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ABSTRACT

We investigate the relationship between foreclosure activity and the health of residents using zip code level longitudinal data. We focus on Arizona, California, Florida, and New Jersey, four states that have been among the hardest hit by the foreclosure crisis. We combine foreclosure data for 2005 to 2009 from RealtyTrac with data on emergency room visits and hospital discharges. Our zip code level quarterly data allow us to control for many potential confounding factors through the inclusion of fixed effects for each zip code as well as for each combination of county, quarter, and year. We find that an increase in the number of foreclosures is associated with increases in medical visits for mental health (anxiety and suicide attempts), for preventable conditions (such as hypertension), and for a broad array of physical complaints that are plausibly stress-related. They are not related to visits for cancer morbidity, which arguably should not respond as rapidly to stress. Foreclosures also have a zero or negative effect on elective procedures, as one might expect. Age specific results suggest that the foreclosure crisis is having its most harmful effects on individuals 20 to 49. We also find that larger effects for African-Americans and Hispanics than for whites, consistent with the perception that minorities have been particularly hard hit.

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I. Introduction

The expansion of mortgage credit over the last decade was followed by a sharp decline in housing prices, which has caused foreclosure rates to reach historically high levels in the United States. According to Realtytrac, a leading firm that monitors and markets foreclosed homes, a record 2.82 million homes faced foreclosure in 2009, a 21 percent rise from 2008 and a huge 120 percent jump from 2007. One in 45 homes (2.23 percent of all housing units in the U.S.) received at least one foreclosure filing during 2010. As policymakers have debated measures to stabilize the housing market and minimize the damage of the crisis to the U.S. economy (e.g., the Obama administration's Making Home Affordable Program launched in March 2009), researchers have turned their attention to understanding the causes and consequences of rising foreclosures.

While a number of studies have investigated the effect of the foreclosure crisis on outcomes such as home prices and sales, residential investment and durable consumption (e.g., Immergluck and Smith, 2006a; Calomiris, Longhofer, and Miles, 2008; Rogers and Winter, 2009; Harding, Rosenblatt, and Yao, 2009; Mian, Sufi, and Trebbi, 2010), there has been no large-scale investigation of the effect of the crisis on health. Currently, the public and political debate over the crisis mostly focuses on the damage caused to the housing market and the overall U.S. economy and any potential toll on public health has been largely ignored. If the foreclosure crisis is having harmful effects on the public health, then policymakers need to factor such a finding into account as they evaluate the costs and benefits of policy responses designed to stabilize the housing market and keep people in their homes.

Home foreclosures might be expected to influence health through several mechanisms. First, for the individuals directly involved, a home foreclosure is an intensely stressful life event.

A growing literature suggests that stress can have harmful consequences through psychological responses such as depression or higher levels of hormones such as cortisol, and that stressful life experiences are associated with both physical and mental illnesses (Goldberger and Breznitz, 1993; McEwen, 1998; Cooper, 2005; Schneiderman, Ironson, and Siegel, 2005). Second, a high rate of foreclosure in a neighborhood also may also have negative impacts on those who do not lose their homes as homeowners see the value of their properties fall. Third, financial problems and stress may cause changes in health behaviors, which in turn may have negative health consequences. For example, people may smoke or drink more, stop taking medications because they cannot afford them, or stop going to the doctor for preventive care. For example, recent news reports suggest that declines in utilization of medical care have led to record profits for health insurers in the wake of the financial crisis (Abelson, 2011).

The goal of this paper is to investigate whether the foreclosure crisis is having an adverse effect on health. This investigation constitutes the first comprehensive analysis of the impact of foreclosures on health. In order to investigate these health effects, we assemble quarterly data on all foreclosures, Emergency Room (ER) visits, and hospitalizations from four states (Arizona, California, Florida, and New Jersey) which are among the 10 states that have been hardest hit by the crisis. Data on foreclosure activity is linked to data on ER visits and hospital discharges at the zip code level. In our analysis, we ask whether ER visits and hospitalizations for stress related conditions rise faster in zip codes that are heavily impacted relative to zip codes in the same county, quarter, and year that are less heavily impacted. We also distinguish between elective and non-elective visits, as well as analyzing hospitalizations and ER visits for different types of conditions.[1] We control for zip code fixed effects so that our effects are identified by

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[1] Elective visits are scheduled visits for non-urgent care. The type of visit is identified in the HCUP data using the variable "ATYPE".

changes within zip codes (rather than comparisons of, for example, rich and poor neighborhoods).   We also control for interactions of county, quarter, and year in order to control for time-varying features of local labor markets such as unemployment rates.   Hence, we take advantage of the fact that some zip codes were much more heavily impacted than others even within a county.   Finally, we examine a "control" condition, cancer, that should be less impacted by immediate changes in stress.

We find considerable evidence of an increase in non-elective hospitalizations and ER visits among 20 to 64 year olds, but smaller effects among those who are 65 and over. There is a large increase in conditions that are "Prevention Quality Indicators," i.e. conditions which should not result in hospital or ER visits if patients receive proper preventive care. Notably, an increase of 100 in the number of foreclosed properties, which approximately the increase experienced in the average zip code in our sample, would raise visits to ERs and hospital admissions for hypertension and diabetes by about 7.2 percent and 8.1 percent among those 20 to 49.   One of the largest increases in numbers of visits is in a category that might be described as "malaise" and which includes "fever of unknown origin", abdominal pain, nausea and so on.   For this category, an increase of 100 foreclosures is associated with a 7.5 percent increase in visits among those 20-49. We also estimate that an increase in foreclosures would raise visits for a wide range of non-elective physical conditions, including urinary tract infections, gastro-intestinal problems, and chest pain, but largely for those younger than 65.   It is notable that we do not find evidence of any effects of foreclosure activity on visits for cancer.   The null finding for cancer is expected, as, while stress may cause cancer over the longer term, it is not expected to do so in the short term.

Turning to mental health conditions, our results again suggest that the effects are concentrated on those younger than 65. We find very large effects on visits for anxiety.

Specifically, 100 foreclosures would be associated with 12.0 percent more visits related to anxiety among those 20-49. We also find that such an increase in foreclosures would be associated with a large percentage effect on visits for suicide attempts, an increase of 38.5 percent for those 20-49. But this finding should be interpreted with caution given the small numbers of visits for suicide attempts in our data.

Since in all but one state (AZ) the medical records we examine identify a patient's race and ethnicity, we are able to conduct separate analyses by demographic group. The sharp rise in foreclosures is thought to have disproportionately affected vulnerable minority populations. These populations may be at "double jeopardy." In other words, minority groups may be both more likely to suffer foreclosure, and more likely to suffer ill health due to foreclosure. We find that some of the health effects of foreclosure are in fact greater for blacks than for whites, most notably for hypertension and asthma among 50-64 year olds, and for mental health conditions other than anxiety or suicide attempts among those 20-49. Hispanics 20-49 have the largest increase in preventable visits: Our estimates imply that 100 foreclosures would increase PQI visits by 12.8 percent.

The rest of the paper is laid out as follows. In Section II, we provide some background information about the foreclosure crisis, and previous work on the relationship between economic activity and health. We then discuss our data in Section III and methods in Section IV, followed by the results in Section V, and a brief conclusion and a discussion of next steps in Section VI.

II. Background

An array of explanations have been offered for the foreclosure crisis including a relaxation in underwriting standards and the expansion of mortgage credit to subprime borrowers (e.g.,

Dell'Ariccia, Igan, and Laeven, 2008; Demyanyk and Van Hemert, 2011), mortgage

securitization having an adverse affect on the screening practices of lenders (e.g., Keys et al.,

2010), widespread negative equity caused by the willingness of mortgage lenders to issue

mortgage-debt on homes in which the owners had little or no equity (e.g., Gerardi, Ross, and

Willen, 2009, 2011), and a rapid increase in interest rates after a period of historically low levels

that fueled a housing bubble (e.g., Mayer and Hubbard, 2008). A related literature has focused on

the economic consequences of foreclosures on a number of economic outcomes, such as home

prices, sales, and property values (e.g., Campbell, Giglio, and Pathak, 2009; Calomiris,

Longhofer, and Miles, 2008, Harding, Rosenblatt, and Yao, 2009, Lin, Rosenblatt, and Yao,

2009; Immergluck and Smith, 2006a) and the overall economy (e.g., Green, 1997; Leamer, 2007;

Gauger and Snyder, 2003).

The implications of the crisis for non-economic domains such as health have been mostly

ignored.[2] In a number of studies relevant for our study, home ownership has usually been shown

to be positively associated with better physical and mental health for adults and children (e.g.,

Dietz and Haurin, 2003; Dunn and Hayes, 2000; Searle, Smith, and Cook, 2009; Fogelman, Fox,

and Power, 1989; Pollack, Knesebeck, and Siegrist, 2004) though this may be in part because

richer individuals are both in better health and more likely to own homes on average. However,

individuals experiencing difficulty making their mortgage payments experience lower levels of

psychological well-being and are more likely to have doctor visits, conditional on financial

hardship (Nettleton and Burrows, 1998; Taylor, Pevalin, and Todd, 2007). Thus, it is possible

that foreclosure places demands on a homeowner's health both mentally and physically (Bennett,

Scharoun-Lee, and Tucker Seeley, 2009; Fields, Libman, and Saegert, 2010; Bowdler, Quercia,

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[2] One exception is Immergluck and Smith (2006b) who show that higher levels of foreclosures are associated with increased violent crime, using data from Chicago. However, this study uses data from 2000, which predates the beginning of the current foreclosure crisis.

and Smith, 2010). These concerns have also been voiced in the media with stories highlighting the rising rates of depression, anxiety, and even suicide in high foreclosure communities (Ablow, 2008; Butts, 2010; Sundaram, 2010).

While there have been some qualitative descriptions of the disruption caused by foreclosure on people's lives (e.g., Nettleton and Burrows, 2000; Ross and Squires, 2011), there is little quantitative evidence about the existence or size of these potential impacts. In fact, a recent article by Bennett, Scharoun-Lee, and Tucker-Seeley (2009) points to the urgent need for credible research investigating the health effects of foreclosures.

In the only previous study to consider this question, Pollack and Lynch (2009) compared the health status of individuals enrolled in mortgage counseling in Philadelphia with respondents of a community health survey in Pennsylvania between July and October 2008. Members of the foreclosure sample were significantly more likely to have hypertension, heart disease, and a clinician-diagnosed psychiatric condition than those of the community sample. However, it is possible that poor health causes foreclosure rather than vice-versa (over a quarter of their foreclosure group owed money to medical creditors) and there may be unobserved differences between individuals going through foreclosure and the population at large. Moreover, the treatment group in Pollack and Lynch (2009) were self-selected individuals who were seeking mortgage counseling. Finally, Philadelphia had substantially lower rates of foreclosures than the hardest hit areas in the U.S., ranking 77th among metropolitan areas in foreclosures in 2008.

There is an extensive literature linking stressful life events like unemployment, job loss, financial strain, and poverty with increased risk for a number of mental and physical health conditions (e.g., Catalano, 2009; Currie, 2009; Currie and Lin, 2007; Dooley, Fielding, and Levi, 1996; Gallo et al., 2000; Strully, 2009, Belkic et al., 2004, Kahn and Pearlin, 2006, Woolf,

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Johnson, and Geiger, 2006, Bosma et al., 1998; Kuhn, Lalive, and Zweimuller, 2009; Sullivan and Wachter, 2009) and it is possible that foreclosure acts in a similar way. The Sullivan and Wachter (2009) paper is especially notable since they were able to follow a large sample of individuals who had lost their jobs in mass layoffs. They find significantly higher death rates due to accidents and heart conditions in this group, both immediately and in the longer term. Moreover, there is evidence linking economic crisis to reductions in utilization of medical care (e.g., Lusardi, Schneider, and Tufano, 2010; Williams and Collins, 1995; Feinstein, 1993).

On the other hand, there are a number of studies suggesting that recessions are associated with reductions in deaths due to several conditions including heart attacks and accidents (e.g., Ruhm, 2000, 2003, 2008; Ruhm and Black, 2002; Neumayer, 2004; Gerdtham and Ruhm, 2006), and with improvements in infant health (Dehejia and Lleras-Muney, 2004). These patterns have been attributed to recession-induced changes in health behaviors. For example, Xu and Kaestner (2010) study a group of low income individuals and find that higher employment is associated with more cigarette smoking and fewer visits to doctors for preventive care. However, Deb et al. (2009) examine a sample of older workers and find that some of them experience increases in body mass index and alcohol consumption in response to job loss.

Miller et al. (2009) find that cyclical changes in mortality among working-age adults result primarily from additional vehicle accidents and are not typically associated with conditions that are sensitive to stress levels or health behaviors among these individuals. Therefore, the authors argue that it is unlikely that changes in health behaviors are the key determinants of aggregate mortality changes over the business cycle. Furthermore, they find that declines in mortality with recessions are concentrated among the elderly (and to a lesser extent among children), so that they may reflect reductions in the amount of time working-age people have to

care for elderly relatives rather than poorer health behaviors among working-aged people.

Browning et al. (2006) examine the effects of job loss in a 10 percent sample of the population of Denmark and find no effect on hospitalizations for circulatory or digestive ailments. Eliason and Storrie (2009a) examine data from plant closings in Sweden in 1987 and 1988 and find that mortality rises by 44 percent in the four years following job loss. In particular, they find a 2 fold increase in suicide. Eliason and Storrie (2009b) also find increases in hospitalizations due to self harm, accidents, and alcohol-related causes in the 12 years following displacement.

In summary, the previous literature has largely ignored the possible relationship between the foreclosure crisis and population health, though it does suggest that such a relationship could exist. Ours is the first comprehensive effort to consider this potential relationship. As such, the findings from this paper constitute an important baseline for future research by providing estimates of the impact of foreclosures on a range of important health problems. Our paper also makes a contribution to the broader literature on the impact of stressful life events on health. Studies of this relationship often suffer from the same limitations as those in Pollack and Lynch. However, the recent foreclosure crisis is unusual in the sense that overall economic weakness did not play a major role in producing delinquencies and foreclosures in most areas - at least initially (U.S. Department of Housing and Urban Development, 2009). These characteristics along with the facts that it was sharp and unforeseen and has had very different impacts on different areas, even within the same county, makes this crisis an ideal "natural experiment" for examining the effects of a stress event like foreclosure on health. To further address the econometric challenges involved in identifying the effect of foreclosures on health, we rely on our detailed longitudinal zip code level data, which allow us to control for many potential confounders that might create a

relationship between neighborhood foreclosure rates and the incidence of morbidity. We control

for unobserved characteristics of neighborhoods by estimating models that include zip code level

fixed effects as well as interactions of each county, quarter, and year. We examine a "control"

condition, cancer, that should be less impacted by immediate changes in stress, and we

distinguish between elective procedures which might well be delayed given financial problems,

and visits for non-elective procedures which are more likely to correspond to real health

emergencies. Finally, our analyses are based on all patients and all neighborhoods with any

foreclosures in the four states, rather than on selected samples of patients or neighborhoods.

III. Data

We focus on the states of Arizona, California, Florida and New Jersey for several reasons.

First, we wish to focus on states that have recently had extremely high levels of foreclosures.

Together these four states comprised almost 50 percent of all the foreclosure filings in 2008

(RealtyTrac Press Release, January 15, 2009). They were all in the top 10, posting the 3rd,

1st, 2nd, and 10th largest totals of foreclosures in the country in 2010, respectively. Second, we

wish to use hospital discharge and emergency room data for entire states, rather than from a

sample of hospitals.[3] It is important to include ER visits in addition to hospitalizations, because

financial constraints can affect whether the person first presents at the ER, and the probability that

someone on the margin is admitted to hospital if they do appear at the ER. Not all states provide

public access to these kinds of data, and not all of those that do also release information about the

patient's zip code and/or county.

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[3] For example, the National Inpatient Database has a 20 percent sample of hospitals and it is not possible to tell if
changes in hospitalizations or ER visits at hospitals in the sample might be counter-balanced by changes in these
outcomes at other hospitals outside the sample.

Foreclosure data are available at the zip code level monthly between April 2005 through December 2009 from RealtyTrac.[4] RealtyTrac is a leading foreclosure monitoring and marketing company, which collects data from public records at the local level, which is where legal documents for foreclosures are recorded, posted, and published. With coverage that accounts for more than 90 percent of the U.S. population, the RealtyTrac data have been widely used by the media as well as researchers studying foreclosures (e.g., Mian, Sufi, and Trebbi, 2011; Hernandez, 2009; Pettit et al., 2009; Gaffney, 2009).

The documents that RealtyTrac collect have information both about the actual foreclosure auction, which includes filings of a notice of trustee sales (NTS) and/or a notice of foreclosure sale (NFS), and about real-estate owned (REO) properties, which are properties that have gone back to the mortgage lender after an unsuccessful foreclosure auction. Following instructions from RealtyTrac, we construct measures of foreclosures as NTS+NFS.[5] We also examine the effect of REOs. REOs reflect the cumulative impact of the foreclosure crisis on the neighborhood. The presence of many REO properties in the neighborhood may indicate that property values have been severely damaged, so that other families in the neighborhood are more likely to find themselves "under water," i.e. owing more than their property is worth. It is also correlated with vacancies.

Our health measures come from two databases collected by the Healthcare Cost and Utilization Project (HCUP), which services a family of health care databases developed through a Federal-State-Industry partnership and sponsored by the Agency for Healthcare Research and

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[4] We appreciate the help of Tyler White from RealtyTrac in acquiring and understanding the foreclosure data.
[5] A state generally has either NTS or NFS and this depends on whether the state uses a judicial or a non-judicial process in foreclosures. The main difference between a judicial process and a non-judicial process is that the former procedure requires court action on a foreclosed home. In general, NTS is available only for non-judicial states, while NFS is only available for judicial states. Some states use both procedures. Among our sample states, AZ and CA conduct both judicial and non-judicial foreclosures, while FL and NJ only conduct judicial foreclosures.

Quality (AHRQ).[6] For ER department visits, we rely upon the HCUP's State Emergency Department Databases (SEDD), which capture discharge information on all emergency department visits that do not result in an admission. Our hospitalization data come from the HCUP's State Inpatient Databases (SID), which hold the universe of inpatient discharge abstracts from individual states. In order for a discharge record to exist, the patient must have been admitted to hospital; hence the SID contains records of patients who require more intensive treatment or for whom treatment cannot be provided on an out-patient basis. The smallest level of aggregation in both databases is the zip code.[7]

In order to match the hospitalization data and the foreclosure data, we calculate the total number of hospitalizations in each category for each zip code and quarter. Similarly, we calculate the total number of foreclosures and REOs for each zip code and quarter. We impute zeros for zip codes that appear in RealtyTrac but have no hospitalizations. The result is a balanced panel of 3,525 zip codes with 19 time periods for a total of 66,975 observations.

In what follows, we devote most of our attention to a combined data set of ER visits that did not result in hospitalizations, plus all hospitalizations among those aged 20 years and over, other than those for childbirth, contraception, abortion and other elective procedures. We also look separately at elective procedures (which never occur in ERs). These are the type of procedures typically planned ahead of time by either the patient or the physician, for conditions that are not life-threatening. For example, a procedure such as a hip replacement is usually considered elective.

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[6] Visit http://www.ahrq.gov/data/hcup/ for more information on HCUP databases.
[7] We restrict the sample to Zip Code Tabulation Areas (ZCTAs) as these are the units reported by the Census. Zip codes are constructed by the postal service and frequently change. ZCTAs are constructed by Census and remain consistent between Censuses. Using ZCTAs allows us to merge population estimates to our data. We drop about 10% of our sample that could not be matched to ZCTAs. The final number of ZCTAs in our analysis sample is 3,525. For ease of understanding we use the term zip code throughout.

Figures 1 and 2 show changes in foreclosure rates and changes in non-elective visits (both hospitalizations and ER) for zip codes in New Jersey, one of our sample states.[8] Rates are calculated using zip code population data from the 2000 Census. That is, these rates can be interpreted as the number of foreclosures, REOs, or hospitalizations per person (rather than per property). We calculate the rate this way since we look at person-level medical data. The figures show that there is considerable variation across zip codes in both types of changes. They also suggest that areas that experienced the sharpest increases in foreclosures also tended to experience the largest increases in hospitalizations.

Table 1 explores this relationship further. The table shows means for all zip codes, as well as for those that were in the top and bottom fifths of the distribution of the rate of foreclosures in 2009. While the average zip code in our sample had 90.8 foreclosures and 44.4 REOs in 2009, zip codes in the top fifth had 201foreclosures and 103.7 REOs which can be compared to only 4.9 foreclosures and 2.6 REOs in the least impacted zip codes. The table shows that while the "top fifth" zip codes also had more foreclosures and REOs in 2005, foreclosure or REO activity has increased much faster in the most heavily impacted zip codes: The rate of foreclosures and REOs increased more than 15 fold in the most highly impacted zip codes, but only 4 fold in the least impacted zip codes.

The number of hospitalizations plus ER visits also increased more rapidly in the "top fifth" than in the "bottom fifth." However, Table 1 indicates that areas that had high foreclosure rates in 2009, already had high hospitalization/ER visit rates in 2005. This comparison shows the importance of controlling adequately for characteristics of the impacted zip codes. The HCUP data sets classify diagnoses using a tool called Clinical Classification Software (CCS).[9] This software takes

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[8] The pattern is similar for the other three sample states.
[9] More information is available at http://www.hcup-us.ahrq.gov/toolssoftware/ccs/ccs.jsp#download.

thousands of International Classification of Disease (ICD) codes and groups them into clinically meaningful categories. We use the single level diagnosis codes, and group them into larger aggregates using information from the multi-level diagnosis codes. For example, single codes 122 (Pneumonia), 123 (Influenza), 124 (Acute and Chronic Tonsilitis), 125 (Acute Bronchitis), and 126 (other Upper Respiratory Tract Infections) are grouped together in a category we call "Upper Respiratory Tract Infections". More information about our aggregates is in the Appendix.

An additional hospitalization category that we consider is an index of "Prevention Quality Indicators" (PQIs). These indicators are published by the AHRQ and are based on ICD-9-CM diagnosis codes. PQIs are index conditions for which good outpatient care can prevent the need for hospitalizations or ER visits, or for which early intervention can prevent complications or more severe diseases. Hospitalizations and ER visits for many other conditions may also be preventable to some extent, but PQIs are those which can almost always be prevented with appropriate care. To the extent that individuals stressed by the foreclosure process have fewer preventive doctor visits, stop adhering to prescription medicine regimes, or reduce self care (e.g., Sterk, Theall, Elifson, 2002; Virtanen et al., 2006; Cobaugh et al., 2008), underlying health problems may be exacerbated by foreclosure activity. The PQI category includes short and long-term complications of diabetes, amputations due to diabetes, and uncontrolled diabetes, perforated appendix, chronic obstructive pulmonary disease, hypertension, congestive heart failure, dehydration, bacterial pneumonia, urinary tract infection, angina without procedure, and adult asthma.

Table 2 shows the number of hospitalizations of different types overall, and for different types of zip codes and three age groups. The first column shows that there are a relatively large number of PQI visits (i.e. visits that should not have occurred if the patient had received adequate

preventive care). Three CCS categories fall wholly under the PQI rubric (diabetes, hypertension, and asthma) and these are broken out separately.   The non-elective conditions are quite skewed towards a few diagnoses. For example, injuries, malaise, gastrointestinal problems, and upper respiratory tract infections together account for 45.9 percent of visits. In what follows, we focus on the top 10 diagnoses, as well as on the PQI, cancer, and mental health diagnoses. The latter are of independent interest given the strong connection between stress and mental health.

The second and third columns of Table 2 show types of visits for people in zip codes in the top and bottom fifths of foreclosure activity.   It is remarkable that while the difference in population is about 45 percent, zip codes in the top fifth of foreclosure activity have more than double the number of PQI visits.   In fact, people in these areas experience more than double the number of hospitalizations for most categories of visits.   Visits for suicide attempts stand out since, while rare, they are 5 times more prevalent in high foreclosure areas.

The rest of Table 2 shows distributions of visit types by age. It is worth noting that those aged 20-49 have more visits in most of our categories than those in the two older categories, though for certain categories, such as heart attacks and strokes, the sufferers are much more likely to be older.   It is striking that people over 49 have fewer visits for anxiety, relative to younger people and fewer suicide attempts. Finally, our control category, visits for cancer, increase with age.

Table 3 shows numbers of hospitalizations by race and type of visit. Given that African Americans account for a minority of the population in the average zip code in our sample, these figures suggest that visit rates are much higher among blacks than among whites. For example, taking the weighted mean number of hospitalizations divided by the weighted mean number of people in the group yields a rate of PQI visits for all 20-49 year olds of 0.5 percent, whereas the

rate for blacks 20-49 is 1.2 percent. For Hispanics the corresponding rate is 0.44, slightly lower than that for the age group as a whole.

IV. Research Design and Methods

While some individuals have always wound up in foreclosure, the spike in foreclosures between 2006 and 2009 was due to loose lending standards and questionable banking practices rather than to changes in the health of individual homeowners. Moreover, while in hindsight many commentators have said that a crash was inevitable, the timing and severity of it were certainly a surprise to almost all observers (Mian and Sufi, 2010; Calomiris, Longhofer, and Miles, 2008; Demyanyk and Van Hemert, 2011). Hence, there is no reason to suppose that the vast majority of foreclosures were caused by health problems on the part of homeowners, and any relationship between the increase in foreclosures and increased health problems is likely to represent a relationship running from stress and foreclosure to health rather than vice versa.

There are several factors that assist us in identifying the relationship between foreclosures and health. First, there is substantial variation across zip codes and over time in the rate of foreclosure as illustrated in Figure 2. Second, while prolonged stress is thought to take a general toll on health (McEwen, 1998), some health conditions may be more immediately sensitive to stress than others. For example, stress has been linked to increased inflammation and depressed immune function. Stress is also closely linked to mental health problems such as depression and anxiety. Thus we might expect to see increases in these conditions relative to conditions such as cancer, which might take longer to develop.

Third, as discussed above, financial distress due to foreclosure could have both a direct effect on health, and an indirect effect through reductions in ability to pay for needed medications

and medical care. We are able to identify the latter effect by examining PQI visits. We also

compare people over 65, who have health insurance through the public Medicare program, to

those 50-64 who do not have public insurance, as discussed further below.

We estimate a series of models that relate changes in the number of hospitalizations or ER

visits to the number of foreclosures:

(1) $\qquad H_{zqt} = \alpha_0 + \alpha_1 \, F_{zqt\text{-}1} + \alpha_2 \, REO_{zqt\text{-}1} + \mu_z + \lambda_{cqt} + \varepsilon_{zqt},$

where H_{zqt} is one of our outcome measures such as the number of ER visits in zip code z in

quarter q in year t. The variable of interest in equation (1) is $F_{zqt\text{-}1}$, which represents the number of

foreclosures in the zip code last quarter. We also control for the number of REOs last quarter, which can be

thought of as capturing the cumulative impact of the foreclosure crisis. Indicators for each zip code, μ_z,

are included to control for any time-invariant zip code level factors that may be correlated with

both foreclosures and health. To adjust for correlations within a zip code, standard errors are

clustered at the zip code level. The unit of analysis in equation (1) is a zip code, quarter, and year.

The vector λ_{cqt} includes an indicator for each county, quarter, and year. Hence, the effect

of foreclosure is identified using the variation in foreclosures across zip codes within the same

county, quarter, and year. These indicators control for any time varying county level factors that

are correlated with both foreclosures and health. For example, they would serve as controls for

unemployment in a particular county, year, and quarter, as well as for seasonality in foreclosures

which may be different in different areas. To the extent that most local responses to the

foreclosure crisis are made at the county or state level rather than at the zip code level, these

fixed effects would also account for the changes in services that provide health services for the

needy. The vector ε_{zqt} represents an idiosyncratic random error term.

It is conceivable (and indeed likely) that unemployment varies at the zip code level within

counties, though official unemployment rates are not computed at the zip code level (and therefore no zip code level measure is available).   However, it is important to recall that while high levels of unemployment may be currently causing foreclosures (Schmidt, 2011), this was not the case during our sample period, when the main cause of foreclosure was questionable mortgage practices and the resulting collapse of the housing market. Also if unemployment is indeed associated with positive health outcomes, then any effect obtained here could be interpreted as a lower bound for the true effect of foreclosures on health.

Note that we have specified equation (1) in terms of levels. It might be more natural to think of specifying the equation in terms of rates; that is, the rate of hospitalization would be regressed on the rate of foreclosures. However, accurate data on population is only available at the zip code level from the decennial Census. If the measure of population used to construct the rates is a constant, then equation (1) is equivalent to a model specified in rates (since both sides would be divided by the same constant to get the rate).   Moreover, including the zip code fixed effect accounts for the fact that some zip codes are much larger than others, and we also weight using zip code population for the relevant demographic group in 2000.

Although we argued above that the sharp rise in foreclosures is not likely to have been caused by a decline in population health, the quarterly frequency of our data also reduces the probability of reverse causality from health to foreclosures.   Specifically, variations in health in a particular quarter are unlikely to impact foreclosures in the next quarter given that it takes time to be foreclosed.

As discussed above, we identified cancer as a "control" condition.   Stress related to foreclosures should not immediately cause cancer, though it is possible that it could, for example, increase infection rates among cancer victims.   Still, we expect a smaller impact of foreclosure

on ER visits and hospitalizations among cancer patients. Note that the effect could even be negative if patients choose to forego or postpone treatments due to financial constraints. Along the same lines, we expect that financial stress should not increase elective procedures, and could cause people to postpone or cancel them.

We also conduct separate analyses by age. An important consideration is that people 65 and over have health insurance through Medicare. Hence, financial constraints should not reduce their access to health care. However, if we find weak effects of foreclosure among the elderly, this might also be because they were less impacted by the foreclosure crisis. But there is little information available about which age groups are most likely to have suffered from the current foreclosure crisis. On the one hand, there is evidence that while overall levels of financial literacy are poor (e.g., Lusardi and Tufano, 2009), financial decision making usually improves with age (e.g. Agarwal et al., 2007) and older people are less likely to borrow on the equity in their homes (e.g., Duca and Kumar, 2010). On the other hand, there is also some evidence that senior citizens have been disproportionately targeted by lenders for predatory lending purposes (Government Accountability Office, 2004, Delgadillo, Erickson, and Piercy, 2008; Collins, 2009).

Cunningham and Capone (1990), and Anderson and VanderHoff (1999) find that foreclosure rates decrease with age, but these studies are based on data at least 20 years old. Ludy and Herlitz (2009) note that the largest increases in homeownership from 1995 to 2004 were among those between 20 and 44. Perhaps the most useful study is by Shelton (2008) who analyzed a random sample of 2.5 million persons from Experian, the credit rating agency. She finds that three quarters of foreclosures in the second half of 2007 were among homeowners less than 50. These figures suggest that the effects of foreclosure may be stronger among younger

individuals.

Hence, we examine individuals 20-49, 50-64, and 65 plus.   Arguably, the 50-64 year olds are more similar to the elderly in terms of the extent to which they were impacted by the foreclosure crisis, though they still differ in terms of access to Medicare. Thus, comparing these two groups may shed light on the effect of Medicare coverage in mitigating the effects of foreclosure.

Finally, we also estimate separate models by race.   Minority groups are thought to have been particularly hit hard by the foreclosure crisis. There is also some evidence that lending agencies have targeted low-income minority neighborhoods for riskier loans (Avery, Brevoort, and Canner, 2007; Bocian, Ernst, and Li, 2008; Squires, 2008). These groups may also have a more difficult time coping with the crisis as they usually have lower savings, poorer labor market prospects, and poorer baseline health than other groups.

V. Results

Table 4 provides an overview of our results for our three age groups.   Consistent with our expectations, foreclosure had little effect on hospitalizations for elective procedures as shown in the first column.

Foreclosures are estimated to have a large impact on visits for non-elective procedures. The impact in terms of numbers of visits is especially large among those 20-49, who are expected to have been most impacted by foreclosure. Comparing the 50-64 year olds with those over 65, we see much larger effects in the younger group. This comparison may suggest that the health effects of foreclosure are mitigated by access to health insurance under the Medicare program. However, even among those over 65, we still estimate that hospitalizations and ER

visits would increase by 1.2 percent with 100 additional foreclosures.

Turning to preventable hospitalizations, virtually all of the impact of foreclosures is on those less than 65. The sole exception is a small increase in hypertension among the elderly. It makes sense that among those with Medicare, foreclosure might have less impact on conditions that can be prevented by adequate care. Once again, the overall effect of foreclosure is larger for those 20-49 than those 50-64 in terms of numbers of visits, though in percentage terms the situation is reversed: Our estimates imply that an increase of 100 foreclosures would increase PQI visits among 50-64 year olds by 6.7 percent compared to a 4.9 percent increase among 20-49 year olds.

Table 5 shows estimates of the effects of foreclosure on mental health. There appears to be no impact on those aged 65 and over. However, there is a significant increase in all three types of mental health problems among those 20-49 and those 50-64. Specifically, an increase of 100 foreclosures would be associated with 12.0 percent (18.8 percent) more ER visits or hospitalizations related to anxiety among those 20-49 (50-64). We also find that such an increase in foreclosures would be associated with a large percentage effect on visits for suicide attempts, an increase of 38.5 percent (41.7 percent) for those 20-49 (50-64). But this finding should be interpreted with caution given the small numbers of visits for suicide attempts in our data. Given that not every person with a mental health crisis presents at an ER or hospital, it appears that the foreclosure crisis may be taking a heavy toll in terms of mental health.

Table 6 breaks the remaining non-elective visits down by CCS category, focusing on the most quantitatively important group of categories, and on cancer, which, as discussed above, can be viewed as a "control" category that should be less impacted by stress than some of the others. As expected, there is no impact of foreclosure on cancer visits.

One reason for looking at detailed categories of complaints is that some of the increase in the use of ER rooms and hospitals might reflect substitution away from private doctor's offices by people who, for example, have lost their health insurance or who can no longer afford copays. While this type of substitution would increase health care costs, it would not necessarily indicate that people were getting sicker. Hence, in addition to looking at those with Medicare (who have little reason to change types of providers in the event of foreclosure) it is useful to look at categories such as chest pain, heart attack, and stroke where someone would normally present at a hospital rather than in a doctor's office.

Table 6 shows first that there are some statistically significant effects of foreclosure among the elderly. Specifically, all but two of the point estimates are positive and those for malaise, skeletal problems, and eye and ear infections are statistically significant. In general, the effects are larger and more precisely estimated for the two younger age groups. For example, the estimates imply that ER visits and hospitalizations for malaise would rise by 2.4, 9.3 and 7.5 percent among those over 65, 50-64, and 20-49, respectively with an increase of 100 foreclosures.

Turning to chest pain, dysrhythmias etc. our estimates imply than an increase of 100 foreclosures in a zip code would result in an increase of 6.3 percent and 6.2 percent for those 50-64 and 20-49, respectively. The same type of calculation suggests that heart attacks and strokes rise by 2.4 percent among those 50-64. We do not see a significant effect on the incidence of these conditions among 20-49 year olds, but this is not surprising given the relatively small incidence of these conditions in this age group.

Remarkably, all of the statistically significant point estimates in Table 6 are positive. They suggest that foreclosure affects all of the conditions that we examine (except cancer)

among 50-64 year olds, and all but two conditions (heart attack/stroke and injuries) among 20-49 year olds.

Table 7 shows estimates comparable to those in Tables 4 and 5, but by race. Across groups, we see the same pattern, where foreclosure has a larger impact on those less than 65 than those above. Hispanic elderly are the only group over 65 who show significant effects, and these are largely concentrated on mental health.

The estimates for many conditions imply much larger than average percentage effects on African-Americans and especially Hispanics. For example, we estimate that an increase of 100 foreclosures would increase PQI visits among 20-49 year olds by 3.4 percent for blacks and 12.8 percent for Hispanics compared to an overall increase of 4.94 percent. For diabetes, the comparable figures for African-Americans, Hispanics, and all races are 4.8, 10.4, and 1.1 percent. We see a similar pattern for mental health conditions. For example, our estimates imply that among 20-49 year olds, an increase of 100 foreclosures would increase suicide attempts by 38.5 percent overall, by 57 percent among blacks, and by 61.2 percent among Hispanics.

Table 8 shows analyses similar to those in Table 6, by race. Once again, we find no significant effects of foreclosure on cancer, our control condition. As in Table 7, the other estimates generally imply larger effects for blacks and Hispanics. For example, overall, the estimates imply that 100 more foreclosures would be associated with a 2.4 percent increase in hospitalizations among those 50-64 for heart attack or stroke. However, the corresponding figure for blacks is 6.7 percent. For Hispanics, we do not find a significant effect for 50-64 year olds, but there is a statistically significant effect on heart attack and stroke among 20-49 year olds – our estimates imply that 100 foreclosures would increase visits for these conditions by 2.4

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percent. For chest pain, dysrhythmias, etc. the corresponding figures for 20-49 year olds are 6.2

percent overall, 5.9 percent for blacks, and 9.5 percent for Hispanics.

This analysis suggests that minorities really have been at double jeopardy in the

foreclosure crisis – both more likely to live in highly impacted zip codes, and more likely to

suffer ill health as a result of the crisis.

VI. Discussion and Conclusions

This study represents a first look at the question of whether the foreclosure crisis has been

making Americans sick. The results suggest that it is having negative consequences not only the

health of the U.S. economy, but also on the health of millions of individuals going through

foreclosure. We find that there are significant effects on mental health, preventable conditions,

and a wide range of conditions that are susceptible to stress. However, effects differ strongly by

race and by age. The results suggest that the foreclosure crisis is having its most harmful effects

on those younger than age 65 and on minorities, especially Hispanics. Taken together, these

results highlight an important implication of the foreclosure crisis that has not received much

attention from the policy-makers.

While our results point to detrimental effects of foreclosures on health, one may argue

that some individuals with mortgages that are under water may actually be better off reneging on

their loan obligations by letting the lender foreclose on their homes.[10] In this case, foreclosure

might be viewed as stress-relieving rather than stress inducing. The fact that we find

overwhelmingly negative health effects suggests however, that such individuals cannot be in the

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[10] This type of behavior is explained by an option-based theory of mortgage default, where the driving factor for default and the subsequent foreclosure is the value of the home relative to the value of the outstanding loan. Under this scenario, homeowners may be better off by ceding their homes to the lenders (U.S. Department of Housing and Urban Development, 2009).

majority among those suffering foreclosure.

Next steps in this research include the following analyses. First, we plan to incorporate zip code level quarterly data on housing prices from Zillow into our empirical model. Controlling for housing prices would further account for time-varying unobserved factors that may be correlated with both foreclosures and health. Second, we will include zip code level housing vacancy data from the Census Bureau to account for the potential negative externalities resulting from foreclosures at the neighborhood level. For example, vacancies may serve as a proxy for neighborhood disinvestment, lower property values, reduced local services, and crime that may negatively influence both the psychological and physical well-being of individuals living in these neighborhoods (e.g., Mallach, 2009; Schuetz, Been, and Gould, 2008; Immergluck and Smith, 2006b). Third, we will complement the foreclosure-morbidity analysis with an analysis of the relationship between foreclosures and mortality. To do this, we will assemble data on the number of mortalities at the county level from the National Center for Health Statistics (NCHS), which include a record of every death of a U.S. resident with the underlying cause of death. Fourth, we will estimate our models with the inclusion of an interaction between our foreclosure variables and the county unemployment rate. This would help us further disentangle the effect of foreclosure from any unemployment impact. Doing this would also allow us to assess the extent to which foreclosure impacts differ between high unemployment and low unemployment counties. Another way to find out more about the role of unemployment in driving our results is to limit the empirical analyses to periods when unemployment was either flat or decreasing for each state.   Fifth, we will estimate similar models for children. There is an increasing concern that foreclosures are having a harmful impact on the educational outcomes of children (Lovell and Issacs, 2008; Comey and Grosz,

2011). Therefore, it is natural to think that the crisis may also place the mental and physical

health of children at risk. Finally, we will attempt to quantify the dollar magnitude of these

effects both in terms of medical costs, and lost quality of life.

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Appendix: Aggregating CCS Single-Diagnosis Codes

We Exclude Induced abortion (178), Normal pregnancy and delivery (196), Live born (218), and Contraception, complications of pregnancy/abortion (codes 176-195).

1) Infectious Disease – codes 1-10
2) Cancer and Benign Neoplasms– codes 11-45, 46-47
3) Diabetes-codes 49,50
4) Other Endocrine/Metabolic disorders – codes 48, 51-58
5) Hematologic Disorders, disorders of veins -- codes 59-64, 188-121
6) Anxiety related Mental Health-codes 651, 657, 660-661
7) Suicide-code 662
8) All other mental health-codes 650, 652-656, 658, 659, 663, 670
9) Headache-code 84
10) Other Central Nervous System-codes 76-83, 85, 95
11) Eye and Ear-code 86-94
12) Heart Attack and Stroke-code 97, 100, 101, 103, 104, 107-117
13) Heart valve disorders, Nonspecific Chest Pain, Conduction Disorders, Dysrhthmias– code 96, 102, 105, 106
14) Hypertension – code 98, 99
15) Upper Resp. Infection (Pneumonia, Influenza, Tonsillitis, Bronchitis, Other)-code 122-126
16) Other Resp. excluding Asthma-code 127, 129-134
17) Asthma-code 128
18) Gastrointestinal including appendicitis-code 135-155
19) Kidney and Urinary Tract (including urinary tract infections)-code 156-163
20) Genital disorders (including inflammation and menstrual disorders)-code 164-175
21) Skin infections, inflammatory conditions, ulcers, other skin-code 197-200
22) Bone disease and musculoskeletal disease (including arthritis, lupus)-code 201-212
23) Injuries-code 225-244
24) Miscellaneous symptoms (including Fever of unknown origin, lymphadenitis, nausea, abdominal pain, malaise, allergic reactions)-code 245-253
25) Other (including rehabilitation care, social admissions, medical evaluation, unclassified)-code 254-259

See http://www.hcup-us.ahrq.gov/toolssoftware/ccs/AppendixASingleDX.txt for a complete list of CCS codes and their mapping into ICD codes.

Table 1: Zipcode Means by Rate of Foreclosure in 2009

	All	Top Fifth	Bottom Fifth
Number of foreclosures 2009	90.83	201.01	4.88
	(92.92)	(108.95)	(4.30)
Number of foreclosures 2005	6.89	13.35	1.29
	(10.75)	(15.59)	(1.86)
Foreclosure Rate 2009	0.0026	0.0060	0.0002
	(0.004)	(0.007)	(0.000)
Foreclosure Rate 2005	0.0002	0.0004	0.0001
	(0.0003)	(0.0005)	(0.0002)
Number REO 2009	44.38	103.67	2.56
	(49.44)	(61.99)	(2.34)
Number REO 2005	1.66	2.08	0.66
	(3.58)	(2.62)	(0.83)
REO Rate 2009	0.001	0.003	0.000
	(0.002)	(0.004)	(0.0002)
REO Rate 2005	0.00006	0.00008	0.00003
	(0.0001)	(0.0002)	(0.00007)
Number Hospitalizations & ER Visits 2009	3278.24	4013.94	1712.62
	(2067.45)	(2238.51)	(1454.10)
Number Hospitalizations and ER Visits 2005	2895.44	3418.81	1535.45
	(1797.42)	(1895.91)	(1289.34)
Total Hospitalization & ER Visit Rate 2009	0.096	0.115	0.071
	(0.045)	(0.056)	(0.044)
Total Hospitalization & ER Visit Rate 2005	0.084	0.097	0.064
	(0.037)	(0.040)	(0.044)
<u>Characteristics of Zip Code in 2000</u>			
Mean population	35536.39	36384.89	25044.93
	(19637.08)	(18697.43)	(17987.47)
Median Income	48013.64	43608.43	63899.84
	(18845.12)	(13504.4)	(26569.58)
Percent Black	0.097	0.111	0.059
	(0.147)	(0.147)	(0.094)
Percent Hispanic	0.323	0.343	0.108
	(0.233)	(0.180)	(0.143)
Percent Over 65	0.129	0.117	0.135
	(0.079)	(0.077)	(0.077)
Poverty Rate	0.131	0.140	0.089
	(0.089)	(0.082)	(0.104)

Notes: All rates are calculated using population from the 2000 U.S. Census. Characteristics of zip codes also come from the 2000 U.S. Census. Standard deviations in parentheses under the means. Sample: ER visits + All hospitalizations - elective procedures - newborns - deliveries. N=3,525 zip codes (ZCTAs).

Table 2: Number of Hospitalizations and ER Visits by Category, Age, and Foreclosure Rates

	All	Top fifth	Bottom fifth	20-49	50-64	65+
Visits for Elective Procedures	154.58	158.59	109.36	35.57	37.1	84.49
Preventable Visits	281.79	344.93	146.00	81.69	43.09	99.97
Diabetes	29.78	38.34	12.48	10.88	7.31	8.87
Hypertension	23.24	27.88	11.11	6.88	6.24	10.20
Asthma	50.85	64.50	22.89	17.70	5.47	5.13
Total Non-Elective (less childbirth)	3020.75	3637.57	1608.20	1227.05	405.55	647.78
Categories of Non-Elective Visits						
Infectious Disease	80.36	91.25	44.10	21.17	7.89	17.96
Cancer and Neoplasms	25.11	26.45	16.03	5.77	6.22	12.84
Other Endocrine Disorders (not Diabetes)	33.70	40.00	19.98	8.61	5.58	14.07
Hematologic and Vein	29.75	34.61	16.28	11.63	5.02	11.32
Anxiety	79.86	86.53	45.69	46.76	13.25	9.56
Suicide Attempt	0.87	1.19	0.26	0.52	0.12	0.05
Other Mental Health	37.25	41.19	16.56	19.48	5.77	7.29
Headache	61.52	78.38	27.02	40.13	8.62	5.04
Other Central Nervous System	64.69	81.93	29.06	28.92	10.56	12.41
Eye and Ear	121.67	149.82	54.40	35.77	12.07	15.57
Heart Attack and Stroke	105.45	115.64	70.66	12.57	24.38	75.59
Chest Pain, Dysrythmias, and Conduction Disorders	127.17	151.34	74.04	51.46	29.77	44.13
Upper Respiratory Infection (Includes Flu, Pneumonia)	228.72	295.94	95.84	62.39	14.81	27.03
Other Respiratory (not Asthma)	121.24	150.41	65.19	35.96	19.86	42.76
Gastrointestinal	241.29	288.08	127.59	97.77	34.47	57.58
UI Tract	126.87	154.11	66.94	53.82	18.87	39.39
Reproductive Disorders	54.60	71.34	23.13	36.76	3.55	3.74
Skin Infection	105.20	130.88	48.03	53.06	13.95	13.81
Skelatal Disorders (including Arthritis)	157.89	193.27	93.08	81.04	31.19	32.67
Injuries	640.76	741.89	402.87	258.37	74.49	118.06
Malaise (Fever, Nausea, Abdominal Pain, etc.)	275.50	336.31	139.02	108.22	28.75	42.01
Other	101.51	121.41	42.76	46.60	13.62	16.63
Number of zip code level obs.	66975	66975	66975	66975	66937	66823
Weighted average population in gro	35536	35536	35536	16635	4785	4937

Notes: Other includes rehabilitation, social admissions, admission for medical evaluation or screenings and unclassified. Means are for the entire sample. Top 1/5 and Bottom 1/5 refer to the top and bottom zip codes for foreclosure in 2009.

Table 3: Number of Hospitalizations and ER Visits by Category and Race

	Black 20-49	Black 50-64	Black 65+	Hispanic 20-49	Hispanic 50-64	Hispanic 65+
Visits for Elective Procedures	15.06	13.14	17.00	12.57	10.82	23.40
Preventable Visits	54.81	35.12	39.05	40.30	19.46	41.13
Diabetes	8.32	6.97	6.51	6.29	4.61	5.05
Hypertension	8.48	7.80	6.33	2.87	3.20	5.08
Asthma	15.47	6.01	2.74	7.77	2.42	2.35
Total Non-Elective (less childbirth)	690.84	247.60	202.81	579.81	166.65	229.02
Categories of Non-Elective Visits						
Infectious Disease	18.46	5.92	6.61	9.70	3.45	6.33
Cancer and Neoplasms	3.78	3.74	4.59	3.34	2.77	4.93
Other Endocrine Disorders (not Diabetes)	4.27	3.60	5.61	3.52	2.07	4.69
Hematologic and Vein	14.78	3.49	4.20	4.67	2.26	5.09
Anxiety	14.30	5.08	1.28	20.69	4.54	1.98
Suicide Attempt	0.20	0.05	0.00	0.15	0.02	0.01
Other Mental Health	11.59	4.17	1.92	8.61	2.41	1.99
Headache	20.82	5.12	2.05	18.42	3.83	2.10
Other Central Nervous System	15.64	7.21	4.93	12.92	3.85	3.91
Eye and Ear	20.61	6.94	4.70	18.40	6.30	6.68
Heart Attack and Stroke	8.95	16.58	25.67	4.66	9.28	27.43
Chest Pain, Dysrythmias, and Conduction Disorders	29.50	16.66	13.21	22.79	11.25	14.39
Upper Respiratory Infection (Includes Flu, Pneumonia)	42.03	10.32	7.18	28.43	6.24	9.86
Other Respiratory (not Asthma)	21.75	12.52	13.21	15.66	6.74	15.24
Gastrointestinal	46.99	17.40	16.83	51.70	16.49	23.90
UI Tract	25.65	8.48	12.58	28.32	8.97	15.34
Reproductive Disorders	30.22	2.68	1.43	18.95	2.14	1.74
Skin Infection	31.33	8.52	4.29	22.75	5.55	5.23
Skelatal Disorders (including Arthritis)	48.99	25.04	13.62	32.60	13.01	11.73
Injuries	117.39	36.38	23.58	106.94	25.16	31.12
Malaise (Fever, Nausea, Abdominal Pain, etc.)	53.43	15.41	13.17	54.02	13.00	15.58
Other	25.33	9.01	5.45	25.05	5.70	5.51
Number of zip code level obs.	61047	57513	53922	65797	64087	61541
Weighted avg. population in grou	4651	1605	1266	9240	10430	2190

Notes: Other includes rehabilitation, social admissions, admission for medical evaluation or screening and unclassified. Means are for the entire sample. Top 1/5 and Bottom 1/5 refer to he ttop and bottom zip codes for foreclosure in 2009.

Table 4: Effects of Foreclosures on Elective, Non-Elective, and Preventable (PQI) Visits

Age: 65+	Elective	Non-Elective	PQI	Diabetes	Hypertension	Asthma
Foreclosures	0.00742	0.0795***	0.00895	0.00196	0.00320*	0.00157
	(1.21)	(3.41)	(1.45)	(1.30)	(2.04)	(1.38)
REO	-0.00405	0.0654**	0.0108	0.00227	0.00137	0.00305*
	(-0.67)	(2.65)	(1.54)	(1.27)	(0.89)	(2.34)
Age: 50-64						
Foreclosures	0.00528	0.259***	0.0287***	0.00795***	0.00549***	0.00301*
	(1.72)	(10.72)	(7.11)	(5.88)	(4.64)	(2.14)
REO	0.00512	0.231***	0.0294***	0.00516**	0.00432***	0.00885**
	(1.59)	(7.10)	(4.19)	(3.19)	(3.36)	(3.20)
Age: 20-49						
Foreclosures	-0.00469	0.568***	0.0494***	0.00921***	0.00497***	0.00840***
	(-1.55)	(10.66)	(8.77)	(4.53)	(3.92)	(3.89)
REO	-0.00308	0.310***	0.0351***	0.00778***	0.00468*	0.00663*
	(-1.01)	(5.22)	(5.13)	(3.44)	(2.35)	(2.15)

Notes:

Standard errors are clustered at the zip code level. T-statistics shown in parentheses. A *, **, or *** indicates significance at the 95%, 99% of 99.9% levels, respectively.

All regressions control for zip code fixed effects and for county*quarter*year effects and are weighted using 2000 zip code population. in the demographic group.

Table 5: Effects of Foreclosure on Mental Health

Age: 65+	Anxiety	Suicide	Other Mental
Foreclosures	0.004	-0.0002	0.003
	(1.74)	(-1.51)	(1.49)
REO	0.002	0.0003*	0.002
	(1.11)	(2.02)	(1.47)
Age: 50-64			
Foreclosures	0.025***	0.0005*	0.009***
	(8.95)	(2.45)	(4.27)
REO	0.010***	0.0004*	0.009***
	(3.55)	(2.01)	(3.50)
Age: 20-49			
Foreclosures	0.056***	0.002***	0.024***
	(8.24)	(4.91)	(4.88)
REO	0.012*	0.0005	0.011
	(2.00)	(1.11)	(1.95)

Notes:

Standard errors are clustered at the zip code level. T-statistics shown in parentheses. A *, **, or *** indicates significance

at the 95%, 99% of 99.9% levels, respectively.

All regressions control for zip code fixed effects and for county*quarter*year effects and are weighted using 2000 zip code population.

in the demographic group.

Table 6: Effects of Foreclosure on Non-Elective Visits, by Category

Age: 65+	Cancer	Injuries	Malaise	Gastro-Intestinal	UI Tract	Skeletal	Eye and Ear	Heart Attack or Stroke	Chest pain, etc.	Upper Resp. Inf.	Other Respiratory
Foreclosures	0.00111	-0.00290	0.0101**	0.00462	0.00516	0.00677*	0.00382*	-0.000436	0.00236	0.00663	0.0120*
	(0.72)	(-0.39)	(3.19)	(1.29)	(1.74)	(2.49)	(1.99)	(-0.10)	(0.63)	(1.40)	(2.54)
REO	-0.00141	-0.00259	0.0105**	0.000142	0.00214	0.00183	0.00212	-0.00639	0.00330	0.0111*	0.0207***
	(-0.92)	(-0.47)	(2.61)	(0.04)	(0.64)	(0.66)	(0.98)	(-1.29)	(0.75)	(2.45)	(4.09)
Age: 50-64											
Foreclosures	0.000665	0.0238***	0.0267***	0.0184***	0.0133***	0.0231***	0.00539***	0.00592**	0.0188***	0.0191***	0.0148***
	(0.57)	(5.12)	(8.68)	(6.10)	(6.39)	(6.88)	(3.48)	(2.97)	(6.51)	(5.73)	(5.16)
REO	0.00135	0.0148*	0.0173***	0.0179***	0.00973***	0.0103**	0.0110***	-0.00312	0.0185***	0.0194***	0.0272***
	(0.97)	(2.07)	(4.18)	(5.64)	(3.32)	(2.58)	(5.31)	(-1.24)	(5.50)	(5.30)	(4.63)
Age: 20-49											
Foreclosures	0.000285	-0.0139	0.0811***	0.0534***	0.0273***	0.0335***	0.0192***	-0.000974	0.0317***	0.0977***	0.0273***
	(0.25)	(-0.99)	(9.91)	(8.47)	(5.46)	(5.48)	(7.11)	(-0.52)	(6.62)	(7.49)	(5.77)
REO	0.00204	-0.0438**	0.0410***	0.0147*	0.0115*	0.00309	0.00843**	-0.000308	0.0126**	0.0867***	0.0340***
	(1.65)	(-2.98)	(4.14)	(2.03)	(2.12)	(0.36)	(2.63)	(-0.14)	(2.66)	(4.96)	(4.37)

Notes:

Standard errors are clustered at the zip code level. T-statistics shown in parentheses. A *, **, or *** indicates significance
at the 95%, 99% of 99.9% levels, respectively.

All regressions control for zip code fixed effects and for county*quarter*year effects and are weighted using 2000 zip code population.
in the demographic group.

Table 7: Effects of Foreclosure by Race

	Elective	Non Elective	PQI	Diabetes	Hypertension	Asthma	Anxiety	Suicide	Other Mental
Black 65+									
Foreclosures	0.00107	-0.00104	-0.00192	0.00218	0.00138	-0.00307	0.00163	0.0000561	0.00297*
	(0.33)	(-0.04)	(-0.15)	(0.78)	(0.37)	(-1.31)	(1.79)	(1.55)	(2.39)
REO	-0.000548	0.0873***	0.00873	0.000263	0.00432	0.00207	-0.0000375	-0.0000365	0.00150
	(-0.10)	(3.87)	(1.08)	(0.12)	(1.37)	(0.97)	(-0.03)	(-1.28)	(0.81)
Black 50-64									
Foreclosures	0.00363	0.117**	0.0195**	0.00200	0.00738*	0.00426*	0.00685**	0.000170	0.00756***
	(1.45)	(3.03)	(2.99)	(1.11)	(2.40)	(2.18)	(3.09)	(0.67)	(3.46)
REO	0.00312	0.154***	0.00781	0.00304	0.00379	-0.00163	0.00985**	0.0000343	0.00679*
	(0.95)	(3.72)	(1.34)	(1.41)	(1.47)	(-0.63)	(2.85)	(0.18)	(1.97)
Black 20-49									
Foreclosures	0.00121	0.256***	0.0201**	0.00401*	0.00400	0.00508	0.0274***	0.00114**	0.0227***
	(0.43)	(3.75)	(2.93)	(2.05)	(1.93)	(1.72)	(4.76)	(2.78)	(3.76)
REO	0.00107	0.386***	0.0335***	0.00441	0.00704*	0.00942*	0.0203**	0.0000976	0.0153
	(0.32)	(4.35)	(3.43)	(1.67)	(2.51)	(2.34)	(2.90)	(0.25)	(1.70)
Hispanic 65+									
Foreclosures	-0.0296*	0.0631	-0.00122	0.000291	0.00300	0.000502	0.00990***	0.000163*	0.0125***
	(-2.54)	(0.84)	(-0.10)	(0.15)	(1.34)	(0.46)	(3.46)	(2.40)	(3.30)
REO	-0.0272*	-0.0116	-0.0107	-0.000809	-0.00226	0.000641	0.00117	-0.0000696	0.00699**
	(-2.15)	(-0.18)	(-0.70)	(-0.55)	(-0.56)	(0.47)	(1.14)	(-1.57)	(2.91)
Hispanic 50-64									
Foreclosures	-0.00750**	0.165***	0.0176***	0.00571***	0.00366***	0.00304***	0.0152***	0.000316**	0.00653**
	(-2.59)	(6.13)	(5.31)	(4.28)	(3.41)	(3.37)	(5.95)	(3.30)	(3.09)
REO	-0.00354	0.0966***	0.0124**	0.00442**	0.00146	0.00189	0.00377	-0.000143	0.00560***
	(-1.32)	(3.43)	(2.92)	(3.26)	(1.15)	(1.73)	(1.77)	(-1.61)	(3.60)
Hispanic 20-49									
Foreclosures	-0.00205	0.637***	0.0517***	0.00656**	0.00452***	0.00903***	0.0313***	0.000918**	0.0137***
	(-0.80)	(8.62)	(8.14)	(2.83)	(5.09)	(4.48)	(6.08)	(2.77)	(5.01)
REO	-0.00348	0.309***	0.0222***	0.00759***	0.00180	0.00402	0.00897	-0.0000658	0.000864
	(-1.67)	(3.80)	(3.35)	(3.50)	(1.61)	(1.48)	(1.73)	(-0.19)	(0.31)

Notes: Only zip codes for CA, NJ and FL are included.

Standard errors are clustered at the zip code level. T-statistics shown in parentheses. A *, **, or *** indicates significance

at the 95%, 99% of 99.9% levels, respectively.

All regressions control for zip code fixed effects and for county*quarter*year effects and are weighted using 2000 zip code population.

in the demographic group.

Table 8: Effects on Visits by Type and African-American or Hispanic

	Cancer	Injuries	Malaise	Gastro-Intestinal	UI Tract	Skeletal	Eye and Ear	Heart Attack or Stroke	Chest pain, etc.	Upper Resp. Inf.	Other Respiratory
Black 65+											
Foreclosures	0.000559	-0.00116	-0.00124	0.00668*	0.00227	-0.00298	-0.00292	0.000845	0.000561	-0.00280	-0.00586*
	(0.30)	(-0.29)	(-0.39)	(2.12)	(0.74)	(-0.50)	(-1.94)	(0.13)	(0.19)	(-0.81)	(-2.10)
REO	-0.00106	0.0130*	0.00746*	0.000682	0.00268	0.0109*	0.00629**	0.000292	0.00575	0.00213	0.0129***
	(-0.50)	(2.52)	(2.28)	(0.24)	(0.71)	(2.12)	(4.10)	(0.06)	(1.79)	(0.49)	(4.23)
Black 50-64											
Foreclosures	0.00152	0.0109*	0.00955*	0.00765*	0.00465	0.00945	0.00398*	0.0111**	0.00578	0.00796	0.0125**
	(1.55)	(2.00)	(2.19)	(2.23)	(1.67)	(1.95)	(2.45)	(2.94)	(0.97)	(1.91)	(2.74)
REO	0.0000422	0.0124	0.0124**	0.0120**	0.00809**	0.0131*	0.00632**	-0.00631	0.0203***	0.00689	0.00994*
	(0.03)	(1.76)	(2.91)	(2.79)	(2.61)	(1.96)	(3.17)	(-1.90)	(4.45)	(1.51)	(2.20)
Black 20-49											
Foreclosures	0.000148	0.00983	0.0377***	0.0259***	0.0127**	0.00576	0.00714*	0.00213	0.0174**	0.0235**	0.00952**
	(0.09)	(0.69)	(4.59)	(3.63)	(2.63)	(0.79)	(2.27)	(1.00)	(3.14)	(2.78)	(2.59)
REO	0.000308	0.0233	0.0379***	0.0133	0.0135*	0.0176**	0.00948**	-0.00329	0.0137**	0.0472***	0.0194***
	(0.22)	(1.43)	(3.48)	(1.72)	(2.52)	(2.60)	(2.91)	(-1.39)	(2.77)	(4.37)	(3.62)
Hispanic 65+											
Foreclosures	0.000500	0.0205	0.00958	0.00390	0.00646	0.00904	0.00157	-0.0180	-0.00222	0.000796	0.00340
	(0.27)	(1.83)	(1.13)	(0.44)	(1.45)	(1.80)	(0.69)	(-1.67)	(-0.47)	(0.17)	(0.55)
REO	-0.000928	0.00285	-0.000495	-0.0120	-0.00334	0.00312	0.00334	0.0000287	-0.00736	0.00361	-0.00344
	(-0.53)	(0.31)	(-0.10)	(-1.04)	(-0.62)	(0.96)	(1.56)	(0.00)	(-1.22)	(0.97)	(-0.44)
Hispanic 50-64											
Foreclosures	0.00106	0.0125**	0.0207***	0.0103***	0.0106***	0.0161***	0.00953**	0.0000252	0.00617*	0.0146***	0.00909***
	(0.99)	(2.80)	(5.45)	(3.74)	(3.50)	(4.99)	(5.20)	(0.01)	(2.01)	(6.33)	(4.43)
REO	0.00138	0.00723	0.00776	0.00430	0.00781*	0.00645*	0.00362*	0.0000404	0.00554	0.00960***	0.00703**
	(1.03)	(1.62)	(1.90)	(1.14)	(2.13)	(1.99)	(2.01)	(0.02)	(1.96)	(3.75)	(2.86)
Hispanic 20-49											
Foreclosures	0.00140	0.0347*	0.0779***	0.0436***	0.0348***	0.0208***	0.0208***	0.00225*	0.0217***	0.0938***	0.0280***
	(1.39)	(2.45)	(7.84)	(6.19)	(5.69)	(5.53)	(5.53)	(2.03)	(5.09)	(8.05)	(6.46)
REO	0.000662	0.0296	0.0334**	0.0286***	0.0114	0.0155***	0.0155***	0.000817	0.0172***	0.0402**	0.0227***
	(0.63)	(1.79)	(3.14)	(3.83)	(1.84)	(4.01)	(4.01)	(0.65)	(3.70)	(3.26)	(4.74)

Notes: Only zip codes for CA, NJ and FL are included.

Standard errors are clustered at the zip code level. T-statistics shown in parentheses. A *, **, or *** indicates significance at the 95%, 99% of 99.9% levels, respectively.

All regressions control for zip code fixed effects and for county*quarter*year effects and are weighted using 2000 zip code population. in the demographic group.

Figure 1: Change in Rates of Foreclosure in New Jersey, 2005-2009

Legend

- -0.015748 - 0.000046
- 0.000047 - 0.000143
- 0.000144 - 0.000263
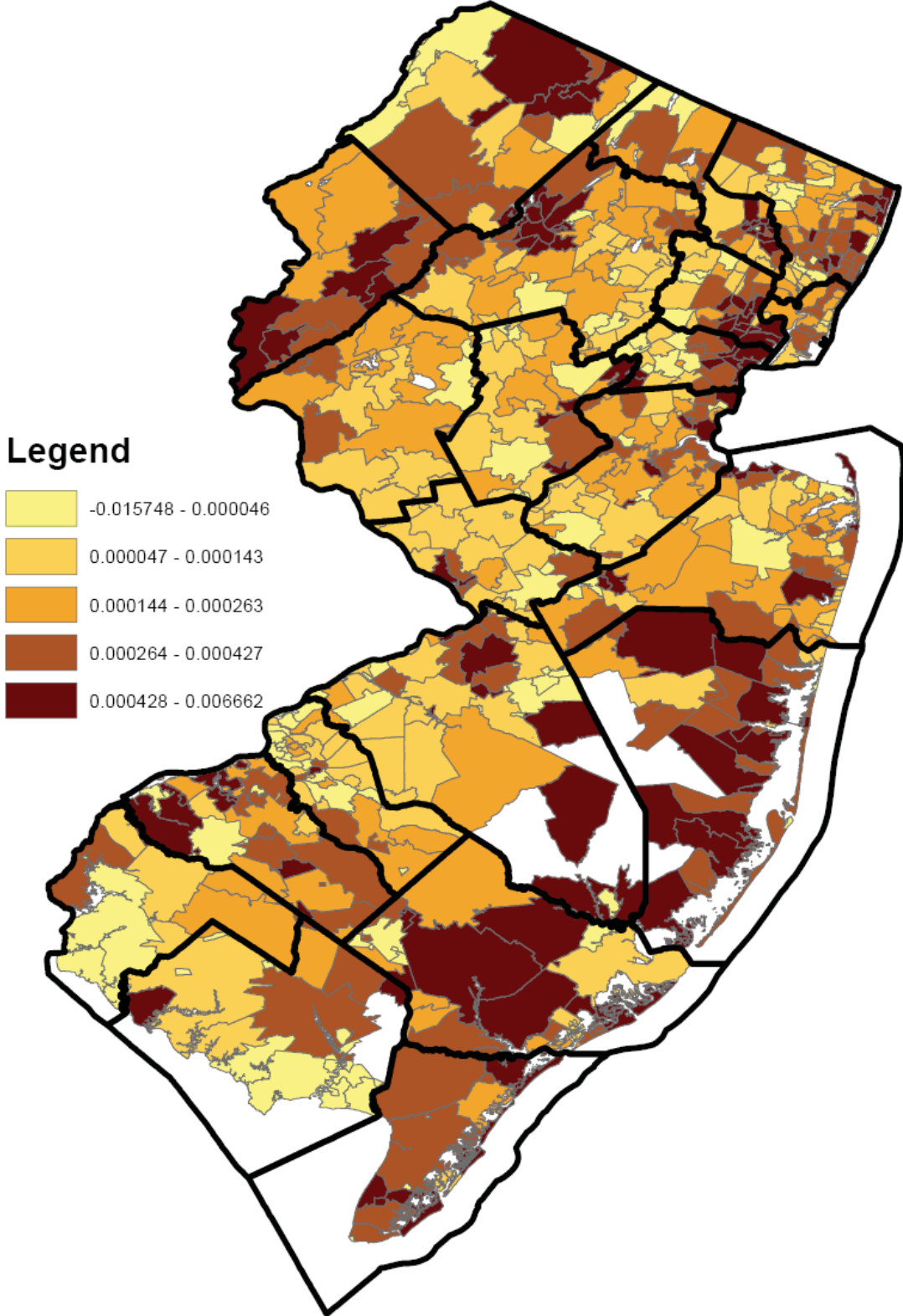- 0.000264 - 0.000427
- 0.000428 - 0.006662

Figure 2: Change in Rates of Hospitalization and ER Visits in New Jersey, 2005-2009

Legend

- -0.195432 - -0.003557
- -0.003556 - 0.000396
- 0.000397 - 0.003321
- 0.003322 - 0.008502
- 0.008503 - 0.457471