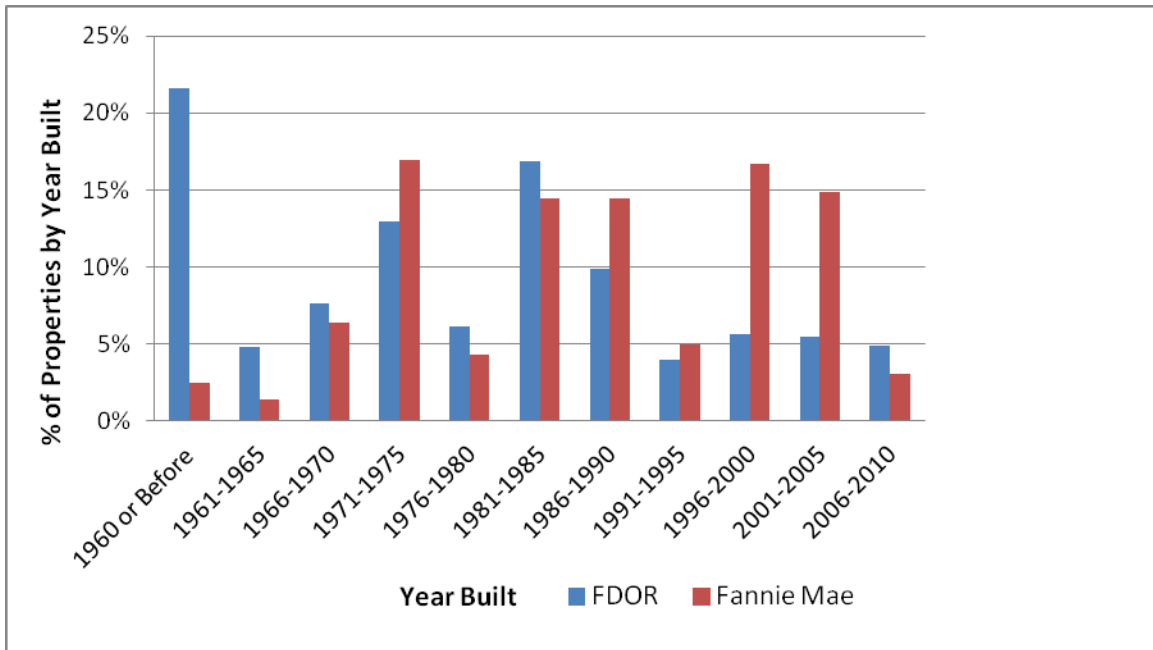
This figure plots the penetration of FDOR and Fannie Mae properties by year built. The FDOR data are as of June, 2011. In total, 28,352 parcels were identified in the 67 counties of Florida as non-condominium, multifamily properties having five residential units or more. Data provided by Fannie Mae contain records for the 834 Florida properties for which it held loans as of June 2011. The properties securing these 834 loans have five or more rental residential units. Excluding senior housing properties and manufactured housing, we were able to match 688 of the Fannie Mae property records to the FDOR database using common addresses or latitude and longitude; 619 of the properties are located in our 21 county sample; 469 are located in our sample that contains the seven largest counties.

**Figure 6. Small FDOR and Fannie Mae Properties by Year Built**



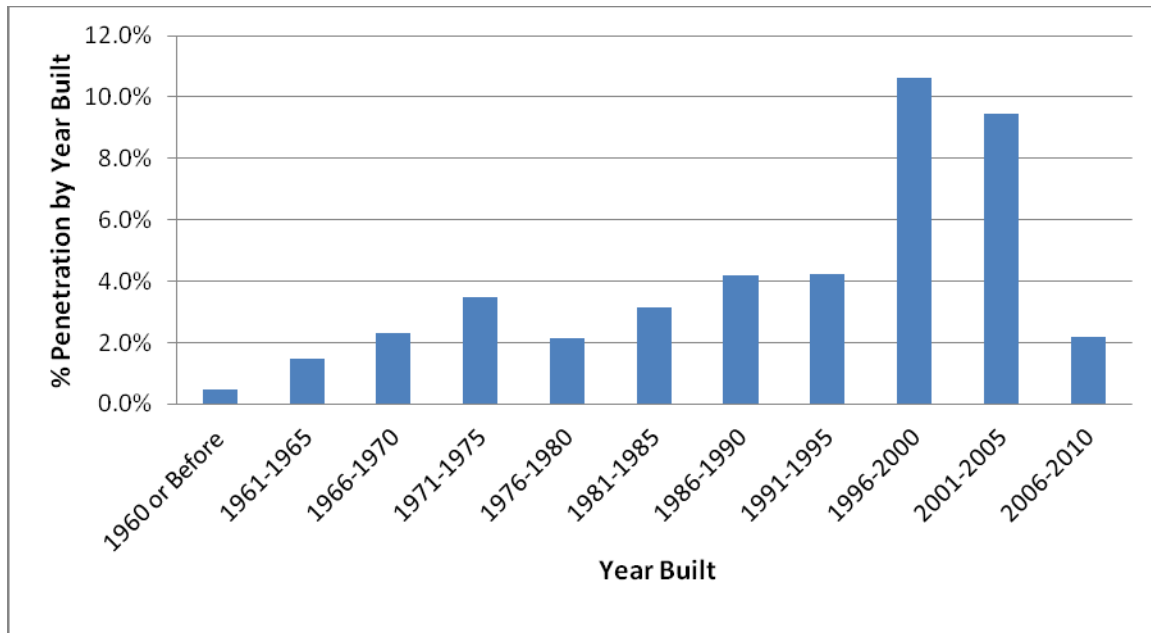
This figure plots the percentage of small (5-50 unit) FDOR and Fannie Mae properties by vintage. The FDOR data are as of June, 2011. In total, 28,352 parcels were identified in the 67 counties of Florida as non-condominium, multifamily properties having five residential units or more. Data provided by Fannie Mae contain records for the 834 Florida properties for which it held loans as of June 2011. The properties securing these 834 loans have five or more rental residential units. Excluding senior housing properties and manufactured housing, we were able to match 688 of the Fannie Mae property records to the FDOR database using common addresses or latitude and longitude; 619 of the properties are located in our 21 county sample; 469 are located in our sample that contains the seven largest counties.

**Figure 7. Large FDOR and Fannie Mae Properties by Year Built**



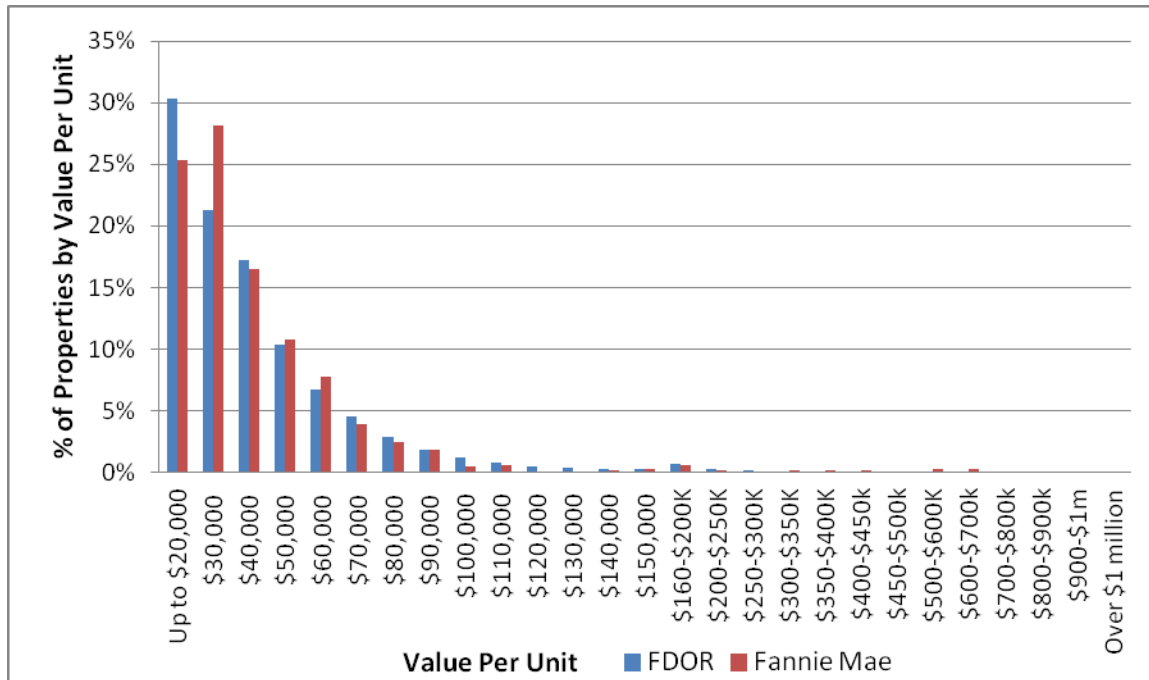
This figure plots the percentage of large (51-plus) FDOR and Fannie Mae properties by vintage. The FDOR data are as of June, 2011. In total, 28,352 parcels were identified in the 67 counties of Florida as non-condominium, multifamily properties having five residential units or more. Data provided by Fannie Mae contain records for the 834 Florida properties for which it held loans as of June 2011. The properties securing these 834 loans have five or more rental residential units. Excluding senior housing properties and manufactured housing, we were able to match 688 of the Fannie Mae property records to the FDOR database using common addresses or latitude and longitude; 619 of the properties are located in our 21 county sample; 469 are located in our sample that contains the seven largest counties.

**Figure 8. Fannie Mae Market Penetration Ratio by Property Vintage**



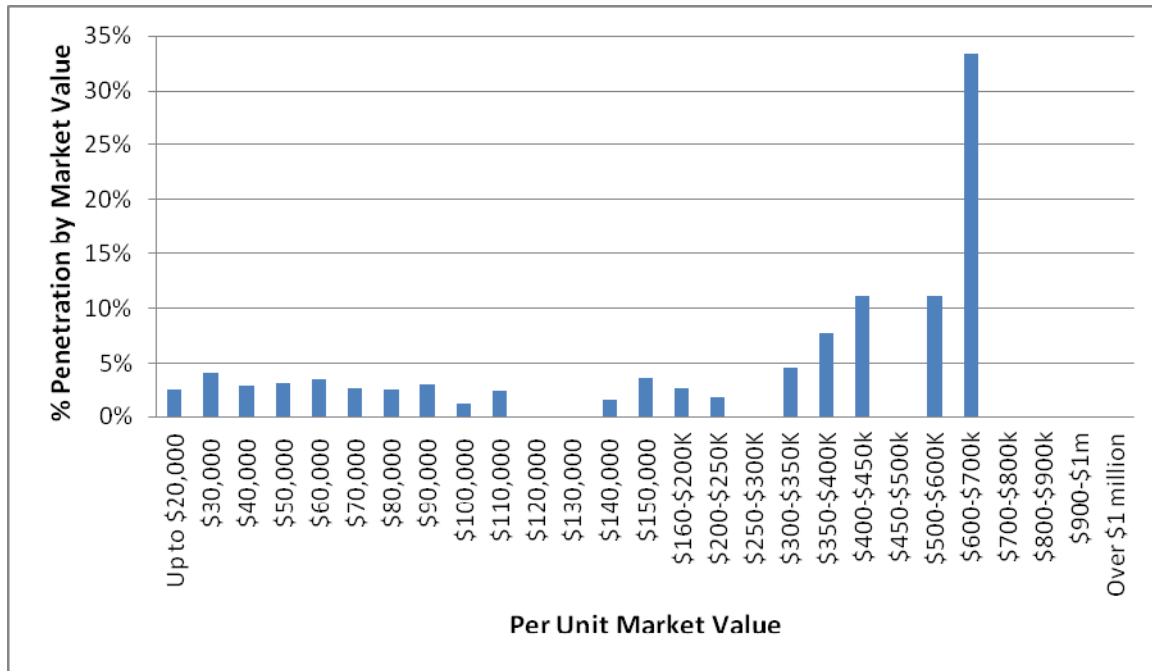
This figure plots the penetration of Fannie Mae by property vintage. The FDOR data are as of June, 2011. In total, 28,352 parcels were identified in the 67 counties of Florida as non-condominium, multifamily properties having five residential units or more. Data provided by Fannie Mae contain records for the 834 Florida properties for which it held loans as of June 2011. The properties securing these 834 loans have five or more rental residential units. Excluding senior housing properties and manufactured housing, we were able to match 688 of the Fannie Mae property records to the FDOR database using common addresses or latitude and longitude; 619 of the properties are located in our 21 county sample; 469 are located in our sample that contains the seven largest counties.

**Figure 9. FDOR and Fannie Mae Properties by Market Value per Unit**



This figure plots the percentage of FDOR and Fannie Mae properties by estimated market value per unit. The FDOR data are as of June, 2011. In total, 28,352 parcels were identified in the 67 counties of Florida as non-condominium, multifamily properties having five residential units or more. Data provided by Fannie Mae contain records for the 834 Florida properties for which it held loans as of June 2011. The properties securing these 834 loans have five or more rental residential units. Excluding senior housing properties and manufactured housing, we were able to match 688 of the Fannie Mae property records to the FDOR database using common addresses or latitude and longitude; 619 of the properties are located in our 21 county sample; 469 are located in our sample that contains the seven largest counties.

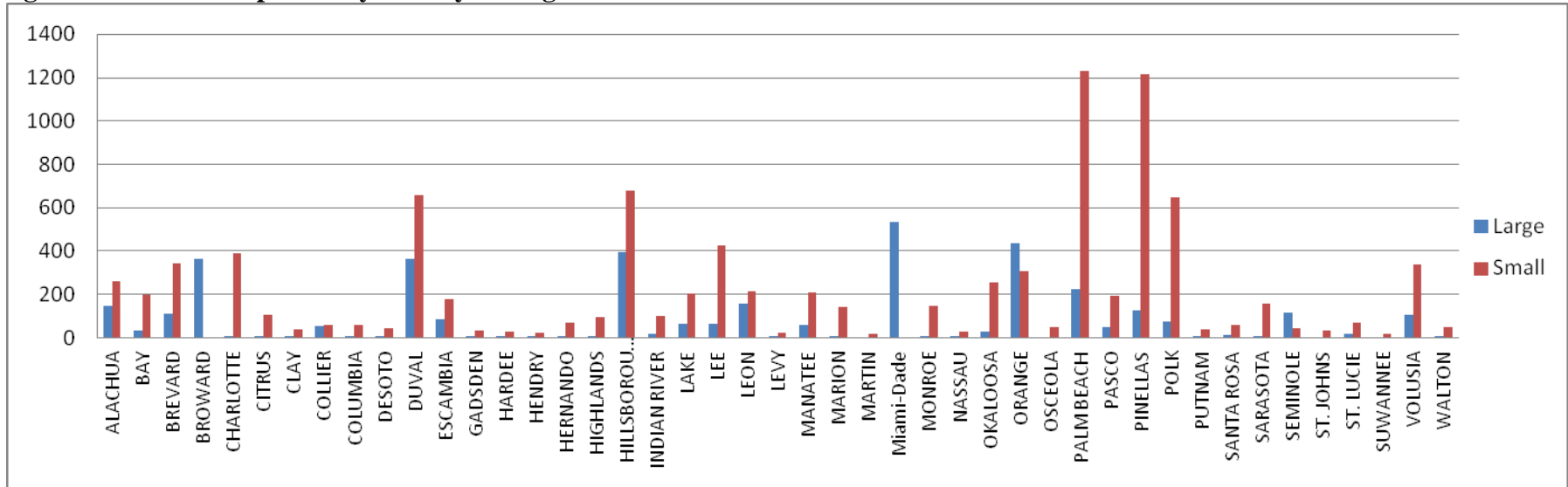
**Figure 10. Fannie Mae Market Penetration Ratio by Per Unit Market Value**



This figure plots the penetration of Fannie Mae in Florida by market value per unit. The FDOR data are as of June, 2011. In total, 28,352 parcels were identified in the 67 counties of Florida as non-condominium, multifamily properties having five residential units or more. Data provided by Fannie Mae contain records for the 834 Florida properties for which it held loans as of June 2011. The properties securing these 834 loans have five or more rental residential units. Excluding senior housing properties and manufactured housing, we were able to match 688 of the Fannie Mae property records to the FDOR database using common addresses or latitude and longitude; 619 of the properties are located in our 21 county sample; 469 are located in our sample that contains the seven largest counties.



**Figure 11. FDOR Properties by County—Large versus Small**



Note: Small apartment counts omitted for Miami-Dade (5,862), and for Broward (2,861).

**Figure 12. Fannie Mae Properties by County: Large versus Small**

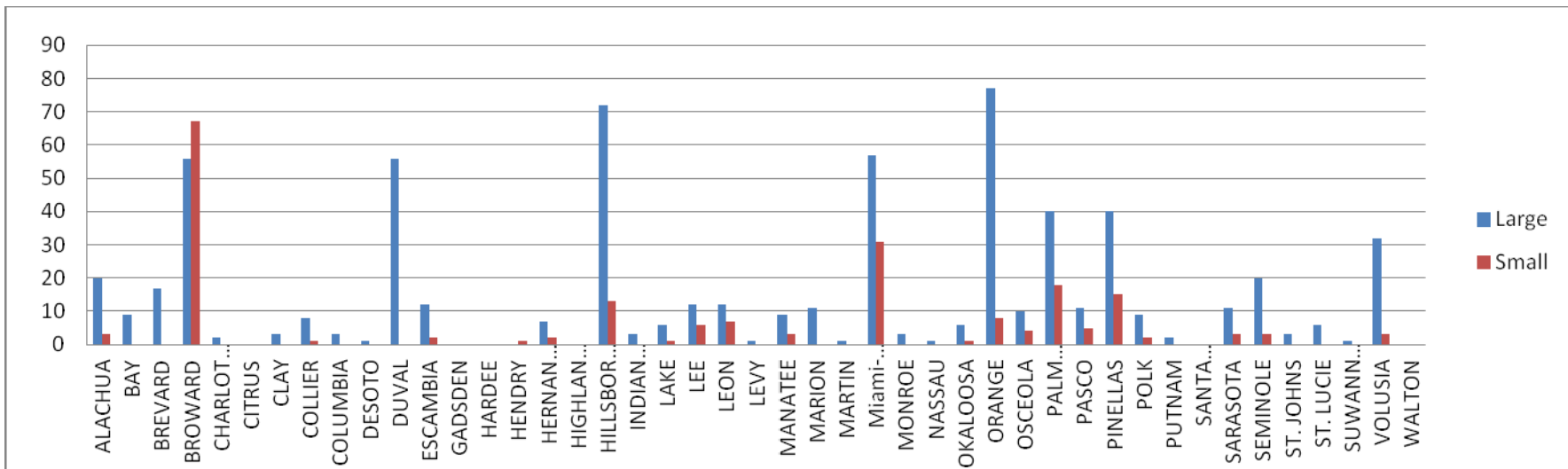
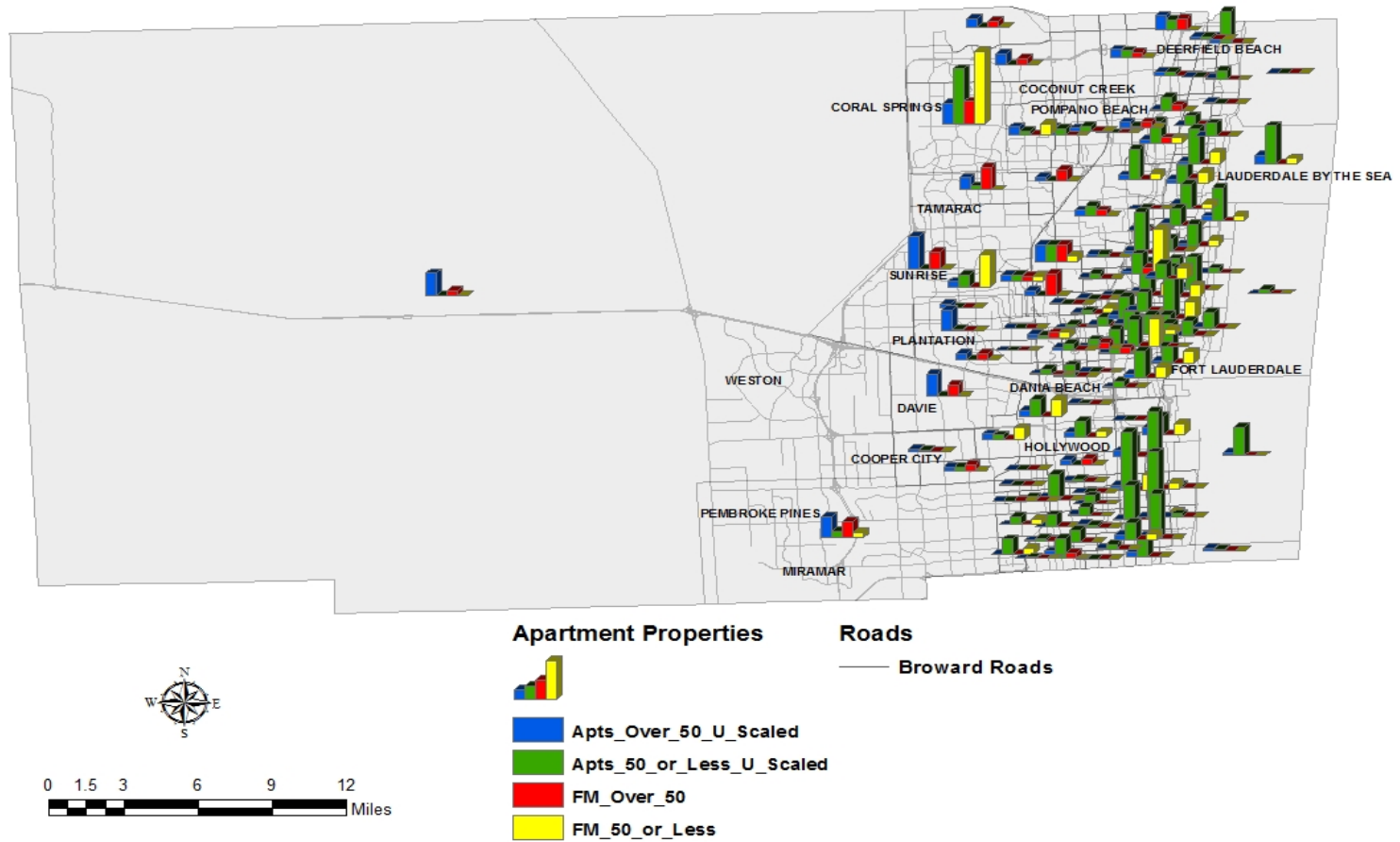


Figure 13. Broward County-Ft. Lauderdale

## Broward County, Florida



# Broward County, Florida

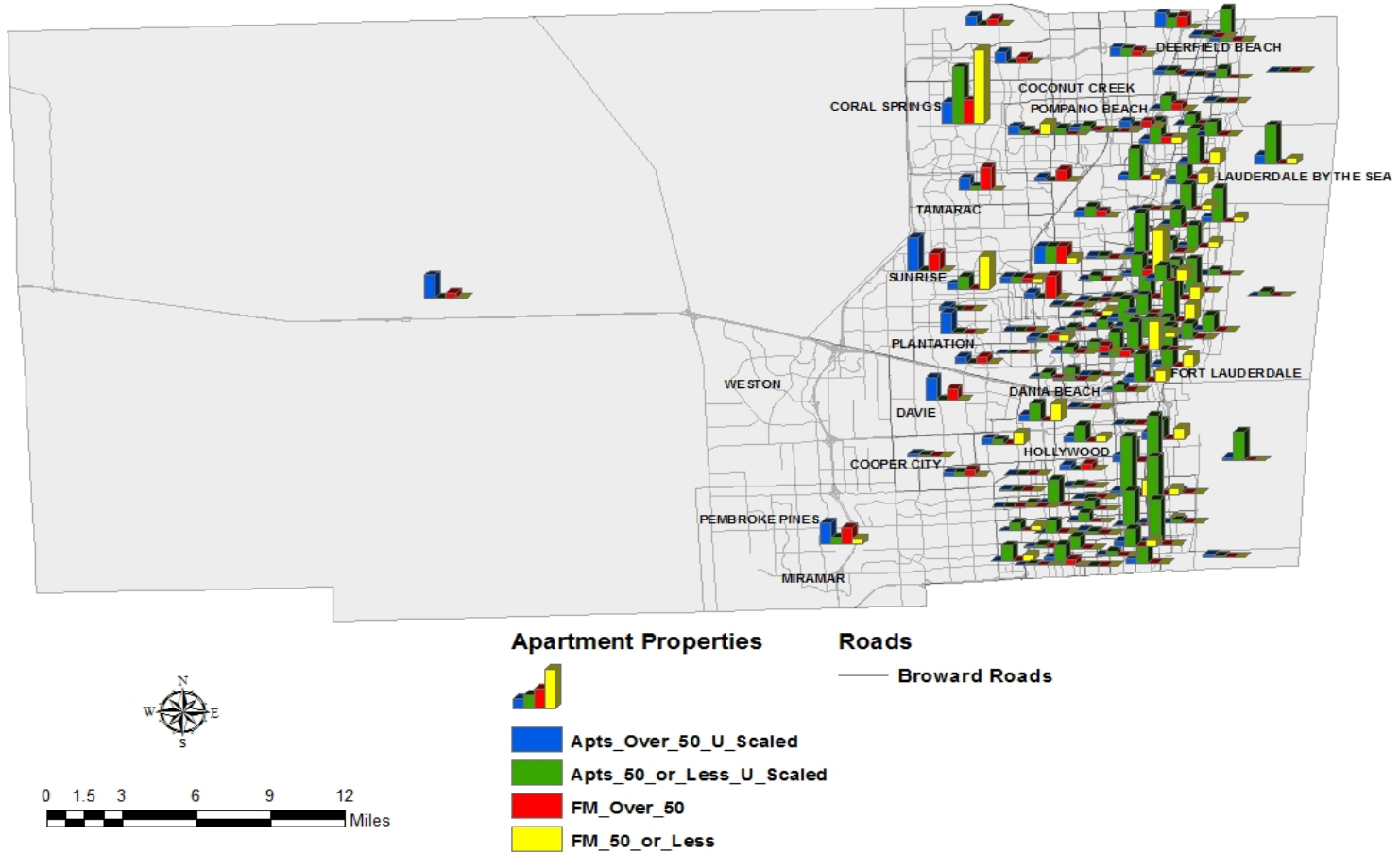
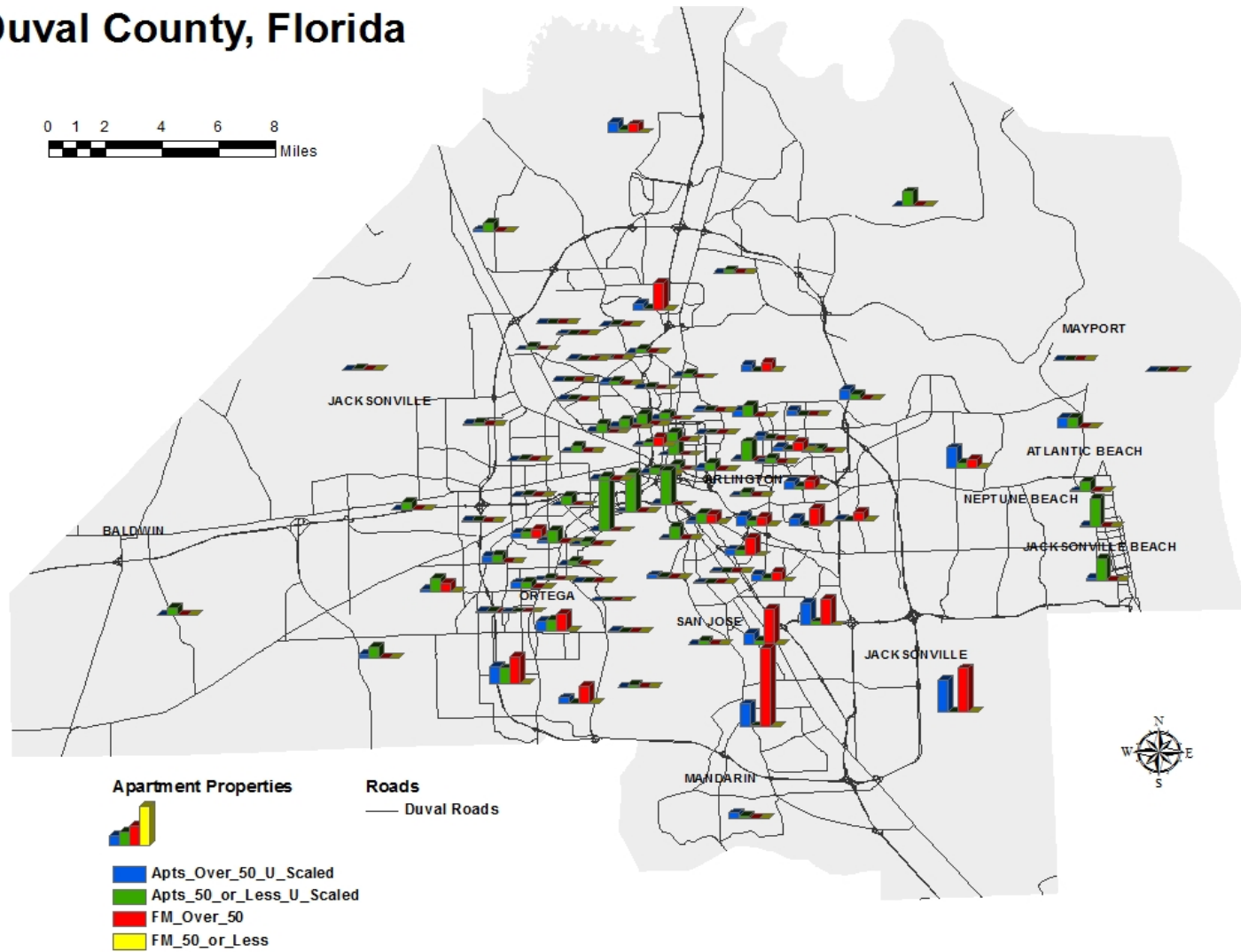


Figure 14. Duval County-Jacksonville

# Duval County, Florida



# Duval County, Florida

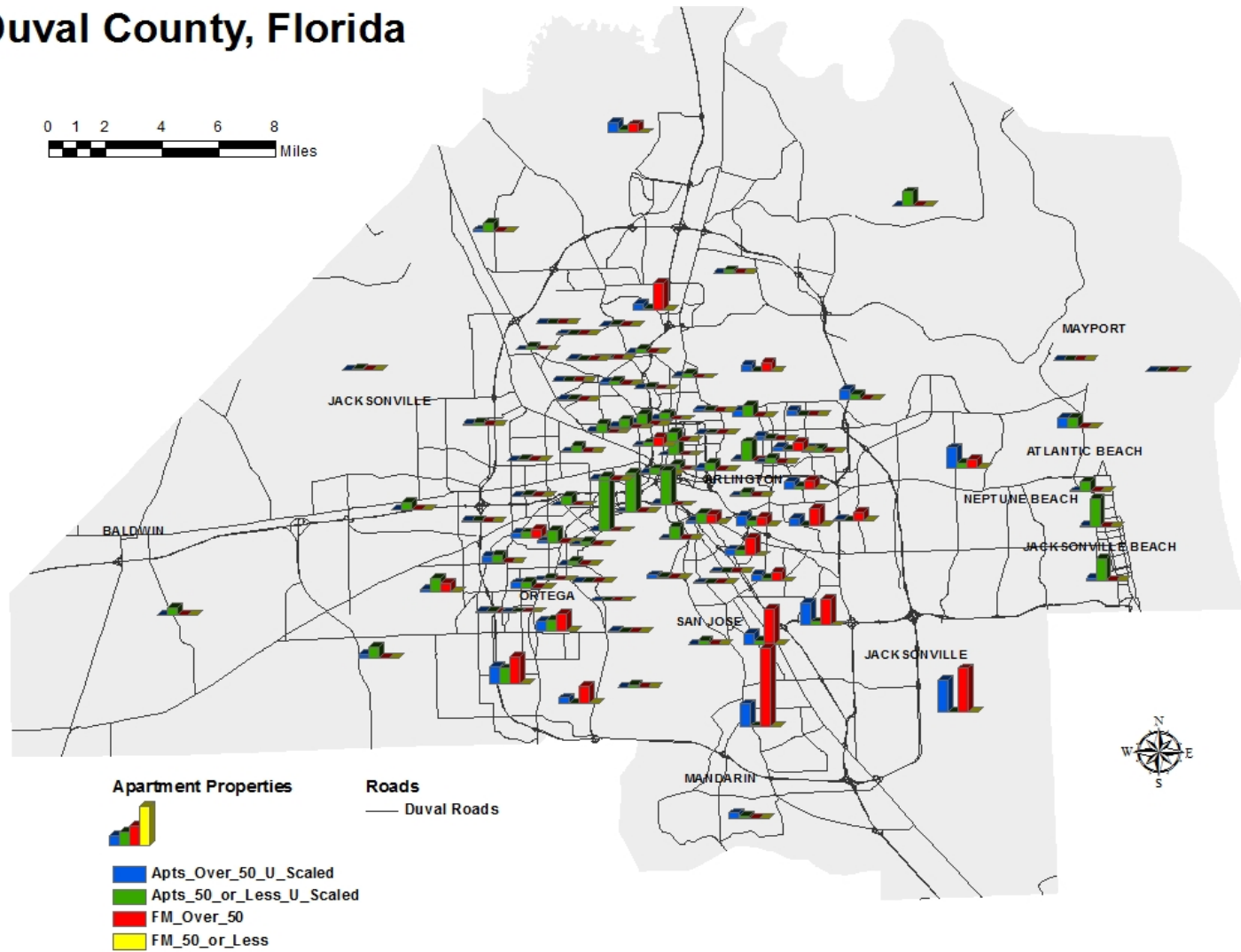
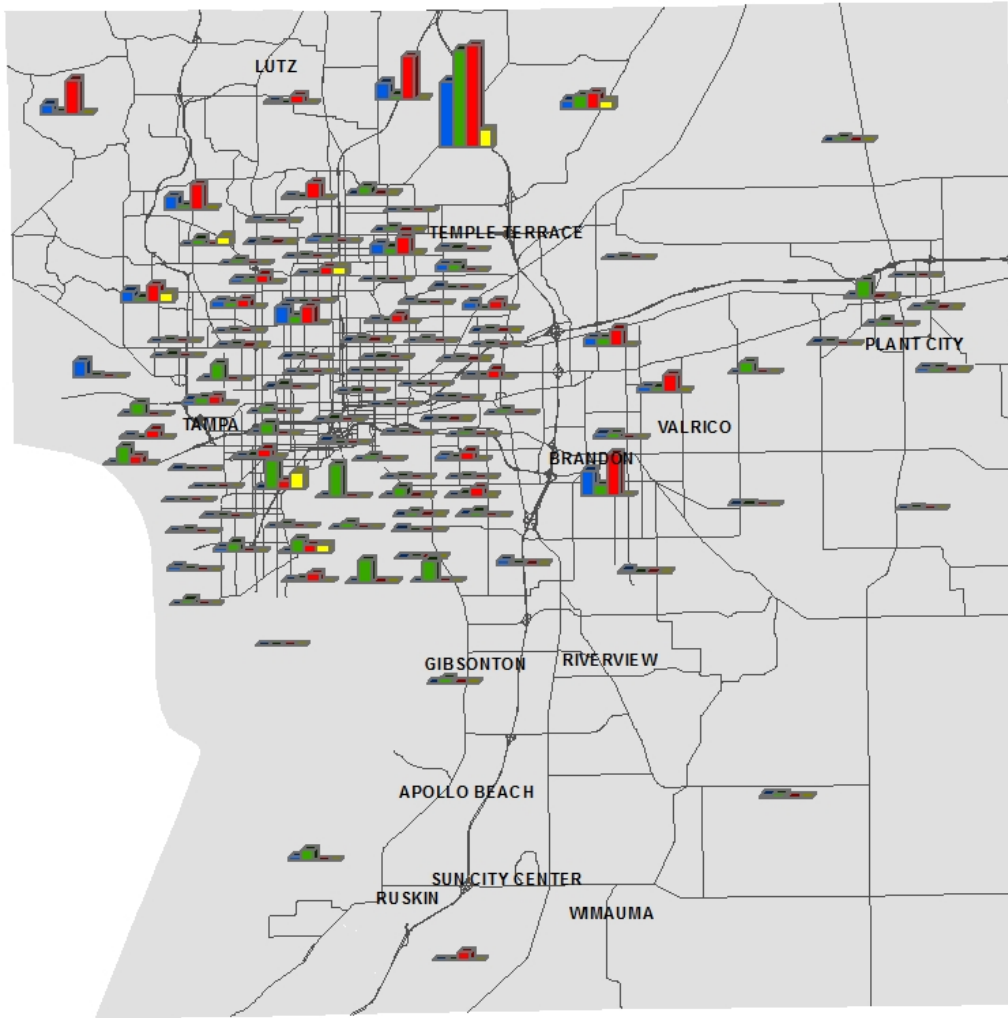


Figure 15. Hillsborough County-Tampa



**Hillsborough County, Florida**

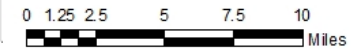
**Apartment Properties**

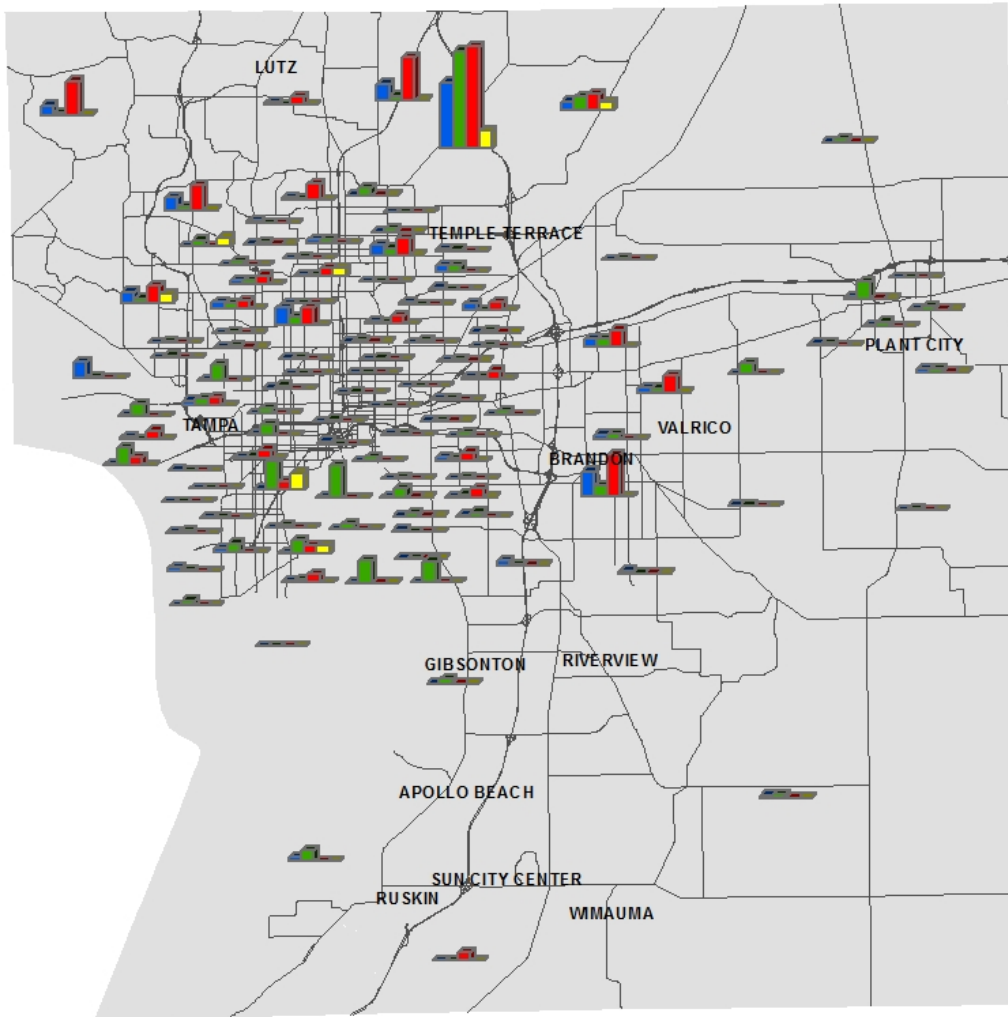


- Apts\_Over\_50\_U\_Scaled
- Apts\_50\_or\_Less\_U\_Scaled
- FM\_Over\_50
- FM\_50\_or\_Less

**Roads**





— Hillsborough Roads





**Hillsborough County, Florida**

**Apartment Properties**

-  Apts\_Over\_50\_U\_Scaled
-  Apts\_50\_or\_Less\_U\_Scaled
-  FM\_Over\_50
-  FM\_50\_or\_Less

**Roads**

— Hillsborough Roads

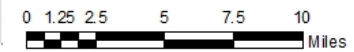
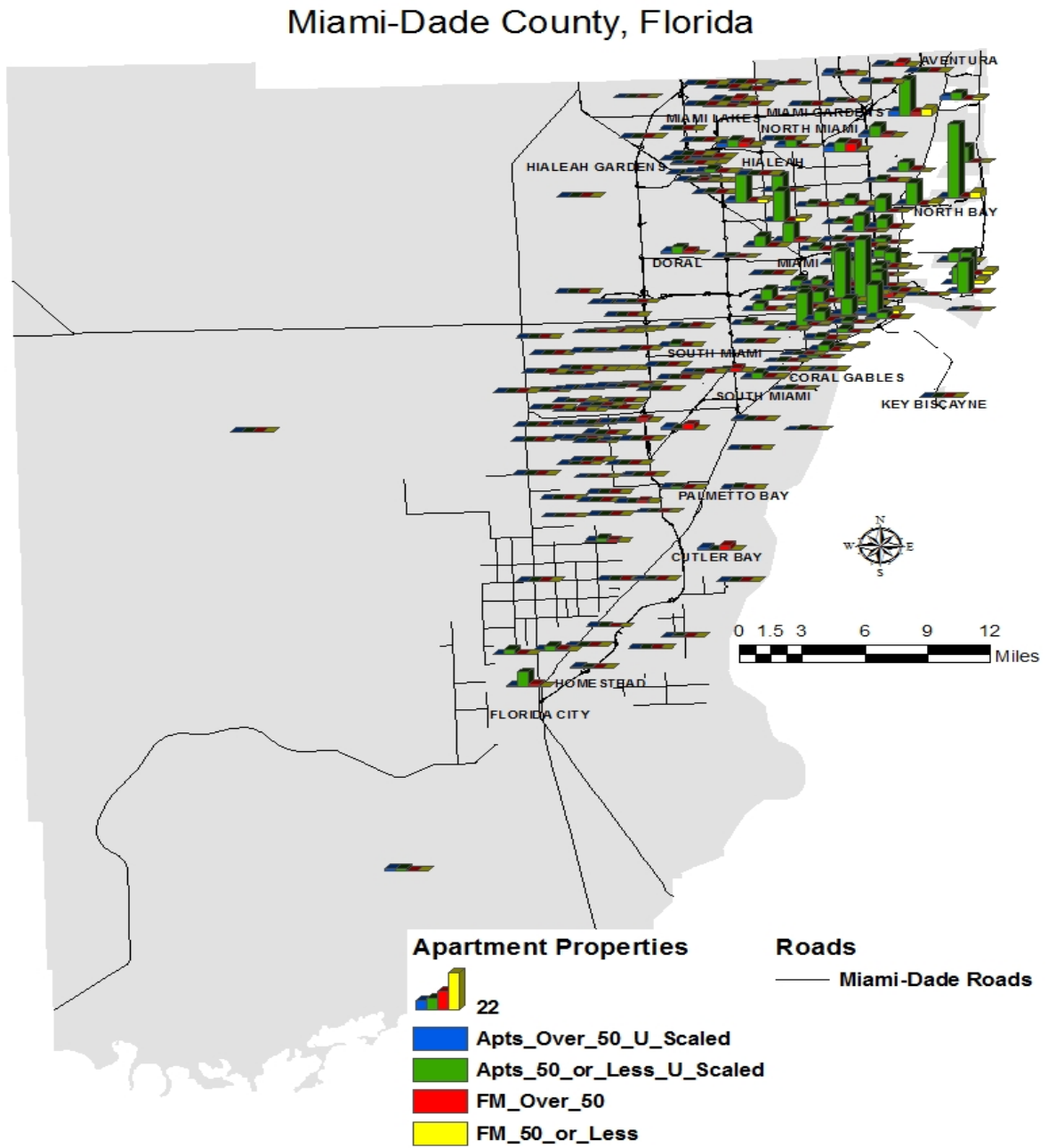


Figure 16. Miami Dade County-Miami





# Miami-Dade County, Florida

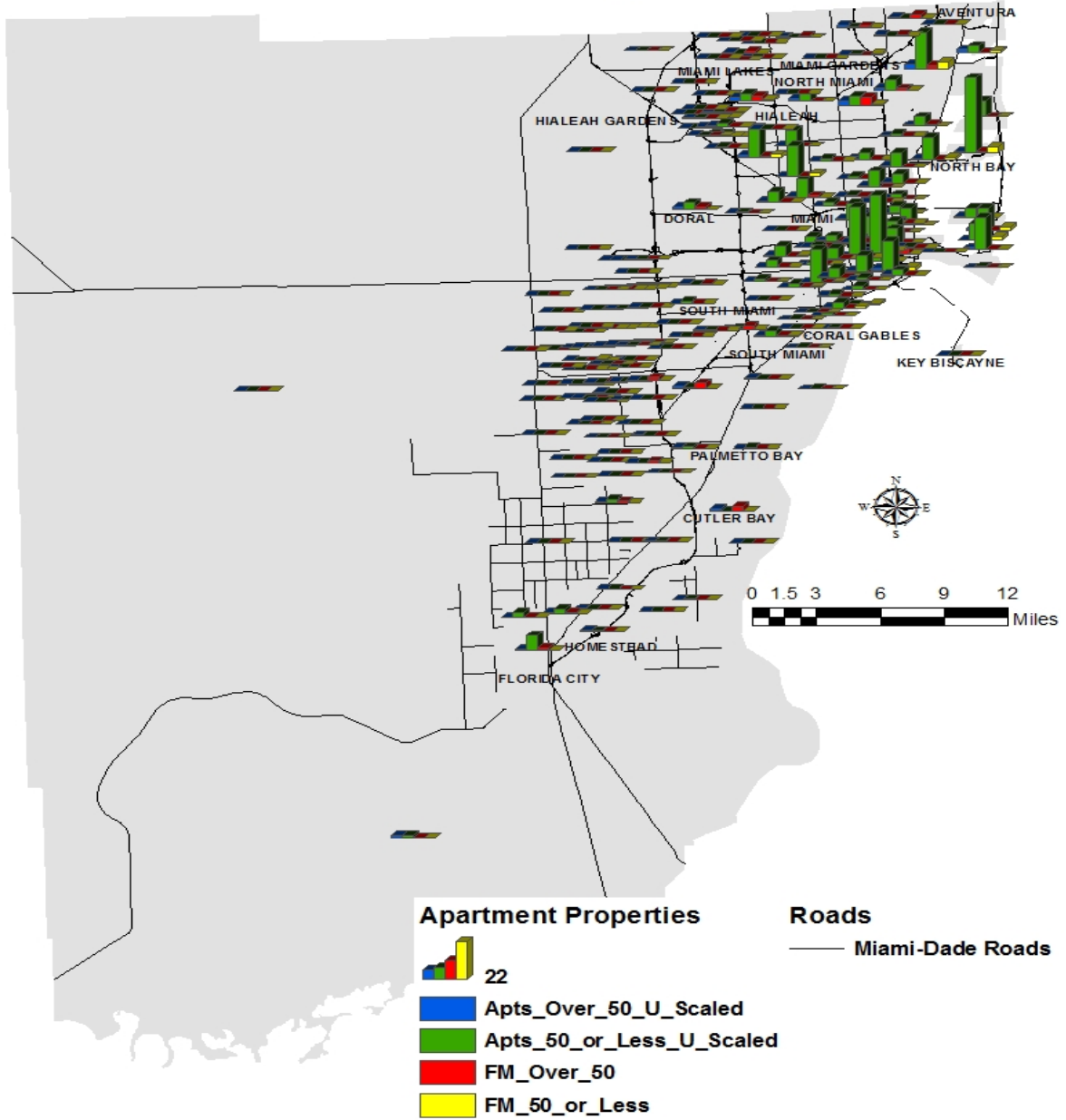
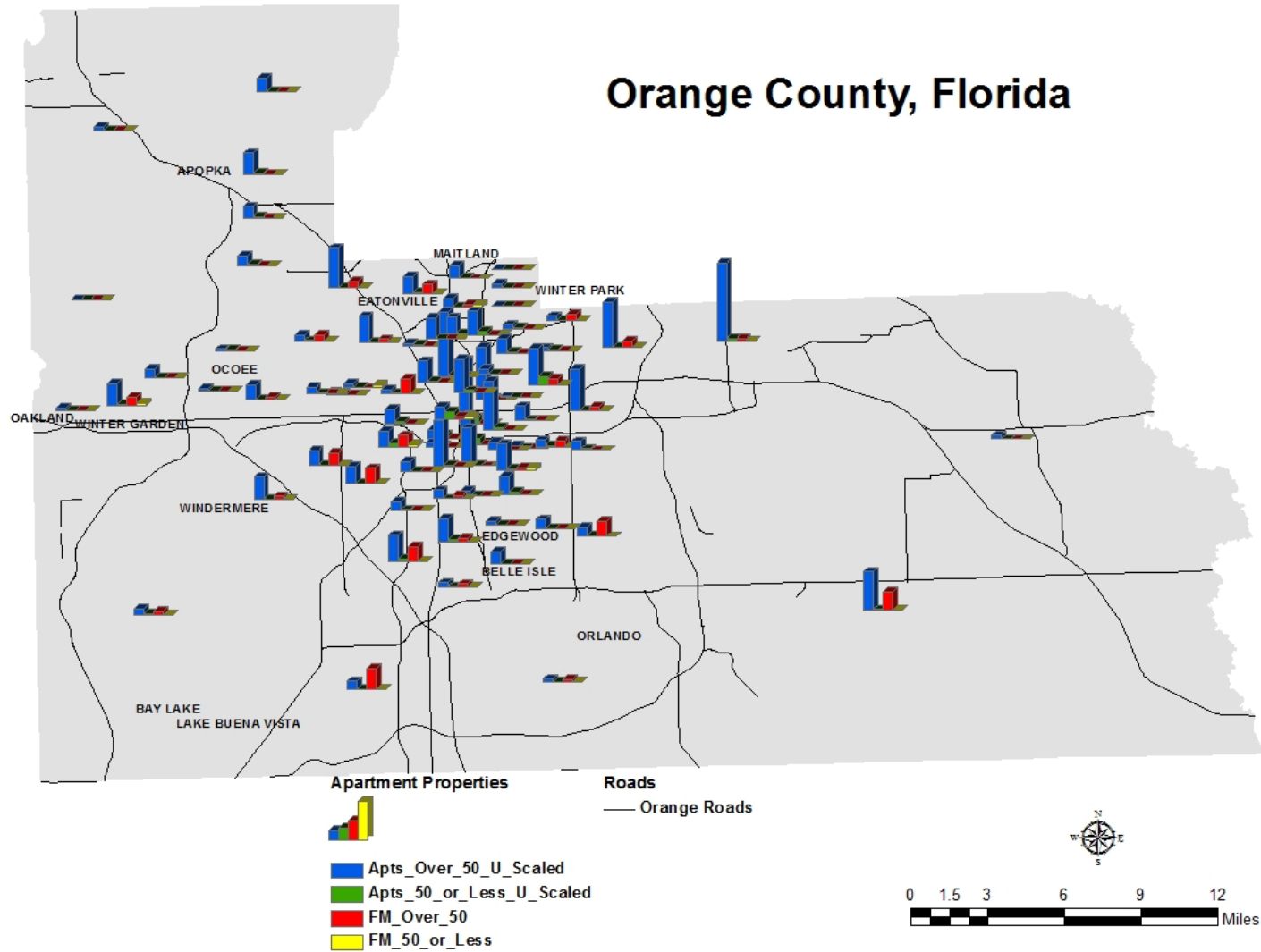
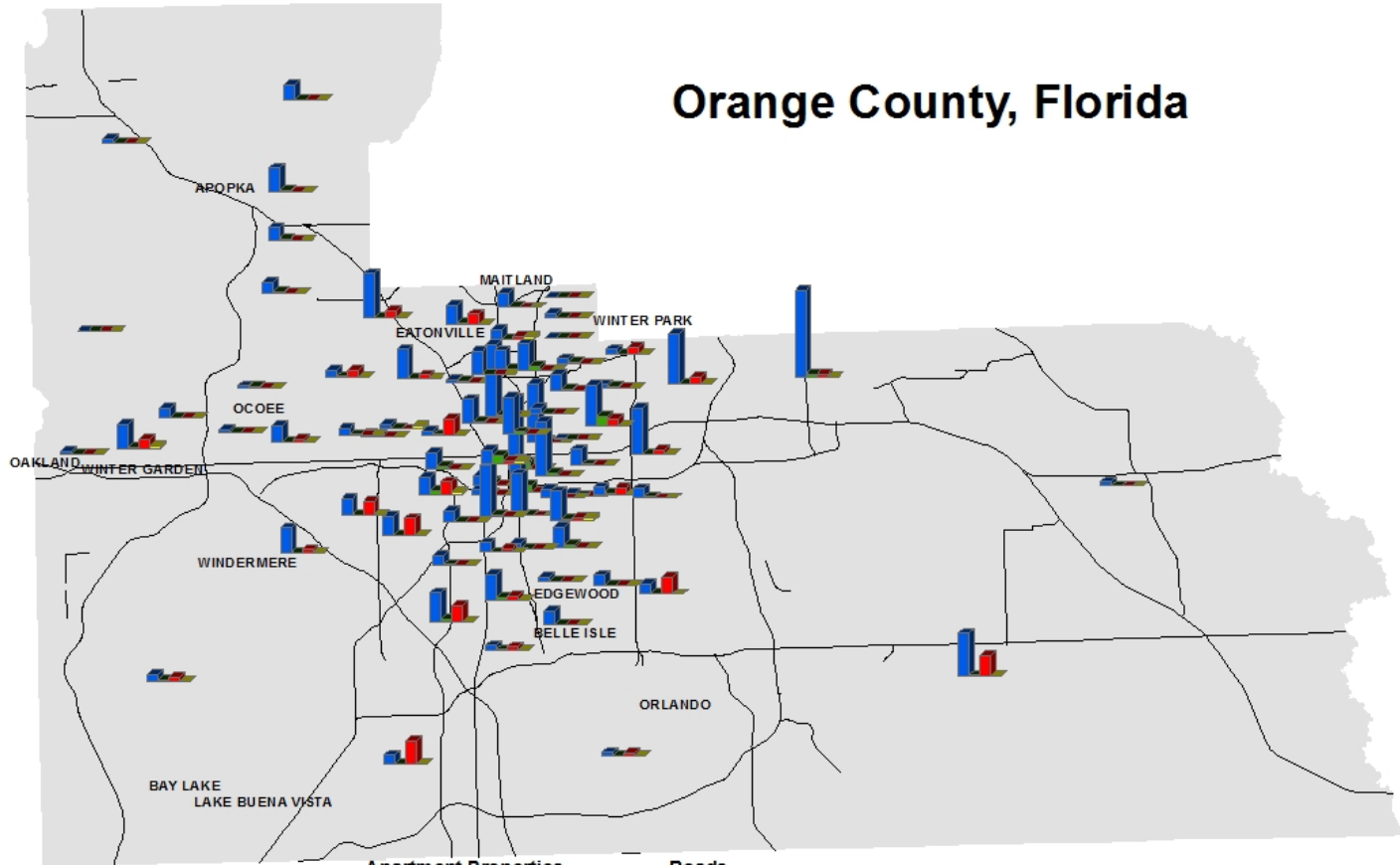


Figure 17. Orange County-Orlando



# Orange County, Florida



**Apartment Properties**



- Apts\_Over\_50\_U\_Scaled
- Apts\_50\_or\_Less\_U\_Scaled
- FM\_Over\_50
- FM\_50\_or\_Less

**Roads**

— Orange Roads

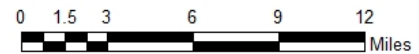
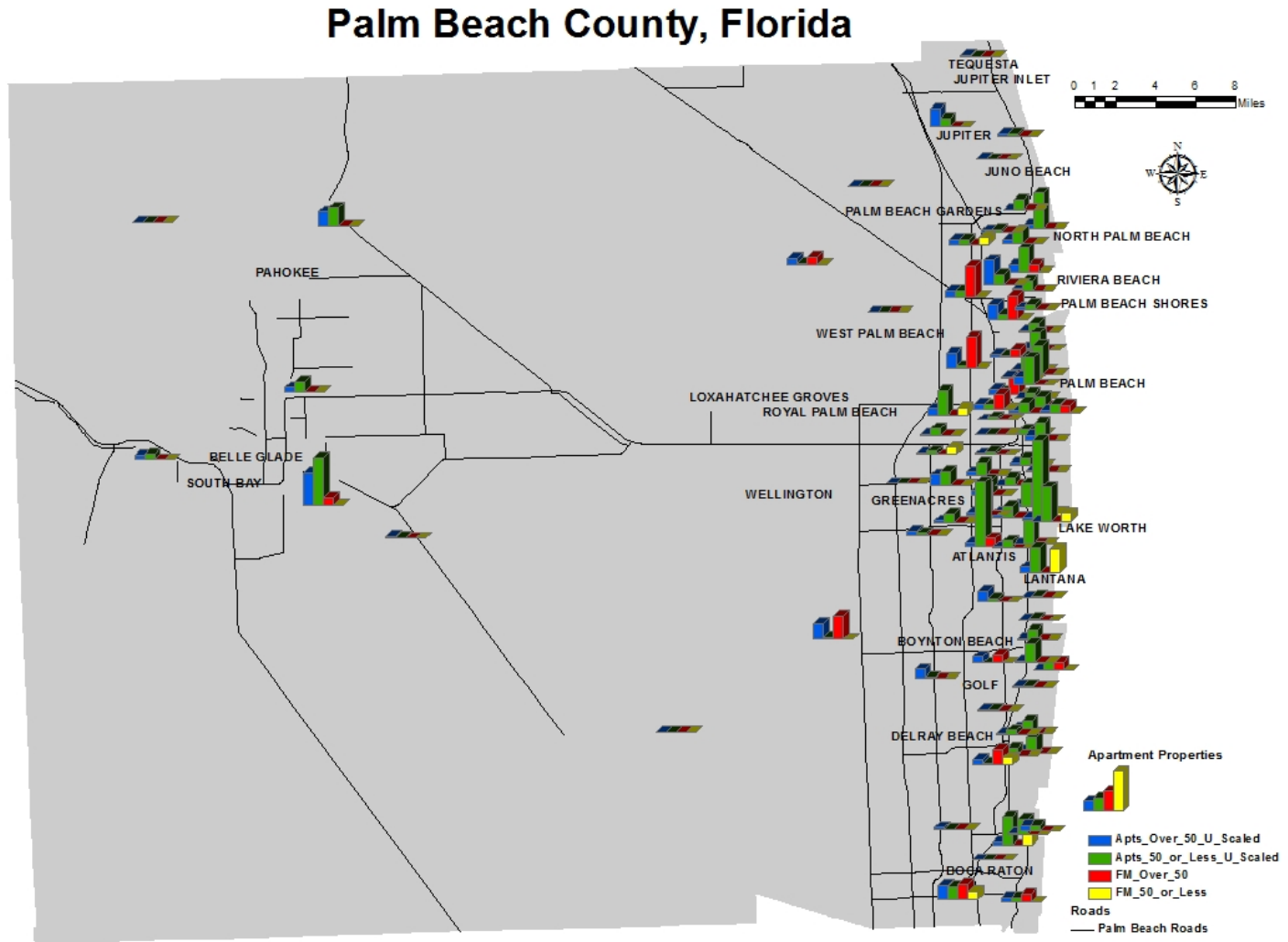


Figure 18. Palm Beach County-Palm Beach



# Palm Beach County, Florida

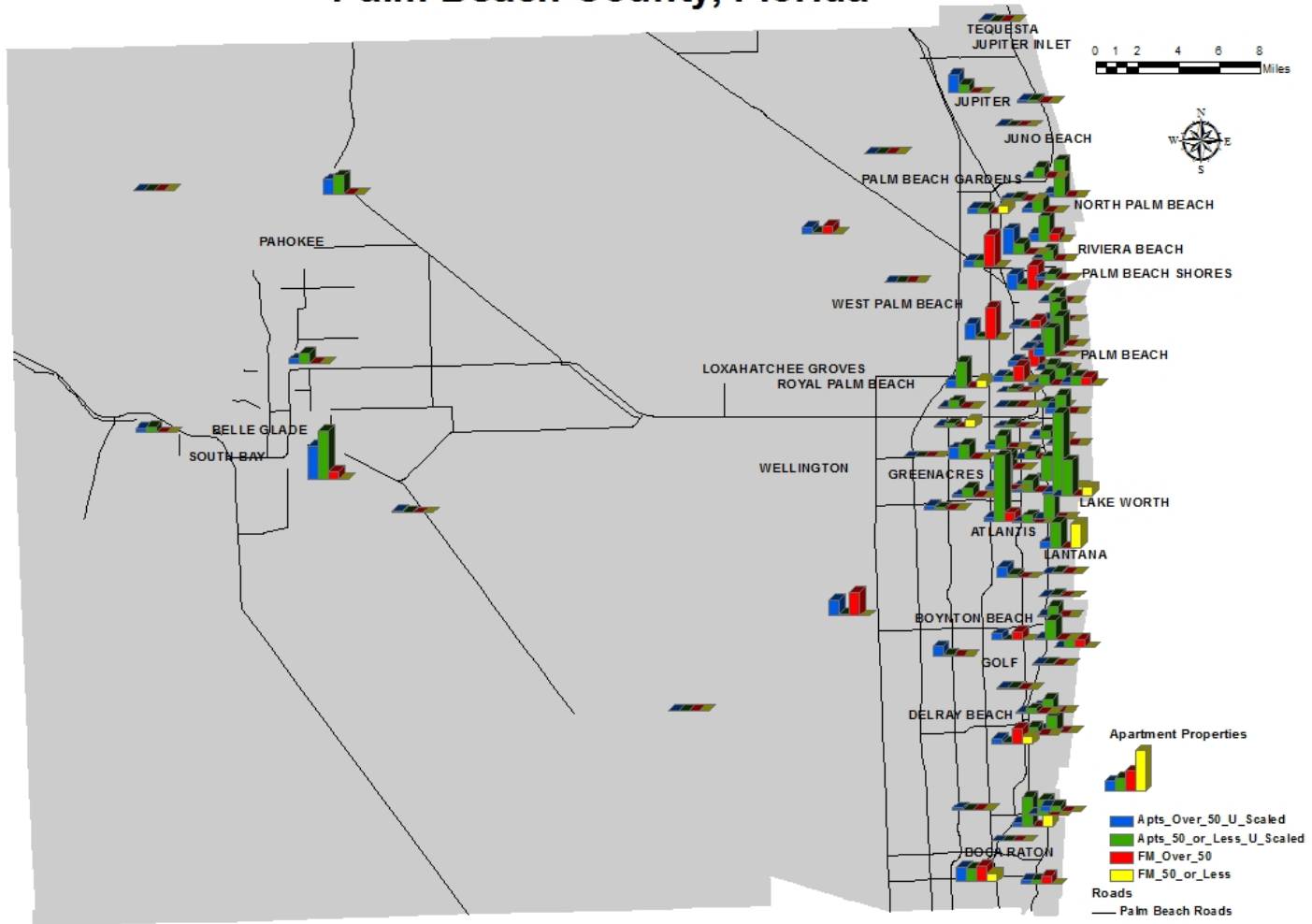
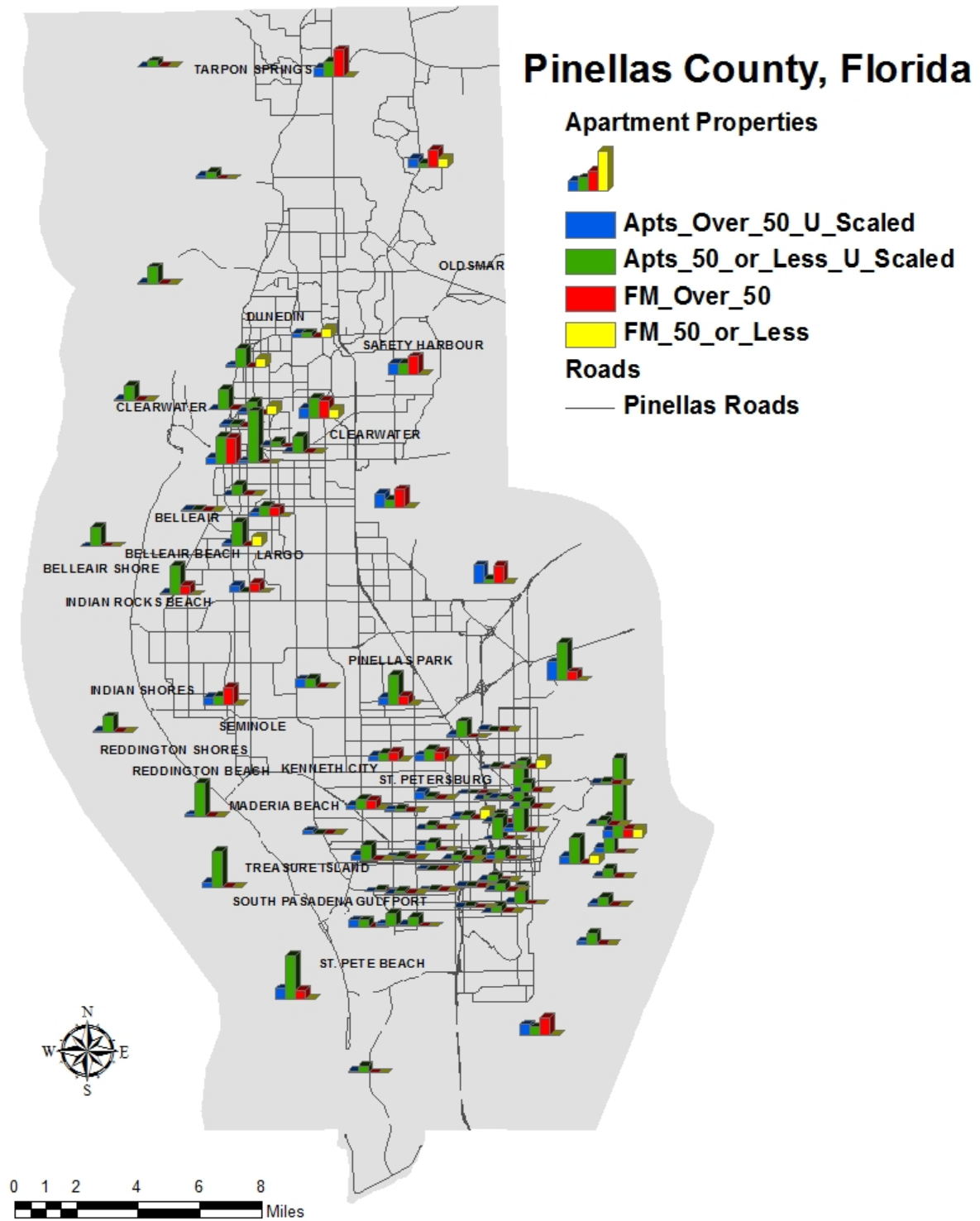


Figure 19. Pinellas County-St. Petersburg



# Pinellas County, Florida

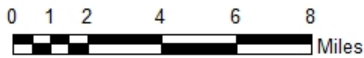
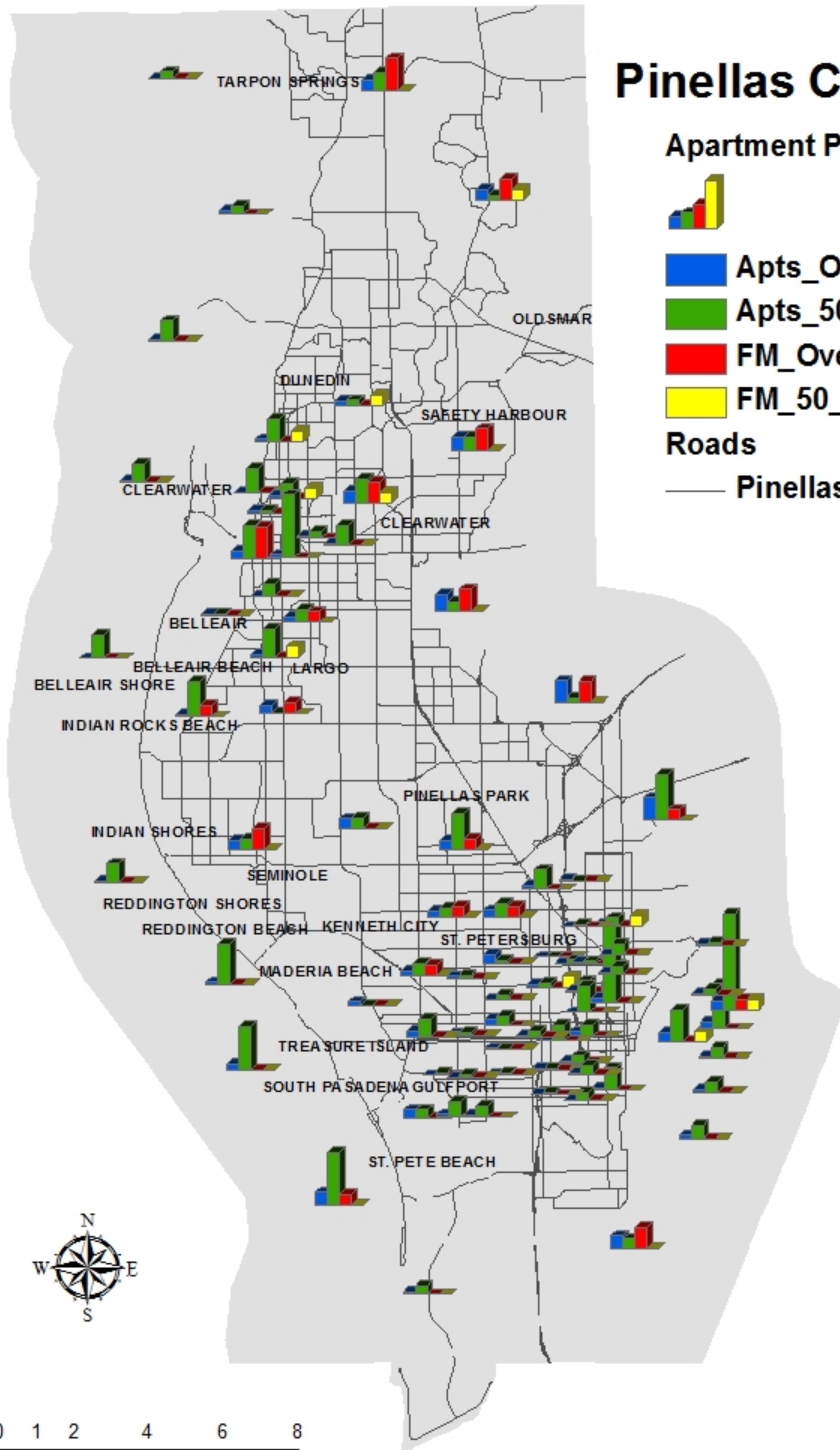
## Apartment Properties



- Apts\_Over\_50\_U\_Scaled
- Apts\_50\_or\_Less\_U\_Scaled
- FM\_Over\_50
- FM\_50\_or\_Less

## Roads

- Pinellas Roads



**Table 1. Logistic Regression Dataset: Florida Property and Unit Counts**

This table reports the total number of multifamily properties financed by Fannie Mae as well as the universe of multifamily properties in 21 counties as well as in Florida's seven largest counties. The universe of multifamily properties was obtained from the Florida Department of revenue (FDOR). The FDOR data are as of June, 2011. In total, 28,352 parcels were identified in the 67 counties of Florida as non-condominium, multifamily properties having five residential units or more. Data provided by Fannie Mae contain records for the 834 Florida properties for which it held loans as of June 2011. The properties securing these 834 loans have five or more rental residential units. Excluding senior housing properties and manufactured housing, we were able to match 688 of the Fannie Mae property records to the FDOR database using common addresses or latitude and longitude. 619 of the properties are located in our 21 county sample; 469 are located in our sample that contains the seven largest counties.

	21 Counties			Seven Largest Counties		
	Number of	Number financed by Fannie Mae	Percentage financed by Fannie Mae	Number of	Number financed by Fannie Mae	Percentage financed by Fannie Mae
Multifamily properties						
Large properties	3,463	434	12.5%	2,441	314	12.9%
Small properties	15,846	185	1.2%	12,805	155	1.2%
Total properties	19,309	619	3.2%	15,246	469	3.1%
Multifamily units						
In large properties	709,805	95,587	13.5%	530,966	73,066	13.7%
In small properties	191,734	3,404	1.8%	150,497	2,628	1.8%
Total units	901,540	98,991	11.0%	681,463	75,694	11.1%





**Table 2. Logistic Regression Dataset: Descriptive Statistics**

This table reports descriptive statistics for the county-level and census tract-level information used in our logistic regression analysis. These data were obtained from American Community Survey and merged our original dataset. Separate statistics are provided for our 21 county sample and our seven county sample.

	21 Florida Counties				Seven Largest Counties			
	Mean	Std. Dev.	Min	Max	Mean	Std. Dev.	Min	Max
<i>County-level variables</i>								
Population	1,507,738	828,063	159,978	2,496,435	1,821,348	629,767	864,263	2,496,435
Housing units per square mile	560	385	99	1,839	652	380	337	1,839
Median rent	\$995	\$93	\$816	\$1,133	\$1,019	\$86	\$880	\$1,133
Median house price	\$233,130	\$38,792	\$148,600	\$357,400	\$242,500	\$32,771	\$175,900	\$269,600
<i>Census-tract level variables</i>								
% of householders under age 35	23.4%	13.4%	0.0%	90.9%	22.7%	10.4%	0.0%	84.4%
% of householders single	65.9%	13.0%	16.3%	98.4%	66.9%	11.7%	16.3%	93.3%
% female-headed households	15.2%	8.8%	0.0%	60.9%	16.1%	9.0%	0.0%	60.9%
% of HHs with income $\leq$ \$25,000	36.1%	16.1%	3.6%	90.6%	36.6%	16.05	3.6%	90.6%
<i>Property-level variables</i>								
Effective age								
All properties	39	18	1	157	41	17	1	108
Properties financed by Fannie Mae	28	14	2	74	29	14	2	74
Number of units in property								
All properties	47	102	5	1,912	45	104	5	1,912
Properties financed by Fannie Mae	160	166	5	1,236	161	171	5	1,236
Market value per unit								
All properties	\$42,820	\$46,180	\$310	\$3,163,790	\$45,469	\$47,066	\$516	\$3,163,790
Properties financed by Fannie Mae	\$43,810	\$89,532	\$1,283	\$2,125,000	\$45,510	\$98,316	\$5,608	\$2,125,000



**Table 3. Logistic Regressions Explaining Probability of Financing by Fannie Mae**

This table contains logistic regression results for our 21-county sample, with parameter estimates, p-values of the associated z-statistics (in parentheses), and measures of goodness of fit, including the p-value of the chi-squared statistic and the pseudo R-squared. Model 1 contains county, census-tract, and property-level variables, including the number of units in the property. In model 2, number of units is replaced with a dummy variable (*SMALL*) that is set equal to one if the property contains 5-50 units; zero otherwise. Model 3 is an interaction model with *SMALL* interacted with all explanatory variables. All three models contain fixed-effects for the seven largest counties. The -2 log-likelihood statistics are significant for all three models.

	Model 1	Model 2	Model 3-Interactive	
			Large Props.	Small Props.
Intercept	8.004 (0.007)	4.254 (0.155)	4.681 (0.123)	
<i>County-level variables</i>				
Population (1,000s) ( <i>POP</i> )	0.0002 (0.826)	0.0002 (0.773)	0.0003 (0.778)	-0.0001 (0.166)
Housing units/sq. mile ( <i>SQMILE</i> )	0.0047 (0.000)	0.0028 (0.018)	0.0027 (0.030)	0.0030 (0.362)
Median house price (1,000s) ( <i>HPRICE</i> )	0.0197 (0.001)	0.0085 (0.152)	0.0065 (0.289)	0.0116 (0.397)
Median rent ( <i>RENT</i> )	-0.0174 (0.000)	-0.0093 (0.041)	-0.0091 (0.047)	-0.0044 (0.004)
<i>Census tract-level variables</i>				
% HHs headed by female ( <i>HHFEM</i> )	2.2898 (0.000)	0.5847 (0.306)	0.3311 (0.645)	1.3709 (0.388)
% HHs with head < 35 yrs. old ( <i>HEAD&lt;35</i> )	1.0692 (0.009)	0.3894 (0.344)	-0.4474 (0.350)	2.3064 (0.001)
% of single HHs ( <i>SINGLE</i> )	-0.3960 (0.410)	0.0824 (0.869)	-0.2339 (0.713)	0.2959 (0.612)
% of HHs with income ≤ 25K ( <i>HHI≤25</i> )	-1.0913 (0.012)	-0.7847 (0.074)	0.2810 (0.608)	-2.1550 (0.008)
<i>Property-level variables</i>				
Effective age ( <i>AGE</i> )	-0.0273 (0.000)	-0.0125 (0.000)	-0.0092 (0.039)	-0.0138 (0.516)
Estimated market value (1,000s) ( <i>VALUE</i> )	0.0000 (0.444)	-0.0001 (0.011)	-0.0000 (0.246)	0.0003 (0.000)
Number of units ( <i>UNITS</i> )	0.0021 (0.000)			
Property is small (yes = 1) ( <i>SMALL</i> )		-2.3323 (0.000)		-8.3899 (0.000)
Number of observations	19,309	19,309	19,309	
Pseudo R-squared	0.1024	0.1721	0.1863	
P-value of chi-squared statistic	0.000	0.000	0.000	

