### **Manufactured Housing Securitization**

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> Duke University Durham, North Carolina 2013

## Acknowledgements

First and foremost, I would like to express my sincere gratitude to my advisor Prof. Charles Becker for his enduring support of my senior thesis. I was a lost and confused Econ major two years ago who stumbled into the fascinating world of manufactured housing after meeting Dr. Becker. What began as a small project turned into weekly adventures behind the closed doors of the manufactured housing industry and taught me everything I know about practical applications of Economics research.

My partners in Dr. Becker's manufactured housing club also deserve my thanks for their contributions to not only my thesis but also my experiences in economic research. Both Reed Few and Caitlin Gorback have been with me every step of the way, asking insightful questions, meeting trailer park residents, and correcting my mistakes (a few too many times). It would have been a much more difficult, and less entertaining journey, without you.

Finally I would like to thank my parents and brother for putting up with my rambles about the ironies of big trucks and satellite television receivers outside \$15,000 homes.

### Abstract

Though prices of manufactured homes rose in the 2000s, demand fell dramatically because of the boom in the stick-built housing market. One of the stated goals of securitization is to increase the supply of credit and decrease the cost of lending to make borrowing accessible to more homeowners. We determine that securitization of manufactured home loans did not play a significant role on the availability of credit for borrowers in North Carolina.

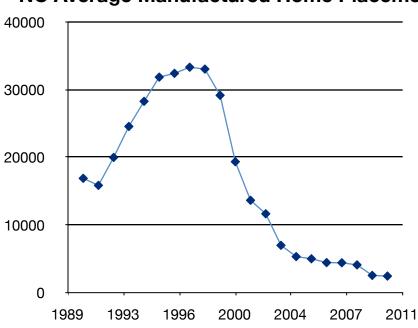
Keywords: Manufactured Housing, Trailer Parks, Securitization, Credit Availability

**JEL codes:** R3, R31, E51

# **1** Introduction

Manufactured housing is an intriguing aspect of the U.S. housing market because it is a practical source of housing for many low income Americans, but has fallen out of favor since the late 1990s. This comes in spite of the growth in securitization that occurred during the early 2000s, even though the intended purpose of securitization is to increase availability of credit. Figure 1 shows this collapse in demand as the number of placements began collapsing in 1998. Meanwhile, Figure 2 shows the strong growth in issuance of mortgage backed securities which began in 2000. This paper focuses on analyzing the effect of securitization on availability of credit for applicants of manufactured home loans titled as real estate in North Carolina.

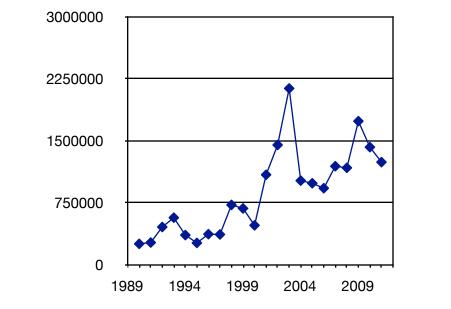




**NC Average Manufactured Home Placements** 

Department of Housing and Urban Development: 2011





### Total Mortgage-Backed Security Issuance (Agency and Non-Agency)

Sources: Fannie Mae, Federal Reserve, Freddie Mac, Ginnie Mae, HUD; FHFA; data compiled by SIFMA

This paper will looks at the effect of securitization on availability of credit primarily by analyzing the impact on loan originations. This relationship rests on the idea that loan originators were aware of the ease of securitization at the time and were more likely to approve loan applications if they believed they could get the loans off their balance sheet quickly. In spite of the collapse in demand for manufactured housing, we show that there is, in one dataset, a positive correlation between the percent of loans originated and the percent of loans purchased by a mortgage-backed security issuer. Another dataset, however, fails to find a correlation between securitization and loan origination, but finds instead that the previous years' loans originations is having a significant impact on the following years' loan originations. Thus, we conclude securitization did not play a significant role in the availability of credit to manufactured home borrowers.

# 2 History

Manufactured homes, also known as mobile homes or trailers, originated in the 1920s as travel trailers. Frequently, mobile homes were pulled behind Ford Model Ts when a family was traveling or camping. It was far more practical, though perhaps less adventurous, to bring what was essentially a ready-made house behind your car instead of having to put up a tent every night. Trailer parks, now officially termed land-lease communities, gained traction soon afterwards as land owners found an opportunity to make a profit by renting a plot of land with amenities such as electricity. Mobile homes gained widespread use after the Great Depression when unemployed workers and their families began moving in permanently (Gorback, 2011:3). They still lived up to their name as mobile homes during this era as the families would move around looking for work. Unlike today, the homes also had wheels, which significantly aided their mobility.

During World War II, the government also took advantage of the practicality of mobile homes and housed displaced workers in them. By 1942 the government owned over 35,000 mobile homes, which they sold after the conclusion of the second world war. Nonetheless, mobile homes remained a staple of American homeownership as veterans encountered a lack of supply in the "stick built" housing market. The scarcity in this sector, which is made up of homes that were built on site instead of in a factory, forced potential homeowners to turn to alternative methods of housing. After a long-run equilibrium was established at a low price, most

homeowners who could afford to move into stick built homes did just that, but some citizens remained excluded due to financial limitations (Gorback, 2011:4). At this stage, in the late 1940s, mobile homes found their niche as a housing option for low income households that would create slurs for manufactured home owners such as "trailer trash".

Trailer parks grew in importance in the 1950s and 60s, and this was followed by growing regulations. The government attempted to enforce a model of what a trailer park should look like, such as minimum space areas for each mobile home, and these regulations would foreshadow much of the trouble facing manufactured housing today. Financing is very difficult to find in the manufactured housing industry because banks are leery of lending money, especially as regulations have increased dramatically. The first problem is the increase in regulations following the financial crisis. Most borrowers who are successful in financing a manufactured home today would also likely be able to finance a more expensive stick built home (Robertson, 2013:1). Secondly, approximately two-thirds of manufactured homes are financed as personal property instead of real property. These loans are commonly referred to as "chattel loans", and they feature significantly higher rates (Conwell, 2013). This critical distinction was created between mobile homes and stick built homes by the Federal Housing Authority after 1971 (Hurley, 2001). A manufactured home is only considered real property if the home owner also owns the land beneath the land. To receive FHA-backing both the land and manufactured home must be financed as a single entity. These loans provided by the Federal Housing Administration help provide loans to lower-income households who frequently cannot even afford to pay a downpayment. The land requirement makes FHA backing much more difficult to receive and borrowers forced into personal property loans generally have higher interest payments and

shorter durations than stick built home mortgages. These higher interest rates are based on the idea that personal property covers items that the homeowners can take with them as they move, such as automobiles, and are not as likely to appreciate over time as real estate is (Conwell, 2013). This paper will look only at homes financed as real property because loan statistics are reported by national agencies such as the Federal Financial Institutions Examination Council (FFIEC).

Technology has continued to improve in the industry since the inception of manufactured home regulation in the 1950s (Gorback, 2011:5). Manufactured homes are by nature produced within a factory. This makes them only more efficient to fabricate, but also at times safer than site built homes because the building materials are protected from the elements. Thus new models are more fire resistant but even they are not are resistant to disasters such as tornadoes and floods because they are not as securely anchored. The materials used to produce manufactured homes are the same as site built homes and the regulations are as, and some times more, stringent than in site built homes. An obscure, but enlightening, example is that a 1 sq. foot wall cover requires precisely ten nails to hold it together while there is no such regulation in site built homes (Robertson, 2013:2). While residents of manufactured homes largely remain part of America's low income demographic, the degrading stereotype of manufactured home structure is no longer true for new models.

In 1976 the Department of Housing and Urban Development began calling mobile homes manufactured homes. Today mobile homes and trailer parks are considered derogatory terms. This is partially because mobile homes are virtually immobile, as mobile home owners stay in their homes longer than site-built homeowners. The costs of moving a mobile home are often

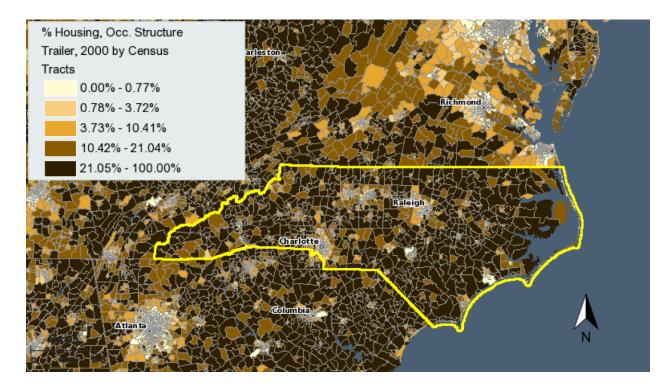
prohibitive at approximately \$2000-\$6000, which may represent 20% of the value of the home (Fabozzi, 1998). The term manufactured home has largely replaced mobile home when discussing these properties. Trailer parks similarly are not officially used to designate the communities where the homes are located because to many people they bring to mind an image of poor, ugly neighborhoods. The technically correct term today is land lease communities, though we will continue to refer to the properties as trailer park since land lease community has yet to be adopted even within the industry.

Homeowners choose to live in manufactured homes for a variety of reasons from their mobility to their affordability. Reed Few and Charles Becker, an associate researcher and my thesis advisor working on manufactured housing at Duke University, conducted a survey of manufactured home land lease communities owners. Their results showed that the ability to own a home is the primary reason for choosing manufactured housing. Typically, manufactured homeowners have below average incomes-\$30,000 in 2012-along with limited access to credit, and manufactured housing provides them with the ability to own a home (Few, 2013). The savings are quite significant, as the U.S. Census Bureau concludes that the average price per square foot of a new single-family home in 2011 was \$83.38 while the price for a manufactured home was only \$41.22 (Manufactured Housing Institute, 2012). This represents savings of 50.6%. As of 2011 there are 8,591,522 occupied manufactured homes in the United States, with their 17,783,976 residents representing 5.86% of the population (U.S. Census Bureau). Table 1 shows that the difficulty of receiving financing as real property makes those gains difficult to translate to the actual monthly cost of homeownership.

The manufactured home industry tells a fascinating story about the low-income sector of the American real estate market in the last decade. While overall property prices skyrocketed from 1998 to 2006, demand for manufactured homes collapsed. Placements of manufactured homes peaked at 373,700 in 1998, when manufactured homes made up 23.1% of housing starts in the United States. At this time almost one in four houses being built was manufactured in a factory! These numbers collapsed to 41,860 placements, accounting for 8.5% of total placements in 2011 (Congressional Budget Office). Figure 1 shows that this collapse was clearly evident in North Carolina's manufactured home industry as placements fell from 33,318 in 1997 to 2,450 in 2010. This was largely due to the appreciation of real estate and the availability of cheap credit to virtually any homebuyer in the early 2000s. Figures 3 and 4 show a stark contrast between the size of the manufactured housing industry in North Carolina in 2000 and 2010, at a census tract level. The data are depicted as a percentage of occupied housing units that are manufactured housing units. There is a clear drop in the size of the manufactured housing industry between 2000 and 2010. The census tracts surrounding Raleigh and Charlotte in particular have fallen from mid-single digit percentages to less than one percent of manufactured housing as people switch to cheaper apartments. Our analysis is limited to North Carolina because of our significant research in the North Carolina manufactured housing market. Over more than two years the members of our research team have met with countless industry members, from manufacturers to park owners to residents, and traveled to numerous trailer parks. Rural areas around the coast and in the middle of the state have high percentages of manufactured homes because of the proliferation of agricultural and food industry jobs. Meanwhile areas near the main cities have far fewer quantities of manufactured homes as lower income residents choose to

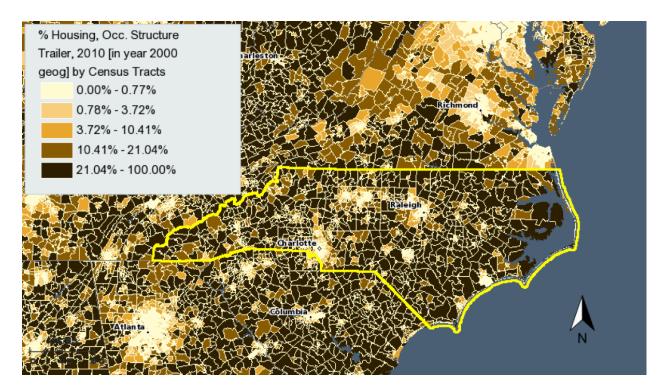
live in cheap apartment buildings (Stock: 2013). Even some less urban areas surrounding Greensboro (west of Raleigh) and Jacksonville (southeast North Carolina) have seen a decline in the relative size of manufactured housing within occupied housing stock. Many manufactured homeowners turned to stick built housing as a result of the housing boom and the distortion of incentives by the Federal Reserve, GSEs such as Fannie and Freddie, and the government administrations of President Clinton and President Bush.

### Figure 3



**US** Census





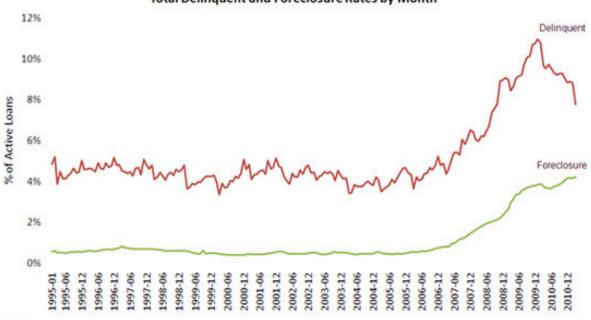
The Clinton administration was influential in increasing homeownership in the United States. In 1996 the Department of Housing and Urban Development instructed Fannie Mae and Freddie Mae to supply a minimum of 42% of their mortgage financing to borrowers with belowmedian income in their area. Under President Bush this increased to 52% in 2005. The Clinton administration also passed the Taxpayer Relief Act in 1997 which gave households a \$500,000, tax exemption on the profit from the sale of a home (Wallison: 2011). Clinton also increased deregulation of the financial industry, in particular by repealing part of the Glass-Steagall Act in 1999 which allowed investment banks and commercial banks to merge (Demyaynk, Hemert: 2008).

President Bush's administration continued Clinton's push towards homeownership. Not only did Bush increase the directive for Fannie and Freddie to supply financing for low income borrowers, but he also pushed deregulation further by passing a law that prohibited states from regulating local banks (Walter: 2013). At the same time the Federal Reserve lowered the target for the federal funds rate dramatically following September 11th, and kept them below 2% for three years (New York Federal Reserve: 2013). The incentives for homeownership were thus dramatically increased during the Clinton and Bush administrations and would be critical factors for the creation of the mid-2000s housing bubble.

Many Americans dream of living in a nice home behind a white picket fence, and this is shown by our consumption of housing relative to our countries. As of 2009 the average Americans spent approximately 30% of their income on housing, while the typical citizen in Canada, the United Kingdom, and Japan all spent approximately 25% of their income on housing. There are many potential reasons for this, from our desire to show our wealth to our

relatively cheap food prices (Plumer: 2009). Unfortunately for the manufactured home industry, this dream home is rarely produced in a factory. While the most practical solution for many borrowers would be to live in a manufactured home, the American dream encourages them to try for a home they cannot afford. The government began piling on the pressure in the late 1990s when President Clinton encouraged the GSEs to buy up loans with weaker credit standards. This was followed by the low interest rates and credit boom of the early 2000s. Many low income borrowers became classified as subprime borrowers and, while some were victims of predatory lending, many borrowers became unable to meet their mortgage payments when prices roses. The ensuing collapse in home prices led to high rates of delinquency and foreclosure in the overall housing market, as shown in Figure 5, and took the stock market to a panic (Stock: 2011).





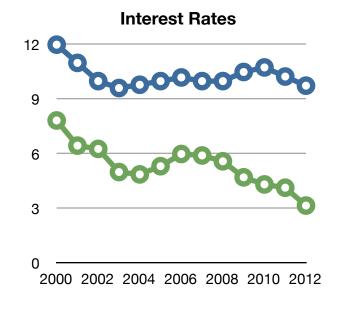
**Total Delinquent and Foreclosure Rates by Month** 

Nick Timiraos: 2011

# **3 Housing Costs**

We will examine the costs of living in a manufactured home and compare them with the costs of renting an apartment and living in owner-occupied housing. One of the primary contributors to housing costs is the interest rate a borrower pays to finance their home. For 15 year loans, which is the most common length for personal property manufactured housing loans, interest rates are frequently twice as high as they are for stick-built mortgages. Manufactured homes titled as real estate have the same interest rates as site-built homes. These rates are presented in Figure 6.





Manufactured Home Loan 15 Year Loan Rates (personal property)
 15 Year FRM Rates

IU Credit Union; HSH Associates

Figure 7 shows that this distinction between personal and real property eliminates the financial advantage of living in a trailer park. This leads to the most problematic aspect of providing financing: riskier borrowers receive loans with higher interest payments to compensate lenders for the increased risk of default but become more likely to default due to the higher interest payments they are paying.

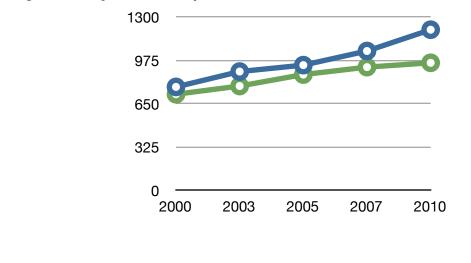


Figure 7

Average Monthly Costs of Apartments and Manufactured Homes (Personal Property)

Apartment Rent
 Monthly Manufactured Home Cost

### IU Credit Union; HSH Associates

Now we turn to comparing manufactured home costs with apartment costs. Comparing the overall housing costs paid by manufactured homeowners with personal property loans with housing costs for people living in low-income apartments does not paint a pretty picture. The analysis leading to Figure 7 averages costs from 9 counties (Maricopa, AZ; Pima, AZ; Riverside, CA; San Bernardino, CA; Polk, FL; Lake, FL; Harris, TX; Hidalgo, TX; Horry, SC) in manufactured housing-dense areas for manufactured homeowners who purchase manufactured homes through personal property loans and, thus, live in trailer parks. Manufactured home costs are a factor of new and used sales prices, lot rent, other fees, and interest rates on a 15 year loan. Interest rates are assumed to hold at a national level as described in Figure 6. Manufactured home loan downpayment rates follow the averages of the period. Specifically, downpayment rates used are 5% from 2000 to 2005 and 15% from 2007 to 2010. Figure 7 shows that the monthly costs of manufactured homes, financed with personal property loans, are almost as high as apartment rents. Following the crisis, apartment rents have increased more dramatically than manufactured home costs. This is likely because personal property loans have become very difficult to finance since the crisis so the homes being financed are cheaper than before. Data are shown in Appendix A.1.

While Figure 7 shows the costs for manufactured homes designated as personal property, the cost of living in a home considered real property is far lower. This is mainly due to the better credit available to the borrowers because of the FHA Title 1 guarantee available for real property loans. They receive lower interest rates, as shown in Figure 3, and are more likely to receive 30 year loans than personal property borrowers. Table 1 shows that, unlike personal property borrowers, manufactured home owners who manage to negotiate real property loans spend a relatively small proportion of their income on housing, with a maximum of 24% in 2011. Thus, their lack of income is compensated by their low monthly payments. Based on Figure 4 and an average income of \$30,000, borrowers with personal property loans face a 43% cost to income

ratio. Clearly financing a real property loan is incredibly valuable to potential borrowers. Data and additional charts in Appendix A.2.

Monthly Housing Costs by Tenure									
	Total Housing Market		Owner Occupied				Manufactured Housing (Real Property)		
Year	Cost	Percent of Income	Cost	Percent of Income	Cost	Percent of Income	Cost	Percent of Income	
1997	542	21	534	17	549	29	351	19	
1999	581	20	581	17	580	28	358	18	
2001	658	21	686	18	633	29	417	18	
2003	684	22	718	18	651	30	410	19	
2005	753	23	809	20	694	32	445	20	
2007	843	24	927	20	755	33	407	18	
2009	909	24	1000	21	808	34	404	18	
2011	927	25	1008	21	845	35	545	24	

Table 1

**US American Housing Survey** 

# **4** Securitization

The causes and effects of the financial crisis have been discussed in depth in other papers, but here we look at the effect of securitization-specifically in the area of manufactured housing. Securitization is the process through which an issuer takes a number of assets, in this case mortgages, and combines them into a security. The pool of mortgages becomes the collateral for the mortgage-backed security and these securities are sold to investors such as investment banks and mutual funds. Securities, in this case mortgage-backed securities, make money through the mortgage and interest payments. The stated goal of securitization is to provide liquidity to the nation's financial system because banks no longer have to hold the assets. They have the ability to sell the mortgages to MBS issuers and use the capital to provide new loans, thus lowering the cost of borrowing for homeowners (Oberg, 2010:1).

The first step of securitization is for a bank or lender to originate the mortgages, with the asset being financed used as collateral. These mortgages are bundled together into a pool which becomes the collateral for the MBS. The MBS is issued by a private financial institution, deemed commercial MBS, or by a government-sponsored agency (agency MBS), and sold to investors. Commercial MBS are not standardized since they are issued by a number of different institutions, including investment banks. Agency MBS can be sold by Fannie Mae, Freddie Mac, or Ginnie Mae. All three Government Sponsored Enterprises (GSEs) are charged with improving access to credit for homebuyers by pooling mortgages and selling them as mortgage-backed securities. By removing the loans from the mortgage originators' balance sheets the GSEs improve the originators' liquidity and theoretically make it more likely the banks will extend credit to more potential homebuyers. Fannie Mae is charged with buying mortgages issued by banks while Freddie Mac's stated focus is to buy mortgages issued by thrifts. Ginnie Mae is more specifically directed to improve access to credit for low income borrowers. Ginnie Mae does not buy the loans and sell MBSs, but instead insures these MBSs. Since Ginnie Mae is a government agency, MBS insured by Ginnie Mae are directly guaranteed by the federal government. This is not the case for Fannie Mae or Freddie Mac as they are public companies with a government sponsorship (Oberg, 2010:2). Nonetheless after the financial crisis of 2007 the government took both GSEs into conservatorship to maintain their solvency. It is estimated that as of December 2012 Fannie and Freddie own or guarantee 60% of all mortgage debt, equal

to approximately \$5.4 trillion. As of August 2012 they have received combined a capital infusion of \$190 billion, worth approximately 5.9% of their assets (Benson; SEC:2012).

Fannie Mae, under pressure from President Clinton to increase access to credit for low income borrowers, decreased the credit requirements for loans they would purchase in 1996 (Holmes). This was done to increase homeownership, but had a very significant unintended consequence. The GSEs began buying up riskier and riskier loans. The growth in securitization of mortgages is shown in Table 2. There was a jump in the early 2000s, followed by a lull in the crisis years, leading to another rise in the later part of the century as the government attempted to spur lending to homebuyers.

Table 2

	MBS							
Year	Fannie Mae	Freddie Mac	Ginnie Mae	Total				
1990	112,792	73,815	64,395	251,002				
1991	111,539	92,479	62,630	266,648				
1992	193,667	179,207	81,917	454,791				
1993	220,595	208,724	137,989	567,308				
1994	128,629	117,110	) 111,191	356,930				
1995	103,107	85,877	72,895	261,879				
1996	147,333	119,702	2 100,900	367,935				
1997	145,807	114,258	3 104,300	364,365				
1998	321,236	250,564	150,200	722,000				
1999	294,740	233,031	151,500	679,271				
2000	204,189	166,901	103,300	474,390				
2001	521,971	389,611	174,600	1,086,182				
2002	725,742	547,046	5 174,000	1,446,788				
2003	1,199,549	713,280	) 217,900	2,130,729				
2004	524,885	365,148	3 125,000	1,015,033				
2005	498,549	397,867	86,900	983,316				
2006	479,773	360,023	83,300	923,096				
2007	620,998	470,976	97,010	1,188,984				
2008	541,902	357,861	269,980	1,169,743				
2009	804,784	475,412	454,030	1,734,226				
2010	627,101	393,037	399,750	1,419,888				
2011	610,495	301,174	327,000	1,238,669				

U.S. Agency Mortgage Securities Issuance<sup>1,2</sup> USD Millions

Sources: Fannie Mae, Federal Reserve, Freddie Mac, Ginnie Mae, HUD; FHFA; data compiled by SIFMA

Lenders, knowing they could easily sell their loans to Fannie and Freddie, began lending to riskier borrowers who would be known as subprime borrowers because they were unable to qualify for typical prime loans. Homeowners who previously did not qualify for loans began qualifying for loans, and those who could not afford high down payments received loans with low down payments. In two or three years the teaser rates-which were initially below market rates- increased dramatically, forcing borrowers to make higher payments or refinance. This policy looked brilliant when more Americans were buying homes, prices were rising, and defaults were low, but foolish when housing prices stabilized and then collapsed. Not only did most people's main source of wealth lose value, subprime borrowers lost the ability to refinance their homes when rates went up. As a result delinquency rates, triggered when a borrower is at least 3 months behind on mortgage payments, began rising at alarming rates, up to 11% in 2010 as shown in Figure 7 (Timiraos: 2011). Foreclosures increased similarly, though they follow a few months behind delinquencies because the borrowers never succeed, or choose not to, in catching up on their mortgage payments.

Because the mortgages backing each MBS were geographically diversified, credit-rating agencies did not believe the derivatives were risky because there had not been a truly national housing collapse in the United States since the Great Depression. The process of lending to more borrowers increased demand for homes and created this housing bubble, thereby perpetuating the cycle of increased risk. Fannie and Freddie lost \$47 billion in 2008 alone, forcing the taxpayer bailout (Holmes).

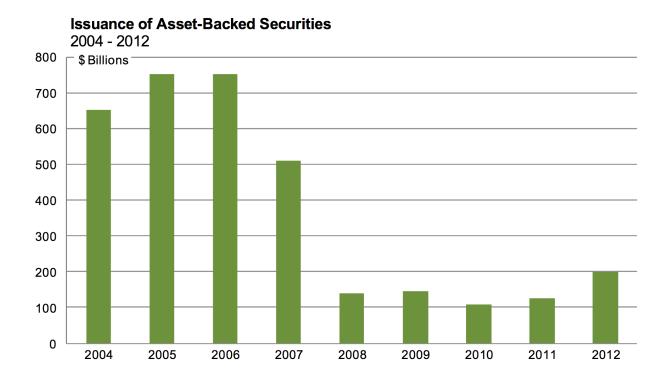
The manufactured housing industry was not as affected by the financial crisis as the rest of the housing sector because it was already in such bad shape, but manufactured home loan

securitization is an intriguing sector because of the rise in overall securitization. Manufactured homes are securitized just as other assets such as site-built homes, though they are pooled together into their own securities. In this paper we will examine only homes that are financed as real estate, meaning the homeowner financed the house and land. These homes were a small part of the monolithic MBS market, but borrowers defaulted heavily in this submarket as well. Even Michael Lewis notices the impact of manufactured housing in *The Big Short* when he says that manufactured home buyers "were defaulting on their loans, their mobile homes were being repossessed, and the people who had lent them money were receiving fractions of the original loans" (Lewis: 2011). This was one of the triggers for Lewis to notice the overall subprime market was nearing collapse.

Even when compared to site-built housing, prepayments occurred at high levels in manufactured housing. While overall default rates for US mortgages peaked at 2% in 2009, manufactured home prepayments were over 3.5% (NAIC: 2010). Prepayment occurs because the loans are paid back early, the loans are refinanced, or the buyer defaults. Defaults count as prepayments because the property is sold and the principal is returned to the investor. Historically, this type of prepayment was less volatile than in the site-built sector, but that obviously changed in the recent financial crisis (Fabozzi, 2000). Refinancing always occurred frequently in manufactured housing primarily because of the higher interest rates than stick-built housing, which was shown in Figure 1. This is an added risk for an investor buying a security backed by personal property loans because it changes the cash flows.

An additional branch of securitization is the process of asset-backed securitization. These securities are similar to mortgage-backed securities except they are backed by automobile loans,

credit card loans, and other financial products instead of mortgages. Figure 8 shows the levels of issuance of asset-backed securities in the mid-to-late 2000s. ABS issuance collapsed in 2008 as investors were hit hard by the prepayments following the collapse of the housing bubble. ABS issuance grew 67% from \$120 billion in 2011 to \$200 billion in 2012, but it nonetheless remains far below the pre-crisis levels when ABS issuance peaked at \$750 billion in 2006 (Sifma: 2013, 9).

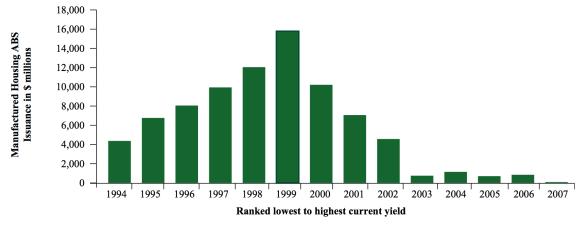


#### Figure 8

Source: Thomson Reuters, SIFMA

The story of private label manufactured-housing securitization is surprisingly vibrant. Personal property manufactured-housing loans were frequently bundled into asset-backed securities in the 1990s and early 2000s but the collapse in demand for manufactured home loans hurt securitization dramatically. Figure 9 shows the quantity of asset-backed securities issued from 1994 to 2007. Personal property loans can only be packaged as asset-backed securities, while real estate loans can be sold as part of mortgage-back securities. All three GSEs limit themselves to mortgage-backed securities, as none of them buy or insure asset-backed securities. Thus there is no opportunity for them to buy or insure personal property manufactured home loans and Figure 9 shows only data from private issuers. Figure 1 demonstrates the collapse in demand for manufactured homes in 1998, and Figure 9 illustrates the collapse in demand for ABS backed by personal property manufactured home loans followed in 1999. This difference in timing is likely due to the delayed nature of securitization: securities can only be packaged and sold after the loan is originated. Issuance of manufactured housing ABS peaked at \$15 billion in 1999, when just about every home sold was being securitized (Manufactured Housing Institute, 2012). ABS issuance fell precipitously to 500 million in 2003. From 1987 to 2007 approximately \$96.2 billion of securities were issued backed by manufactured housing mortgages (Brown). These securities are typically AAA-rated, which is the least-risky classification of loan. Loan to value ratios are approximately the same as in the site-built home at 85% (Fabozzi, 2000). Green Tree was one of the largest securitizers of manufactured home loans. From 1992 to 2008 Green Tree raised \$29.2 billion through securitization. The bankruptcy of Conseco Financial, the former parent of Green Tree, in 2001 hurt securitization dramatically. Vanderbilt, a branch of manufactured home producing giant Clayton Homes, is the other large provider of manufactured home loans, and they raised \$9.8 billion from 1994 to 2003. They too experienced financial difficulties due to the lack of demand for manufactured homes which led to the precipitous decline in manufactured home ABS issuance.

#### Figure 9



#### Manufactured Housing ABS Issuance, 1994-2007

While securitization of site built homes occurs commonly by Fannie Mae and Freddie Mac, it is much less common for manufactured housing titled as real estate. Unlike the site-built market, where GSE-backed loans are primarily purchased and sold by Fannie Mae and Freddie Mac, in the manufactured housing market GSE-backed loans are primarily securitized by Ginnie Mae. Ginnie Mae, which is focused on increasing the availability of borrowing for lower income households, securitizes manufactured homes more frequently. Ginnie Mae has recovered more quickly from the crisis that most recently issued MBSs backed by manufactured home loans in 2010. Of their \$1.38 trillion portfolio of securities however, only \$238 million of securities are backed by manufactured housing loans (Ginnie Mae). This makes up less than one-fiftieth of one percent.

Since 2003 there has been little demand for manufactured housing ABS in the private sector because of the increased risk of prepayment associated with the loans. Currently the dominant players are the GSEs, who buy and insure MBS, and they appear to be the only future

Source: JPMorgan, IGM Structured Finance Watch, Bloomberg, as of 3/19/08

options for manufactured home securitization. As mentioned previously, to be considered real estate the loans must also include the land beneath the loans. The limited proportion of manufactured homes titled as real property, less than one-third of loans originated, has limited the growth of manufactured housing securitization over the past 25 years. This will likely continue to pose a challenge to renewal of securitization, which we as we show here, helps improve credit availability and growth of loan originations in the manufactured housing industry.

The primary tool to analyze the availability of credit will be loan originations, specifically as a percentage of loan applications. At the simplest level, the relationship between securitization and loan originations will be looked at. The correlation between securitization and originations at different income levels will further help establish the relationship. Finally, the relationship between the number of loan application denials by certain categories and securitization will provide the final opportunity to look at how securitization affected the process of mobile homes. If fewer people are being denied loans because of high debt-to-income ratios when securitization increases it may be that securitization is improving their access to credit. Thus, these correlations between securitization and increased approval of loans will theoretically show that the lender's awareness of being able to sell more loans off its balance sheet will increase their incentive to provide loans. As there could also be causality from the number of loan originations to the number of loan applications, a lag variable is used to provide evidence of causality from the securitization to the loan originations.

## **5** Literature Review

Following the financial crisis there has been a deluge of research into the diverse causes, symptoms, and effects of the crisis. Our research explores the link between securitization of manufactured housing with the availability of credit in the 1990s and 2000s and the decline in demand for manufactured housing. In order to do this we need to establish securitization practices and manufactured housing background of the previous 25 years. Prior research has focused little on the role of manufactured housing in the crisis, but, as the collapse of the subprime market was one of the catalysts of the crisis, a number of economists have focused their expertise on subprime borrowing. In particular, there is a great deal of research on the role of low interest rates and securitization in influencing borrowing tendencies. Existing research shows a powerful side effect of the low cost of borrowing, partially caused by securitization, was that many lenders lent to increasingly risky subprime borrowers whose delinquencies contributed to the financial meltdown.

Lower interest rates have been found to lead to weaker lending standards and greater risktaking by banks. Maddaloni and Peydro (2011) use data from bank lending surveys in the United States and Europe to analyze the effect of interest rates on lending standards. The authors put forth evidence to show that lower short-term interests rates promoted softer lending standards. The conclusion is that many borrowers who should not have received loans were not screened appropriately and ultimately received loans. Other researchers have looked at the effect of leverage on the lending standards. Gerardi, Sherlund, Lehnert, and Willen (2009) find that leverage increased dramatically during the early to mid-2000s. They assert that lenders had sufficient data to conclude a large drop in home value would significantly increase foreclosure rates and thus lenders should have been more cautious in their underwriting practices.

Additionally, securitization amplifies the effect of lower interest rates. Keys, Mukherjee, Seru, and Vig (2010) provide direct insight into this question by analyzing portfolios with loans around the 620 FICO score boundary (below which borrowers are considered very risky). Loans with credit scores just above 620 were far more likely to be securitized, and hence were screened less, but were practically identical to loans with scores just below 620. The portfolios with higher levels of securitization experienced 10-25% more defaults, implying that-since they were approximately equally risky-borrowers with credit scores above 620 were not screened as stringently as those below 620. Maddaloni and Peydro (2010) agree that high levels of securitization increased the softening of lending standards.

Another pair of papers analyze the falling lending standards and put them in perspecitive with securitization. Demyaynk and Hemert (2008) agree with Sherlund, Lehnert, and Willen that the quality of loans given out fell for six consecutive years prior to the crisis. The authors also incorporate the role of securitizers into the crisis by arguing that they were aware of this decreasing quality, which is measured by increasing interest rates for borrowers with the same above average loan to value ratios. Meanwhile Mian and Sufi (2009) reach the same conclusion by analyzing credit and income growth. Until 2002 income grew with credit. However, as securitization took off from 30% in 2002 to 60% of originated loans in 2006, credit growth began outpacing income growth. Additional evidence for the effect of securitization is that securitization was far more common in subprime zip codes than prime zip codes. These subprime

zip codes, which feature the highest quartile of national zip codes with borrowers of credit scores below 660, went on to experience much higher default rate growth from 2005 to 2007.

While the existing research is on the impact of manufactured housing is in its infancy, the roles of interest rates and securitization have been well developed. The process of securitization not only lowered interest rates but also decreased the screening of potential borrowers. Both of these effects had powerful consequences as increasingly risky borrowers received subprime mortgages. Undoubtedly, most of these borrowers should not have been receiving those loans and many of them should have, economically, bought manufactured homes. Thus, the literature provides a strong foundation to help answer the question of the effect of securitization on manufactured housing.

## 3 Data

Similar to overall research on manufactured housing, datum on the subject are limited compared to stick-built housing. A few government-run sources collect data on the industry to create their databases. Notably, the US American Housing Survey collects significant quantities of data on housing characteristics that is published in the US Census. The data for the income and monthly costs breakdown in the introduction came from the AHS. The other major supplier of manufactured housing data is the Federal Financial Institutions Examination Council (FFIEC), which regulates financial institutions under the mandate of the Federal Reserve. The FFIEC oversees implementation of the Home Mortgage Disclosure Act (HMDA) which, beginning in 1975, requires financial institutions to publish data on home purchases and investments. The data used in the bulk of this paper's analysis come from the FFIEC's aggregation of this data. Noticeably absent from these government-collected datasets is any information on personal property loans, thus we will only analyze manufactured home lending for property described as real estate. However, as previously noted, real estate loans constitute only approximately onethird of manufactured home loans. Additionally real estate loans are qualitatively different from personal property loans as real estate loans finance the home and the land beneath it, so are conclusions are limited to homes titled as real estate.

The HMDA Aggregate Reports are publicly available online from 1999 to 2011, and the reports are grouped by Metropolitan Statistical Area. Prior to 2004, the survey made no distinction between single-family homes and manufactured housing so data used in this analysis range from 2004 to 2011. In 2004 the data are published only in PDF format, while from 2005 to 2011 it is released additionally as text files. The interesting data from these files are the loan

applications, applications purchased by GSEs or commercial agencies, applications by race and income, and manufactured home denials.

The first step of data preparation is to isolate the tables of interest in the PDFs and text files of each MSA in North Carolina. The loan applications and applications purchased spreadsheets are organized according to census tracts within the MSA. Meanwhile the applications by race and income along with the manufactured home denial spreadsheets are sorted by race and income bracket within each MSA. Thus the second step is crafting a new dataset for the loan applications and applications purchased spreadsheets and a different dataset for the applications by race and manufactured home denials spreadsheets. This allows for easier analysis in STATA. As loan applications varied during this time period, each dataset requires prodigious amounts of cleaning up. This consists of adding blank entries for census tracts when there were no loan applications so the census tracts matched across years.

To summarize there are two datasets being analyzed. The first dataset, hereafter deemed the census tract dataset, features data aggregated from individual observations at the census tract level on manufactured home loan applications and loan purchases. The second dataset, hereafter called the MSA dataset, organizes manufactured home applications and denials aggregated from individual observations at the MSA level sorted by race and income. The census tract dataset is used to determine the relationship between the rate of origination of manufactured home loans and the rate of securitization of manufactured home loans. Origination of manufactured home loans is expected to be a factor of the rate of loan securitization, income, year, location, and the number of loans applications. Positive correlation would imply that increased securitization improved access to credit for manufactured home borrowers. Meanwhile, the MSA dataset is

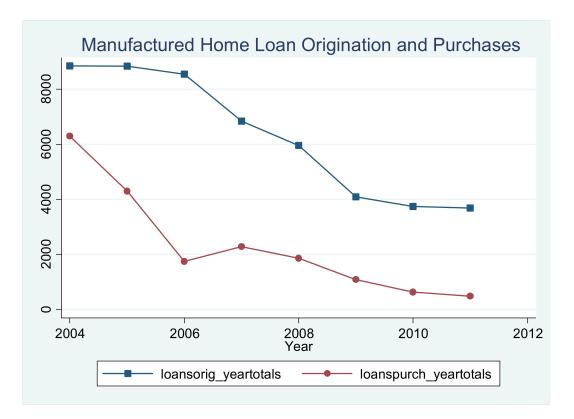
analyzed to determine the relationship between income and origination rates along with the relationship between income (not available at the individual level) and reasons for denial. Rate of origination is expected to be a factor of income, percent of loans purchased, year, and the number of loan applications. Naturally, it is to be expected that origination rates are positively correlated with income, but if lower income households show increased origination rates over time that would provide evidence for increased availability of credit. Meanwhile decreasing levels of denials due to reasons such as debt-to-income ratios, too low collateral, and insufficient cash, controlling for income, would imply that the pool of potential borrowers is increasing as well. This model of percent of applications denied is expected to be a factor of income, percent of loans purchased, and year.

MSA Dataset Descriptive Statistics (North Carolina)								
Year	Loans Originated	Applications Denied	Loans Securitized	Percent Originated	Percent Denied	Percent Purchased		
2004	8850	14036	6296	0.29861	0.47360	0.71141		
2005	8843	14045	4302	0.30406	0.48293	0.48649		
2006	8544	10697	1744	0.36153	0.45263	0.20412		
2007	6841	6468	2279	0.36153	0.40112	0.33314		
2008	5965	5440	1868	0.42425	0.38439	0.31316		
2009	4091	3296	1088	0.42138	0.35410	0.26595		
2010	3748	4397	629	0.43951	0.42702	0.16782		
2011	3681	5454	428	0.36399	0.43601	0.11627		

Table 3

#### FFIEC

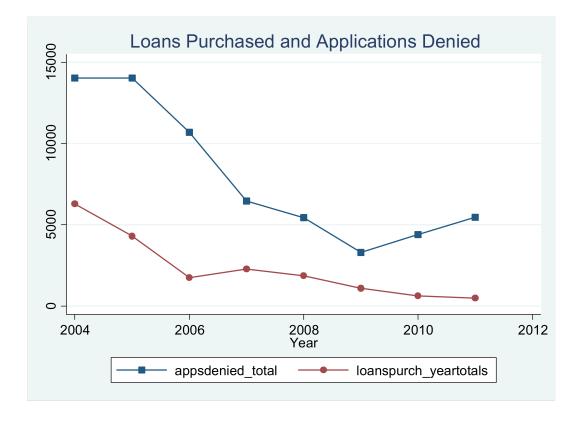
Based on the census tract dataset, an eyeball-level analysis of loan origination and purchases shows that securitization, described as purchases of loans per year, fell at similar rates to loan originations per year. In Table 3 we see that 71.1% of loans originated, 6296 out of 8850, were purchased by a GSE in 2004. Figure 8 clearly shows that securitization fell even more abruptly than loan originations in 2005 and 2006 when GSEs were largely exiting the securitization market in fear of being overexposed to subprime borrowers (Benson: 2012). Securitization fell at a similar pace with loan originations from 2007 to 2011, though securitization of manufactured housing loans practically stopped by 2010. Table 3 shows that in 2011 only 428 loans were securitized compared with 3681 originated, making up a rate of 11.6%,.





FFIEC

Figure 11



### **FFIEC**

A positive relationship between loan securitization and availability of credit would imply that an increase in purchases of loans would lead to a decrease in denials. For the most part Figure 10 shows that a decrease in denials is accompanied by a decrease in securitization. This goes against theory in a superficial setting, but is more likely due to the collapse in loan applications and toughened standards as seen in Table 3. The percentage of loan applications denied barely changes during the eight years being analyzed, falling from 47.4% to 43.6%, but the quantity of denials fell dramatically, as seen in Figure 11, due to the collapse in demand. The "selection" of loans accepted by originators changes dramatically from the beginning to the end of the period. We will analyze the relationships between originations and purchases along with denials and purchases further in our regressions.

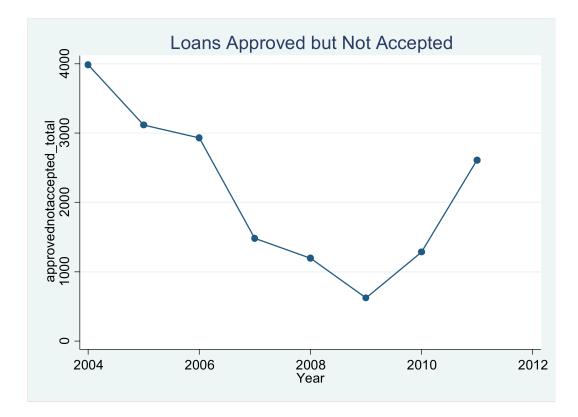


Figure 12

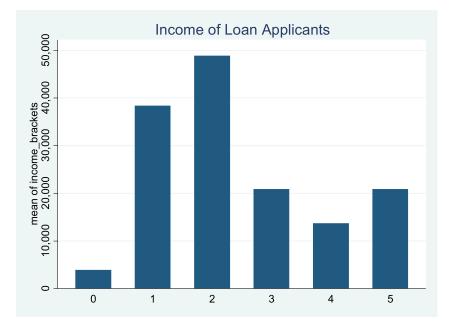
### **FFIEC**

Figure 12 illustrates an interesting scenario where the number of loans approved but not accepted falls between 2004 and 2009 but then jumps in 2010 and 2011. Following the onset of the crisis many of the people being approved for manufactured housing loans were also being approved for site built loans, so it is likely these applicants were accepting loans for site built homes (Robertson: 2013). It could be the case that applicants for manufactured home loans were wealthier in the last two years of analysis, which could explain why the number of applicants not accepting their loans increased. However, we have already seen in Table 3 that the percentage of

loan applications successfully originated rose from 29.9% to 36.4% from 2004 to 2011. Since more loan applications are being accepted overall it makes intuitive sense that more loans are also being turned down by the applicants. Since far fewer people are applying for loans, likely due to their awareness of the tough standards for approval, the overall number of loans originated fell dramatically from 8850 in 2004 to 3681 in 2011.

#### Figure 13

Income Distribution of Manufactured Home Loan Applicants in NC from 2004 to 2011



- 0) Income not Reported
- 1) Income below 50% Median Income in the MSA
- 2) Income between 51 and 79% Median Income
- 3) Income between 80 and 99% Median Income
- 4) Income between 100 and 119% Median Income
- 5) Income greater than 120% Median Income

FFIEC

Now we begin to look at the census tract dataset, which includes income data. Figure 13 shows that the highest proportion of potential borrowers, thirty-four percent, who apply for manufactured housing loans have incomes between 51 and 79% of the median income in the MSA. Clearly even applicants for real estate loans have incomes well below the median in their MSA. Figure 13 shows the aggregate quantities for the entire dataset, but certain MSAs deviate interestingly. Raleigh, and the other large MSAs in North Carolina, featured the poorest borrowers, relative to their area. Forty percent of applicants in Raleigh had incomes less than 50% of the median in the MSA, as shown in Figure 14. Meanwhile, smaller cities such as Jacksonville had relatively wealthier borrowers. Figure 15 illustrates this, as only 8 percent of the applicants have income below 50% of the median while twenty-five percent had incomes over 120% of the median income. This discrepancy between the more populous areas and less populous ones is likely due to the fact that the median income in the large cities is far higher than in the smaller, more isolated ones. While Raleigh's median household income was \$46,612 in 2000, Jacksonville's median income was only \$32,544. Additionally, the lack of applicants in the smaller areas could skew the incomes of those who applied between 2004 and 2011.

## Figure 14



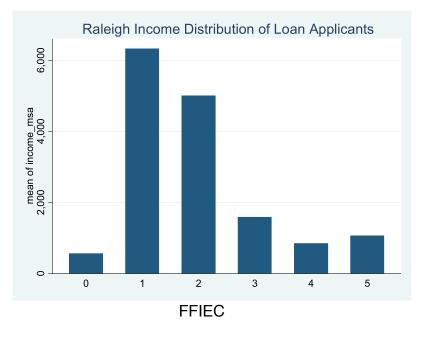
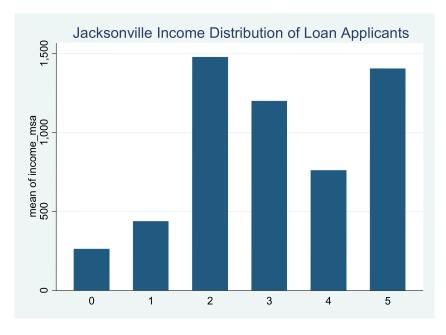


Figure 15

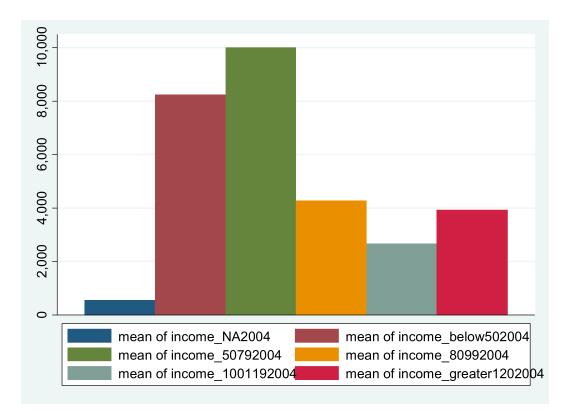
Income Distribution of Manufactured Home Loan Applicants in Jacksonville from 2004 to 2011



FFIEC

Figures 16 and 17 show that the incomes of applicants does not appear to change greatly over time. The income brackets are the same as Figures 13, 14, and 15. Figure 16 describes the income distribution of applicants in 2004 while Figure 17 shows the income distribution in 2011. Comparing the y-axis of the two charts is an interesting exercise as the number of applicants of every income level collapsed between 2004 and 2011. While Figure 11 brings up the possibility that wealthier borrowers began applying for loans in 2010 and 2011, Figures 16 and 17 show that is not the case.

#### Figure 16

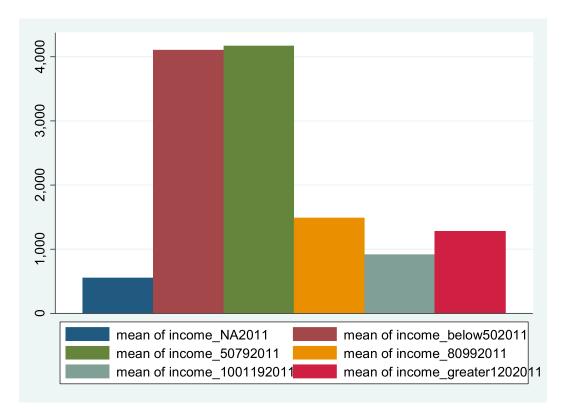


#### **Income Distribution of Loan Applicants in 2004**

FFIEC



## Income Distribution of Loan Applicants in 2011



FFIEC

# **4 Results**

The models for these regressions are based on the theory that the percent of loans originated successfully is dependent on the percent of loans purchased (or securitized), the number of loan applications within the MSA or census tract being measured, the year, and the location. The percent of loans securitized is included because it is the primary variable we are looking to determine causation on the percent of loans originated with, and the number of loan applicants is included because we expect the larger or smaller numbers of loan applications to have different rates of loan originations. We also expect that different years and locations of the applications may affect the percent of loans originated, so they are controlled for as well. Other models such as fixed effects, clusters, and lag variables are also utilized for diverse reasons that are explained as they are presented. Throughout the following analysis the year and locations are controlled for through dummy variables representing each value. Since there are eight years and fifteen MSAs, broken down further into census tracts, being analyzed in the first dataset, these control variables are not included in the output below, and are discussed where meaningful.

Table 4 provides the regression results for the percent of loans successfully originated. There are 3171 observations in these regressions, each of which represents a census tract which is matched with a year, a number of loan applications, successful loan originations, and loan purchases. The percent of loans originated and loans purchased is used in the regression because the quantity of loans originated and purchased is affected so much by the number of loan applications that no other variables are impactful. Using percentages not only provides more significant results, but also makes intuitive sense as we reach a conclusion on the availability of credit relative to the size of the market.

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#### Table 4

	A-simple OLS	B-OLS with Year variables	C-FE (Location)	D-Cluster (Location)	E-Lag Percent Originated
Constant	0.332 (0.006)	0.342 (0.010)	0.342 (0.010)	0.341 (0.014)	0.283 (0.011)
Percent Purchased	0.09*** (0.014)	0.175*** (0.013)	0.175*** (0.013)	0.175*** (0.037)	0.242*** (0.017)
Loan Applications	0.0003*** (0.00008)	0.0007*** (0.00008)	0.0007*** (0.0008)	0.0007*** (0.0001)	0.0003*** (0.00009)
Lag- Percent Originated					0.164*** (0.021)
sigma_u			0.0283	0.0337	0.0255
sigma_e			0.1456	0.1459	0.1300
R-squared	0.0136	0.2455	0.2469	0.2469	0.2372
Adjusted R-squared	0.0130	0.2433	N/A	N/A	N/A
No. observations	3171	3171	3171	3171	2360

Regression Results for Percent of Loans Successfully Originated

#### FFIEC

Column A describes a basic regression of the percent of loans successfully originated on the percent of loans securitized and the number of loan applications. This regression features a low R-squared value of 0.0136, but looking at Column B shows that adding the year dummies as independent variables helps the regression describe the data far better with an adjusted R-squared of 0.2433. Securitization has a small effect on the percent of loans successfully originated, but the year dummies have a larger impact on the model.

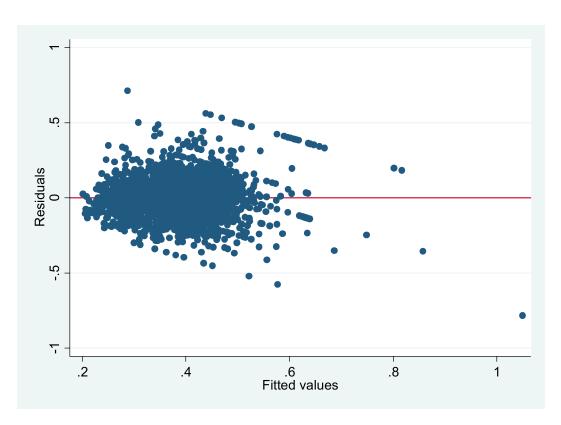
With the next three regressions we can begin to look at causality. The percent of loans purchased is positively affecting the percent of loans originated in the fixed effects model (Column C), the clustering model (Column D), and the lagged dependent variable model (Column E). The location of the applicant may be affecting the percent of loans originated in unobserved ways, time-invariant ways so we run a fixed effects model. Additionally we believe the errors may be clustered by location, since Figures 14 and 15 show that different locations have different incomes, so we also run a clustering model. We cluster at the MSA level for location. In both models there appears to be a significant, positive correlation between the percent of loans purchased and the percent of loans originated, suggesting that securitization leads to an increase in the availability of credit. The sigma u of 0.0283 shows the standard deviation within the group (location), while the sigma e shows the error of the regression after controlling for the location is 0.2469. Meanwhile, we also believe people living in higher demand areas may feature a larger response to securitization if it is easier for lenders in those areas to sell their loans. Thus, the cluster regression in Column D of Table 4 is run to determine if there remains a correlation between securitization and loan originations after controlling for the correlation of error terms (clustering) across location, regardless of whether or not there are changes over time. Again there appears to be a positive relationship between the percent of loans purchased and the percent of loans originated. Similarly the sigma u of 0.0337 shows the withingroup error is slightly more than in the fixed effects, and the error of the regression remains the same at 0.2469.

Finally, we believe the percent of loans originated in the year t-1 year may be affecting the percent of loans originated in year t because loan originators likely rely on the previous year's applications to determine which loans they will approve. If a larger than expected number of applicants had poor credit scores in the previous year (the datasets used in this analysis did not include credit scores) they might expect similar credit scores in the current year and accept more applicants with low credit scores than they would otherwise. Thus, we regress the percent of loans successfully originated on the percent of loans purchased, the number of applications, the year, the location, and the lag value of the percent of loans originated. The sigma\_e shows that the lagged regression has the lowest error of the final three regressions, 0.1300, suggesting that it describes the data best. The coefficient of loans purchased jumps when the lagged variable is included in the regression. The percent of loans purchased remained significant in this regression as the coefficient of 0.242 has an economic impact of 0.00414, after multiplying by the standard deviation. This implies that a one standard deviation change in the independent variable leads to a change of 0.00414 in the percent of loans originated. This is not a very large impact. Nonetheless, the OLS, time-series, and lagged regressions in Table 5 appear to support the idea that securitization lead to an increase in the percent of loan originations, even if quite modestly.

The number of loan applications is also a significant factor affecting the percent of loans successfully originated, as more applications appear to lead to a higher success rate of loan originations. However the economic impacts are so minuscule, 2.7 X 10<sup>-10</sup> for the lagged model, that they may not be very influential.

An analysis of all three of these regressions with quantities of loan originations and quantities of loan securitization produced very similar results. Combining these results begins to provide some empirical support for the theory that the process of securitization is positively impacting the percent of loans originated.





#### FFIEC

The previous regressions assumed a linear model describes the data well, and an analysis of the residuals also points to that conclusion. Figure 18 shows the residuals appear to be randomly distributed around 0, with a few outliers above and below. However, a Breush-Pagan test shows that heteroskedasticity may be a concern (results in Appendix A.3). This would imply that the standard deviations are not constant over time, which would make the standard errors biased and would affect significance. This could be a result of increasing values of explanatory variables, such as the number of applications. To provide further evidence for our results, Huber-White robust estimates of SE are tested as well. The standard deviations were not significantly affected and the results were the same as the ones in Table 4.

#### Table 5

	A-Location/Year Independents	B- FE (Location)	C- Cluster (Location)
Constant	0.487 (0.020)	0.382 (0.011)	0.385 (0.014)
Percent Purchased	0.120*** (0.013)	0.120*** (0.013)	0.120*** (0.018)
Loan Applications	-0.0008*** (0.000009)	-0.0008*** (0.00009)	-0.0008*** (0.0001)
sigma_u		0.0361	0.0313
sigma_e		0.1608	0.1608
R-squared	0.1866	0.1602	0.1602
Adjusted R-squared	0.1808	N/A	N/A

#### Regression Results for Percent of Loans Denied

#### FFIEC

Another interesting piece of analysis from the census tract dataset came from analyzing the applications denied. Table 5 shows that an OLS regression, fixed effects model, and cluster model found a positive correlation between the percent of loans purchased and the percent of loans denied. This is certainly counter-intuitive, as we would expect an increasing level of securitization to lead to a decreasing denial rate, but it may be a result of a very poor model as the R-squared values are all very low. It could also be due to a selection bias as the relationship may only exist in this aggregate analysis, and not during the individual years, if each time period is not adequately represented in the data. Additionally, the economic impact of the percent purchased is much lower in these regressions, only 0.00156 in the fixed effects model, which implies the percent of loans purchased is not significant.

One of the discussed potential pitfalls in the census tract dataset is that it does not include income data. This can be considered a confounding variable if people of higher incomes are applying for more loans (and thus granted the loans more successfully) at the same time as

securitization is increasing. Income is a variable in the MSA dataset, however, and six dummy variables were created for different income ranges in addition to the dummies for year and location. These ranges are: Income not Available, Below 50% of the Median Income in the MSA, between 51 and 79% of the Median Income in the MSA, between 80 and 99% of the Median Income in the MSA, between 100 and 119% of the Median Income in the MSA, and greater than 120% of the Median Income in the MSA. The theory for this analysis is that the percent of loans originated is a factor of the percent of loans purchased, the number of loan applications, income, year, and location.

#### Table 6

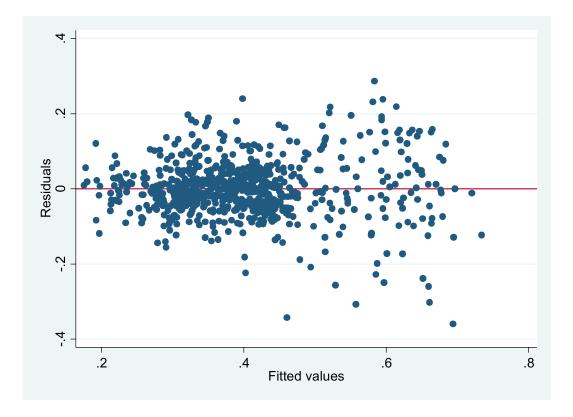
	A-Year/Location/Income Independents	B-FE (Location)	C-Cluster (Location)	D-Huber-White Robust	E-Lag Percent Originated
Constant	0.296 (0.014)	0.306 (0.013)	0.551 (0.020)	0.551 (0.020)	0.365 (0.032)
Percent Purchased	-0.004*** (0.001)	-0.004*** (0.001)	-0.004 (0.0025)	-0.004*** (0.001)	0.0023 (0.0027)
Loan Applications	0.000003 (0.0000025)	0.00003 (0.000025)	0.000008 (0.000025)	0.000008 (0.000019)	-0.000011 (0.000034)
Lag-Percent Originated					0.286*** (0.0430)
sigma_u		0.0305	0.0289	0.0289	0.0290
sigma_e		0.0789	0.079	0.079	0.0787
R-squared	0.6696	0.6494	0.6493	0.6493	0.6626
Adjusted R-squared	0.6526	N/A	N/A	N/A	N/A
No. observations	720	720	720	720	720

Regression Results for Percent of Loans Originated (with Income)

#### FFIEC

The 720 observations each represent an MSA matched with a year, an income bracket, a number of loan applications, loan originations, and loan purchases. Four of the five regressions

presented in Table 6 come to the unexpected conclusion that increasing the percent of loans purchased leads to a decline in the percent of loans originated when controlling for income, year, and location. It is also interesting to note that the number of loan applications does not significantly impact the percentage of loans originated, as that was one of our original hypotheses. Even in the census tract dataset however, though the quantity of loan applications was significant, it had a very small economic impact. All of the cross-sectional and lagged regressions had nearly identical errors, suggesting they described the data similarly. This is reinforced with the similar R-squared values.



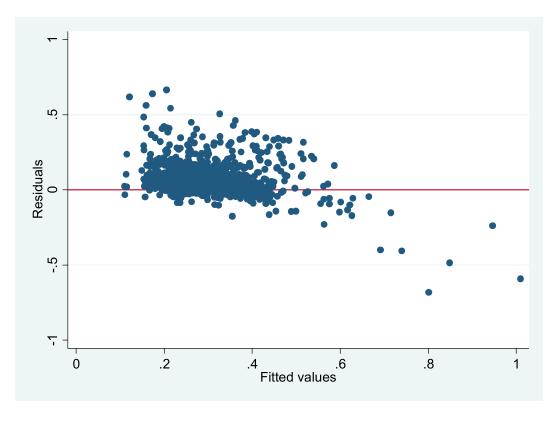


FFIEC

Both the Breush-Pagan test and the fan shape of the residuals in Figure 19 indicate that heteroskedasticity is a problem in this situation. Additional robustness checks are necessary, which is the purpose of Column D in Table 6. Adding the Huber-White robust standard errors does not change the surprising result that increasing the percent of loans purchased leads to a decline in the percent of loans originated. However, the introduction of the lag variable leads to the conclusion that the percent of loans originated in the previous year is having a significantly positive impact on the percent of loans originated in the current year. Neither the percent of loans securitized nor the number of applications is significant in this model. These results are far more intuitively reassuring, as they suggest that securitization is not leading to a decline in credit availability but instead that the percent of loans originated in the previous year is having a very large impact on the availability of credit. Causality remains difficult to pin down, as an increase in origination may prompt an increase in securitization as well. A possibility is that causality goes both ways, from securitization to origination and vice versa, and this creates an upward bias on the coefficient of percent purchased.

Additional interesting results from the MSA dataset are shown in Table 7. Table 7 breaks down the effect of securitization on the loan origination rates of potential borrowers based on their income level. Income levels are described according to their relationship with the median income in the MSA. In the below 50% income bracket and the 100-119% income bracket, potential borrowers are more likely to get approved if there is a higher rate of securitization during that period. However, the economic impact of securitization is relatively small, 0.00035 for the below 50% bracket and 0.00048 for the 100-119% bracket. The 50-79%, 80-99%, and greater than 120% brackets do not show such an impact from increased securitization. We

expected income to be protective in this situation as increased availability of credit would especially help those who are most likely to get approved for a loan. It could be the case that the highest income borrowers are already approved at a relatively high level and thus are not duly affected by a rise in availability of credit, but it seems more likely that securitization is not linked to credit availability in these income-specific breakdowns as only two of the five section experienced a positive correlation.





FFIEC

Breusch-Pagan does not make a case for heteroskedasticity here (results in Appendix A. 3). The residuals of the first income bracket regression, shown in Figure 20, appear to be randomly distributed, though there are a few outliers. Thus, here we look only at fixed effects and clusters, controlling for location All columns have year dummies as independent variables.

## Table 7

Regression Results for	Percent of Loans O	Priginated by Income Le	evel
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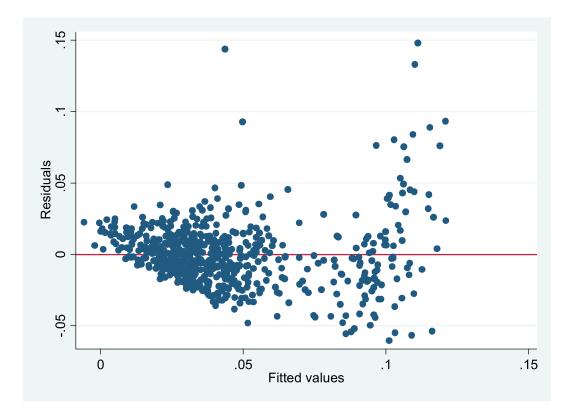
	Income Below	50% MSA Median	Income 50-79% MSA Median		
	A-FE	B-Cluster	C-FE	D-Cluster	
Constant	0.203 (0.016)	0.184 (0.019)	0.305 (0.016)	0.294 (0.025)	
Percent Purchased	0.029** (0.012)	0.026** (0.010)	-0.009 (0.032)	0.012 (0.025)	
Loan Applications	-0.00001 (0.00004)	0.000055*** (0.000018)	-0.000044 (0.000037)	-0.00014 (0.000018)	
sigma_u	0.0476	0.0282	0.0403	0.0334	
sigma_e	0.0470	0.0470	0.0383	0.0383	
R-squared	0.6724	0.6591	0.7536	0.7518	
No. observations	120	120	120	120	

	Income 80-99%	MSA Median	Income 100-119% MSA Median			
	E-FE	F-Cluster	G-FE	H-Cluster		
Constant	0.336 (0.021)	0.337 (0.034)	0.310 (0.027)	0.312 (0.036)		
Percent Purchased	-0.00036 (0.018)	-0.002 (0.015)	0.032** (0.015)	0.028*** (0.0091)		
Loan Applications	-0.00016 (0.0001)	-0.00012 (0.00011)	0.0014 (0.00025)	0.00015 (0.00013)		
sigma_u	0.0599	0.0608	0.0473	0.0441		
sigma_e	0.0526	0.0526	0.0665	0.0665		
R-squared	0.5938	0.5937	0.3704	0.3697		
No. observations	120	120	120	120		

	Income Above 120% MSA Median					
	I-FE	J-Cluster				
Constant	0.379 (0.020)	0.367 (0.031)				
Percent Purchased	0.018 (0.014)	0.016 (0.012)				
Loan Applications	-0.000012 (0.00013)	0.00012 (0.00011)				
sigma_u	0.0417	0.0303				
sigma_e	0.0570	0.0570				
R-squared	0.2760	0.2651				
No. observations	120	120				

The relationship between the rejection rates for different reasons of denial and the rates of securitization are also analyzed in Table 8. The reasons for denial are debt-to-income ratios, employment history, lack of collateral, credit history, and insufficient cash. Again analysis of the residuals led to a fan shape which forced us to use heteroskedasticity-robust standard errors in all of the regressions. There are very few significant correlations. There is a slightly negative correlation between percent of loans purchased and the percent of people rejected for having poor credit. This implies that an increase in securitization could lead to lower rates of rejection for poor credit. This lends further validity to the theory that securitization is succeeding in its stated purpose of increasing availability of lending it suggests that the ability to get rid of loans from their balance sheets is incentivizing mortgage originators to lend more. However, the economic impact of -0.0000039 is so low that it is hard to draw any meaningful conclusions from the data. Since the data span 15 MSAs, 5 income groups, and 8 years there is not enough variation in the data anymore. Meanwhile, limited collateral and credit incompleteness were actually positively correlated with percent of loans purchased, implying that increasing securitization increased the percentage of people being rejected for those reasons. This seems unlikely and, again, the economic impacts are so low, 2.2 X 10<sup>-7</sup> and 5.6 X 10<sup>-7</sup> respectively, that it seems unwise to jump to any conclusions.





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Table	8
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	A-Debt-to-Income	B-Employment	C-Credit	D-Collateral
Constant	0.046 (0.006)	0.039 (0.010)	0.063 (0.006)	0.068 (0.009)
Percent Purchased	0.0007 (0.0009)	0.0012 (0.0012)	-0.0026* (0.0015)	0.0024*** (0.0009)
Loan Applications	-0.000026*** (0.0000008)	-0.0000052* (0.0000027)	0.000018 (0.000026)	-0.000008 (0.000006)
sigma_u	0	0	0.0046	0.0093
sigma_e	0.0238	0.0072	0.0448	0.0259
R-squared	0.5788	0.5945	0.5451	0.3809
No. observations	626	279	681	662

# Table 8 (continued)

	E-Insufficient Cash	F-Credit Incompleteness
Constant	0.034	0.031
	(0.005)	(0.005)
Percent Purchased	0.00039	0.0014***
	(0.0018)	(0.0004)
Loan Applications	-0.00001***	-0.000013***
	(0.000003)	(0.00004)
sigma_u	0	0
sigma_e	0.0100	0.0106
R-squared	0.2575	0.4785
No. observations	430	397

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# **6** Conclusion

The study of manufactured housing is one that inspires a great deal of interest, after a couple of seconds of ridicule from those uninformed with the topic, as it has been largely ignored by most of the housing experts. Table 1 shows that this industry is capable of providing practical housing for much of the low-income population in America but, due to political considerations and negative consequences from tight lending standards, demand has collapsed in the past decade.

The process of securitization was developed to improve liquidity of lenders and, through them, improve availability of credit to potential borrowers. Our research finds that securitization has not significantly affected the availability of credit to potential borrowers in North Carolina. The results of our analysis are not entirely straightforward, as regressions from the census tract dataset appeared to suggest that securitization positively affects availability of credit, while results from the MSA dataset suggest there is no correlation.

The data in the census tract dataset imply that increased levels of securitization lead to increased levels of origination rates in manufactured housing loan applications, though the economic impact is very small. The central conclusion from the MSA dataset comes from the lagged variable regression, which suggests that the effect of securitization on the percent of loans successfully originated was outweighed by the effect of the loan origination rates of the previous year. A couple of income groups in the MSA data did, however, suggest that securitization is positively affecting the origination rates. Nonetheless, the small economic impact in the census tract dataset and the lack of correlation in the MSA dataset suggest that securitization did not significantly affect availability of credit in the manufactured housing industry.

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Future opportunities for analyzing this relationship include evaluating the correlation between loan originations and securitization over other time periods. The period from 2004 to 2011 featured one of the largest housing collapses of all time, which distorted the housing market. Beginning analysis in the 1980s, before manufactured housing began its dramatic growth, could provide some interesting insights, though securitization at the time was nowhere near as large as it was in the 2000s.

Additionally combining data from personal property loans (sold as ABSs) would supplement the MBS data exceptionally well, as only one-third of manufactured housing loans are financed as real estate. This analysis could also be replicated in other states, and data on credit scores or more granular (individual) data on income could provide additional methods for controlling for the creditworthiness of buyers. These would be very useful tools to establish how potential borrowers of more specific levels of creditworthiness were impacted by securitization in their loan application process.

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# Appendix A.1: Additional Data

Comparis	son of A	Apartme	ent ar	nd Manufa	acture	d Hon	ne Mor	nthly (	Costs		
Counties	Marico	Rivers	Polk	San Berr	Harris	Pima	Hidalç	Horry	Lake	Aver	ages
Monthly Fair (3 Bedroom			ment	Rent in D	ollars						
2000	-	845	597	845	864	850	523	690	896	778	
	1121				1042		561		1072		
2005		1058			1071				1049		
2007					1024				1019		
2010					1189		-		1317		
Manufacture											
				845.31	732.8	747.3	619.13	665.3	695.5	723	
2003	883.87	938.41	611.4	938.41	793.0	826.5	632.73	683.2	755.3	785	
2005	991.68	1090.6	670.8	1090.60	851.5	936.6	686.50	732.5	785.8	871	
2007	1041.0	1208.1	691.9	1208.17	843.7	1032.	756.08	775.9	780.5	926	
2010	1009.2	1230.6	787.6	1230.64	917.1	954.6	782.4	824.8	893.6	959	
Avg. Sales P	rice of N	/lanufac	tured	Home							
2000	39,508	48,037	33,79	48,037	37,86	39,50	37,860	37,05	33,79		
2003	49,440	60,077	38,52	60,077	43,16	49,44	43,160	42,23	38,52		
2005	56,492	70,121	41,34	70,121	46,90	56,49	46,90	45,98	41,34		
2007	59,656	74,699	43,97	74,699	50,14	59,65	50,144	49,12	43,97		
2010	54,111	68,366	43,63	68,366	50,01	54,11	50,010	48,95	43,63		
Avg. Sales P											
2000	28942	43646	2618	43646	33197	28942	33197	31802	2618		
	36217										
				64377							
	45740										
	42049										
2012	39486	59466	3540	59466	44892	39486	44892	43327	3540		
<u> </u>											
Avg. Sales P				•	-						
	54,100	,		,							
	-	-		67,700							
	-	-		79,900							
				85,500							
2010	78,600	78,600	60,10	78,600	60,10	78,60	60,100	60,10	60,10		

				Year	Manu	15 Ye	ar FRM	I Rate	s			
				2000	12	7.84						
Placement Fe	160			2001	11	6.46						
Manufactured	200			2002	10	6.28						
Reinspection	110			2003	9.62	5.01						
Total	470	2.6111		2004	9.8	4.88						
				2005	10	5.33						
12% interest	rate use	ed for 2	000	2006	10.2	6						
9.62% interes	st rate u	ised for	2003	2007	10	5.92						
10% interest	rate use	ed for 2	005	2008	10	5.6						
10% interest	rate use	ed for 2	007	2009	10.5	4.72						
10.75% intere	est rate	used fo	r 2010	2010	10.8	4.33						
				2011	10.3	4.15						
5% downpay 15% downpay					9.75	3.17						
Apartment Re	ents cal	culated	from I	HUD Fair	Marke	t Rent	s					
New Manufac	ctured H	lome P	rices f	rom Cens	us							
Used Manufa	ctured	Home F	rices	from MH '	Village							
Financing Co	sts fron	n bankra	ate.co	m/IU Crea	dit Unic	on/ Ka	nsas C	ity M⊢	l Park	COwr	ner	
Fee estimates	s from (	Californi	a gov	ernment								
Mortgage Rat	tes Cal	culated	at mlo	alc.com								

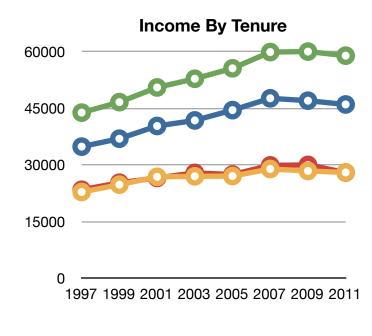
# Appendix A.2

Year	Overall Monthly Cost	Overall Household Income	Overall Percent of Income
1997	542	34842	21
1999	581	36942	20
2001	658	40305	21
2003	684	41775	22
2005	753	44503	23
2007	843	47632	24
2009	909	47000	24
2011	927	46000	25

Year	<b>Owner Occupied Cost</b>	Owner Occupied Income	Owner Occupied Percent of Income
1997	534	43840	17
1999	581	46616	17
2001	686	50505	18
2003	718	52803	18
2005	809	55571	20
2007	927	59866	20
2009	1000	60000	21
2011	1008	58919	21

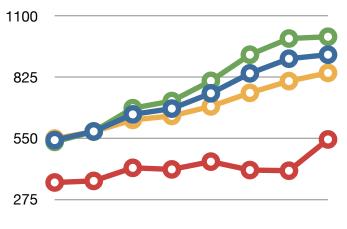
Year	<b>Renter Occupied Cost</b>	Renter Occupied Income	Renter Occupied Percent of Income
1997	549	22834	29
1999	580	24772	28
2001	633	26848	29
2003	651	26983	30
2005	694	27051	32
2007	755	28921	33
2009	808	28400	34
2011	845	28000	35

Year	Manufactured Housing Monthly Co	Household Incom	Manufactured Housing Percent of Inco
1997	351	23414	19
1999	358	25280	18
2001	417	26556	18
2003	410	27885	19
2005	445	27452	20
2007	407	29876	18
2009	404	30000	18
2011	545	27984	24



- Overall Household Income
- Owner Occupied Income
- Renter Occupied Income
- Manufactured Housing Household Income

### Monthly Housing Costs (Real Estate only)



0 1997 1999 2001 2003 2005 2007 2009 2011

- Overall Monthly Cost
- Owner Occupied Cost
- Renter Occupied Cost
- Manufactured Housing Monthly Cost

	Table 4	Table 6	Table 7	Table 8
Chi-Squared	262.23	106.73	1.80	330.05
Prob>Chi- Squared	0.000	0.000	0.180	0.000

Appendix A.3: Breusch-Pagan Tests for Heteroskedasticity

Appendix B.1: STATA Code (Census Tract Dataset)

```
clear all
set more off
use "ApplicationDataEdited.dta"
/*Generate Variables*/
egen loansorig2005 = total( loansoriginatednumber ) if year==2005
egen loansorig2011 = total( loansoriginatednumber ) if year==2011
tab loansorig2004
tab loansorig2011
egen loanspurchased2004 = total(loanspurchasednumber) if year==2004
. . .
egen loanspurchased2011 = total(loanspurchasednumber) if year==2011
tab loanspurchased2004
tab loanspurchased2011
drop loanapps percentoriginated percentpurchased loanappsquant percentoriginatedquant
percentpurchasedquant
egen loanapps = rowtotal( loansoriginatednumber approvednotacceptednumber
appdeniednumber appwithdrawnnumber filesclosedforincompletenessnumb)
gen percentoriginated= loansoriginatednumber/loanapps
gen percentpurchased= loanspurchasednumber/loanapps
reg percentoriginated percentpurchased
egen loanappsquant= rowtotal( loansoriginated000s approvednotaccepted000s appdenied000s
appwithdrawn000s filesclosedforincompleteness000s)
```

gen percentoriginatedquant = loansoriginated000s/loanappsquant gen percentpurchasedquant = loanspurchased000s/loanappsquant

/\*Regressions and Plots\*/

reg percentoriginatedquant percentpurchasedquant twoway scatter loansorig2004 loansorig2005 loansorig2006 loansorig2007 loansorig2008 loansorig2009 loansorig2010 loansorig2011 loanspurchased2004 loanspurchased2005 loanspurchased2006 loanspurchased2007 loanspurchased2008 loanspurchased2009 loanspurchased2010 loanspurchased2011 year

twoway scatter loanspurchased2004 loanspurchased2005 loanspurchased2006 loanspurchased2007 loanspurchased2008 loanspurchased2009 loanspurchased2010 loanspurchased2011 year

twoway scatter loansoriginatedyear loanspurchasedyear year

gen loansoriginatedyear= loansorig2004 replace loansoriginatedyear=loansorig2005 if year==2005

replace loansoriginatedyear=loansorig2011 if year==2011

reg percentoriginated percentpurchased loanapps

reg percentoriginatedquant percentpurchasedquant loanappsquant

egen percentorigapp = rowtotal(loansoriginatednumber approvednotacceptednumber)

egen percentorigappquant = rowtotal(loansoriginated000s approvednotaccepted000s)

reg percentorigapp percentpurchased loanapps

reg percentorigappquant percentpurchased loanappsquant

xtreg percentoriginated percentpurchased loanapps year1 year2 year3 year4 year5 year6 year7, i(location) fe

xtreg percentoriginated percentpurchased loanapps year1 year2 year3 year4 year5 year6 year7, vce(cluster location)

gen lag\_percentoriginated1=percentoriginated[\_n-1]

xtreg percentoriginated percent purchased loanapps lag\_percentoriginated1 year1 year2 year3 year4 year5 year6 year7 location1 location2 location3 location4 location5 location6 location7 location8 location9 location10 location11 location12 location13 location14

reg percentdenied percentpurchased loansapps year1 year2 year3 year4 year5 year6 year7, i(location) fe

reg percentdenied percentpurchased loansapps year1 year2 year3 year4 year5 year6 year7, vce(cluster location)

reg percentoriginated percent purchased loanapps lag\_percentoriginated1 year1 year2 year3 year4 year5 year6 year7 location1 location2 location3 location4 location5 location6

location7 location8 location9 location10 location11 location12 location13 location14, vce(robust)

/\*Residuals\*/

quietly reg percentoriginated percentpurchased loanapps year1 year2 year3 year4 year5 year6 year7 location1 location2 location3 location4 location5 location6 location7 location8 location9 location10 location11 location12 location13 location14

predict res, r predict yhat scatter res yhat, yline(0) estat hettest

## Appendix B.1: STATA Code (MSA Dataset)

clear all set more off use "MSAData.dta"

/\*Generate Variables\*/ tabulate year, gen(year) tabulate msa, gen(msa) tabulta income, gen(income0)

```
gen percentoriginated= loansoriginatednumber/appsreceived
gen percentpurchased= loanspurchasednumber/appsreceived
```

```
gen location = 1 if msa1==1
replace location=1 if msa2==1
```

```
replace location=1 if msa15==1
```

```
gen debttoincomepercent= debttoincome/appsreceived
```

gen creditincompletepercent= creditincome/appsreceived

```
egen income01_2004= sum(income01) if year==2004
```

```
egen income01_2011= sum(income01) if year==2011
```

```
egen income02_2004= sum(income02) if year==2004
```

•••

egen income02\_2011 = sum(income02) if year==2011

```
...
```

egen income01\_total= sum(income01\_2004 income01\_2005 income01\_2006 income01\_2007 income01\_2008 income01\_2009 income01\_2010 income01\_2011)

•••

egen income06\_total = sum(income06\_2004 income06\_2005 income06\_2006 income06\_2007 income06\_2008 income06\_2009 income06\_2010 income06\_2011)

```
/*Regressions and Plots*/
```

reg percentoriginated percentpurchased appsreceived

reg percentoriginated percentpurchased appsreceived year1 year2 year3 year4 year5 year6 year7 msa1 msa2 msa3 msa4 msa5 msa6 msa7 msa8 msa9 msa10 msa11 msa12 msa13 msa 14 income01 income02 income03 income04 income 05

xtreg percentoriginated percentpurchased appsreceived year1 year2 year3 year4 year5 year6 year7 income01 income02 income03 income04 income 05, i(location) fe xtreg percentoriginated percentpurchased appsreceived year1 year2 year3 year4 year5 year6 year7 income01 income02 income03 income04 income 05, vce(cluster location) gen lag\_percentoriginated=percentoriginated[\_n-1]

xtreg percentoriginated percent purchased loanapps lag\_percentoriginated1 year1 year2 year3 year4 year5 year6 year7 msa1 msa2 msa3 msa4 msa5 msa6 msa7 msa8 msa9 msa10 msa11 msa12 msa13 msa 14 income01 income02 income03 income04 income 05

xtreg percentoriginated percentpurchased appsreceived year1 year2 year3 year4 year5 year6 year7 if income01==1, i(location) fe

xtreg percentoriginated percentpurchased appsreceived year1 year2 year3 year4 year5 year6 year7 if income01==1, vce(cluster location)

•••

xtreg percentoriginated percentpurchased appsreceived year1 year2 year3 year4 year5 year6 year7 if income05==1, i(location) fe

xtreg percentoriginated percentpurchased appsreceived year1 year2 year3 year4 year5 year6 year7 if income05==1, vce(cluster location)

xtreg debtincomepercent percentpurchased appsreceived year1 year2 year3 year4 year5 year6 year7 income01 income02 income03 income04 income 05, i(location) fe

...

xtreg creditincompletepercent percentpurchased appsreceived year1 year2 year3 year4 year5 year6 year7 income01 income02 income03 income04 income 05, i(location) fe

graph bar income01\_total income02\_total income03\_total income04\_total income04\_total income06\_total

graph bar income01\_2004 income02\_2004 income03\_2004 income04\_2004 income05\_2004 income06\_2004

/\*Residuals\*/

quietly reg percentoriginated percentpurchased loanapps year1 year2 year3 year4 year5 year6 year7 msa1 msa2 msa3 msa4 msa5 msa6 msa7 msa8 msa9 msa10 msa11 msa12 msa13 msa 14 income01 income02 income03 income04 income 05

predict res, r predict yhat estat hettest