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Contagion effects in strategic mortgage defaults☆

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ABSTRACT

Using a large sample of U.S. mortgages observed over the 2005–2009 period, we document contagion effects in strategic mortgage defaults. Strategic defaults result from borrowers *choosing* to exercise their in the money default option and our findings suggest this choice is influenced by the delinquency rate in surrounding zip codes (within a 5 mile radius), after controlling for other known determinants of mortgage default. These controls include a large array of borrower and loan characteristics, local demographic and economic conditions, spatial correlations, and changes in property values. Our findings that the local area delinquency rate is an important factor for strategic defaulters (borrowers that can be influenced in their decision) but not for defaults that are the result of inability to pay (borrowers that had no choice) lend support the contagion hypothesis. Our estimates suggest that a 1% increase in the local area delinquency rate may increase the probability of a strategic default by 7.25–16.5%.

1. Introduction

The 2007–2010 real estate market collapse and ensuing financial crisis has highlighted the previously little known fact outside of academic and banking circles that US homeowners hold the equivalent of a put option on their mortgages. That is, homeowners have the option to return their property to the lender at any time, which absent other costs becomes valuable if the loan balance exceeds the market value of the underlying property. Exercising this option necessarily results in a mortgage default, but unlike defaults resulting from an inability to pay, these "strategic defaults" occur because homeowners recognized that the benefits of a default outweighed its costs (Das, 2012).

The relative increase in strategic defaults in the last recession has renewed interest among academics and policymakers in the factors that may compel homeowners to default on their mortgages.[1] In a recent paper, Guiso et al. (2013) using survey data find evidence of social contagion: homeowners with negative equity are more likely to strategically default if they know others who have done so. We empirically investigate strategic defaults as identified in Guiso et al. (2013) using a sample of over 30 million mortgages originated over the period 2000–2008 and observed from 2005 to 2009, a period of significant stress in the US housing markets. Specifically, we test the extent to which mortgage default frequencies affect the probability of a strategic default of a nearby mortgagor, controlling for other risk factors, including changes in the estimated value of the home.

Peer-effect models are notoriously challenging to identify. In its simplest form, the problem lies in separating the hypothesis that the actions of neighbors influence the actions of individual homeowners from the scenario that such an observation is simply a reflection of common actions of homeowners in the neighborhood. If the hypothesized effect is linear, regressing the outcomes of

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[1] Foote et al. (2008) find that during the 1990–1991 recession only 6.4% of homeowners with negative equity engaged in a strategic default whereas a 2011 study by Experian-Wyman estimates that in the fourth quarter of 2011 23% of all mortgage defaults were strategic.

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members of a group on the average group outcome would not, in general, yield identification (Manski, 1993). In theory, however, one could exploit variations in functional forms or particularities of the data generating process in order to achieve identification. Indeed, a variety of papers have pursued these detection strategies by using panel data (Brock and Darlauf, 2007), by exploiting non-linearities (Brock and Darlauf, 2001; Sirakaya, 2006), by introducing lags (Manski, 2000) or variations in group sizes (Lee, 2007).

Our identification strategy is motivated by this literature. The non-linear aspect we exploit relies on the observation that defaults occur for one of two reasons: borrowers are *unable* to service their debt or borrowers are *unwilling* to repay because they recognize that in their situation the benefits of defaulting outweigh their costs. In the first case, social contagion should be nonexistent because borrowers do not choose to default. In the second case, borrowers choose to default and their choice can be the result of learning from their neighbors' actions. Specifically, our identification strategy is designed to show that (i) the area delinquency rate does not affect the probability of default in the overall population of borrowers, but (ii) for borrowers that are most likely to be strategic defaulters (homeowners with deep negative equity in their homes yet with high credit scores) the area delinquency rate statistically and economically increases their probability of default.

We examine the probability that a given loan in a zip code enters into default as a function of the 3-month lagged area delinquency rate (the 90+ days delinquency rates within a 5 mile radius of each zip code), while controlling for economic fundamentals such as borrower and loan characteristics, changes in property values, economic and demographic conditions at the zip code level, spatial correlations, as well as time and geographic fixed effects. We find that for the general population the coefficient on the area delinquency rate does not affect the probability that a loan will enter into default. However, for borrowers that are more likely strategic defaulters we find that a one percent increase in the area delinquency rate results in a 1.1–2.5% increase in the probability of default. Moreover, the coefficient on the area delinquency rate for borrowers in this group is statistically different from borrowers less at risk of strategically defaulting.

While our results are consistent with a social contagion effect, they may still be influenced by unobservable, but correlated, shocks. We fully recognize that, short of an experiment that would assign homeowners to neighborhoods, correlated effects are hard to rule out. To the extent that correlated shocks are not fully absorbed in the controls, our estimates may be upward biased. To reduce the likelihood that these shocks are driving our results, we further exploit non-linearities in peer-effects as in Imberman et al. (2012). If the results are driven by social contagion, the sensitivity of defaults to nearby defaults should increase with the number of affected units as the information they provide about the benefits of strategically defaulting increase. Consistent with this conjecture we find that the sensitivity of the probability to enter delinquency to the area delinquency rate monotonically increases in more affected areas.

In addition to this non-linear test, we perform four other robustness checks. First, instead of using high credit scores to identify strategic defaulters, we examine whether Government-Sponsored Enterprise (GSE) lending classification makes a difference. This categorization is motivated by Keys et al. (2010) results showing that GSE borrowers appear to behave differently than non GSEs borrowers. If, on average, GSE borrowers are more sophisticated than non GSE borrowers, they may be more likely to exploit the option value of default for strategic reasons. Consistent with this insight, we find that the area delinquency rate increases the probability of default for GSE borrowers with negative equity in their homes, relative to other groups.

Second, following the empirical strategy in Piskorski et al. (2010), we exploit the increase in the number of strategic defaulters over time, from a handful in 2005 and 2006 to over 90,000 by 2009. Similar to the non-linearities in peer-effects logic just discussed (e.g. Imberman et al., 2012), an increase in the number of strategic defaulters should result in a higher default-area delinquency rate sensitivity. Our results are consistent with this observation. In particular, we re-estimate our main regressions but only for 2007–2009, and find that the effect of the area delinquency rate is higher for this sub-period, relative to the entire sample period.

Our third robustness check utilizes a borrower's payment history as another mechanism for identifying strategic defaulters. In particular, we classify borrowers into two broad groups: those that never missed a payment in their mortgage (prior to default), and those that did. We argue that, on average, those that never missed a payment ought to be, at least relative to those that did miss some, less likely to be defaulting because of inability to service their debt. Consistent with this argument, we find that the estimated default-area delinquency rate coefficient is highest for the group of borrowers that never missed a payment in their mortgage, but had a loan-to-value ratio in their property of over 120%.

The final robustness check is the inclusion of county fixed effects interacted with quarter fixed effects in the main model. The inclusion of these interaction effects aims at absorbing any remaining local (county) and time (quarter) variation not already controlled for in the model. The results are robust to the inclusion of these interaction effects.

Our findings suggest that there may be important consequences of mortgage defaults on neighborhoods. For example, Campbell et al. (2009) and Harding et al. (2009) find that foreclosures reduce neighborhood home prices. Additionally, Immergluck and Smith (2006) and Ellen et al. (2012) among others find that foreclosures increase local crime rates. In contrast, we document that mortgage defaults incite neighbors to default beyond what can be explained through lower property prices. Second, this paper fits in the growing literature examining the effectiveness of debt renegotiation programs implemented privately or through the government. Notably, Mayer et al. (2014) find evidence that homeowners strategically defaulted on their mortgages to take advantage of a court settlement against CountryWide Financial that offered loan modification programs to seriously delinquent borrowers. Also, Agarwal et al. (2013) find that the Home Affordable Modification Program (HAMP), which provided intermediaries of distressed loans with financial incentives to renegotiate mortgages, appears to have had modest effects in reducing foreclosures and indicates that debt renegotiation programs that either increased (CountryWide) or decreased (HAMP) foreclosures on targeted loans are likely to have sizable spillover effects on other loans. It further highlights that social interactions with neighbors are important in shaping homeowners' strategic behavior. Third, identifying peer-effects can educate the mortgage securitization design process. Deep flaws in the mortgage securitization process such as asset-misrepresentation by intermediaries (Piskorski et al., 2015) and a bias to foreclose over similar mortgages held by banks have been reported (Piskorski et al., 2010). Our results suggest that accounting for amplification effects through social interactions should be an integral part in both evaluating the welfare implications of these studies and in selecting the pool of properties to be securitized.

The question we address in this paper is similar to that of Towe and Lawley (2013). Examining data in 5 Maryland counties, they show that, on average, one additional foreclosure in a neighborhood of 12 houses around a reference unit increases the probability of foreclosure of that unit by 18%. In contrast, this nationwide study uses the loan-to-value and credit scores of borrowers

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