6 Testing the wealth effect on strategic default

Now that we have described the trade-off faced by households when deciding whether or not to walk away from an underwater mortgage contract, we present some evidence of the existence of the proposed wealth effect on the strategic default behavior. We build a panel data set in order to analyze the effect of house price drops on mortgage delinquency. We show that delinquency is more sensible to a decrease of house prices in areas with higher per capita income.

To test the impact of the wealth effect on delinquency, we estimate the following model with mortgage delinquency rate as dependent variable:

$$delinquency_{it} = \beta_0 + \beta_1 \cdot \Delta P_{it} + \beta_2 \cdot \Delta P_{it} \cdot income_{it} + \gamma \cdot X_{it} + \alpha \cdot year_t + c_i + \epsilon_{it} \quad (6\text{-}1)$$

where ΔP_{it} is the house price variation and $income_{it}$ is the per capita personal income in area i at time t. We control for other characteristics that affect mortgage delinquency in the vector X_{it}. In the vector $year_t$, we include year dummies to account for macroeconomic effects that are common to all areas.

House price variation is included in the model to capture variations of net home equity from mortgage holders. As argued previously in the paper, households have a stronger incentive to become delinquent when mortgage debt exceeds their home value. Most of the variation in net home equity comes from house price movements because mortgage debt changes in a pre determined and stable path. Due to their low amortization payment requirements, this is specially relevant for new mortgage contracts which have high current loan to value ratio and, therefore, are more exposed to house price drops. In line with the literature (Foote et al. (2008)), we expect the coefficient β_1 to be negative. There is, price drops should trigger a higher mortgage delinquency in a region once we control for measures of economic tightness and mortgage contract characteristics.

The new feature introduced in this paper is the existence of a wealth effect in the strategic default decision. Because low-income families experienced a rare opportunity to access the mortgage market, they are less likely to obtain funding again if they default on their mortgages. Hence, low-income households

should have a lower probability of defaulting strategically on their mortgages in response to a large price drop.

According to this wealth effect, if we control properly for the availability of funds to borrowers in an area, then house price drops should be less harmful to mortgage delinquency where borrowers have a lower income. Therefore, we expect the coefficient β_2 to be negative. In other words, mortgage delinquency in regions with a higher per capita income should be more sensitive to house price movements.

The term c_i in equation (6-1) accounts for time-invariant characteristics of region i that affect mortgage delinquency. Ghent and Kudlyak (2010) describe differences in state legislation regarding the possibility of recourse in mortgage contracts to estimate the pervasiveness of strategic default. Since state laws do not change very often, our model does not require us to control for this sort of effect if all the chosen area units do not cover more than one state.

Guiso et al. (2009) argue that moral constraints are important to explain the strategic default decision of households. Our model accounts for this effect because moral values are expected to be relatively stable over time in specific regions. A household derives its moral values from daily experiences that are extremely influenced by the community it belongs, therefore groups of families in an area are likely to share the same set of moral constraints. This set of moral values is a result of one's lifelong experiences and are just marginally affected by current incidents, hence moral constraints should not change a significantly over time.

Estimating a fixed effects regression also controls for other relevant variables such as population composition and income distribution. A greater proportion of low-income households may be related to a higher delinquency rate through more subprime lending during the 2002-2005 period. Since income distribution is a slow moving variable, it should not affect our model. This is specially true when we estimate the model to the restricted sample to the post-crisis period.

To estimate model (6-1), we build a panel data set for eleven US states and run a regression with state fixed effects. In the next subsection, we describe our data choice to test the hypothesis that β_2 is negative.

6.1 Data

Data on mortgage delinquency come from the Quarterly Report On Household Debt and Credit from the New York Fed. The report provides us with a quarterly series of the Percent of Mortgage Debt 90+ days which

considers the ratio between mortgage contracts that are either in foreclosure or late for 90 days or more and the total mortgage debt. The series is available for eleven US states[1] that, together, embody 53.9% of the population of the United States. Since these series are available from 1999 to 2010, we restrict our sample to those eleven states from 1999 to 2010 in a quarterly frequency.

We use data on house prices from the Federal Housing Finance Agency. We collect the seasonally adjusted purchase only house price index for the selected states which are available for each quarter from 1991 to 2011. Moreover, we use state level data on income and unemployment. The data used for income is the state quarterly Personal Income series from the Bureau of Economic Analysis and for unemployment is the seasonally adjusted series from the Bureau of Labor Statistics.

The bottom part of Table B.2 presents the summary statistics for our full sample of eleven US states and 48 quarters. In the sample, mortgage delinquency has an average of 2.95% and a high within-state standard deviation of 3.7%. Delinquency could be as low as 0.03% and as high as 20.9%. All other variables show a similar pattern of a high within-state standard deviation.

Table B.2 also shows the variables averages in each year of the sample. We can split the sample into two periods with different characteristics, specially when we focus on the housing market. From 1999 to 2006, delinquency remained relatively stable around 1% and house prices increased continuously. This upward movement of house prices accelerated between 2002 and 2005. In the beginning of 2007 the outlook of the housing became less favorable and the average mortgage delinquency started to increase, reaching 9.7% in 2010. Along with this increase in delinquency, house prices experienced a sharp drop and the overall economic condition deteriorated with higher unemployment and lower income growth.

6.2 Results

Regression estimates of equation (6-1) are shown on Table B.3. The model was estimated using states fixed effects with different specifications and time horizons for robustness. Column (1) presents a traditional model that does not include the interaction between house price variation and per capita income. As in Elul et al. (2010) and Bhutta et al. (2011), we estimate that a price drop causes delinquency in the mortgage market to increase. Moreover, the estimated coefficients for personal income growth and unemployment are significant and present the expected signs.

[1]The states included in the sample are Arizona, California, Florida, Illinois, Michigan, New Jersey, Nevada, New York, Ohio, Pennsylvania and Texas.

To test the existence of the wealth effect on mortgage delinquency, we introduce the interaction term in the model in column (2) as in equation (6-1). Once more, unemployment and income growth present significative estimated coefficients with the expected signs. An unemployment increase of 1 p.p. implies a mortgage delinquency 0.98 p.p. higher and an income growth over two years 1 p.p. higher implies a delinquency rate 0.16 p.p. lower.

With the interaction term in the equation, the pure effect of price movements on delinquency is no longer significative. Furthermore, the estimated coefficient of the interaction term is negative and significant which means that the impact of a price drop on mortgage delinquency is stronger in states with a higher per capita personal income. As argued previously, this result can be interpreted as evidence of the wealth effect discussed in the paper.

To gain an understanding of the economic importance of this wealth effect, let us estimate the impact of a 20% drop in house prices over a two years horizon in states with different income levels. Consider California and Arizona that had per capita personal income of 44 and 35 thousands of dollars respectively in the last quarter of 2010. According to the model estimated in column (2), delinquency would rise by 1.7 p.p in California and by 1.4 p.p. in Arizona. The impact discrepancy in these two states results from the per capita income difference between them.

This evidence could be related the results of Ghent and Kudlyak (2010). They show that the response of the probability of default to house price drops is stronger for more expensive houses. Since expensive houses are owned by wealthier households, their finding could also be interpreted as evidence of the existence of the wealth effect. Our result is also corroborated by Elul et al. (2010). They find that the probability of default of households with high credit card utilization is less sensitive to the current loan to value ratio of their mortgages. In other words, credit restricted households are less likely to default in response to a decrease of their net home equity when compared to not credit restricted households.

6.3 Robustness Checks and Endogenicity Problems

In the last subsection, we presented a simple empirical test that offers evidence of a wealth effect on mortgage delinquency. Now we discuss some problems in the estimation of equation (6-1) and provide some additional evidence as robustness check for our results.

First, consider column (3) of Table B.3 in which we change the horizon of house price variation in the interaction term in order to capture the long run effect of prices on delinquency. In this specification, both the pure house price

and the interaction term coefficients are significative. As suggested by Foote et al. (2008), households may wait to see if the house price drop is permanent before exercising their options to default on their mortgages. Using long run house price movements, we estimate the effect of the permanent house price drops over the strategic default decision.

One could argue that the effect estimated in columns (2) and (3) is related to the rapid growth of subprime lending in richer states during the easy credit period. States with a higher per capita income could have experienced a greater subprime credit expansion between 2002 and 2005, and, for this reason, their delinquency rates increased during this period. To account for this possibility we restrict sample to the post-crisis period. Since subprime lending almost disappeared in this period, the composition of borrowers in a state is given during the 2006-2010 period. With a shorter time horizon, we also expect the income distribution state population to be stable. Hence, the estimated coefficients with this restricted sample should not be biased by a changing composition of borrowers.

Columns (4) and (5) present the model estimation with the sample restricted to the 2006-2010 period. For both specifications, the estimated coefficients from the interaction term are stronger. During a high delinquency regime, when strategic default is expected to be more pervasive, the wealth effect that we propose seems to be more important. Again, to understand the economic importance of the effect, let us consider a 20% house price drop in California and Arizona. The house price drop would cause mortgage delinquency to increase by 2.1 p.p. in California and by 1.45 p.p. in Arizona. The 0.65 p.p. difference in impact is higher than the 0.3 p.p. difference estimated with the full sample.

Now let us turn to the discussion of some endogenity problems in the estimation of equation (6-1). One source of problems is that we do not consider the characteristics of mortgage contracts such as the initial loan to value ratio (LTV). Since contracts with high initial LTV are more exposed to house price drops, this should be an important variable to explain mortgage delinquency. Hence, states with a high fraction of mortgage holders with a high LTV would be more sensible to house price movements.

One important feature of subprime lending documented in the literature (Mayer and Pence (2008)) is that these contracts had higher LTV than prime contracts, so delinquency in states with more low-income families would respond more to price drops. Conversely, states with a higher per capita income would have more contracts with low LTV and, therefore, would be less sensitive to house price drops. Even ignoring this effect, the estimated coefficients on

Table B.3 are negative and significative. If we were able to control for mortgage contracts characteristics in the state, we would expect to find a stronger wealth effect.

Another relevant problem that is not treated by our model is reverse causality of delinquency on house price drops. When delinquency is high, more houses are supplied in the market which drives home prices down. Because delinquency would rise less in areas with good economic conditions and better credit quality borrowers, price drops would be smaller in high-income regions. This is computed by the interaction term in our model, implying that high-income states would have a smaller impact of prices on delinquency. Yet, the estimated coefficient is still significative.