

What Matters More for Foreclosure Rates – Income or House Price Shocks? A Metropolitan-Level Study

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Introduction

- As of October 2011, 1 in 1,230 U.S. homes (0.0813%) were in foreclosure; this rate is double the rate of foreclosure observed at the beginning of 2007 when 1 in 3,154 U.S. homes (0.0317%) were in foreclosure.

While foreclosure rates in cities like Las Vegas, NV, and Stockton, CA, were more than twice the national average at the beginning of 2007, the percent of homes foreclosed has since skyrocketed, reaching foreclosure rates three to four times higher than the national average in October 2011 (see Table 1).

Not all cities shared the same fate; New York City and Atlantic City, NJ, for example, have foreclosure rates that are much lower than the national average (see Table 2).

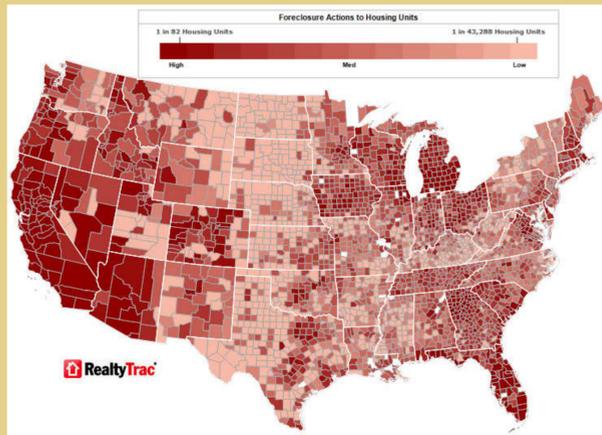


Figure 1: Foreclosure Actions to Housing Units, October 2011

What accounts for the variation in foreclosure rates observed across metropolitan areas?

Differences in house price fluctuations

Falling house prices may leave some homeowners “underwater,” or with a mortgage loan balance that exceeds the market value of the house; homeowners in this situation are at increased risk for defaulting on mortgage payments, the first step towards ending up in foreclosure. Cities experiencing greater house price depreciation are likely to have relatively higher foreclosure rates.

Asymmetric income shocks

A negative income shock can leave a homeowner unable, financially speaking, to make monthly mortgage payments. The recent recession hit some metropolitan areas harder than others, and those metropolitan areas with greater declines in employment (more instances of job loss) are likely to experience relatively higher foreclosure rates.

Table 1: Metropolitan Areas with the Highest Foreclosure Rates, October 2011

Metropolitan Area	Percent of Homes in Foreclosure	1 in
Las Vegas, NV	0.347%	1 in 288
Grand Junction, CO	0.320%	1 in 313
Stockton, CA	0.258%	1 in 388
Merced, CA	0.254%	1 in 394
Phoenix, AZ	0.245%	1 in 408
Vallejo, CA	0.234%	1 in 427
Riverside, CA	0.225%	1 in 444
Bend, OR	0.224%	1 in 446
Medford, OR	0.221%	1 in 452
Modesto, CA	0.219%	1 in 457

Data source: “Homes Foreclosed (%)” from Zillow.com

Table 2: Metropolitan Areas with the Lowest Foreclosure Rates, October 2011

Metropolitan Area	Percent of Homes in Foreclosure	1 in
Binghamton, NY	0%	-
State College, PA	0%	-
Utica, NY	0%	-
New York, NY	0.004%	1 in 25,000
Atlantic City, NJ	0.008%	1 in 12,500
Rochester, NY	0.012%	1 in 8,333
Oklahoma City, OK	0.013%	1 in 7,692
Poughkeepsie, NY	0.014%	1 in 7,143
Albany, NY	0.015%	1 in 6,667
Spartanburg, SC	0.016%	1 in 6,250

Data

We collected data for 88 metropolitan areas over the January 2001 to October 2011 time period for the following variables:

- Homes Foreclosed (%)
Source: Zillow.com
- Zillow Home Value Index (Source: Zillow.com)
Expected relationship with foreclosure rate: As house prices increase, the Zillow Home Value Index rises, and homeowners are less likely to default on mortgages and enter foreclosure.
- Employment (Source: Bureau of Labor Statistics)
Expected relationship with foreclosure rate: As employment rises, fewer homeowners are facing financial difficulties and are less likely to enter foreclosure.

- Building Permits (Source: Dept. of Housing and Urban Development)
Expected relationship with foreclosure rate: An increase in building permits typically occurs in response to higher local demand for housing units, so a rise in building permits is expected to occur in areas with relatively lower foreclosure rates

Our sample data has a panel structure ($\hat{t} = 88$; $\tau = 130$) which enables us, through the use of regression analysis, to pinpoint the relationship between foreclosure rates, house prices, employment and building permits through variation observed both across cities and over time.

A natural log transformation was applied to the Zillow Home Value Index, employment and building permits; a change in the natural log of a variable is approximately equal to a percentage change of the variable, which is convenient for interpreting results.

Methodology & Results

Panel Vector Autoregression (Panel VAR) Model

- The four variables identified in the previous section are best described as “endogenous,” or simultaneously determined.
 - For example, a fall in house prices in a given metropolitan area is likely to result in a higher foreclosure rate, but the rise in foreclosures may also contribute to further declines in house prices in the area since banks often sell foreclosed homes at reduced prices.
- A vector autoregression model treats each of the variables in the system as endogenous, allowing for dynamic relationships between the variables; a panel VAR model is simply a vector autoregression model applied to a panel data set, which best describes our sample data.

Theoretical model: $z_{it} = \Gamma_0 + \Gamma_1 z_{i,t-1} + \varepsilon_{it}$ where $z_{it} = \{\text{employment, permits, house prices, foreclosures}\}$

The panel VAR was estimated using the approach of Love and Zicchino (2006)

The estimation results from a panel VAR are typically presented in two forms:

Variance decompositions: A variance decomposition for variable Z indicates the proportion of Z's variance that is attributed to shocks in the system variables

Impulse response functions: An impulse response function provides the response of variable Z to a one-standard-deviation shock in one of the system variables

Results

- The variance decomposition results for foreclosures reveal an interesting pattern.
 - Initially ($t=12$ months), only 24% of the variation in foreclosures is attributed to house prices while 74% of the variation is attributed to past changes in foreclosures (see Figure 2).
 - However, as time passes ($t \rightarrow 48$ months), a larger fraction of the variance in foreclosures is attributed to house prices, with 76% of the variation in foreclosures attributed to house price movements after 48 months (see Figures 3-5).
 - Only 1-2% of the variation in foreclosures is attributed to employment at any of the time horizons.
 - The variance decomposition results clearly articulate that house prices explain a greater proportion of the variation in foreclosures vs. employment.
- The impulse response functions, also suggest that a house price shock has a more significant impact on foreclosures vs. a shock to employment.
 - The one-standard-deviation (positive) shock to house prices leads to a statistically significant decrease in foreclosures (see Figure 6); however, a positive shock to employment has an impact on foreclosures that is not statistically different from zero (see Figure 7).

Figures 2-5: Variance Decompositions for Foreclosures at $t = 12, 24, 36, 48$

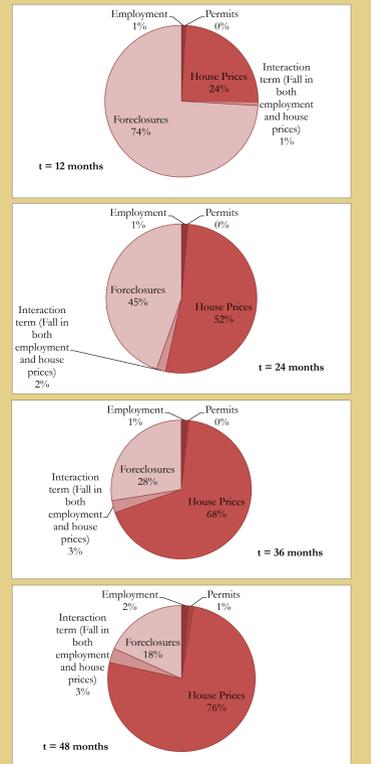


Figure 6: Impulse Response of Foreclosures to a House Price Shock

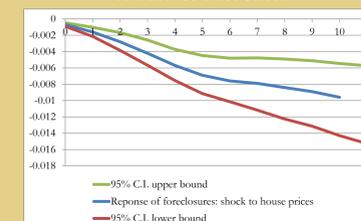
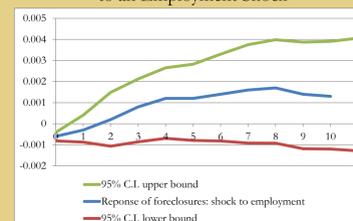


Figure 7: Impulse Response of Foreclosures to an Employment Shock



Discussion & Future Research



Housing markets are inherently local, so our ability to use metropolitan-level (instead of state-level) data in this study allows us to capture information about local house price fluctuations, in the form of the Zillow Home Value Index, to explain movements in foreclosure rates. The empirical results from the panel VAR suggest that house price fluctuations are relatively more important than employment or building permits for explaining the observed variation in foreclosure rates across metropolitan areas. These preliminary regressions do include an interaction term that attempts to capture instances of falling house prices and drops in employment that happen concurrently (in the spirit of the Double Trigger Theory discussed in the state-level study); however, we will continue to explore other possible ways to account for negative house price and income shocks that occur simultaneously in an effort to test the possible explanatory power of the Double Trigger Theory at the metropolitan level.