Foreclosures, House Prices, and the Real Economy*

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Abstract

Foreclosures during the 2007 to 2009 recession had a large negative effect on house prices, residential investment, and durable consumption. Our empirical methodology uses state laws requiring a judicial foreclosure as an instrument for actual foreclosures, as well as focusing on zip codes very close to state borders with differing foreclosure laws. We show that the likely channel for the house price effect is a large foreclosure-induced increase in the supply of houses on the market. Our findings are consistent with macroeconomic models in which the leverage-induced forced sale of assets amplifies negative shocks and reduces economic activity.

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An extensive body of research postulates that a levered economy is subject to large swings in economic activity (e.g., Fisher (1933)). One of the key mechanisms through which leverage is believed to amplify shocks is negative price effects from the leverage-induced forced sale of durable goods (e.g., Shleifer and Vishny (1992), Kiyotaki and Moore (1997), Krishnamurthy (2003, 2009), and Lorenzoni (2008)). This amplification can occur through a variety of channels including reduction in collateral value, balance sheet weakness, or negative wealth effects. But the central conclusions are clear: first, the forced sale of durable goods can have negative price effects and, second, these negative price effects can lead to a significant decline in real economic activity.

We examine this idea in the context of the recent rise in foreclosures. The top left panel of Figure 1 shows that aggregate foreclosure filings in the U.S. increased from 500,000 in 2006 to more than 2 million in 2010. While we do not have data on foreclosures before 2006, the mortgage default rate increased above 10% in 2009, which is more than twice as high as any year since 1991. By any standard, the recent U.S. mortgage default and foreclosure crisis is of unprecedented historical magnitude.

The sharp rise in foreclosures accompanied large drops in house prices, residential investment, and durable consumption. As the top right panel of Figure 1 shows, nominal house prices fell 35% from 2005 to 2009. The drop in residential investment from 2005 to 2009 shown in the bottom left was larger than any drop experienced in the post World War II era. The drop in durable consumption is also large, but more comparable to recent recessions. While durable consumption and residential investment are small components of overall GDP, they are especially important in understanding macroeconomic fluctuations (Leamer (2007)).

This paper evaluates the effect of the recent foreclosure crisis on house prices, and then examines the amplification effect by estimating how foreclosures affect residential investment and durable consumption. We utilize a county and zip level data set covering the entire United States until the end of 2010 with information on a number of variables of interest including house prices, residential investment, auto sales, mortgage delinquencies, and foreclosures.

A strategy to estimate the effect of foreclosures on house prices is confounded by concerns of unobserved shocks and reverse causality. For example, an unobservable negative shock can drive down house prices and increase foreclosures at the same time. Further, reverse causality is a major concern given that a necessary condition for foreclosure is that a borrower have negative equity (Deng, et al (2000), Bajari, et al (2008)). Consequently, foreclosures and house prices will be strongly negatively correlated in the data, even if foreclosures have no independent effect on house prices. An empirical strategy seeking to estimate the effects of foreclosures on house prices must employ plausibly exogenous variation in foreclosures.

Our strategy relies on variation in foreclosures that is driven by state rules on whether a foreclosure must take place through the courts (a *judicial foreclosure*). In states that require a judicial foreclosure, a lender must sue a borrower in court before conducting an auction to sell the property. In states without this requirement, lenders have the right to sell the house after providing only a notice of sale to the borrower (a *non-judicial foreclosure*). As first highlighted in the economics literature by Pence (2006), the 21 states that require judicial foreclosure impose substantial costs and time on lenders seeking to foreclose on a house.

We begin by showing that there is indeed a very strong negative correlation between actual foreclosures and whether a state requires a judicial foreclosure. States that require judicial foreclosure have a rate of foreclosures per homeowner during 2008 and 2009 that is 2.4

percentage points lower than states without, which translates to a 2/3 standard deviation and is more than half of the mean (3.7% homeowners in foreclosure). Using data on mortgage delinquencies, we show that states with judicial requirements have a much lower ratio of foreclosures to delinquent accounts. In fact of the 13 states with the highest propensity to convert delinquent homes into foreclosure sales, *none* require judicial foreclosure, and only 1 of the top 22 states require judicial foreclosure.

While judicial requirement strongly predicts the foreclosure rate, it can only be a legitimate instrument for foreclosures if it is *not* correlated with other factors that may have contributed to the severity of a recession in a state. We show that states with a judicial foreclosure requirement are remarkably similar to other states in all attributes of interest except the propensity to foreclose. For example, as of 2000 states that do and do not require judicial foreclosure display no difference in the fraction of subprime borrowers, the fraction of lower income residents, the unemployment rate, the minority share of the population, and the fraction of the residents living in urban areas. Similarly, there is no evidence of differential house price growth between 2000 and 2005, and no difference in mortgage delinquency rates during the mortgage default crisis. While delinquencies are similar across states, the rate at which delinquencies progress into foreclosures is substantially lower in judicial requirement states.

Perhaps the most obvious difference one would expect between states that do and do not require a judicial foreclosure is credit supply during the housing boom (Pence (2006)). While we find evidence that loan size and loan to income ratios were higher in non-judicial states during the mid-1990s, the difference completely disappears from the late 1990s onwards. There is no evidence of higher credit supply to non-judicial states during the housing boom of the 2000s.[1]

[1] We discuss potential reasons why ex ante credit supply shows no major differences in Section III.

Using state laws requiring judicial foreclosure as an instrument for foreclosures, we estimate the effect of foreclosures on house prices. We find a large effect. Our state-level baseline estimate suggests that a one standard deviation increase in foreclosures in 2008 and 2009 leads to 1/2 standard deviation lower house price growth over the same period. Alternatively, moving from the median to the 90th percentile of the foreclosure per homeowner distribution leads to 8% lower house price growth from 2007 to 2009.

Our estimate of the effect of foreclosures on house price growth is robust to extensive controls for demographics and income differences across states. All specifications explicitly control for the effect of mortgage delinquencies on house prices. In other words, our estimate captures the incremental price effect of foreclosures above and beyond delinquencies. In addition, the effect is similar when we conduct the analysis at the MSA-level and is robust to the use of either the Fiserv Case Shiller Weiss or Zillow.com house price indices.

As an additional test, we focus on zip codes near the border of two states that differ in foreclosure laws. Consistent with the state level correlations, there is a sharp, discontinuous increase in the foreclosure rate as one crosses the border from a judicial requirement state into a state with no judicial requirement. There is no similar jump in other observable variables as one crosses the border. In terms of house price growth, it is likely that the sharp discontinuity in foreclosures would be smoothed across state borders given that house buyers may be locally indifferent between properties on either side of the border. We find that house price growth drops in a judicial state as one approaches the border, but there remains a sharp drop when one crosses the border into the state with no judicial requirement. Further, house price growth continues to decline as one goes further into the non-judicial state. We find similar two-stage least squares

estimates of the effect of foreclosures on house prices when focusing on these zip codes, which helps mitigate concerns that omitted variables drive the state and CBSA level results.

We also provide evidence regarding the channel through which foreclosures affect house prices. Using zip code level data on the number of new listings of homes for sale, we show a sharp discontinuous increase in the number of homes for sale as one enters a non-judicial state from a judicial state. The two-stage least squares estimates suggest that a one standard deviation increase in foreclosures leads to a full standard deviation increase in listings. We conduct a back of the envelope calculation which suggests that the foreclosure-induced increase in supply of housing can plausibly explain all of the lower house price growth in non-judicial states.

We then turn to residential investment and durable consumption. Employing a similar two stage least squares estimation strategy, we find that a one standard deviation increase in foreclosures per homeowner leads to a 1/2 to 2/3 standard deviation decrease in permits for new residential construction. Further, a one standard deviation increase in foreclosures leads to a 2/3 to 1 standard deviation decline in auto sales.[2]

We use our microeconomic estimates to quantify the aggregate effects of foreclosure on the macro-economy. From 2007 to 2009, our estimates suggest that foreclosures were responsible for 20 to 30% of the decline in house prices, 15 to 25% of the decline in residential investment, and 20 to 35% of the decline in auto sales over the same period. The details of this calculation are in Section V.

It is important to emphasize that we do not take a stand on whether foreclosures help to bring house prices, durable consumption, or residential investment closer to or further from their-

[2] We conduct a number of robustness tests for these results. As a placebo test, we show that non-judicial states did not experience a relative decline in durable consumption or residential investment during the 2001 recession when foreclosures were negligible. We also show that our results are similar if we exclude Arizona and Nevada, the two states with the highest foreclosure rates. Further, our results are similar if we change the classification of some states--particularly Massachusetts--based on the legal filing requirement for a foreclosure. See Section VI.

long-run socially efficient levels. For example, in the absence of foreclosures, house prices may display downward rigidity given loss aversion (Genesove and Mayer (2001)). Alternatively, house prices may be kept above their socially efficient level by government support. Further, it is conceivable that the declines we document would occur in the long run even in the absence of foreclosures; it is also conceivable that states where foreclosure is easy will experience a faster housing recovery. But our estimates suggest that foreclosures lead to more abrupt declines in these outcomes than would be observed in the absence of foreclosures, and these declines are likely to be more painful in the midst of a severe recession. This is consistent with the amplification mechanisms emphasized in Kiyotaki and Moore (1997) and Krishnamurthy (2003).

Our findings are most closely related to recent studies on foreclosures and house prices (Calomiris, et al (2011), Campbell, et al (2010), Foote, et al (2008), Hartley (2010a)). One advantage of our study relative to the existing literature is comprehensiveness: our analysis covers the entire United States as opposed to one state or one city and we examine foreclosures all the way through the end of 2010.[3] Relative to these studies, we are the first to examine the effect of foreclosures on real economic activity.

We are also the first to use state laws on judicial requirement for foreclosure to identify the effect of foreclosures on house prices. The importance of an instrument for foreclosures is mentioned prominently in the literature.[4] Further, our results show the powerful effect of the legal environment on foreclosure incidence, a fact that is important to know for those designing laws related to household defaults.

[3] One important disadvantage is that many of these studies have individual level data on foreclosures and house prices, whereas we have only zip code level data.

[4] As Campbell, et al (2010) note, "…foreclosures are endogenous to house prices because homeowners are more likely to default if they have negative equity, which is more likely as house prices fall. Ideally, we would like an instrument that influences foreclosures but that does not influence house price except through foreclosures; however, we have not been able to find such an instrument" (15). We find that the unconditional OLS estimate of the effect of foreclosures on house prices is 50% larger than 2SLS estimate.

The paper is organized as follows. In the next section, we discuss the data and summary statistics. Section II presents the main suggestive correlations and Section III discusses identification and the empirical strategy we employ. Sections IV and V present and discuss our main empirical results on house prices, residential investment, and durable consumption. Section VI provides robustness tests, and Section VII concludes.

I. Data and Summary Statistics

A. Data

We use data from a number of sources. Foreclosure data from RealtyTrac.com, one of the leading foreclosure listing websites, are available to us at the zip code level at annual frequency for 2006 through 2010. RealtyTrac.com collects data from legal documents that are submitted by lenders during the foreclosure process. There are five types of filings collected by RealtyTrac.com. The first two are filings that are done before a foreclosure auction: a notice of default (NOD) and a *lis pendens* (LIS). Two of the filings are directly associated with a foreclosure auction: a notice of trustee sale (NTS) and a notice of foreclosure sale (NFS). Finally, RealtyTrac.com collects information on whether the foreclosed home is purchased by the lender at auction, or real-estate owned (REO).

For every zip code, we have the total number of filings for each of these five categories. To avoid double-counting filings for the same property, RealtyTrac.com provided us totals for the last filing in the process for a given property in a given year. For example, if a borrower received a notice of default and a notice of trustee sale in the same year, RealtyTrac.com records one notice of trustee sale for the property. Our measure of total foreclosures in a zip code is the

total number of notices of trustee sale, foreclosure sales, or real estate owned (NTS+NFS+REO).[5]

Data on house prices at the zip code-quarter level are from Fiserv Case Shiller Weiss and Zillow.com. An excellent description of the differences and similarities between FCSW and Zillow.com is available in the appendix of Guerrieri, et al (2010). New residential permit data is from the Census and is available at the county-annual level. Auto sales data are from R.L. Polk and are available at the county-monthly frequency. For more information on the R.L. Polk data, see Mian and Sufi (2010).

We supplement foreclosure, house price, residential investment, and auto sales data with zip code-quarterly level information on delinquencies from Equifax.[6] The Equifax data also allow us to measure at the zip code level the fraction of borrowers that had credit scores below 660 as of 2000. Finally, we supplement the zip code level data with demographic information from the 2000 Decennial Census.

Given the availability of variables at different levels of geographic aggregation, we construct final data sets at the state, CBSA, and zip code level. The underlying zip code level data covers approximately 31,000 zip codes, which represent the entire United States. Zip codes are matched to states, counties, and CBSAs using a data set from zip-codes.com.

The main restriction on the data is the availability of zip code house price indices. Zillow.com zip code level house price data are available for 8,900 zip codes in our sample, and FCSW house price data are available for 4,199 zip codes. Zip code level data are available from one of these two sources for 9,213 zip codes. These zip codes represent 65% of the total U.S. population, 81% of total home-related debt as of 2005, and 83% of total foreclosures in 2008 and

[5] We are grateful to Tyler White for providing us with information on the foreclosure data from RealtyTrac.com. Readers interested in acquiring the foreclosure data should contact tyler.white@realtytrac.com.
[6] See Mian and Sufi (2009) and Mian, Sufi and Trebbi (2010) for more information on the Equifax data.

2009. By far the largest observable difference between zip codes for which we do and do not have data is whether the zip code is in an urban area. Almost 80% of zip codes for which we have house price data available are in urban areas; only 19% of zip codes for which we do not have house price data are in urban areas.

B. Summary Statistics

The top panel of Table 1 presents summary statistics of the state level data used in the analysis. The average number of foreclosures per homeowner in 2008 and 2009 is 0.037. The number of homeowners is approximated using the number of mortgage accounts as of 2005 according to Equifax. The number of 60 days past due delinquent mortgage or home equity accounts per homeowners is 0.095, which implies an average pass-through from delinquency to foreclosure close to 40%.

Data on house prices and residential investment show the dramatic turn of events starting in 2006 and 2007. From 2007 to 2009, house prices dropped by 10 to 20% depending on the data source. Residential investment at the state level dropped by 80% as measured by the Census data on permits for new residential construction. Auto sales dropped by 41%.

Table 1 also presents summary statistics at the CBSA level. The patterns in foreclosures, delinquencies, house price growth, residential investment growth, and auto sales growth are similar. Table 1 also contains information on other important variables, including the increase in the debt to income ratio from 2002 to 2005, the fraction of consumers that were subprime borrowers as of 2000, and the unemployment rate as of 2000.

II. Correlations

A crucial insight from previous research is that house price declines are a necessary condition for foreclosures. If a homeowner owns a house with positive equity but faces

significant liquidity constraints in making mortgage payments, she can either refinance to loosen the constraint or sell the home to liquefy the positive equity position. However, she will not allow for the bank to foreclose if she has positive equity (Deng, et al (2000), Bajari, et al (2008)). As a result, foreclosures and house price growth will be mechanically negatively correlated.

The results in Table 2 confirm this mechanical correlation. In columns 1 and 2, we report estimates form an OLS specification of house price growth from 2007 to 2009 on foreclosures in 2008 and 2009. Even after controlling for mortgage delinquencies, there is a strong negative correlation. The coefficient estimate in column 1 of Panel A implies that a one standard deviation increase in foreclosures is associated with 4% lower house price growth. The magnitude is similar using the FCSW data. In column 2 we regress house price growth on foreclosures per delinquent account. The estimate implies that a one standard deviation increase in foreclosures per delinquent account (0.18) is associated with 6% lower house price growth, which is about half a standard deviation.

Columns 3 and 4 report CBSA-level regression specifications of house price growth on foreclosures with state fixed effects. In columns 5 and 6, we examine the correlation at the zip code level with the inclusion of CBSA fixed effects. In all specifications, house price growth is strongly negatively correlated with house price growth. In terms of magnitudes, the coefficients for the within state and within CBSA regressions are smaller than the cross-state specification. But distributional effects are similar.[7] In Appendix Figure 1, we show the state-level scatter plot of foreclosures and house prices that corresponds to the results in Table 2.

The results in Table 2 confirm a strong negative correlation between foreclosures and house price growth. It is difficult, however, to infer the direction of causality. Given that a

[7] The distributional effects are similar because the within-state and within-CBSA foreclosure variation is a larger portion of the overall variation relative to house prices. For example, a one within-CBSA SD increase in foreclosures (0.065) is associated with a third of a within-CBSA SD decline in house prices (0.065*0.33/0.07).

borrower must have negative equity in order to allow a foreclosure to occur, it would be shocking if there were anything but a strong negative correlation. An analysis seeking to estimate the effect of foreclosures on house prices must utilize plausibly exogenous variation foreclosures. We discuss our strategy in the next section.

III. Empirical Strategy

We utilize state laws that require judicial foreclosures as an instrumental variable for actual foreclosures.[8] In this section, we first provide background on judicial foreclosures and then provide evidence on the legitimacy of the identification strategy.

A. Judicial Foreclosure Requirement as an Instrument

A foreclosure represents a forced sale of a property by a lender with the purpose of reimbursing the lender for the debt outstanding against the property. The process by which the lender executes the sale differs across states. One of the most important differences is whether a state requires that the sale be implemented through the courts. In states that require a judicial foreclosure, lenders must file a notice with a judge providing evidence regarding the amount of the debt, the delinquency of the debt, and why the delinquency should allow the lender to sell the property. This filing is typically called a *lis pendens*. The borrower is notified of the filing and has a chance to respond. If the court finds that the lender is accurate in their claim, a property will move to the auction stage of the process.

In a *non-judicial foreclosure*, the lender does not need court approval to auction a property. Lenders use rights that they have obtained in the original mortgage document allowing sale of the property if the borrower is delinquent on the account. In a non-judicial foreclosure, a lender sends a *notice of default* to the borrower, and the notice is typically also filed with the

[8] General information on the foreclosure process presented in this section comes from Pence (2003, 2006), http://www.all-foreclosure.com/judicial.htm, http://en.wikipedia.org/wiki/Foreclosure, and http://www.calculatedriskblog.com/2007/04/foreclosure-sales-and-reo-for-ubernerds.html.

jurisdiction authority (i.e., county, municipality, etc.). If the borrower fails to pay the debt or dispute the notice, a *notice of sale* is subsequently filed which begins the auction process.

A large body of evidence suggests that costs to lenders are substantially higher for judicial versus non-judicial foreclosures (Wood (1997), Ciochetti (1997), Pence (2003), Pennington-Cross (2004)). Websites covering the mechanics of foreclosure frequently cite that judicial foreclosures are expensive for lenders. For example, on calculatedriskblog.com, one of the main bloggers writes: "Non-judicial foreclosure is almost always faster and cheaper for the lender than a judicial foreclosure."[9] The October 2010 announced foreclosure moratorium by JPMorgan-Chase, GMAC, and Bank of America highlights the costs to lender in states that require judicial foreclosure. Given problems with the verification of documents, these servicers stopped all foreclosure activity in states that require judicial foreclosure.[10]

Figure 2 shows states that require judicial foreclosure shaded in dark gray. The classification of states comes from RealtyTrac.com. Figure 2 shows that while the majority of states that require judicial foreclosure are located in the upper Midwest and Northeast, there is geographical variation outside this area.

There is a certain degree of subjectivity in the classification of state laws requiring judicial approval for a foreclosure. We follow RealtyTrac for the following reasons. First, the information from RealtyTrac is publicly available, concrete, and justified--we have no ability to manipulate the classification and other researchers can examine the precise reasons for the classification at RealtyTrac's website.[11] Second, RealtyTrac specializes in the collection of legal filings on foreclosures and our data on foreclosures are from RealtyTrac; it is therefore natural to use their classification of foreclosure laws. Third, using alternative sources for the classification

[9] http://www.calculatedriskblog.com/2007/04/foreclosure-sales-and-reo-for-ubernerds.html
[10] See http://www.nytimes.com/2010/10/08/business/08frozen.html .
[11] See http://www.realtytrac.com/foreclosure-laws/foreclosure-laws-comparison.asp.

of states (for example, Pence (2006) or all-foreclosure.com) leads to a weaker correlation between foreclosure propensity and judicial foreclosure requirement. This is evidence that the RealtyTrac classification is more accurate in predicting the difficulty in foreclosing.[12]

One particular set of zip codes that we focus on in the empirical analysis includes those that are close to the border of two states that differ in whether judicial foreclosures are required. To form this sample, we restrict the sample to zip codes that meet the following three restrictions: (1) the zip code must have available house price data from FCSW, (2) there must be zip codes across the nearest state border that also have house price data available, and (3) the state that is across the border must have a different law regarding judicial foreclosures.

Table 3 lists the state borders that are included in the border analysis, along with the number of zip codes within 25 and 10 miles of the border. One disadvantage of the border sample that is obvious from Table 3 is that none of the states with the largest incidence of foreclosures are included (i.e., Arizona, California, Florida, and Nevada).

B. Two-Stage Least Squares Specification

Our estimation of the effect of foreclosures on house prices, residential investment and durable consumption is based on a two stage least squares specification of the following form:

$$Ln(Y2009_{gs}) - Ln(Y2007_{gs}) = \alpha + \beta * \widehat{Foreclosures}0809_{gs} + \Gamma * X_{gs} + \varepsilon_{gs} \quad (1)$$

$$Foreclosures0809_{gs} = \pi + \theta * JudicialForeclosureRequirement_{s} + \Lambda * X_{gs} + \eta_{gs} \quad (2)$$

Equation (2) represents the first stage. We regress foreclosures in 2008 and 2009 scaled by the number of homeowners as of 2005 in geographical unit *g* (which can be a state or CBSA) on an indicator variable for whether the geographical unit is in a state *s* that requires judicial foreclosure. If the level of analysis is the state level then the *g* subscript is redundant. The second

[12] We address issues related to the potential misclassification of states in both Section VI and the appendix.

stage in equation (1) regresses the growth rate in outcome Y in geographical unit g from the end of 2007 to the end of 2009 on the predicted value of foreclosures from the first stage. Outcomes include house prices, residential investment, and auto sales. Control variables are in the matrix X.

The specification outlined in (1) and (2) treats the variation in foreclosures induced by differences in state laws on judicial foreclosure as random, and uses this random variation to examine house prices, residential investment, and durable consumption. One obvious drawback from this approach is that we cannot back out the structural parameters of the full system of equations where each of these three outcome variables (house prices, residential investment, and durable consumption) is allowed to affect one another. In other words, if foreclosures lead to a reduction in residential investment in the two-stage least squares specification, we cannot discern whether foreclosures directly affect residential investment, or whether foreclosures indirectly affect residential investment through their effect on prices. Nonetheless, under the identifying assumptions, we are able to use the specification to estimate the overall effect of foreclosures on each of these outcomes.

A consistent estimate of the coefficient β requires two conditions. First, whether a state requires judicial foreclosure must be correlated with the actual incidence of foreclosures. Second, the exclusion restriction must be met. The instrument must be uncorrelated with the error term in the underlying relation between the outcome of interest and foreclosures. The next two subsections discuss each of these two conditions.

C. Judicial Foreclosure Requirement and Actual Foreclosures

The evidence strongly supports the argument that foreclosures are less likely in states that require judicial foreclosure. Table 4 presents regressions of foreclosures on an indicator variable for whether the state requires judicial foreclosure, which is a specific version of the first stage

shown above in equation (2). As column 1 shows, states with a judicial foreclosure requirement have a foreclosure per homeowner ratio in 2008 and 2009 that is 0.024 lower, which represents 2/3 of the mean and 2/3 of a standard deviation of the left hand side variable.

Further, column 2 shows that mortgage delinquencies display no correlation with whether states require judicial foreclosure. The standard error is small, and we are able to reject at the 5% level the hypothesis that delinquencies per homeowner are 2/3 a standard deviation lower in judicial foreclosure requirement states. The inclusion of delinquencies per homeowner as a control variable does not materially change the lower foreclosure rate in judicial states.

In column 4, we examine the pass-through rate, which we define to be the number of foreclosures scaled by the number of delinquent mortgage accounts. As the coefficient estimate shows, the pass-through rate to foreclosures is significantly lower in judicial foreclosure states. The magnitude is large. Judicial states have a pass-through rate to foreclosure that is a full standard deviation lower than non-judicial states.

The left panel of Figure 3 shows the foreclosures per delinquent account ratio for every state. States shaded in black require judicial foreclosure. The 13 states with the highest foreclosure to delinquent account ratios all allow non-judicial foreclosure. Of the 22 states with the highest pass-through rate from delinquencies to foreclosures, only 1 requires judicial foreclosure. The right panel of Figure 3 plots foreclosures per homeowner against delinquencies per homeowner. Judicial states are plotted as triangles, and non-judicial states are plotted as circles. Consistent with the left panel, there is a much lower sensitivity of foreclosures to delinquencies in judicial states.

Figure 4 shows the first stage for zip codes in the border sample shown in Table 3. More specifically, to produce the plots in Figure 4, we estimate the following specification:

$$Foreclosures\ Per\ Delinquent\ Account_{zbsx} = \alpha_{bsx} + \sum_{i=-50}^{50} \gamma^i * D_{zbsxi} + \varepsilon_{zbsx} \qquad (3)$$

where $Foreclosures\ Per\ Delinquent\ Account_{zbsx}$ represents foreclosures per delinquent account for zip code *z* that is located near border *b* in state *s* within a 10 mile strip *x* of the border.[13] The specification includes fixed effects at the level of border-state-10 mile strip (α_{bsx}). The dots in Figure 4 represent the coefficient estimates of γ^i on the indicators D_{zbsxi}, which are indicators for each one mile on either side of the border, with negative values being in the state that requires judicial foreclosure. These coefficient estimates represent the average foreclosures per delinquent account ratio for one mile wide bands around the border of a judicial state and non-judicial foreclosure state, after controlling for (border state*10 mile strip) fixed effects.

The top two panels of Figure 4 plot the estimates of $\gamma^i$for the foreclosures per delinquent account for 2008 and 2009. Consistent with the state level analysis in Figure 4, there is a very sharp jump in the foreclosure to delinquent account ratio as one crosses the border from a judicial requirement state into a non-judicial requirement state. [14]

As a final check we assessed the issue of possible weakness of our instrumental variable. In Tables 4 and following, we generally observe F statistics above Stock and Yogo (2005) weak identification critical values, rejecting the hypothesis that the IV is weak. We also verified that all our results were robust to weak instruments by employing the approach in Moreira (2003, 2009), which produces tests and confidence sets with correct size when instruments are arbitrarily weak for the just-identified case of a single endogenous variable.

D. Exclusion Restriction

[13] The 10 mile strip indicator variables control non-parametrically for omitted variables among zip codes that are close to one another and equidistant from the border. These are important given that some states border one another in very different geographical areas.

[14] Appendix Figure 2 shows the plots for every year from 2006 to 2010. The border jump is weaker in 2006, gets stronger through 2009, and is similar in 2010.

The bottom panel of Table 4 shows that there are no obvious statistically significant differences in observable covariates between judicial and non-judicial states. In particular, states with judicial foreclosure do not show a statistically significant difference in delinquency rates, house price growth from 2002 to 2005[15], subprime fraction of the population, income, unemployment, poverty, racial demographics, education, or ruralness. The standard errors are relatively small. For every variable except FCSW house price growth (for which the sample is only 24 states), we can reject at the 10% level of confidence that judicial requirement states are different by a 3/4 standard deviation.

In the bottom six panels of Figure 4, we examine the validity of the exclusion restriction using the zip code border sample. More specifically, Figure 4 shows whether zip codes on either side of the border are different in terms of their delinquency rates, subprime borrowers, income, poverty incidence, minority share, or education. The specification that produces these plots is analogous to equation (3) with different outcome variables. As the coefficient estimates on the one-mile bands show, there is no discernable jump in any of the variables at the border.

Perhaps the biggest concern for the exclusion restriction is the ex ante differential incentives of lenders to supply credit in judicial versus non-judicial states. Given that lenders can more easily foreclose on collateral in non-judicial states, they should be more willing to supply credit for borrowers in those states. A potential concern is that the higher credit supply during the housing boom in non-judicial states is responsible for the outcomes we find. Support for this concern comes from Pence (2006), who uses a census tract border discontinuity design in 1994 and 1995 data and finds that individual mortgages are 3 to 7% smaller in judicial versus non-judicial states (see also Benmelech, et al (2005) on commercial mortgages).

[15] There is no significant difference in the level of log house prices in 2005 between judicial and non-judicial states either.

We explore this concern using the border sample, which is similar to the strategy used in Pence (2006). In Appendix Table 1 we show that during the 1990s there is some evidence of higher credit supply to states with no judicial foreclosure requirement. But by the late 1990s into the 2000s, there is no evidence that lenders were willing to lend higher amounts in states with no judicial foreclosure requirement.

Why does the Pence (2006) result weaken over time? Why did lenders from 2000 to 2005 not extend more credit to borrowers in non-judicial states where the costs of foreclosure are lower? One reason is that, during the housing boom, lenders and intermediaries assigned a very low probability to states of the world in which house prices declined substantially (Gerardi, et al (2008)). If lenders assign a very low probability to default states, then the loss given default would play a negligible role in lending decisions.

Another reason is lack of due diligence by purchasers of securitized mortgage backed securities, who may not have fully understood the ex post differences in foreclosure rates across states. Relatedly, most of the loans originated in general, i.e. the conforming loans, are guaranteed by the GSEs against default. There is no evidence that GSE insurance premiums differ by the foreclosure laws in a given state. As a result, originators would be indifferent between judicial and non-judicial states when it comes to evaluating the loss given default in different states. Finally, we find that the ease of foreclosure leads to larger price declines. If banks ex-ante understand this general equilibrium effect of forced sales, they will weigh the ease with which they can grab the delinquent home against the lower price they get in the event of a sale.[16] The net effect of these two forces may be neutral.

[16] The house price drop due to foreclosures is an externality from the perspective of the individual decision of a bank to foreclose or not. Therefore, in the event of default, ex-post competition across banks will lead them to foreclose without internalizing the impact on house prices.

One final concern with regard to the exclusion restriction is whether other laws related to foreclosures are correlated with the judicial versus non-judicial difference, and whether these other laws are responsible for our results. In Appendix Table 2, we examine this issue in detail. We find that the difference in foreclosure rates across judicial and non-judicial states is robust to the consideration of other laws, and the judicial versus non-judicial split is by far the most powerful determinant of variation across states in foreclosure rates.

IV. The Effect of Foreclosures on House Prices

In this section, we present results from our two-stage least squares estimation of the effect of foreclosures on house prices. The first section utilizes state and CBSA level data for the full sample, and the second section utilizes the sample of zip codes near borders.

A. Full Sample

Figure 5 presents the reduced form version of our two-stage least squares estimation. It plots house price growth in states with and without a judicial foreclosure requirement from 2004 onwards. For both the FCSW (top) and Zillow.com (bottom) indices, there is a larger drop in house prices in states that do not require judicial foreclosure. The magnitude of the relative decline is significantly larger using the FCSW index. For the FCSW index, house prices in non-judicial states fell by 43% from the middle of 2006 to the beginning of 2009. They fell by only 28% in judicial states. The top right panel plots the difference over time. The drop using Zillow.com from the second quarter of 2007 to the third quarter of 2009 is about 4%.[17] Further, there is no systematic evidence of differential house price trends before the foreclosure crisis.

Table 5 presents the second stage estimates of the effect of foreclosures on house price growth. Columns 1 through 3 focus on house price growth measured by Zillow.com from 2007

[17] In Appendix Figure 3, we replicate Figure 5 using publicly available data from the FHFA and the S&P Case Shiller 20 MSA indices. The results are qualitatively similar.

to 2009. As the estimates show, there is a strong negative effect of foreclosures on house price growth.[18] The estimates in columns 1 through 3 imply that a one standard deviation increase in foreclosures per homeowner in 2008 and 2009 leads to an 5 to 7% relative drop in house price growth, which is 2/5 to 3/5 a standard deviation decrease in house price growth. The estimate in column 1 implies that moving from the state with median foreclosure rate to a state with the 90th percentile foreclosure rate leads to 8% lower house price growth from 2007 to 2009.

The inclusion of control variables does not have a large effect on the magnitude of the estimates. These results are consistent with evidence in Section III that states with and without judicial foreclosure requirement are similar on observable characteristics. The estimates are similar for the FCSW house price measure. The statistical power is weaker, especially in column 6, given that FCSW data is available for only 24 states in the sample.

In Table 6, we replicate the specifications using CBSA level data. While the variation in judicial requirement for foreclosures in the first stage is at the state level, the CBSA level-analysis allows us to control for other characteristics at a more granular level. The estimates imply a negative effect of foreclosures on house prices that is statistically significant at the 10% level in all specifications except for column 3. The magnitude of the coefficient estimates is slightly smaller in the CBSA level analysis. The estimate in column 2 implies that a one standard deviation increase in foreclosures per homeowner leads to a 1/3 standard deviation lower house price growth.[19]

[18]For both Zillow and FCSW, the 2SLS estimate of the effect of foreclosures on house prices conditional on delinquencies is slightly larger than the OLS correlation conditional on delinquencies shown in Table 2. If we do not condition on delinquencies in either the OLS or the 2SLS (unreported), the OLS coefficient increases sharply and is 50% larger than the 2SLS coefficient. This is consistent with a bias in the OLS that overstates the negative effect of foreclosures on house prices.

[19] The reduced form graphs in Figure 5 suggest a larger decline in house prices using the FCSW indices relative to Zillow, yet the 2SLS magnitudes for both indices are similar. This is driven by two effects. First, Figure 5 does not condition on delinquencies whereas the 2SLS specification does. Conditioning on delinquencies does not change the Zillow reduced form, but decreases the FCSW reduced form by about 25%. Second, the FCSW indices are only

B. Analysis of Zip Codes Near the Border

In this section, we examine house price growth patterns in zip codes that are near the border of two states with differing state laws. The first stage effect in Figure 4 (discussed above) shows a very sharp increase in foreclosures per delinquent account as one crosses the border from a judicial to a no judicial requirement state. What is the effect on house prices?

Even with the sharp discontinuity in foreclosures and a true effect of foreclosures on house prices, one would expect less of a sharp discontinuity in house price growth than foreclosures around the border. The main reason is that housing markets are not sharply divided by a border between two states. If home-buyers view houses in zip codes across a state border as close substitutes, a foreclosure-induced drop in house prices on the non-judicial side of the border will have spillover effects onto the housing markets on the judicial side of the border.

The left and middle panels of Figure 6 show this effect. The plots are for house price growth from 2008 to 2009 for FCSW (left) and 2008 to 2010 for Zillow (right). The plots are created with the same estimation as in equation (3) in Section III. Both plots show a pattern that is very consistent with higher foreclosures in the non-judicial state leading to lower house prices. As one goes from 25 miles away from the border in the judicial state toward the border, house prices begin to drop reflecting the spillover from foreclosures on the other side of the border. There is a sharp drop in house prices right at the border (although less clear using Zillow). House prices continue to decline as one goes further into the non-judicial state.

Despite the smoothing of the discontinuity across housing markets near the border, we can still estimate our two stage least squares specification to see if there is a break at the border. More specifically, Table 7 presents estimates from the following:

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available for 24 states, and the first stage is stronger among these states. Given that the 2SLS estimate is based on the ratio of the reduced form coefficient to the first stage, the 2SLS estimate for FCSW is similar given the larger first stage.

$$HousePriceGrowt\square 0809_{zbsx} = \alpha_{bsx} + \beta * \widehat{Foreclosures}09_{zbsx} + \Gamma * X_{zbsx} + \varepsilon_{zbsx} \quad (4)$$

$$Foreclosures09_{zbsx} = \alpha_{bsx} + \theta * JudicialForeclosureRequirement_s + \Lambda * X_{zbsx} + \eta_{zbsx} \quad (5)$$

where $HousePriceGrowt0809_{zbsx}$ is house price growth from 2008 to 2009 in a zip code *z* that is located near border *b* in state *s* within a 10 mile strip *x* of the border. The specification includes fixed effects at the level of border-state-10 mile strip (α_{bsx}). The first stage in equation (5) regresses foreclosures in 2009 on an indicator variable for whether the state in which the zip code is located requires judicial foreclosure. The second stage in equation (4) estimates the effect of foreclosures in 2009 on house price growth from 2008 to 2009.

One difference in the empirical specification for the border sample is that we focus only on foreclosures as of 2009. In the smaller sample, the first stage is weak for 2008. This is likely due to the fact that the foreclosure crisis in the border sample was muted relative to the full sample in 2008; indeed, states with very high foreclosure rates as of 2008 (e.g., Arizona, California, Florida, Nevada) are not included in the border sample. We also use Zillow house price growth through 2010 given the later onset of the foreclosure crisis in the border sample. For the Zillow specification we use foreclosures in 2009 and 2010 as the right hand side variable. We do not yet have data from FCSW through 2010.

The second stage specification reported in Panel A of Table 7 uses the entire sample of zip codes in the border discontinuity sample. The coefficient estimate of β is negative and statistically significant at the 1% level in column 1. In this subsample, the magnitude of the estimate in column 1 implies that a one standard deviation increase in foreclosures per homeowner in 2009 leads to a one standard deviation lower house price growth from 2008 to

2009. This magnitude calculation is done using standard deviations that are within each state-border-10 mile strip group.

The statistical power of the estimate is slightly weaker with control variables. The results using Zillow.com house price data are similar in magnitude and significant at the 10% level of confidence. While the coefficient estimate is twice as large, the within state-border-10 mile strip group standard deviation in Zillow.com house price growth is also twice as large implying a similar distributional effect.

In order to further homogenize the sample of zip codes in judicial and non-judicial states and to tighten the identification of the foreclosure coefficient, we restrict the sample in Panels B and C to zip codes that are within 25 and 10 miles of the border. While the statistical power of the tests diminishes, the magnitudes are similar.

C. The Housing Supply Channel

What is the precise channel through which foreclosures lead to a drop in house prices? According to the two-stage least squares estimates, the effect of moving from a judicial state to a non-judicial state (0.024) leads to a reduction in house price growth by (1.9*0.024 =) 5%. Our data are at the zip code level, and therefore they do not allow us to decompose this effect into the actual foreclosed homes versus non-foreclosed homes.

However, we are able to give a back-of-the-envelope calculation as to how much the additional foreclosures in non-judicial states increase the supply of houses on the market. We utilize a zip code level data set from Target Data Inc that records the number of new "for sale" listings from Multiple Listing Service (MLS) for 2009.[20] In 2009, the fraction of new listings to homeowners is on average 6% across the states in the sample. In order to isolate the supply effect, we use the number of new listings per homeowner as an independent variable.

[20] See http://www.targetdata.net/ for more details. The data for years before 2009 are not available.

The right panel of Figure 6 examines zip codes in the border sample, using a similar estimation technique as in equation (3) in Section III. There is strong evidence of a sharp increase in listings when one enters the non-judicial state. The magnitude is very large. The average difference around the border is between 1 and 2% of homeowners, and the standard deviation of the variable is 1.3%. In Table 8 we present the state level two stage least squares estimate. It shows a very strong effect of foreclosures on new "for sale" listings, which is consistent with the supply of houses on the market being driven heavily by foreclosures.

In terms of magnitudes, the estimate in Table 8 implies that a one standard deviation increase in foreclosures leads to a 1.4 standard deviation increase in houses for sale. Moving from a judicial to a non-judicial state leads to a 22% increase in the number of new listings per homeowner. Recall that our previous estimates imply that foreclosures lead to house price growth that is 5% lower in non-judicial states. Our view is that it is plausible that a 22% increase the supply of housing can explain a 5% reduction in house price growth. However, it is important to emphasize that other studies have found negative price effects due to poor incentives to maintain foreclosed homes (Hartley (2010a)).

V. The Effect of Foreclosures on Residential Investment and Durable Consumption

A. Two-stage least squares estimates

The results in the above section document a large negative effect of foreclosures on house prices. A central idea in macroeconomic research is that a sharp negative movement in the relative price of durable goods can amplify shocks and lead to a reduction in real economic activity. This section explores this idea in the context of residential investment and durable consumption.

In the left panel of Figure 7, we present the state-level correlation between residential investment growth from 2007 to 2009 and foreclosures per homeowner in 2008 and 2009. There is a very strong negative correlation. Arizona and Nevada are the extreme states, but the correlation is quite strong even among the other states in the sample. The same is true of durable consumption as measured by auto sales. More specifically, the right panel shows a strong negative correlation between auto sales growth from 2007 to 2009 and foreclosures per homeowner in 2008 and 2009.

Figure 8 presents the reduced form version of our two-stage least squares specification. The top panel plots residential investment growth in non-judicial and judicial states from 2004 to 2010 as measured by new residential construction permits collected by the Census. The data used in the top panel are at the annual frequency.[21] The top left graph is in natural log scale with the natural log of the level of residential investment in 2004Q1 subtracted from the series.

Residential investment patterns were similar through 2007, at which point there was a larger drop in residential investment in non-judicial states through 2009. The significance of the relative decline appears muted given the very large overall decrease in residential investment in all states. However, in the top right panel we show the difference between non-judicial and judicial states. Residential investment dropped by 8 percentage points more in non-judicial states relative to judicial states from 2007 to 2008 and remained significantly lower in 2009. There is some evidence of a relative rebound from 2009 to 2010 in non-judicial states, although it is not statistically significant.

[21] Permits for new residential construction are available from the Census at a monthly frequency. However, there are two disadvantages with the monthly data. First, monthly data are available for only 2/3 of the underlying counties for which the annual data are available. Second, the seasonal pattern in residential construction is so strong that it is difficult to discern differences using data at a frequency less than annual.

The bottom panel of Figure 8 plots auto sales. It shows a smaller decline in auto sales in states that require judicial foreclosure. As the bottom right panel shows, auto sales in each quarter from 2008Q2 to 2010Q4 were 5 to 10% lower in non-judicial versus judicial states relative to their 2004Q1 respective values. It is important to note that both the residential investment and auto sales data are flows, not stocks. So the cumulative difference over 2008 and 2009 in auto sales and residential investment between judicial and non-judicial states is large.

The first three columns of Table 9 present the state-level two-stage least squares estimates for residential investment as measured by new residential construction permits. The estimate in column 1 on foreclosures per homeowner implies that a one standard deviation increase in foreclosures leads to a 2/5 standard deviation decrease in residential investment growth from 2007 to 2009. Alternatively, moving from the median to the 90th percentile of the distribution of foreclosures leads to 23 percentage points lower residential investment growth from 2007 to 2009. The CBSA level estimates imply a similar magnitude. Both the state and CBSA level estimates are sensitive to the inclusion of the full set of control variables in column 3, but the CBSA level results remain significant at the 12% confidence level.

Table 10 presents the corresponding results for auto sales. The estimate in column 2 implies that a one standard deviation increase in foreclosures leads to a 3/5 standard deviation decrease in auto sales growth from 2007 to 2009. Alternatively, moving from the median to the 90th percentile of the foreclosures distribution leads to 12 percentage points lower auto sales growth from 2007 to 2009.[22]

B. Macroeconomic Implications

[22] Unlike the house price data which are available at the zip code level, residential investment and auto sales data are only available at the county level. In Appendix Table 3, we estimate county-level specification isolating the sample to counties that are near the border of two states that differ in their foreclosure laws. We find similar coefficient estimates for auto sales and residential investment, although for the latter the standard errors are very large.

We can use the estimates obtained in Tables 5, 6, 9, and 10 to inform the debate regarding the effect of foreclosures on the macro-economy. However, it is critical to emphasize that the estimated marginal effects are driven by variation in foreclosures that comes from the judicial foreclosure requirement in certain states. Given that the local average treatment effect (LATE) is driven by this very specific source of variation, we urge caution in using the full distribution of foreclosures to estimate aggregate impacts.[23]

Our strategy to estimate the aggregate effect of foreclosures relies only on the variation in foreclosures that is driven by the judicial foreclosure requirement. This corresponds to the first stage estimate of the effect of judicial foreclosure requirement on foreclosures that is reported in Table 4 for the state level data. The advantage of this approach is that it utilizes variation that can be explained with the first stage, and is therefore analogous to an "in-sample" treatment effect where judicial foreclosure requirement states represent the control group. The estimate is -.024, which implies that foreclosures per homeowner are 2.4 percentage points lower in judicial foreclosure requirement states.

We multiply the foreclosure coefficient estimates in Tables 5, 6, 9, and 10 with the 2.4 percentage point difference in foreclosure rates to estimate the aggregate impact of foreclosures on house prices, residential investment and auto sales. For house prices, the estimate in column 2 of Table 5 implies that house price growth from 2007 to 2009 was (-1.4*-0.024 =) 3.4 percentage points lower in non-judicial versus judicial states. The average decline in the sample is 12 percentage points, which implies that foreclosures can explain about 28% of the decline in house prices. The CBSA calculation leads to an estimate that foreclosures explain 22% of the decline.

For residential investment, the state-level estimate in column 2 of Table 9 suggests that residential investment growth from 2007 to 2009 was (-5.2*-0.024 =) 12 percentage points lower

[23] For more on this issue, see Chapter 4 of Angrist and Pischke (2009).

in non-judicial versus judicial states. The average decline in the sample is 77 percentage points, which implies that foreclosures can explain about 15% of the overall decline in residential investment. A similar calculation using the CBSA-level estimate in column 5 of Table 9 implies that foreclosures can explain 25% of the overall decline in residential investment.

For auto sales, the estimate in column 2 of Table 10 implies that auto sales growth from 2007 to 2009 was (-3.3*-0.024 =) 8 percentage points lower in non-judicial versus judicial requirement states. The average decline in the sample (from Table 1) is 41 percentage points, which implies that foreclosures can explain about 20% of the overall decline in auto sales. Using the CBSA-level estimate in column 5 of Table 10 implies that foreclosures can explain 35% of the overall decline in auto sales from 2007 to 2009.

Overall, our analysis implies that foreclosures can explain 20 to 30% of the aggregate house price decline, 15 to 25% of the decline in residential investment from 2007 to 2009 and 20 to 35% of the decline in auto sales over the same period.

VI. Robustness

One concern discussed in Section III is the use of RealtyTrac's classification of judicial versus non-judicial states. As we discuss above, there are clear reasons to use the RealtyTrac classification. The state about which there is most disagreement is Massachusetts, which RealtyTrac counts as a judicial state but other sources count as a non-judicial state. We explore this issue at length in the appendix (see discussion of appendix tables 4-7, and appendix figures 4-5 in the online appendix). We discuss why RealtyTrac lists Massachusetts as a non-judicial state, justify the classification based on the data, and show that the results are similar if we switch Massachusetts to be classified as a state with no judicial requirement.

A second concern is that the states that do not require judicial foreclosure are inherently different than other states. We have already shown a number of results that mitigate this concern. For example, Table 4 shows that observable variables are remarkably similar across the two groups of states, and these variables include delinquencies during the recession and house price growth before the recession. Second, we find similar results in the examination of zip codes right around the border of two states that differ in foreclosure laws.

In the appendix, we conduct two additional tests to mitigate this concern. First, we show (see appendix table 8) that our core results are robust to the exclusion of the two states with the highest foreclosure rates (Arizona and Nevada). Second, we show (see appendix table 9) that we do not see a similar reduction in real economic activity in states with no judicial requirement during the 2001 recession when foreclosures were negligible. This latter test refutes the hypothesis that states with no judicial requirement are inherently more cyclical or prone to boom-bust cycles.

An additional concern is that the residential investment or auto sales results are driven by the fact that individuals hit by foreclosures are more likely to move from the area, hence lowering local aggregate demand. Research by Hartley (2010b) mitigates this concern. He shows that mobility patterns are actually lower in 2009 than in years past. Further, while it is true that MSAs which experienced large declines in house prices experienced a reduction in the average likelihood of staying in the same house, the drop is driven by people who moved but remained in the same county (implying even our most disaggregated unit of observation will be unaffected).

A final issue is whether delaying foreclosures in states with a judicial requirement will eventually cause bigger problems going forward. In the appendix (appendix table 10) , we show results for the outcome variables for which we have data through 2010. Foreclosure rates remain

elevated in states with no judicial requirement, even through 2010. The drops in house prices, residential investment, and auto sales have moderated in non-judicial states in 2010, but there is no strong statistically significant evidence of a rebound in these states. The bottom line is that it is too early to tell whether states that delayed foreclosures will be worse off in the long run.

VII. Conclusion

A large body of theoretical research in macroeconomics emphasizes how the leverage-induced forced sale of durable goods can (1) lead to negative price effects and (2) reduce economic output. Many academics, policy-makers, and regulators have emphasized these models in building an understanding of the recession of 2007 to 2009. Yet, to our knowledge, there is limited empirical evidence that directly links a specific financial friction to the real economy.

We bridge this gap by examining the price and real effects of foreclosures using variation in state-specific laws as an instrument. We find that foreclosure-induced increase in the supply of houses for sale has a large negative impact on house prices. The drop in housing wealth generates further drops in durable consumption and residential investment. Our findings thus suggest that foreclosures may be an important reason for the magnitude and length of the recession of 2007 to 2009.

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Table 1
Summary Statistics

This table presents summary statistics for the state and CBSA level data used in the analysis. Foreclosures are measured by RealtyTrac.com as new foreclosure filings. Delinquencies represent the number of delinquent accounts 60 days past due as measured by Equifax. The scalar homeowner represents the number of mortgage accounts as of 2005 as measured by Equifax. Subprime consumer fraction is the fraction of consumers with a credit score less than 660 as measured by Equifax. Residential permits represent the value of permits for new residential construction as measured by the Census. Auto sales are measured by R.L. Polk.

	N	Mean	SD	10^{th}	50^{th}	90^{th}
State level data						
Foreclosures per homeowner, 2008 and 2009	51	0.037	0.034	0.009	0.030	0.071
Delinquencies per homeowner, 2008 and 2009	51	0.095	0.042	0.058	0.086	0.133
Zillow house price growth, 2002 to 2006	45	0.326	0.163	0.133	0.330	0.588
Zillow house price growth, 2006 to 2007	47	-0.018	0.047	-0.083	-0.014	0.041
Zillow house price growth, 2007 to 2009	48	-0.119	0.126	-0.268	-0.091	0.012
FCSW house price growth, 2002 to 2006	24	0.365	0.199	0.097	0.347	0.675
FCSW house price growth, 2006 to 2007	24	-0.070	0.069	-0.196	-0.048	-0.002
FCSW house price growth, 2007 to 2009	24	-0.206	0.162	-0.476	-0.178	-0.066
Residential permits growth, 2002 to 2006	51	0.289	0.275	-0.071	0.245	0.656
Residential permits growth, 2006 to 2007	51	-0.198	0.141	-0.339	-0.191	-0.037
Residential permits growth, 2007 to 2009	51	-0.768	0.270	-1.082	-0.726	-0.496
Auto sales growth, 2004 to 2006	51	-0.020	0.123	-0.116	-0.046	0.093
Auto sales growth, 2006 to 2007	51	-0.022	0.056	-0.104	-0.019	0.050
Auto sales growth, 2007 to 2009	51	-0.413	0.157	-0.578	-0.399	-0.238
CBSA level data						
Foreclosures per homeowner, 2008 and 2009	958	0.029	0.032	0.003	0.020	0.063
Delinquencies per homeowner, 2008 and 2009	958	0.092	0.044	0.050	0.083	0.140
Zillow house price growth, 2002 to 2006	339	0.349	0.195	0.106	0.338	0.611
Zillow house price growth, 2006 to 2007	356	-0.028	0.090	-0.147	-0.020	0.058
Zillow house price growth, 2007 to 2009	364	-0.148	0.151	-0.341	-0.120	0.013
FCSW house price growth, 2002 to 2006	121	0.385	0.213	0.096	0.396	0.677
FCSW house price growth, 2006 to 2007	120	-0.098	0.112	-0.249	-0.058	0.007
FCSW house price growth, 2007 to 2009	120	-0.201	0.158	-0.443	-0.162	-0.042
Residential permits growth, 2002 to 2006	946	0.317	0.567	-0.311	0.281	1.010
Residential permits growth, 2006 to 2007	947	-0.159	0.442	-0.559	-0.179	0.264
Residential permits growth, 2007 to 2009	945	-0.771	0.517	-1.480	-0.757	-0.138
Auto sales growth, 2002 to 2006	958	-0.049	0.121	-0.170	-0.060	0.079
Auto sales growth, 2006 to 2007	958	-0.024	0.080	-0.125	-0.020	0.072
Auto sales growth, 2007 to 2009	958	-0.420	0.153	-0.624	-0.413	-0.227
New mortgages/income, 2005	958	0.113	0.094	0.038	0.082	0.235
Debt to income increase, 2002 to 2005	958	0.193	0.325	-0.087	0.190	0.481
Subprime consumer fraction, 2000	958	0.343	0.094	0.236	0.328	0.474
Ln(Income, 2005)	958	3.757	0.215	3.542	3.722	4.015
Fraction with income less than 25K, 2005	958	0.470	0.062	0.401	0.469	0.540
Unemployment rate, 2000	958	0.061	0.022	0.038	0.057	0.089
Poverty fraction, 2000	958	0.138	0.056	0.079	0.128	0.211
Black fraction, 2000	958	0.084	0.121	0.002	0.028	0.276
Hispanic fraction, 2000	958	0.060	0.120	0.005	0.019	0.140
Less than high school education fraction, 2000	958	0.210	0.077	0.127	0.194	0.320
Urban fraction, 2000	958	0.617	0.188	0.362	0.612	0.881

Table 2
Foreclosures and House Price Growth: Correlations

This table presents correlations between foreclosures and house price growth. The specifications reported in columns 1 and 2 are estimated at the state level, specifications reported in columns 3 and 4 are estimated at the CBSA level using state fixed effects, and specifications reported in columns 5 and 6 are estimated at the zip code level using CBSA fixed effects. Standard errors in columns 3 and 4 are clustered at the state level. Standard errors in columns 5 and 6 are clustered at the CBSA level.

Panel A: Zillow house price growth, 2007 to 2009

	State level		CBSA level with State FE		Zip code level with CBSA FE	
	(1)	(2)	(3)	(4)	(5)	(6)
Foreclosures per homeowner, 2008 and 2009	-1.226**		-1.508**		-0.151*	
	(0.347)		(0.336)		(0.064)	
Delinquencies per homeowner, 2008 and 2009	-1.627**		-0.618**		-0.400**	
	(0.268)		(0.198)		(0.085)	
Foreclosures per delinquency, 2008 and 2009		-0.321**		-0.375**		-0.042**
		(0.117)		(0.117)		(0.011)
Constant	0.083**	-0.016	-0.012	-0.019	-0.115**	-0.163**
	(0.021)	(0.033)	(0.012)	(0.040)	(0.012)	(0.004)
N	48	48	364	364	10,188	9,988
R^2	0.690	0.199	0.744	0.642	0.761	0.712

Panel B: FCSW House price growth, 2007 to 2009

	State level		CBSA level with State FE		Zip code level with CBSA FE	
	(1)	(2)	(3)	(4)	(5)	(6)
Foreclosures per homeowner, 2008 and 2009	-1.710**		-1.132+		-0.331**	
	(0.598)		(0.583)		(0.116)	
Delinquencies per homeowner, 2008 and 2009	-1.492**		-0.614*		-0.401**	
	(0.435)		(0.230)		(0.075)	
Foreclosures per delinquency, 2008 and 2009		-0.411*		-0.491+		-0.084**
		(0.185)		(0.272)		(0.023)
Constant	0.049	-0.058	-0.060**	-0.028	-0.157**	-0.211**
	(0.036)	(0.054)	(0.013)	(0.096)	(0.009)	(0.009)
N	24	24	120	120	4,098	4,095
R^2	0.750	0.240	0.872	0.787	0.858	0.775

**,*,+ Coefficient statistically different than zero at the 1%, 5%, and 10% confidence level, respectively

Table 3
List of Borders of States with Different Foreclosure Rules

This table shows the borders of states where the judicial foreclosure requirement laws differ. It also shows the number of zip codes in the sample that are near those borders. The total sample is restricted to zip codes for which the border in question is the closest state border and for which FCSW house price data are available.

Total

Border	Number of zip codes
Connecticut - Rhode Island	80
Georgia - South Carolina	53
Illinois – Wisconsin	150
Massachusetts - New Hampshire	170
Massachusetts - Rhode Island	181
Michigan – Ohio	151
North Carolina - South Carolina	85

Within 25 miles of border

Border	Number of zip codes
Connecticut - Rhode Island	27
Georgia - South Carolina	4
Illinois - Wisconsin	55
Massachusetts - New Hampshire	149
Massachusetts - Rhode Island	142
Michigan - Ohio	27
North Carolina - South Carolina	57

Within 10 miles of border

Border	Number of zip codes
Connecticut - Rhode Island	8
Georgia - South Carolina	3
Illinois - Wisconsin	18
Massachusetts - New Hampshire	63
Massachusetts - Rhode Island	60
Michigan - Ohio	12
North Carolina - South Carolina	25

Table 4
Judicial Foreclosure Requirement Instrument

Panel A presents coefficients from the first stage regression of foreclosures on whether a state requires a judicial foreclosure. Each row of Panel B represents an univariate regression of the variable in the first column on whether a state requires a judicial foreclosure. Standard errors are heteroskedasticity-robust.

Panel A: First Stage

	(1) Foreclosures per homeowner 08-09	(2) Delinquencies per homeowner 08-09	(3) Foreclosures per homeowner 08-09	(4) Foreclosures per delinquency 08-09
Judicial foreclosure requirement	-0.024**	-0.004	-0.021**	-0.192**
	(0.008)	(0.012)	(0.005)	(0.038)
Delinquencies per homeowner, 08-09			0.618**	
			(0.109)	
Constant	0.047**	0.096**	-0.013	0.384**
	(0.007)	(0.008)	(0.009)	(0.032)
N	51	51	51	51
R^2	0.121	0.003	0.700	0.286

Panel B: Correlation with Other Observable Variables

	Judicial foreclosure requirement	N	R^2
Delinquencies per homeowner, 06	0.0014	51	0.003
	(0.004)		
Delinquencies per homeowner, 09	-0.0028	51	0.001
	(0.010)		
Zillow house price growth, 2002 to 2005	-0.001	45	0.000
	(0.051)		
FCSW house price growth, 2002 to 2005	0.049	24	0.018
	(0.073)		
Debt to income increase, 2002 to 2005	-0.026	51	0.007
	(0.042)		
Subprime consumer fraction, 2000	-0.0161	51	0.014
	(0.018)		
Ln(Income, 2005)	0.0332	51	0.010
	(0.050)		
Fraction with income less than 25K, 2005	-0.0046	51	0.003
	(0.012)		
Unemployment rate, 2000	-0.0046	51	0.029
	(0.004)		
Poverty fraction, 2000	-0.0078	51	0.014
	(0.009)		
Black fraction, 2000	0.0103	51	0.002
	(0.030)		
Hispanic fraction, 2000	0.0050	51	0.001
	(0.021)		
Less than high school education fraction, 2000	0.0013	51	0.000
	(0.012)		
Urban fraction, 2000	0.0266	51	0.007
	(0.046)		

**,*,+ Coefficient statistically different than zero at the 1%, 5%, and 10% confidence level, respectively

Table 5
Foreclosures and House Prices, State-Level 2SLS

This table presents coefficients of the second stage of a 2SLS specification of house price growth on foreclosures. The first stage, reported in Table 4, regresses foreclosures on whether a state has a judicial foreclosure requirement. Standard errors are heteroskedasticity-robust.

	Zillow house price growth, 07-09			FCSW house price growth, 07-09		
	(1)	(2)	(3)	(4)	(5)	(6)
Foreclosures per homeowner, 08-09	-1.904*	-1.446*	-1.685*	-1.853*	-1.373+	-5.316
	(0.859)	(0.635)	(0.721)	(0.876)	(0.739)	(3.945)
Delinquencies per homeowner, 08-09	-1.188*	-0.512	-0.741	-1.399*	-0.173	6.079
	(0.582)	(0.533)	(1.531)	(0.595)	(0.603)	(11.684)
House price growth, 02-06		-0.141+	-0.230*		-0.127	-0.399
		(0.081)	(0.098)		(0.106)	(0.419)
House price growth, 06-07		0.931**	0.437		1.142+	1.238
		(0.231)	(0.296)		(0.586)	(1.470)
Delinquencies squared, 08-09			0.645			-11.357
			(4.034)			(26.770)
New mortgages/income, 2005			0.135			0.629
			(0.335)			(1.735)
Debt to income increase, 02-05			-0.072			-0.189
			(0.097)			(0.309)
Subprime consumer fraction, 2000			-0.137			-0.470
			(0.261)			(1.019)
Income, 2005			0.052			-0.769
			(0.122)			(0.508)
income < 25K fraction, 2005			-0.172			-4.360
			(0.535)			(2.965)
Unemployment rate, 2000			0.139			-6.351*
			(1.581)			(3.011)
Poverty fraction, 2000			1.144			3.198*
			(0.790)			(1.417)
Black fraction, 2000			0.055			-0.470
			(0.123)			(0.582)
Hispanic fraction, 2000			-0.080			1.046
			(0.179)			(1.194)
< high school education fraction, 2000			0.025			1.249
			(0.330)			(1.173)
Urban fraction, 2000			-0.149+			-0.176
			(0.082)			(0.319)
Constant	0.067*	0.049+	-0.039	0.046	0.010	4.681
	(0.028)	(0.028)	(0.653)	(0.038)	(0.046)	(2.940)
N	48	45	45	24	24	24
R^2	0.677	0.806	0.868	0.750	0.832	0.822

**,*,+ Coefficient statistically different than zero at the 1%, 5%, and 10% confidence level, respectively

Table 6
Foreclosures and House Prices, CBSA-Level 2SLS

This table presents coefficients of the second stage of a 2SLS specification of house price growth on foreclosures. The first stage regresses foreclosures on whether a state has a judicial foreclosure requirement. Standard errors are heteroskedasticity-robust and clustered at the state level.

	Zillow house price growth, 07-09			FCSW house price growth, 07-09		
	(1)	(2)	(3)	(4)	(5)	(6)
Foreclosures per homeowner, 08-09	-1.196+	-1.403**	-0.864	-1.542+	-1.171+	-2.982*
	(0.656)	(0.533)	(0.656)	(0.921)	(0.697)	(1.292)
Delinquencies per homeowner, 08-09	-1.397**	-1.033**	-1.836**	-1.059+	-0.535+	-0.312
	(0.321)	(0.276)	(0.514)	(0.576)	(0.310)	(0.784)
House price growth, 02-06		-0.223**	-0.146**		-0.199*	-0.402**
		(0.043)	(0.047)		(0.087)	(0.087)
House price growth, 06-07		-0.139	-0.359**		0.274*	0.100
		(0.098)	(0.067)		(0.138)	(0.215)
Delinquencies squared, 08-09			1.572+			0.231
			(0.951)			(1.497)
New mortgages/income, 2005			-0.321**			0.454+
			(0.120)			(0.243)
Debt to income increase, 02-05			-0.087**			-0.094+
			(0.018)			(0.055)
Subprime consumer fraction, 2000			0.414**			0.078
			(0.149)			(0.375)
Income, 2005			-0.099*			-0.238**
			(0.042)			(0.080)
income < 25K fraction, 2005			-0.124			-1.051*
			(0.228)			(0.519)
Unemployment rate, 2000			0.105			-0.537
			(0.422)			(0.734)
Poverty fraction, 2000			-0.337			1.247*
			(0.334)			(0.599)
Black fraction, 2000			0.053			-0.195
			(0.093)			(0.294)
Hispanic fraction, 2000			0.142*			0.064
			(0.062)			(0.118)
< high school education fraction, 2000			-0.341*			0.285
			(0.157)			(0.237)
Urban fraction, 2000			0.053+			0.105
			(0.030)			(0.074)
Constant	0.057**	0.097**	0.536*	0.020	0.037	1.242**
	(0.014)	(0.017)	(0.210)	(0.036)	(0.035)	(0.433)
N	364	339	339	120	120	120
R^2	0.597	0.677	0.769	0.694	0.770	0.793

**,*,+ Coefficient statistically different than zero at the 1%, 5%, and 10% confidence level, respectively

Table 7
Foreclosures and House Prices:
Zip Codes Near Border Sample 2SLS

This table presents coefficient estimates from the zip code level second stage of a 2SLS specification of house prices on foreclosures. Every specification includes fixed effects for 10 mile strips on either side of the border. The control variables are house price growth from 2002 to 2006 and from 2006 to 2007 and delinquencies per homeowner from 2008 to 2009. Standard errors are clustered at the 10 mile strip level.

Panel A: Full Sample of Zip Codes Near Border of Two States with Different Judicial Foreclosure Laws

	(1)	(2)	(3)	(4)
	FCSW house price growth 08-09		Zillow house price growth, 08-10	
Foreclosures per homeowner	-1.875**	-2.055	-3.500+	-3.394*
	(0.727)	(2.084)	(2.030)	(1.708)
Control variables?	N	Y	N	Y
N	862	862	780	766

Panel B: Within 25 Miles of Border

	(1)	(2)	(3)	(4)
	FCSW house price growth 08-09		Zillow house price growth, 08-10	
Foreclosures per homeowner	-2.074*	-2.416*	-3.557	-2.349
	(0.859)	(1.140)	(2.342)	(1.460)
Control variables?	N	Y	N	Y
N	458	458	413	412

Panel C: Within 10 Miles of Border

	(1)	(2)	(3)	(4)
	FCSW house price growth 08-09		Zillow house price growth, 08-10	
Foreclosures per homeowner	-1.646**	-1.264+	-3.603	-1.981+
	(0.634)	(0.672)	(3.076)	(1.128)
Control variables?	N	Y	N	Y
N	187	187	166	165

**,*,+ Coefficient statistically different than zero at the 1%, 5%, and 10% confidence level, respectively

Table 8
Foreclosures and New For Sale Listings, State-Level IV

This table presents coefficients of the second stage of a 2SLS specification of the number of new for sale listings on foreclosures. The first stage regresses foreclosures on whether a state has a judicial foreclosure requirement. Standard errors are heteroskedasticity-robust.

	New for sale listings, per homeowner 2009
Foreclosures per homeowner, 2009	0.500**
	(0.187)
Delinquencies per homeowner, 2009	0.059
	(0.102)
N	51
R^2	0.52

**,*,+ Coefficient statistically different than zero at the 1%, 5%, and 10% confidence level, respectively

Table 9
Foreclosures and Residential Investment, 2SLS

This table presents coefficients of the second stage of a 2SLS specification of residential investment growth on foreclosures. The first stage regresses foreclosures on whether a state has a judicial foreclosure requirement. Standard errors are heteroskedasticity-robust. Standard errors in columns 4 through 6 are clustered at the state level.

	Residential Permits Growth, 2007 to 2009					
	State-level 2SLS			CBSA-level 2SLS		
	(1)	(2)	(3)	(4)	(5)	(6)
Foreclosures per homeowner, 08-09	-5.841*	-5.239*	-2.351	-8.951*	-7.753+	-7.159
	(2.590)	(2.384)	(2.875)	(4.294)	(4.137)	(4.521)
Delinquencies per homeowner, 08-09	-0.515	-0.948	-10.905*	0.927	-0.323	-2.608
	(1.672)	(1.499)	(4.094)	(1.987)	(1.927)	(2.011)
Residential permits growth, 02-06		-0.100	-0.209		-0.075*	-0.064
		(0.106)	(0.227)		(0.034)	(0.046)
Residential permits growth, 06-07		-0.060	-0.146		-0.374**	-0.369**
		(0.188)	(0.248)		(0.062)	(0.067)
Delinquencies squared, 08-09			27.705*			7.144
			(12.090)			(5.427)
New mortgages/income, 2005			-0.447			-0.378
			(1.058)			(0.558)
Debt to income increase, 02-05			-0.085			0.084
			(0.391)			(0.056)
Subprime consumer fraction, 2000			-0.481			0.588
			(1.482)			(0.399)
Income, 2005			-0.413			-0.437*
			(0.576)			(0.194)
income < 25K fraction, 2005			-1.546			0.110
			(3.287)			(0.899)
Unemployment rate, 2000			-6.740			0.258
			(4.571)			(1.513)
Poverty fraction, 2000			3.947			-0.818
			(3.575)			(0.696)
Black fraction, 2000			0.898			-0.198
			(0.662)			(0.263)
Hispanic fraction, 2000			0.314			0.089
			(0.786)			(0.270)
< high school education fraction, 2000			-0.309			-0.325
			(1.673)			(0.542)
Urban fraction, 2000			0.427			0.471**
			(0.261)			(0.135)
Constant	-0.501**	-0.465**	2.188	-0.595**	-0.551**	0.865
	(0.082)	(0.074)	(3.519)	(0.080)	(0.078)	(0.972)
N	51	51	51	945	943	943
R^2	0.464	0.491	0.623	0.071	0.186	0.236

**,*,+ Coefficient statistically different than zero at the 1%, 5%, and 10% confidence level, respectively

Table 10
Foreclosures and Durable Consumption, 2SLS

This table presents coefficients of the second stage of a 2SLS specification of auto sales growth on foreclosures. The first stage regresses foreclosures on whether a state has a judicial foreclosure requirement. Standard errors are heteroskedasticity-robust. Standard errors in columns 4 through 6 are clustered at the state level.

	Auto Sales Growth, 2007 to 2009					
	State-level 2SLS			CBSA-level 2SLS		
	(1)	(2)	(3)	(4)	(5)	(6)
Foreclosures per homeowner, 08-09	-2.906+	-3.310+	-3.756+	-7.105*	-6.324*	-4.946*
	(1.559)	(1.694)	(2.135)	(3.122)	(2.485)	(2.019)
Delinquencies per homeowner, 08-09	-0.490	0.108	-2.226	1.774	1.385	0.351
	(1.008)	(1.037)	(4.377)	(1.475)	(1.174)	(0.877)
Auto sales growth, 04-06		0.180	0.513**		-0.324*	-0.202+
		(0.209)	(0.135)		(0.149)	(0.112)
Auto sales growth, 06-07		0.700	0.636		-0.335*	-0.079
		(0.471)	(0.486)		(0.139)	(0.103)
Delinquencies squared, 08-09			11.493			3.395+
			(11.124)			(1.832)
New mortgages/income, 2005			-0.592			-0.049
			(0.809)			(0.265)
Debt to income increase, 02-05			0.423			0.039
			(0.297)			(0.028)
Subprime consumer fraction, 2000			-0.662			-0.246+
			(0.949)			(0.135)
Income, 2005			-0.249			-0.140+
			(0.327)			(0.076)
income < 25K fraction, 2005			-0.648			0.050
			(1.835)			(0.343)
Unemployment rate, 2000			1.169			0.204
			(2.186)			(0.434)
Poverty fraction, 2000			-0.086			-0.264
			(1.726)			(0.231)
Black fraction, 2000			0.365			-0.101
			(0.396)			(0.100)
Hispanic fraction, 2000			-0.107			-0.155+
			(0.476)			(0.081)
< high school education fraction, 2000			0.479			-0.281+
			(1.054)			(0.161)
Urban fraction, 2000			0.104			0.184**
			(0.237)			(0.042)
Constant	-0.258**	-0.280**	1.047	-0.376**	-0.387**	0.218
	(0.050)	(0.050)	(1.907)	(0.054)	(0.049)	(0.383)
N	51	51	51	958	958	958
R^2	0.378	0.425	0.584			0.222

**,*,+ Coefficient statistically different than zero at the 1%, 5%, and 10% confidence level, respectively

Figure 1

Foreclosures, House Prices, Residential Investment, and Durable Consumption

The top left panel shows aggregate foreclosures from RealtyTrac.com and the household default rate from Equifax. House price growth in the top right panel is from S&P/Case Shiller. Residential investment and durable consumption growth in the bottom panels are from the NIPA.

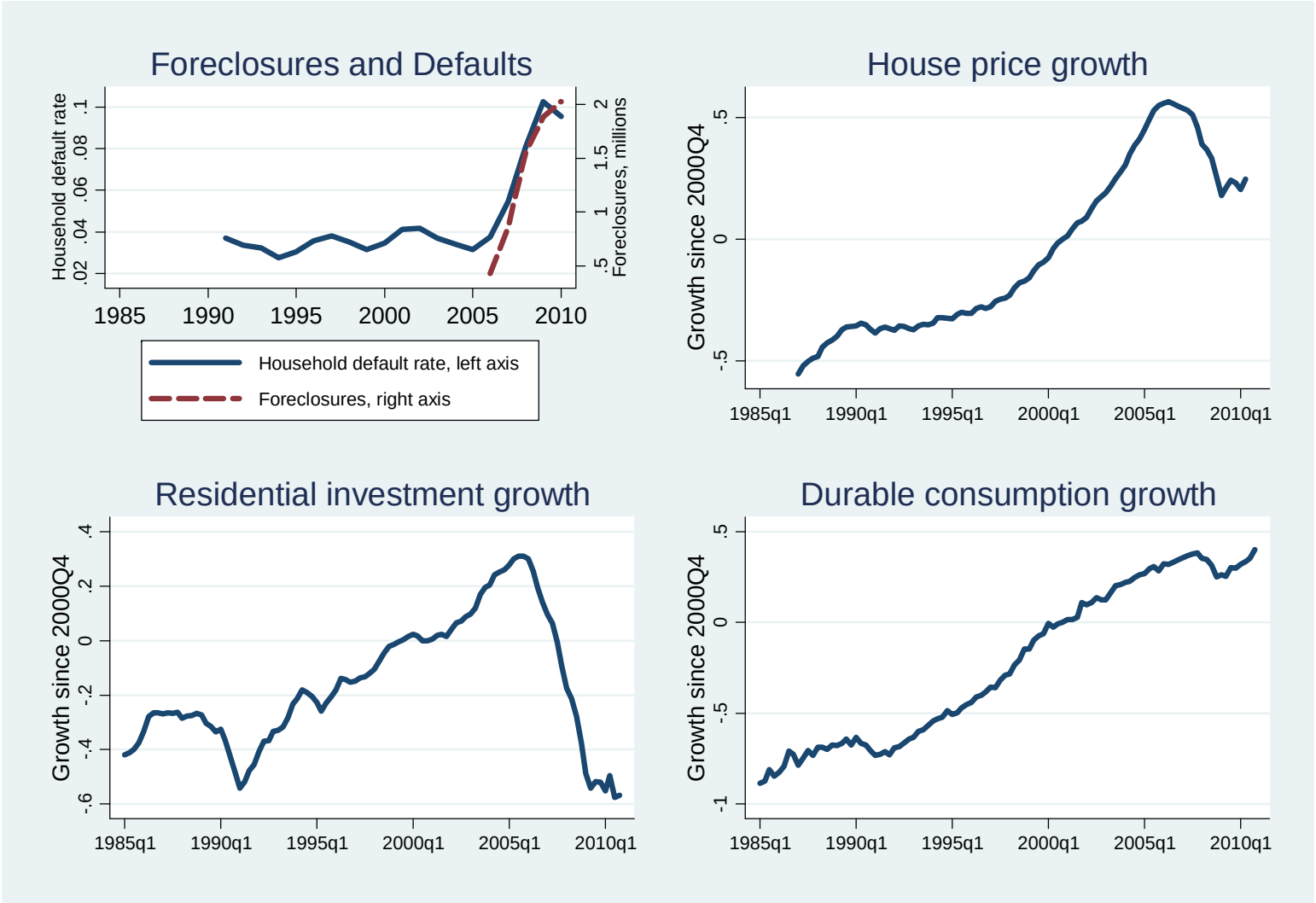

Figure 2
States with Judicial Foreclosure Requirement

States shaded in dark gray require judicial foreclosure. The data come from RealtyTrac.com and are available at: http://www.realtytrac.com/foreclosure-laws/foreclosure-laws-comparison.asp

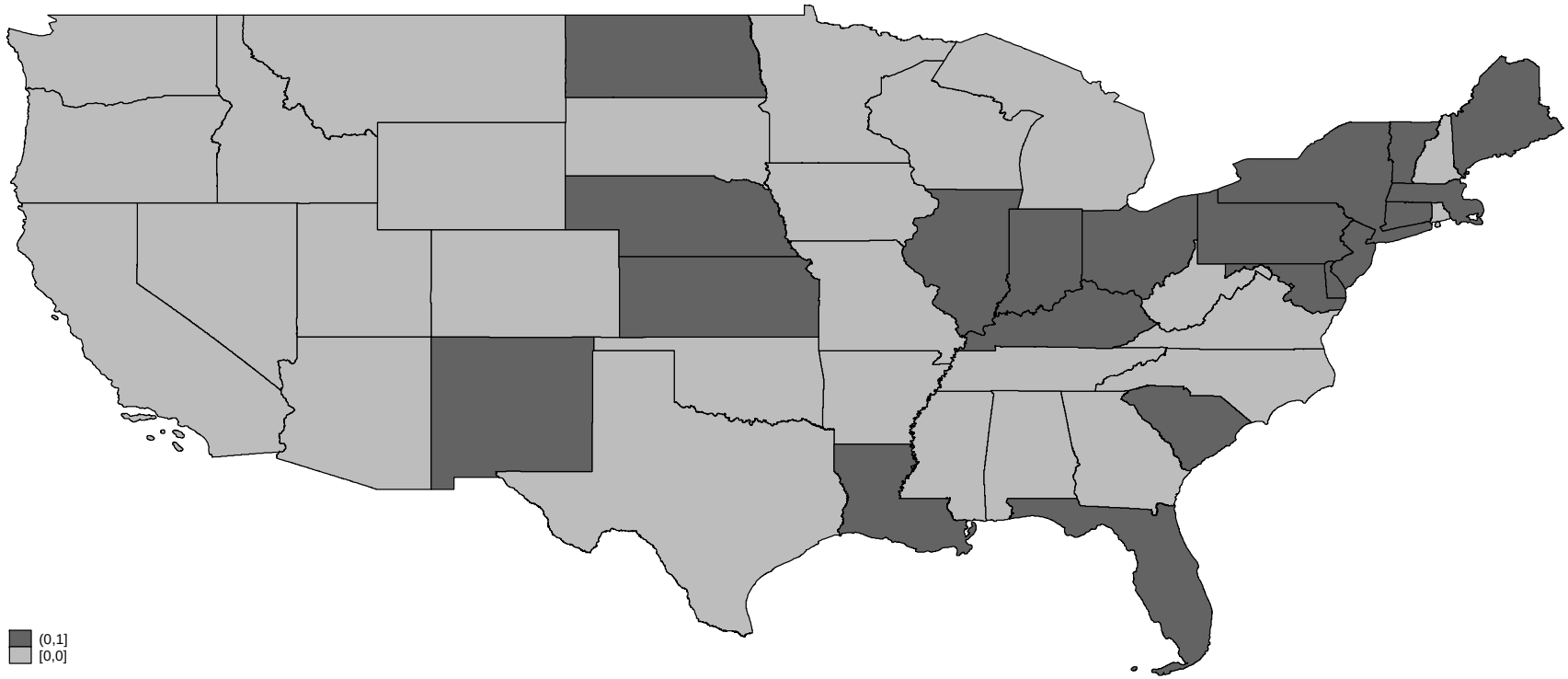

Figure 3

The Effect of Judicial Foreclosure Requirement on Actual Foreclosures

The left panel plots the foreclosures per delinquent account ratio for 2008 and 2009 by state. States that require a judicial foreclosure are shown in black. The right panel plots foreclosures against delinquencies, where the sample is split by whether the state requires a judicial foreclosure.

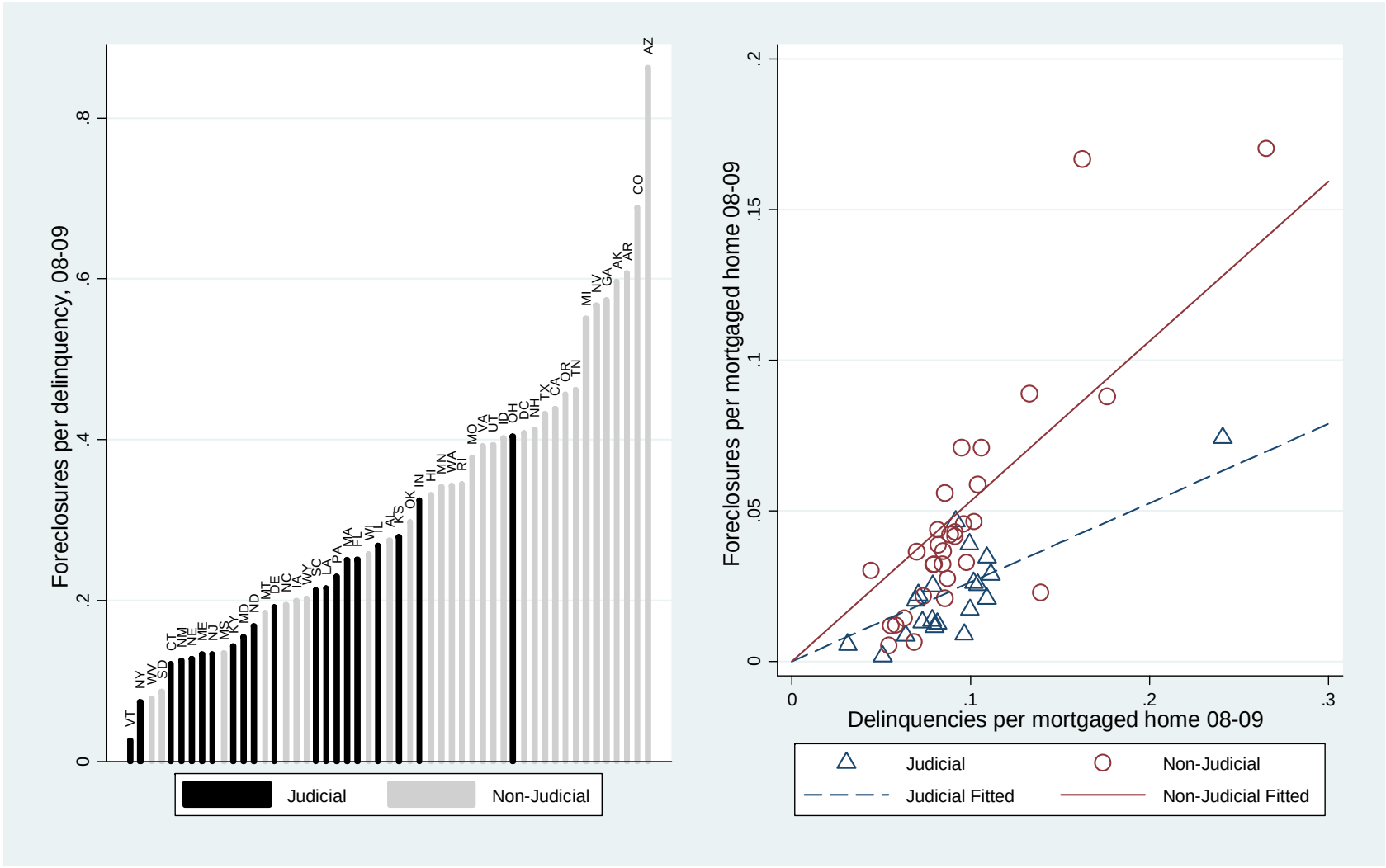

Figure 4
Foreclosures and Other Variables:
Zip Codes Near the Border Sample

The figures plot averages of foreclosures and other variables for zip codes that are near borders where the judicial requirement regime changes across states. We generate the graphs by regressing the variable of interest on state-border-group FE and on 1-mile band distance-to-the-border dummies (where the dummies are negative for judicial states) and then plot the coefficients on the distance-to-the-border dummies. The border is at 0, the omitted category.

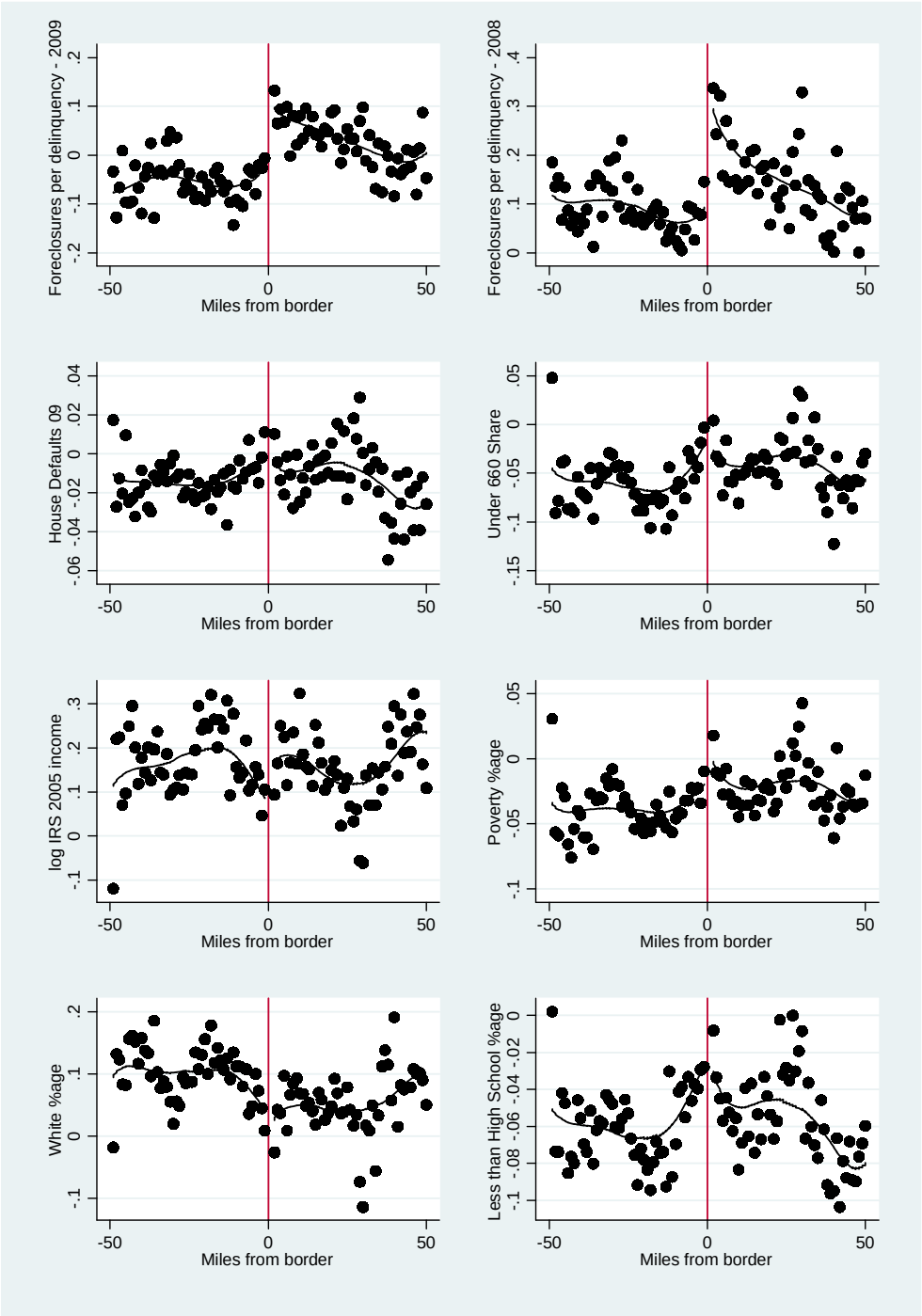

Figure 5
Foreclosures and House Prices, Reduced Form

The figures plots house price growth in judicial and non-judicial states from 2004 to 2010. The averages are weighted by total population.

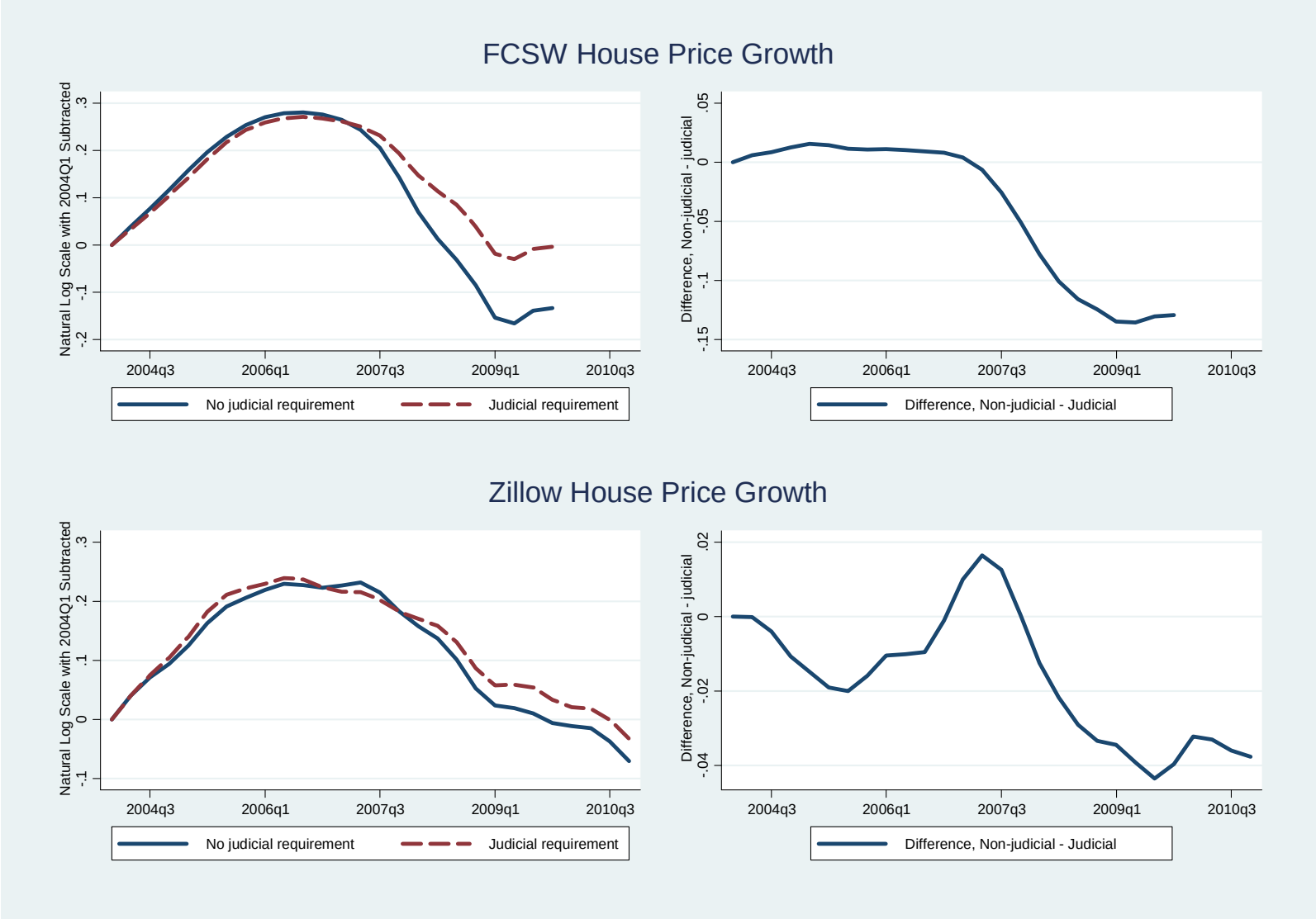

Figure 6
House Price Growth and New For Sale Listings
Zip Codes Near Border Sample

The left and middle panels plot the house price growth from 2008 to 2009 (2008 to 2010 for Zillow) for zip codes that are near borders where the judicial requirement regime changes across states. The right panel plots the number of houses newly listed for sale per homeowner in 2009 for zip codes that are near borders where the judicial requirement regime changes across states. We generate the graphs by regressing the outcome variable on state-border-group FE and on 1-mile band distance-to-the-border dummies (where the dummies assume negative values for judicial states) and then plot the coefficients on the dummies. The border is at 0, the omitted category.

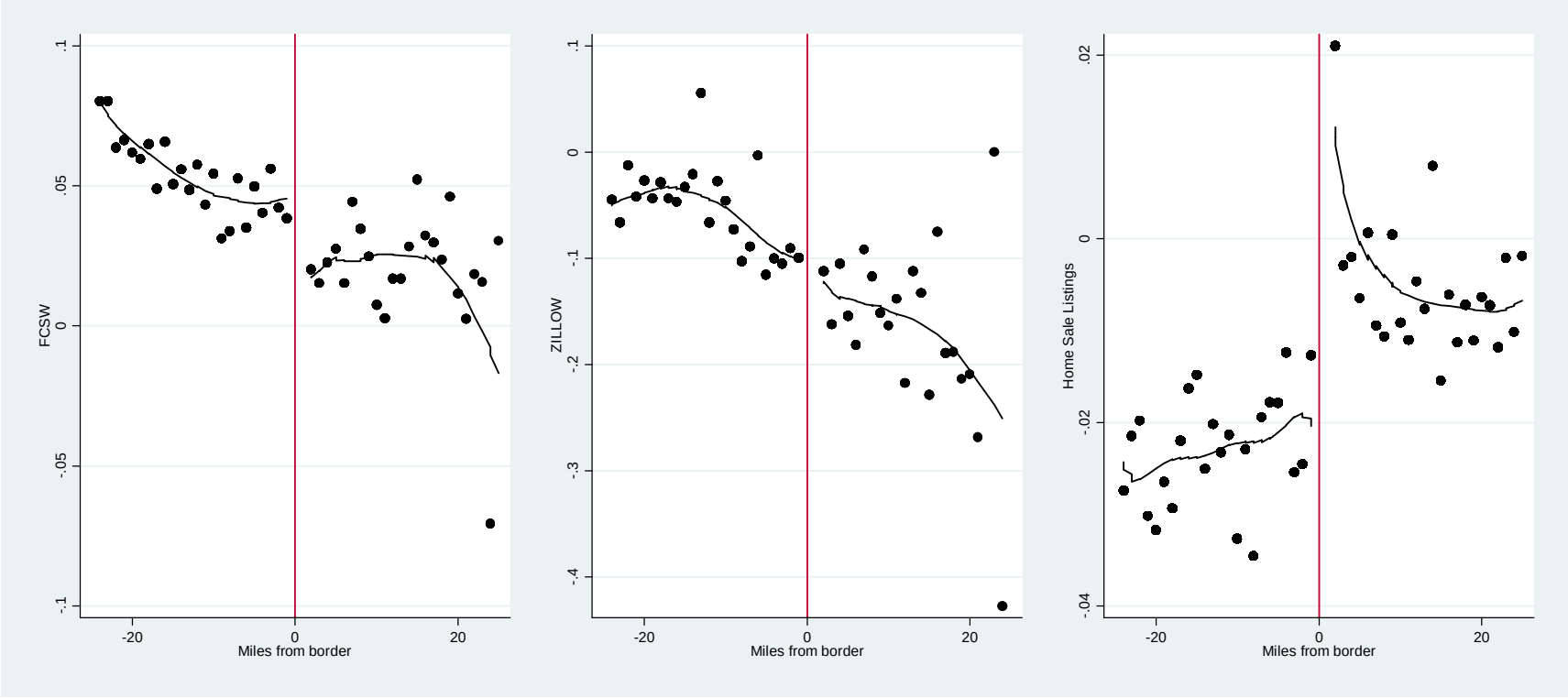

Figure 7

State Level Correlation of Foreclosures with Residential Investment and Durable Consumption

Residential investment is measured by the value of new permits for new residential construction as collected by the Census. Auto sales data are from R.L. Polk.

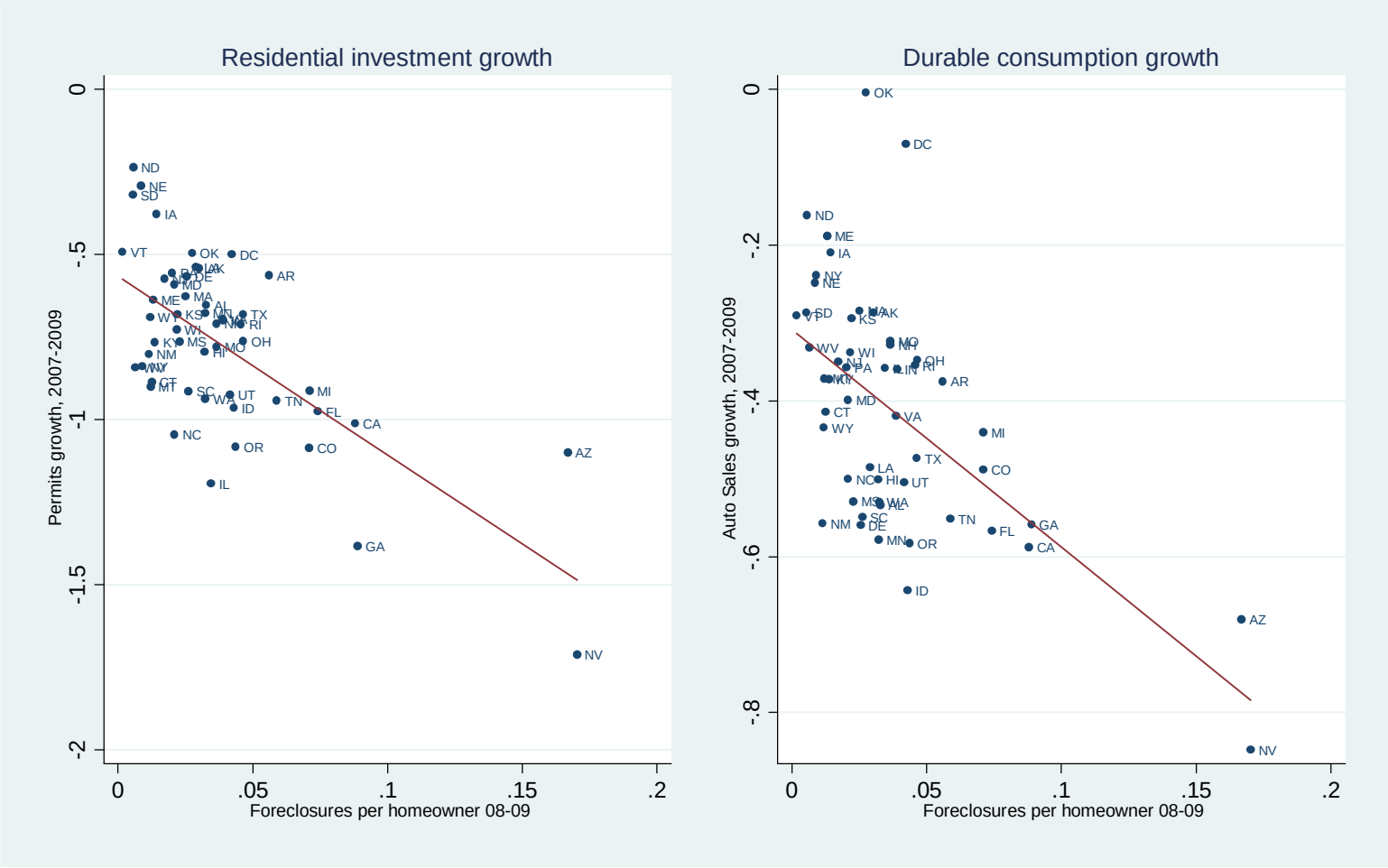

Figure 8

Foreclosures, Residential Investment, and Durable Consumption, Reduced Form

The figures plot residential investment (top) and auto sales (bottom) growth in judicial and non-judicial states from 2004 to 2010. The averages are weighted by total population.