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Adverse selection in mortgage securitization ☆

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ABSTRACT

Using several large data sets of mortgage loans originated between 2004 and 2007, we find that in the prime mortgage market, banks generally sold low-default-risk loans into the secondary market while retaining higher-default-risk loans in their portfolios. In contrast, these lenders retained loans with lower prepayment risk relative to loans they sold. Securitization strategy of lenders changed dramatically in 2007 as the crisis set in with most unwilling to retain higher-default-risk loans in return for lower prepayment risk. Contrary to the prime market, the subprime market does not exhibit any clear pattern of adverse selection.

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1. Introduction

The U.S. economy recently experienced one of the worst financial and economic crises since the Great Depression. The crisis was triggered by a collapse of the bubble in residential real estate markets. Many commentators cite the remarkable growth of securitization in recent years as a major contributor to the rise of the real estate bubble and the ensuing crisis. Part of the argument is that securitization creates additional layers of agency problems in loan origination, which lead to lax underwriting and thus higher default rates (Rajan et al., 2011).

In this paper, we investigate determinants of lenders' choice to securitize loans, focusing on the quality of loans they sell to investors in the secondary mortgage market relative to ones they retain on their balance-sheets. Lenders typically obtain information—both soft and hard (Petersen, 2004; Agarwal and Hauswald, 2010)—about the borrowers when screening their applications (origination) and may use this information when deciding the quality of loans to sell to the investors (post-origination). The conventional wisdom is that lenders may know more about the credit quality of a borrower than what is reflected in the hard information collected, such as the credit score, income, and debt payments of the borrower. Lenders could have incentives to take advantage of their unobservable private information about borrowers and retain higher-quality loans on their balance-sheets while selling inferior-quality loans. However, market mechanisms, such as lender reputation concerns, due diligence practices in the securitization chain including the originator

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representation and warranties may prevent this from occurring. The ultimate impact of lender ability to securitize on the quality of loans they retain is an empirical question—one which we investigate in this paper.

There are marked differences between securitization in the subprime and prime markets. Prime lenders typically sell mortgage loans in the secondary market to Fannie Mae or Freddie Mac, which are GSEs (Government-Sponsored Enterprises) who in turn sell to investors. In contrast, subprime loans, originated largely by different sets of lenders (Mayer and Pence, 2009), are typically packaged and sold to investors by private issuers such as investment banks. Important differences between the control GSEs or private issuers impose on the securitization chain (e.g., provision of incentives/monitoring) can influence both the origination and post-origination practices of the lenders. For instance, GSEs offer investors guarantees against default risk, while private issuers pass the default risk on to parties that are willing to bear it. As a result, it can be expected that GSEs would impose more stringent underwriting standards regarding default risk for lenders who sell loans to them. Similarly, regulatory capital requirements which are a bigger consideration for prime lenders might also influence lenders' decisions to retain risky mortgages in the prime market. Due to such differences in these markets, we examine the origination and post-origination decisions in these markets separately.[1]

In the empirical analysis, we will look at two margins of risk that the lender faces—prepayment and default risk.[2] Prepayment risk refers to the risk that mortgages may be repaid; prepayments often take place in the form of refinancing due to a decline in the interest rate, which is precisely when prepayment is costly for the investor. Default risk refers to the likelihood that the borrower may stop making payments. Earlier studies of adverse selection in mortgage markets focus mostly on default risk. In this paper, we consider both prepayment risk and default risk, and show that both risks play a critical role in lenders' securitization strategies.

We use a large detailed data set of residential mortgage loans from Lender Processing Services (LPS) Applied Analytics, Inc.[3] to compare default and prepayment risks of loans retained on lenders' balance-sheets with those that are sold to investors between 2004 and 2007. We infer the quality of the loan based on the ex post performance (whether the loan defaults or prepays) of the loan. As a result, we need to account for endogeneity, that is, observed securitization and loan performance are co-determined, with each affecting the outcome of the other. To circumvent this problem, the central identification of the paper imposes a certain structure to the securitization process. This structure follows from the institutional background involving various participants in the securitization of mortgage credit.

Our identification method is best understood as follows. We first map the loan-level observables to default and prepayment probabilities. In particular, we infer the quality on these two dimensions based on loan characteristics for all the loans in a training sample. Importantly, we construct the estimates of loan quality as a function of loan characteristics for all loans in the sample. Doing so ensures that these estimates are constructed regardless of the lender decision to sell these loans or keep them on the balance-sheet (i.e., we examine the distribution of entire set of loans). Second, we take these estimates and perform an out-of-sample forecast of default and prepayment probabilities in a holdout sample. Finally, we correlate the estimated default and prepayment probabilities in out-of-sample loans with the actual observed securitization outcomes for these sets of loans. These three steps allow us to better investigate determinants of lenders' choice to securitize loans.

Our analysis of default outcome shows that in the prime market (loans intended for GSEs), originators chose to sell low-default-risk (not high-default-risk) and high-prepayment-risk loans to the secondary market in the pre-crisis period, 2004–06. This strategy changed in 2007 when widespread market disruption was imminent with most of these lenders unwilling to retain higher-default-risk loans in return for lower prepayment risk. In contrast, we do not find a significant difference in the default and prepayment risks between portfolio and securitized loans for subprime loans. In fact, the only year where a significant difference in default risk for subprime loans is found is 2007, when the real estate bubble started to burst.

We also conducted additional tests to examine the robustness of our inferences. Specifically, we conduct reduced form analysis to ensure that our classification of the "prime-like" loan sample does not drive our findings. In addition, we also conduct our analysis in several samples which will also allow better classification and accounting of differences in incentives of participants across the GSE and non-GSE markets. The inferences from this analysis are the same. There is no clear pattern that emerges across subprime loans. In contrast, in the prime market (loans intended for sale to GSEs), banks generally sold low-default-risk loans into the secondary market while retaining higher-default-risk loans in their portfolios. In addition, we also find support for adverse selection with respect to prepayment risk in the prime market.

Our results illustrate the difference in origination and post-origination behavior of lenders across the prime and subprime sectors. We rationalize these findings by arguing that the differences are likely due to GSEs imposing control on default risk of loans originated by lenders since they offer guarantees only against default risk to investors. This control is missing on the prepayment margin—giving lenders more freedom to adversely select on prepayment risk—since this risk is passed to the investors by GSEs. In contrast, there is no private issuer

[1] A more detailed presentation of the securitization process for the prime and subprime markets can be found in the two figures in Appendix A.

[2] Investors in mortgage loans are concerned with three kinds of risk. Interest risk refers to the fact that a change in interest rates leads to an opposite change in the value of the mortgage. Interest rate risk is independent of the borrower's characteristics, and hence, is not subject to potential adverse selection concerns.

[3] LPS Analytics, Inc. was known as McDash Analytics before this company was acquired by Lender Processing Services, Inc. in 2008.

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