# Double Trigger: Does it Explain Differences in State Level Foreclosure Starts?

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## Motivations

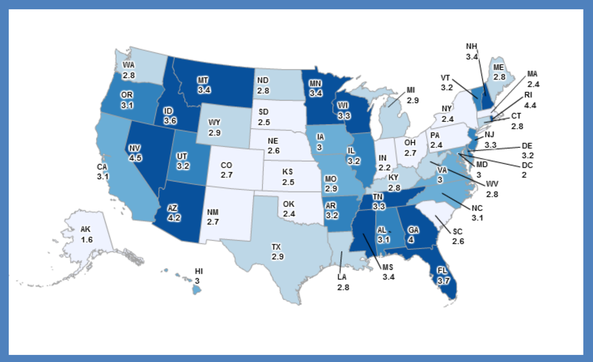



**Figure 1**: Percent of outstanding loans starting foreclosure in the 1st quarter of 2011

The past few years have seen impressive variation in foreclosure rates across the United States, particularly at the state level. In the first quarter of 2011 the percent of outstanding loans starting the foreclosure process ranged from 1.6% in Alaska to 4.5% in Nevada (Figure 1). What factors might explain the observed variation in the percent of loans in foreclosure?

One of the key narratives of the foreclosure crisis has been "strategic default". That is, those foreclosed upon are still able to make payments but choose to default on the mortgage as a financial decision motivated by falling house prices. Can falling house prices ***alone*** explain the variation in foreclosures? We explore this topic and present an alternate hypothesis, the Double Trigger Theory, as a way to explain the variation in foreclosures observed across states.

## Double Trigger Theory

House price shocks are indeed one of the defining explanations of the recent increases in foreclosures. Falling house prices reduce homeowners' equity, and as mortgage equity falls to a point where the loan is considered underwater, or that the balance due on the loan is larger than the market value of the house, some homeowners may make the strategic decision to stop making mortgage payments.

Existing research conducted with loan-level data, however, has documented the fact that falling house prices alone don't explain all foreclosures; Bhutta, Dokko, and Shan (2010), for example, find that the "median borrower does not walk away until equity has fallen to -62 percent of the house value" – far deeper into negative equity territory than many borrowers have actually fallen. Why would this be? Homeowners attach value to local schools, proximity to amenities, personal connections and other non-observable elements of the home that might dissuade them from electing to default just because the home's market value has decreased.

An additional factor that may contribute to rising foreclosure rates would be a negative income shock (i.e. job loss). A strain on a homeowner's budget might force a choice between mortgage payments and other consumption, raising the likelihood that he will default on his mortgage and enter foreclosure. Moreover, *a combination of falling house prices and rising unemployment rates might explain more than each variable could alone*. This hypothesis, known as the **Double Trigger Theory**, offers a key to explaining the observed variation in foreclosures. A homeowner with negative equity who has recently lost his job will be more likely to fall into foreclosure vs. a homeowner with negative equity who is still financially able to make mortgage payments.

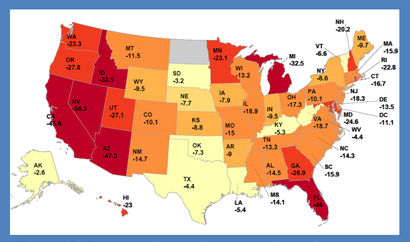



**Figure 2**: Percent change in house prices since recent peak, as of 2011q1

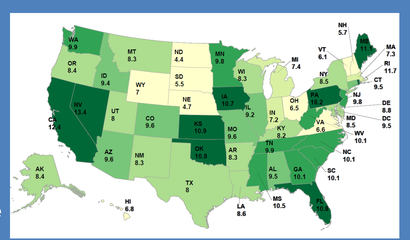



**Figure 3**: Unemployment rate (%), 2011q1

## Methodology

We used regression analysis to estimate the impact of various determinants on the percent of loans in foreclosure across the 50 states and DC over the 2009q4-2011q1 period. More specifically, we applied the panel least squares estimator to a regression equation similar to the following:

$$FC_{it} = \beta_0 + \beta_{HPI} HPI_{it} + \beta_{INC} INC_{it} + \beta_{DTR} DTR_{it} + \mathcal{E}_{it}$$

where

- $FC$ is the percentage of outstanding loans in the $i^{th}$ state that started the foreclosure process during a given quarter (t)
- $HPI$ is a house price indicator
- $INC$ is an income shock indicator
- $DTR$ is the term that represents the "double trigger" effect. The house price indicator and income shock indicator are each demeaned and then multiplied together to create an interaction term. This interaction term measures the effect of a combination of a falling house prices and a shock to income. It takes the following form:

$$DTR = (HPI_{it} - HPI_{mean}) \cdot (INC_{it} - INC_{mean})$$

- The error term, $\mathcal{E}_{it}$, captures the unobserved or unexplained component of the dependent variable
- Period and regional fixed effects were included in each regression.

## Data & Results

### Variables, Expectations & Data

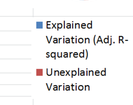
**Foreclosures:** We used percent of outstanding loans starting foreclosure in a given quarter, drawn from the Mortgage Bankers Association National Delinquency Survey, as the measure of foreclosures. More specifically, we used variants of this series that include foreclosure starts for just subprime loans or just prime loans as well as foreclosure starts for all loans.

**House Price Indicator:** We constructed a series called "Number of Quarters Since Peak" to act as the house price indicator. First, the quarter in which the FHFA House Price Index reached its peak was determined for each state. Next, for each time period for each state, we determined for how many quarters the state's house prices had been in decline. All else held equal, we expect that the longer the house prices are in decline (which corresponds to a higher value of HPI), the more likely it is that homeowners will fall into foreclosure, and the percent of loans starting the foreclosure process will rise.

**Income Shock Indicator:** We used two representations of the unemployment rate for the income shock indicator. The first is the official unemployment rate, which is the series "U3" from the Bureau of Labor Statistics. The second measure added underemployment (captured by the series "U6" minus "U5") to the official unemployment rate. All else held equal, we expect an increase in this variable (either measure) to correspond to increases in foreclosure starts as more homeowners are experiencing income shocks.

**Double Trigger Term:** As mentioned in the previous section, the double trigger term is an interaction term composed of the house price and income shock indicators, measured relative to their mean value. As this term increases in value, the state is experiencing house price and income shocks that are increasing in severity, so we expect foreclosure starts to rise along with the value of the double trigger term.

| Subprime Foreclosure Starts | | Goodness of Fit (Adj. R-squared) |
|---|---|---|
| **Model 1: Unemployment** | | |
| x | β | |
| Number of Quarters Since Peak | 0.088*** | |
| Unemployment | 0.058** | |
| Double Trigger Term | 0.016*** | |
| **Model 2: Unemployment and Underemployment** | | |
| x | β | |
| Number of Quarters Since Peak | 0.082*** | |
| Unemployment and Underemployment | 0.057*** | |
| Double Trigger Term | 0.012*** | |
| **Prime Foreclosure Starts** | | |
| **Model 1: Unemployment** | | |
| x | β | |
| Number of Quarters Since Peak | 0.057*** | |
| Unemployment | 0.069*** | |
| Double Trigger Term | 0.012*** | |
| **Model 2: Unemployment and Underemployment** | | |
| x | β | |
| Number of Quarters Since Peak | 0.046*** | |
| Unemployment and Underemployment | 0.058*** | |
| Double Trigger Term | 0.009*** | |
| **All Foreclosure Starts** | | |
| **Model 1: Unemployment** | | |
| x | β | |
| Number of Quarters Since Peak | 0.041*** | |
| Unemployment | 0.039** | |
| Double Trigger Term | 0.005** | |
| **Model 2: Unemployment and Underemployment** | | |
| x | β | |
| Number of Quarters Since Peak | 0.031*** | |
| Unemployment and Underemployment | 0.040*** | |
| Double Trigger Term | 0.002 (n.s.) | |
| **Key:** | | |
| (n.s.) - not significant at a 10% level | | |
| * - significant at a 10% level | | |
| ** - significant at a 5% level | | |
| *** - significant at a 1% level | | |




### Results

Our regression results, for the most part, are consistent with expectations. Across all of our models we see positive and significant correlation between foreclosure starts and the house price variable, Number of Quarters Since Peak. The estimated slope coefficients on the income shock variables are also positive and significant across models; the models using Unemployment plus Underemployment tend to explain a greater fraction of the variation in foreclosure starts than the models using just Unemployment as the income shock measure. The estimated slope coefficient on the Double Trigger Term is also positive in all models, matching our expectation that a combination of declining house prices and increasing unemployment contributes to higher foreclosure starts and providing support for the Double Trigger Theory of foreclosure. Furthermore, this variable is highly significant for the models explaining foreclosure starts for subprime and prime loans. In the model for foreclosure starts as a percent of all loans, the statistical support for the Double Trigger Term is not quite as strong; the estimated slope coefficient is not significantly different from zero (p-value = 0.11) in the specification featuring Unemployment plus Underemployment as the income shock measure, but it is significant at the 5% level in the specification featuring Unemployment.

## Discussion & Future Research

The empirical results are encouraging because they reaffirm the link between house prices and foreclosure as well as between income shocks and foreclosure. Moreover, the results provide support for the Double Trigger Theory at the state level, a contribution to the existing literature documenting its importance at the individual (loan) level. However, it is our opinion that the results cannot represent the full depth of the Double Trigger effect. First, by using state-level housing data, we miss local variation in variables like house prices that are better observed at the metropolitan level (Figure 4). Being able to account for this local variation may potentially yield more interesting results about the interaction between income shocks and falling house prices and their collective impact on foreclosure starts. Second, while fluctuations in house prices and unemployment influence foreclosure rates, it must be noted that large scale foreclosure shocks can increase the speed at which house prices fall and unemployment rises. Our current methodology does not provide us with the tools to address this kind of endogeneity. In order to address these issues, subsequent research will take place using metropolitan-level data and an estimation approach, the panel vector autoregression, that treats the variables as endogenous.

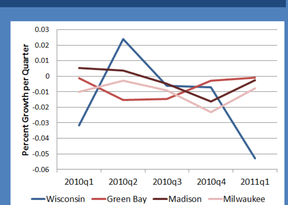



**Figure 4**: House Price Index for Select Cities in Wisconsin

**Bhutta, N., J. Dokko, and H. Shan (2010). "The Depth of Negative Equity and Mortgage Default Decisions," Finance and Economics Discussion Series Paper No. 2010-35, Federal Reserve Board**

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