

# Second Liens and the Holdup Problem in First-lien Mortgage Renegotiation

Sumit Agarwal<sup>#</sup>  
Gene Amromin<sup>#</sup>  
Itzhak Ben-David<sup>\*</sup>  
Souphala Chomsisengphet<sup>§</sup>  
Yan Zhang<sup>§</sup>

September 2012

## ABSTRACT

Loss mitigation actions (e.g., liquidation, renegotiation) for delinquent mortgages might be hampered by the conflicting goals of claim holders with different levels of seniority. Agency problems may be particularly acute when junior claimants, in their role as servicers, exercise operational control over loss mitigation actions on delinquent first-lien mortgages. We show that servicers are less likely to act on the first-lien mortgage owned by investors when they themselves own the second-lien mortgage secured by the same property. When they do act, such servicers' choices are skewed towards actions that maximize their second-lien claims, favoring modification over liquidation and short sales over foreclosures. We show that these actions transfer wealth from first to second liens and moderately increase borrower welfare.

**Keywords:** Subprime Crisis, Household Finance, Second Liens, Mortgages, Holdup Problem

**JEL Classification:** G21

---

The authors would like to thank Fredrik Andersson, Gadi Barlevy, Ted Durant (MGIC), Ronel Ellul, Christopher Foote, Karen Furst, Dennis Glennon, Bruce Krueger, Mark Levonian, Amit Seru, and seminar participants at the OCC, and AREUEA (Chicago) for helpful comments and suggestions. The views in this paper are those of the authors and may not reflect those of the Federal Reserve System, the Federal Reserve Bank of Chicago, or of the Office of the Comptroller of the Currency.

**Contact author:** Itzhak Ben-David, bendavid@fisher.osu.edu.

<sup>#</sup> National University of Singapore and the Federal Reserve Bank of Chicago

<sup>\*</sup> Fisher College of Business, The Ohio State University

<sup>§</sup> Office of the Comptroller of the Currency

## 1 Introduction

Conflicts between debt holders at times of bankruptcy are a central problem in corporate finance. In the simplest form, senior debt holders enjoy the absolute priority rule and are quick to liquidate assets since they generally have little upside in renegotiating the debt. In contrast, junior debt and equity holders are interested in restructuring the obligations of a bankrupt firm as they can benefit from the option value of its resurrection (Warner 1977, White 1983).

The recent boom and bust of the housing market, with its wave of delinquencies, led to similar conflicts in the mortgage market. The second lien home equity market rose from under \$200 billion in the beginning of 2000 to peak at well over \$1 trillion in 2008 (Lee, Mayer, and Tracy 2012). Goodman, Ashworth, and Yin (2010) report that more than 50 percent of first lien mortgages that have been securitized in the private-label market have a second lien (or higher) attached to them. In these cases, the incentives for liquidation and renegotiations are different for first- and second-lien holders. Compared to corporate finance, the situation in the mortgage market is even more complex (and interesting to study), since first-lien mortgages are often securitized and loss mitigation decisions are thus made by servicers, who in many cases own a concurrent second-lien claim on the same property (Engel and McCoy 2011). This structure of ownership and decision-making alters the power balance and potentially gives substantial leverage to junior-lien holders, who decide on how to mitigate losses on the senior loan (a variant of the classic “holdup problem”).<sup>1</sup> If in corporate finance the issue is that senior claimants are quick to liquidate, in the case of residential mortgages the concern is that second-lien claimants have the power to delay resolution or to shift the burden of loss mitigation onto the senior claimant. Such choices could potentially increase eventual losses and undermine

---

<sup>1</sup> On one hand, the pooling and servicing agreement (PSA) requires the servicer to act for the benefit of the investors who own the first lien. On the other hand, some actions that are optimal from the first-lien owners’ perspective may be suboptimal to the servicer when that servicer is the owner of the second-lien loan.

sustainability of renegotiated mortgages. This conflict of interest has been raised in Mayer et al. (2009a), Goodman (2011a, 2011b), and Cordell, Dynan, Lehnert, Liang, and Mauskopf (2011); has received considerable media coverage;<sup>2</sup> and has led to a legislative proposal, the Mortgage Servicing Conflict of Interest Elimination Act of 2010, which aims to prevent servicers from servicing first-lien mortgages that are attached to second liens that they own.

Dealing with the large inventory of delinquent mortgages remains the key component in restoring the health of the housing market, which has substantial implications for broader macroeconomic performance. It is therefore important for both policymakers and mortgage investors to understand the impact that servicer conflicts of interest have on workouts of delinquent loans. Such understanding is useful in designing near-term policy initiatives as well as forward-looking reforms for the mortgage servicing market. For private investors, assessing these conflicts is helpful in refining the contractual covenants that govern servicer relationships. Our paper aims to fill a gap in the existing literature on agency effects on loss mitigation choices and to contribute a set of empirical facts about the existence and quantitative impact of servicer conflicts related to junior-lien ownership.

In this paper we test for the existence of holdup in the loss resolution process. We particularly evaluate the claim that servicers who own second-lien mortgages while servicing the first lien on behalf of outside investors (“holdup servicers”) have a conflict of interest and therefore may obstruct loss mitigation actions. Our unique dataset of matched senior- and junior-lien claims and their loss mitigation actions in the event of delinquency allows us to compare these “holdup servicer” mortgages to control groups in which such a conflict of interest is likely to be less intense.

---

<sup>2</sup> See, for example, Gretchen Morgenson, “In This Play, One Role is Enough,” *New York Times*, August 14, 2010, and Alex Ulam, “Why Second-lien Loans Remain a Worry,” *American Banker*, May 2, 2011.

Holdup servicers' incentives have the potential to affect the likelihoods of both liquidation and modification. In the case of foreclosures, proceeds from auction sales satisfy the claims of senior-lien holders before any residual is turned over to junior claimants. Since this residual is often small or non-existent, servicers that own second liens have no particular incentive to pursue aggressively foreclosure and extinguish their claims for little in return.<sup>3</sup> In the case of non-foreclosure liquidations—deeds-in-lieu and short sales—the servicer does not automatically have to extinguish the second lien, but they need to resolve it in some fashion in order to be able to dispose of the liquidated property. Typically, in approving a pre-foreclosure liquidation, the holdup servicer effectively converts its second-lien loan into an unsecured claim, akin to a credit card balance. This, too, provides relatively little incentive for the second-lien owner/servicer to trigger the liquidation process (unless the second lien is also seriously delinquent and the owner-servicer has already recognized the second as a loss).

In cases of loan modifications, second liens present a particularly thorny problem. On the one hand, there is a great incentive for junior-lien holders to modify the first lien and attain a stronger position for their junior claim. Modification of the first lien without any adjustment to the junior lien would benefit the junior claimants because the borrower's improved financial position frees up additional cash flows to the second-lien holders. On the other hand, many pooling and servicing agreements (PSA), which govern the relationship between loan servicers and investors, make it hard to modify the first-lien mortgage unless the second-lien holder relinquishes their claim on it (see e.g., McCoy 2012, Cordell et al. 2011, Pinedo and Baumgardner 2009). The first-lien holders are generally reluctant to agree to a modification that leaves the junior claim intact, since lien priority dictates that junior claimants bear the loss first.

---

<sup>3</sup> Amherst Mortgage Insight (February 11, 2011) suggests that upwards of 20% of prime mortgages held in private-label securities (PLS) fit this profile.

For their part, junior debt holders are not willing to simply extinguish their claims and allow modification to proceed, since there is always a chance that a delinquent loan may cure or that collateral value may rise high enough to yield a positive return in an event of foreclosure. The resulting stalemate may be all the more pronounced when the second-lien holder is also the party determining when, whether, and how to proceed with a specific set of loss mitigation actions. Indeed, servicers are not obligated to modify second liens at all.<sup>4</sup>

Thus, second-lien owners have an incentive to “hold up” any resolution (modification or liquidation) of the mortgage unless they can recover some price above the true value of the second lien. The potential for holdup may be especially strong when the first lien is securitized, since in that case the ownership structure of the first claim holders is dispersed. This significantly hampers negotiations between first- and second-lien holders, making a mortgage resolution holdup more likely. In a proposal for optimal loan modification strategy, Mayer et al. (2009a) discuss this possibility.<sup>5</sup>

We identify the holdup problem by using a unique dataset from the OCC that matches the first and second liens by the exact property address. This data has several advantages over existing datasets on mortgage performance—McDash, Loan Performance, BlackBox, etc. First, the existing datasets only know if a second lien exists on the property if it was issued at the same time the first lien was. But with the OCC dataset we can match the first and second liens even if the second lien was issued months or years after the first. Second, the OCC data allow us to separately identify whether the same or a different servicer is servicing the first and second liens,

---

<sup>4</sup> Under the HAMP Second Lien (2MP) program, servicers of second liens are given financial incentives to modify their claims on the *pari passu* basis with first-lien modifications—the second lien is modified in exactly the same fashion as the first-lien loan.

<sup>5</sup> Mayer et al. (2009a) proposes a solution to the holdup problem by providing a fee to the second-lien holder to relinquish its control on the modification of the first lien. Beyond the mortgage market, there is a vast literature that has suggested possible solutions to the holdup problem in more general settings (see Mailath and Postelwaite 1990 and Kominers and Weyl 2011).

in addition to identifying whether the first lien is being held in the servicer's portfolio or is securitized. Finally, we can precisely track outcomes like foreclosures, modifications, etc., in the OCC data, while the other datasets require some of the outcomes to be imputed.

Our group of interest (treatment) contains pairs of first and second mortgages in which (1) the first lien is securitized and delinquent and (2) the second lien is owned and serviced by the same bank that services the first lien. This group of mortgages is subject to holdup by the second-lien holder (and servicer).

We compare this group of mortgages to a control group consisting of properties in which (1) the first lien mortgage is securitized and is delinquent but (2) the second lien loan is owned and serviced by a *different* bank than the one that services the first lien. Hence, this group has a similar ownership and servicing structure, but without the holdup problem at issue in the treatment group.<sup>6,7</sup>

Using this identification approach, we find significant evidence that the possibility for holdup leads servicers to delay loss mitigation actions on the first-lien mortgage. Specifically, with holdup, the probability of no action increases by 1 to 4 percentage points (2% to 11% in relative terms) for the six-month horizon. This effect remains as strong for a longer horizon of 12 months. Also, the effect is weaker for first-lien mortgages that were securitized by the GSEs (Government Sponsored Entities).

---

<sup>6</sup> In a previous version of the paper we used three different groups to identify the holdup effect via a difference-in-differences approach. Those groups included: first- and second-lien loans held on lender's portfolio, first-lien mortgages that are portfolio loans (with no second liens), and first-lien mortgages that are securitized loans (with no second liens). Given the complexity of this structure, we switched into a simpler setting.

<sup>7</sup> We note that it is possible that the second-lien holder in the control group could hold up the modification or refinancing of the first lien by refusing to resubordinate its claim to the new loan. This holdup problem is different from the holdup problem we consider in this paper, which results from having the same servicer servicing the first- and second-lien loans.

Among the mortgages on which servicers took action, we find that holdup leads to a lower probability of liquidation and a higher probability of modification. For the six-month horizon, we find that holdup reduces the likelihood of liquidation by up to 2.1 to 3.4 percentage points (7% to 10% in relative terms). Modification rates are higher for GSE loans by 1.1 to 4.4 percentage points (15% to 21% in relative terms) for the same horizon. For both liquidation and modification the effects remain strong for the 12-month horizon. The effects are generally weaker for loans securitized by the GSEs. Restricting the sample to modified loans, we find little effect of holdup on modification type.

An important question is whether holdup is only a wealth transfer from first- to second-lien holders or whether there is also an effect on borrowers. We test the relation between holdup and the performance of first- and second-lien loans. First-lien loans that are securitized by the GSEs and serviced by holdup servicers perform better by about 5% than similar loans that are serviced by non-holdup servicers. Second-lien loans perform about 3% better when they are attached to first-lien loans in private-label securitizations that had no action and are serviced by holdup servicers. These results are consistent with the idea that holdup servicers encourage second-lien borrowers to stay current, potentially in exchange for no action on their first-lien loan.

Our paper is related to several strands of the literature. First, recent studies found that securitization could impede renegotiation following delinquency (Piskorski et al. 2010, Agarwal, et al. 2011a, Zhang 2012): securitized loans exhibit lower rates of renegotiation and higher rates of liquidation.<sup>8</sup> However, these papers cannot identify a specific channel through which the agency frictions brought about by separation of ownership and control through securitization

---

<sup>8</sup> Several commentators have argued that securitization does not fully explain the lack of modifications, especially since the government introduced the Home Affordable Modification Program (HAMP), which should have made modifications easier (Agarwal et al. 2011b).

affect loss mitigation actions. As argued above, the frictions may be exacerbated if the controlling entity (the servicer) also owns an accompanying second-lien note on the delinquent property (which was unobservable in the databases previously used).

Second, our work is related to the growing literature that seeks to explain the crisis and drivers of mortgage foreclosures. Keys et al. (2010), Mian and Sufi (2009), Campbell et al. (2011), Mayer et al. (2009b), Ellul (2011), Agarwal et al. (2011c), and Agarwal et al. (2011d) study various factors that pertain to mortgage foreclosures. Our paper contributes to the literature by documenting the important role of second liens in mortgage foreclosures and renegotiation. Third, our work also contributes to long literature on the role of second liens on mortgage defaults. We contribute to this literature by looking at the redefault rate of mortgages. Finally, there is a vast literature in law and economics on eminent domain and corporate takeovers that has been motivated by the holdup problem. Specifically, in public land assembly projects minority land holders can create a holdup problem. In order to cover this problem the Fifth Amendment of the US Constitution allows the government to take over private property under the justification of eminent domain (Posner 2005). Similarly, in corporate takeovers of public firms, the law requires the acquiring party to bid for all the shares of the firm. To keep minority shareholders from holding up the bid, some jurisdictions allow the acquirer to bid for a supermajority of shares (Armour and Skeel 2007).

The rest of the paper proceeds as follows. In Section 2 we develop a set of testable hypotheses, while Section 3 summarizes the data. Section 4 details the results. Section 5 discusses the policy implications of our findings.



## **2 Hypotheses and Identification Strategies**

### **2.1 Hypotheses**

The effect of second-lien holders on the loss mitigation workout process is discussed in two main sources. Mayer et al. (2009a) argue that a holdup problem arises when property values decline and modification of the first lien is acceptable to investors only when it effectively extinguishes the second lien on the property. The authors also propose that by dragging their feet, second-lien holders put pressure on first-lien holders to buy them out.

In addition, Goodman (2011a, 2011b) analyzes the conflict of interests between first and second-lien holders when the second-lien holder services both liens; she proposes several hypotheses. Like Mayer et al. (2009a), she concludes that second-lien lenders oppose resolutions that deplete the value of their claims. Specifically, liquidations are less likely to be initiated, since the second-lien holders bear most of the cost from this action. Moreover, second-lien lenders would be more likely to approve first-lien loan modifications without making similar concessions on their part, whenever possible. This outcome in less sustainable modifications, since the borrowers' overall debt burden is not reduced by as much as it would be in the absence of such conflicts (Goodman 2011b).

Thus the predictions based on Mayer et al. (2009a) and Goodman (2011a, 2011b) are threefold. First, the likelihood of inaction on delinquent first-lien mortgages is higher in the presence of holdup on the part of second-lien lenders. Second, the likelihood of liquidations is lower when second-lien lenders service first-lien mortgages. Finally, second-lien holdup lenders increase the likelihood of renegotiations, especially if such renegotiations can be done so as to

shift the burden towards first-lien holders. The purpose of the study is to empirically test these hypotheses and quantify their relative effects.

## **2.2 Terminology**

Our paper deals with several types of mortgages. To facilitate the discussion, we developed a shorthand notation that captures different ownership and servicing structures. Specifically, loans that are collateralized by the same asset receive a four-letter acronym. The first two letters pertain to the first lien while the second two pertain to the second lien. The first and third letters describe the *servicing* status of the first and second liens, respectively. The second and fourth letters describe the *ownership* status of the first and second liens, respectively. “P” stands for private securitization and “G” stands for GSE securitization. “S” indicates a generally securitized loan.

To illustrate the convention, consider the notation of the following mortgages. If there are two liens, and both are owned and serviced by the same bank, then the notation is AAAA. ASAA denotes a first lien that is securitized while the second lien is owned and serviced by the same bank that services the first, where S equals P for private-label securitization or G for GSE securitization. Code ASBB indicates cases where there are two liens: the first is securitized and serviced by Bank A the second is owned and serviced by a different bank, Bank B.

## **2.3 Treatment and Control Groups**

The loans susceptible to holdup are those in which the first lien is securitized and the second is owned and serviced by the same bank that services the first lien—group ASAA (see,

e.g., Mayer et al. 2009a, Goodman 2011a, 2011b, McCoy, 2012, Cordell et. al 2011).<sup>9</sup> In such cases the servicer has a potential conflict of interest. On one hand the servicer has the PSA-mandated fiduciary duty to service the portfolio to the investors' benefit. However, as the second-lien owner, the servicer seeks to maximize its own benefit.

Our proposed control group is ASBB, in which the servicers of the first and second liens are distinct banks (as opposed to the same servicer, as in ASAA); hence, there is no holdup problem in the form studied here.

$$ASAA - ASBB = \textit{Holdup effect}.$$

In a regression framework, we would combine the two samples and introduce a *different servicer* dummy (indicating that the observation is from group ASAA), which we call a “holdup dummy”.

$$\textit{LossMitigation} = \theta + \gamma * I(\textit{Different servicer}) + \varepsilon.$$

We note, however, that holdup problems exist even when the second-lien servicer does *not* service the first lien. In particular, it is possible that the owner of the second lien could hold up the modification or refinancing of the first lien by refusing to resubordinate its claim to the new loan. Hence, our estimates will express the difference between these two frictions.

### 3 Data

#### 3.1 Source and Address Matching for First-lien mortgages and Home Equity Loans

We use three raw data sources to develop our analysis data. The first one is OCC Mortgage Metrics (MM), which collects data from the 10 large banks that service about 56 million (64%) of first-lien mortgages in the U.S. The MM database records various loan

---

<sup>9</sup> Ideally, we would like to compare the AAAA group to ABAA, where the first lien is owned by another bank. However, in our data most first-lien mortgages that are owned by a third party are in fact securitized, making group ABAA very small.

attributes as well as precise loss mitigation and performance outcomes beginning in January 2008. The second is the OCC Home Equity (HE) database, which contains about 23.2 million second-lien home equity credits (representing about 65% of all home equity credits outstanding). Similar to MM, HE has, from May 2008, a pre-defined list of attributes that covers a broad spectrum of loan/borrower attributes measured at the time of loan origination, current measures of loan/borrower attributes, delinquency behavior, and loss mitigation/workout resolutions.

Associated with the HE database is the OCC Home Equity Crosswalk (HECW). For each home equity account that exists in the data from December 2009 to June 2011, the HECW database allows us to link a second-lien home equity loan to a first-lien mortgage through an exact matching address for each loan in a given month. Each record of the HECW data contains a pair of MM and HE loan numbers, the statement month and the corresponding ID for each property address (e.g., 1234 Main Street, City X, State Y, and Zip Code 56789). If multiple MM loans or HE loans are found for a single property, the HECW data for that property address shows multiple records. For example, if a borrower takes out a first-lien mortgage (loan A), a home equity loan (loan B), and a home equity line of credit (HELOC, loan C) for his/her home, two records will be shown: loan A matching with loan B, and then loan A matching with loan C under a single property address ID, and the match type of both records is labeled as having one first-lien mortgage and many home equity credit lines.

We use the HECW data at December 2009 to extrapolate HECW prior so that we can merge MM and HE data from May 2008 through November 2009. By doing so, we obtain a merged MM and HE dataset with longer history. By matching the MM and HE data through the HECW address link, we are able to extract about 3.64 million loan pairs (95 million loan-pair-months from May 2008 through June 2011). One first-lien mortgage that matches to one second-lien home equity credit line represents more than 80% of the home equity properties in HECW.

We focus on properties that have one first-lien mortgage with one home equity credit attached. To address left censoring issue, we are interested in loans that became seriously delinquent after they enter the database. To construct our sample of in-trouble loans, we first require loans to be either current or at most 30 days when the loan-pair first appear in the data. We then define a loan as being in trouble/distress when either the MM loan or the HE loan became serious delinquent (defined as 60 days past due)<sup>10</sup> afterwards. Using this definition, we identified about 0.6 million distressed loan-pairs with 8.08 million loan-pair-months with the stress month as the first month, ranging from June 2008 to June 2011.

### **3.2 Summary Statistics**

We present the summary statistics in Table 1. Panel A summarizes the frequency of different loss mitigation actions for the treatment and the control groups for the 6- and 12-month horizons following delinquency of the first-lien loan.. The panel shows that most delinquent loans (about 55%) receive no action from their servicers in the first six months. Among those loans that are acted upon by the servicers, the most common outcome is to be placed into foreclosure process (about 28% of delinquent first-lien loans). Only a small share of loans get fully liquidated (i.e. run through the entire foreclosure process or have short sale/deed-in-lieu transaction completed) or modified within the first six months. Over a longer 12-month horizon the likelihood of no action is reduced to about 40%, with the difference distributed between the foreclosure process, forced and voluntary liquidation, and modifications. In more than half of all cases, the second lien is performing when the first lien becomes delinquent.

---

<sup>10</sup> This is the Mortgage Bankers Association definition of delinquency.

When comparing different groups, we see that the treatment groups (APAA and AGAA) have a consistently higher incidence of inaction than the control groups (APBB and AGBB). The treatment groups also have somewhat lower unconditional means of for delinquent first-lien mortgages being placed into the foreclosure process, liquidated, or modified. We also note that second-lien loans in the treatment groups have lower performance rates at the time of first-lien delinquency at both time horizons.

A number of earlier studies (Lee, Mayer, Tracy 2012, Goodman et. al 2011) have documented that a substantial share of second-lien loans remain current for considerable periods of time after the associated first-lien loan becomes delinquent. This recent phenomenon has been attributed to household desire to retain access to a line of credit at times of economic stress. Such credit sources become more important when the first-lien mortgage obligation cannot be sustained, leading to degraded credit scores and subsequent difficulty in initiating new credit lines. Figure 1 below corroborates the results of these earlier studies by summarizing the timing of defaults on the senior and junior lien backed by the same property.

We document that only a small fraction of properties in our sample – 8.9% of those with GSE-backed first-lien mortgages and 7.4% of those with PLS first-lien mortgages – record delinquencies on their second lien loan 3 or more months before the onset of delinquency on the associated first-lien loan. Using a two-month window to define contemporaneous first- and second-lien defaults, we find 36.9% of loans in the GSE sample and 43.7% of loans in the PLS sample to default simultaneously on both liens. The striking fact, however, is that about an equal share of loans in the GSE sample (37.1%) and 28.4% of loans in the PLS sample remain current on their second lien loan throughout the entire period of time that we observe them.

Panel B presents summary statistics for the key borrower and loan characteristics in treatment and control groups, at both the 6- and the 12-month horizons. About half of all loans in

our sample have borrower FICO scores below 660, as would be expected for borrowers who have just gone through a serious delinquency. More importantly for the design of the study, the distribution of FICO scores appears broadly similar for treatment and control groups for both GSE- and PLS-securitized loans. The same can be said about the loan-to-value ratios on first-lien loans at the time of delinquency and the distribution of the first- and second-lien unpaid principal balances.

As expected, a higher fraction of mortgages securitized via PLS are classified as low-documentation loans as compared to GSE-backed loans. Interestingly, the fraction of low-documentation first-lien mortgages is consistently lower in the treatment (holdup) groups, for both GSE and PLS loans. Another notable difference between PLS and GSE mortgages is the extent to which the second-lien loan is supported by the collateral that would remain after paying off the first lien. PLS loans have much lower cushions, on average, relative to GSE loans. It should be kept in mind that this measure is likely to substantially overstate the amount of collateral that would be available for the second-lien holder, as it assumes no-cost liquidation at appraised value. Among PLS loans, the treatment (holdup) group shows somewhat lower levels of collateral support for the second lien.

A particular area of concern in comparing the treatment and control groups is whether they contain a different mix of second-lien loans. As pointed out by several studies (notably, Lee, Mayer, and Tracy 2012), there is a substantial difference in borrower characteristics and subsequent performance for closed-end second lien loans originated alongside first-liens – the so-called piggyback loans – and the more traditional home equity lines of credit (HELOCs). Our database includes an identifier for second-lien loans that are HELOCs, which allows us to compare the samples. As reported in Panel B, the share of HELOCs in the holdup PLS sample is slightly higher than in the control PLS sample, while the share of HELOCs in the holdup GSE

sample is slightly lower. However, both of the differences appear to be rather small (71% vs. 65% for PLS and 60% vs. 64% for GSE-backed loans).

Since loss mitigation actions have been shown to be influenced by the type of state law governing foreclosures (Ghent and Kudlyak 2011), we also compare the distribution of loans in the two samples across judicial- and non-judicial foreclosure states. We find virtually no difference in the fraction of loans in judicial foreclosure states in the treatment and control groups for either type of securitization.

## **4 Empirical Results**

We test the effects of holdup on several aspects of loss resolution. First, we test whether the propensity of servicers to take an action is lower when holdup is a possibility. Second, we examine the effects of holdup on the likelihood of modification and liquidation (forced and voluntary). Third, we look for evidence that servicers' behavior affects the long-term performance of first and second loans.

### **4.1 Holdup and No Action**

During the recent financial crisis, a surprisingly high fraction of loans had no loss mitigation action (Agarwal et al. 2011a). In this subsection we test whether this lack of action is exacerbated by the holdup problem. From the perspective of second-lien holders, delaying an action on the first lien allows the second-lien holder to benefit from the borrower's potential recovery. Given that most delinquent borrowers are underwater, an immediate resolution of the first lien has a high likelihood of reducing the value of second lien, often rendering it valueless. The prediction is, therefore, that the possibility of a holdup increases the likelihood of no action.



In the test we regress an indicator of whether there was any action against the first lien on behalf of the servicer onto a holdup indicator and controls. “No action” is defined as having no record of a loss mitigation on file, i.e., the first lien neither entered a modification (trial or permanent) or started a foreclosure process, nor was it liquidated. We include a large battery of controls.<sup>11</sup> Standard errors in all regressions are clustered by zip code.

We present several specifications. The table presents results where the sample includes the treatment group (ASAA) and the first control group (ASBB). There are results for the 6- and 12-month horizons, as well as splits between loans securitized by GSEs and those with private-label securitizations (PLS).

The results in all specifications show that the likelihood of no action is higher when holdup is a possibility. The economic magnitude is large. The unconditional probability of no action in PLS loans is 54.9% and 41.1% for 6 and 12 months, respectively. For GSE loans, the probability of no action is 56.8% and 42.8% for 6 and 12 months, respectively. For PLS loans the coefficient on the holdup is about 4 percentage points, about 1 percentage point for GSEs. Thus, for PLS loans, a holdup in the short term translates to a higher likelihood of no action by about 8%, 11% in the longer term; for GSE it is 2% in the short term and 2.5% in the longer term.

---

<sup>11</sup> Controls include: an indicator as to whether the second lien has defaulted at the time of delinquency, five indicators for buckets of FICO at the time of delinquency, indicators for buckets of the leverage of the first-lien loan at the time of delinquency, indicators for buckets of the unpaid balance (in dollars) of the first- and second-lien loans, the fraction of the second-lien loan that could be covered by the current value of the house, indicators for the original terms of the first- and second-lien loans, indicators as to whether the first- and second-lien loans have a low documentation level, an indicator as to whether the first-lien loan is an ARM, indicators as to whether the first- and second-lien loans are interest only loans, an indicator as to whether the state of the borrower considers the first- and second-lien loans as non-recourse, an indicator as to whether the state of the borrower is a judicial state, an indicator as to whether the second-lien loan is a home equity line of credit, an indicator as to whether the second-lien loan is fully drawn, an indicator as to whether the second-lien loan is a credit line and is frozen, an indicator to whether the second lien loan is a piggyback loan (i.e., originated within two months of the origination of the first lien loan), indicators for the delinquency month, and indicators for the origination year of the first-lien loan.

We consider an alternative explanation for our results. A difference in the likelihood of receiving any action can potentially be explained by coordination time. Suppose that the first- and second-lien holders negotiate the outcome of a loan. In this case we would expect there to be more delay, due to legal negotiations, when the negotiating parties are distinct, as in the control group ASBB. In contrast, the regressions show that this action is less likely when the first and second liens are serviced by the same party, as in ASAA.

Interestingly, the regressions show that mortgages in which only the first lien has defaulted (i.e., the attached second lien is continuing to perform) have a higher likelihood of having no action. This is consistent with the idea that when the second lien is current (i.e., non-delinquent), there is little incentive for the second lien to cooperate.

Overall, these results show that the possibility of a holdup reduces the likelihood of any action by 2% to 11%.

## **4.2 Holdup and Liquidations**

The OCC data allow us to identify the specific type of liquidation that takes place. We define liquidations as mortgages that have been liquidated either involuntarily (foreclosure post sales and real-estate owned REOs) or voluntarily (short sales and deed-in-lieu). In addition, for the purpose of this analysis we include in this category loans that remain in the foreclosure process. The prediction is that a bank servicer is less likely to liquidate a securitized first-lien mortgage if it holds in its portfolio the second lien.

To test this prediction in Table 3, we regress an indicator for whether a loan was liquidated or is in the foreclosure process within 6 or 12 months post-delinquency on the holdup indicator. We perform this test in an unconditional sample (Columns (1) to (4)) and in a sample restricted to loans that went through a loss mitigation action (Columns (5) to (8)).

The results in show that the likelihood of the liquidation or foreclosure of the first-lien loan is significantly lower for loans where holdup is a possibility, by 2.1 to 3.4 percentage points (Panel A, Columns (1) through (4)). This effect is strong for both PLS and GSE loans. In relative terms the likelihood of liquidation or foreclosure is lower by 7% to 10%. This result is consistent with the idea that first-lien servicers who have a stake in the second-lien loan use their power to hold up liquidations and foreclosures.

In Panel A, Columns (5) through (8), we rerun the regressions, this time conditioning on whether any action was taken (i.e., removing all loans with no action from the sample). The regressions show that liquidations and foreclosures are less favorable actions for GSEs. There is no effect for PLS loans, meaning that the probability of liquidation and foreclosures is proportionally lower than other loss mitigation actions.

Panel B presents the breakdown of the results by liquidation type: voluntary liquidation, involuntary liquidation, and in a foreclosure process. The results show that the holdup is associated with a higher likelihood of voluntary liquidations and a lower likelihood of involuntary liquidations and foreclosure starts. The effects are statistically and economically significant. With holdup, voluntary liquidation increases by about 30%, relative to the unconditional mean. Involuntary liquidations decrease by approximately 18%, and foreclosure starts decline by about 7%. We note that the unconditional likelihood of voluntary liquidations is relatively low: 1.1 percentage points (GSE) and 1.4 percentage points (PLS) within 6 months, and 1.3 percentage points (GSE) and 2.1 percentage points (PLS) within 12 months. Hence, the aggregate liquidation results are dominated by the effect of the involuntary liquidations.

In summary our results indicate that liquidation, in general, is less likely when the securitized first-lien mortgage has a second lien attached that is being serviced by the holder of

the second lien. This finding is consistent with the idea that second-lien lenders hold up first-lien lenders.

### **4.3 Holdup and Modifications**

Whether or not holdup servicers favor modifications of first-lien loans is a subject of debate. Legally, the second lien is not automatically extinguished once the first lien is modified. Therefore, modification of the first-lien loan could be favorable to the owner of the second-lien loan because it improves the borrower's overall cash flows, thereby making repayment of the second lien more likely. In practice, modification of the first lien may lead to a deadlock. In many cases, the PSAs do not allow the first lien to be modified without the second lien being extinguished or modified. Second-lien holders, however, may be reluctant to relinquish their claim. However, when the same servicer has control over both first and second liens, it may be able to push a modification through.

In Table 4, Panel A, we test the proposition that holdup servicers will favor modification of the first lien. First, we regress a modification dummy on the holdup indicator and the usual set of controls and fixed effects. The results are mixed. For PLS loans, modification is less likely for holdup servicers by up to 21% (Columns (1), (3), (5), and (7)). For GSE loans, however, modification is more likely by up to 21% (Columns (2), (4), (6), and (8)).

The difference between the results for GSE loans and PLS loans potentially reflect the difference in the discipline in the PSA agreements. While decisions on GSE loans are well coordinated across investors due to the power of the GSEs, in PLS originations, investors are dispersed and the coordination mechanism is poor. The difference allows holdup servicers to have greater latitude in the decision about modification in PLS loans than in GSE loans.

Overall, consistent with the holdup interpretation, these regressions show that modification of a first-lien mortgage is less likely to take place when a second lien is attached and the holder of the second lien does not own the first-lien mortgage.

#### **4.4 The Characteristics of Modifications of Loans Subject to Holdup**

To better understand the effects of holdup on renegotiations, we take a closer look at the types of modification given to first-lien mortgages, and test whether holdup is associated with their terms. To do so, we devise indicators for the different types of modification terms: principal deferral, principal write-down, capitalization of interest, interest rate reduction, interest rate freezing, and term extension.

Table 4, Panels B and C, present the results for mortgages securitized by GSEs and for mortgages securitized by private-label securitizers, respectively. Here the samples consist only of loans that were modified (Columns (1) through (8)) or having a rate-reduction modification (Columns (9) and (10)); hence they are substantially smaller. We focus on the 12-month horizon. The regressions present evidence that securitized first-lien mortgages receive somewhat less concessionary modification terms during modification in the presence of a holdup problem. Specifically, when securitized first-lien mortgages are modified, they are generally less likely to get a principal deferral (for the GSE sample). Other modification actions have generally lower probability as well, but it is statistically insignificant.

Of special interest is the rate reduction action, as it is by far the most common one. In Columns (7) to (10) we focus on the change in interest rates post- relative to pre-modification. Our results show that holdup is associated with less aggressive interest rate reduction. E.g., Table 4, Panel B, shows that GSE first-lien loans with the potential for holdup that are modified at higher rate by 9 bps. There is a result with a similar magnitude in Panel C, Column (7), although

not statistically significant (potentially due to the small sample size). We conclude that the economic magnitude of these results is relatively small.

Overall, our results show that modifications of first-lien loans that are subject to holdup from the servicer are similar to those of non-holdup first-lien loan. This result may reflect the fact that PSA agreements set some discipline upon servicers. Furthermore, it is possible that some of the modifications are indeed HAMP modifications, in which servicers are bound by the HAMP's guidelines of modification (Agarwal et al. 2011b).

#### **4.5 The Effects of Holdup on Borrower Welfare**

Our results so far show that holdup affects the distribution of cash flows between first- and second-lien holders. An important question is whether holdup behavior also affects borrowers' welfare or whether it reduces to a wealth transfer between first- and second-lien holders only.

To answer this question, we examine the performance of loans conditional on holdup. We begin with the first lien. In Table 5, we regress an indicator for the performance of the first lien in a 12-month horizon on a holdup indicator. We define "performance in 12 months" as the first-lien loan being current (self-cured or modified) within 6 months of entering the sample; non-performing loans are loans that are delinquent or were liquidated. The 12-month horizon sample has similar definitions.

Columns (1) and (2), where the sample is restricted to loans with no action at the sixth month post-delinquency, presents mixed results. For PLS loans, there appears be no association between holdup and the 12-month performances of first-lien loans. For GSE securitizations, there is a positive relation between holdup and the 12-month performance: the loans are more likely to perform by 1.6 percentage points (about a 4.5% improvement).

When restricting the sample to loans that were modified up to month 6 (Columns (3) and (4)), we find that the PLS first-lien loans perform better; however, the statistical significance is low ( $t = 1.55$ ). There is no effect on GSE loans.

We next test the performance of the second lien. This test is important beyond the welfare question, since it is possible that holdup servicers encourage borrowers to stay current on their second-lien loans in exchange for inaction on the first-lien loan. In Columns (1) and (2) of Table 6 we examine all loans in which only the first lien was delinquent at the outset. Second-lien loans attached to PLS loans perform better by 3.1%, and there is no material effect for second-lien loans attached to GSE securitizations. In Columns (3) and (4) we further restrict the sample to loans for which there was no action in Month 6. Again, second-lien loans attached to PLS loans perform better by 3.0%, with no effect for second-lien loans attached to GSE securitizations. When looking at loans that were modified by Month 6 (Columns (5) and (6)), there is no effect for either second-lien loans attached to PLS or GSE first-lien loans. This suggests that the improvement in the performance of second-lien loans comes from the no action group, i.e., consistent with the idea that holdup servicers convince borrowers to stay current on their mortgages in exchange for taking no action on the first lien.

In sum, there is evidence that the holdup servicers of PLS loans manage to gain by the better performance of second-lien loans, supporting the idea that holdup servicers encourage borrowers to stay current on their second-lien loan.

## **5 Conclusion**

In this paper we present novel evidence showing that the seniority structure in mortgage lending affects loss mitigation outcomes. In particular, we find evidence for a wealth transfer from first-lien loan holders to second-lien loan holders; this transfer is driven by servicers who

own the second-lien loan and who service both loans. Our study suggests that such “holdup” servicers are less likely to take actions that jeopardize the value of their own claim. In cases of holdup, the servicers are more likely to delay any action on delinquent first-lien mortgages, lowering the likelihood of foreclosures. When such servicers do pursue liquidations, they are somewhat more likely than non-holdup servicers to use the short-sale approach, which gives them greater bargaining power in the foreclosure process. Our results also suggest that holdup increases the likelihood of modifications for GSE-backed loans, but that it somewhat lowers this likelihood for PLS loans.

Our results show that the holdup problem may moderately increase borrowers’ welfare, as the likelihood of loan performance is higher when there is a holdup. This evidence is consistent with the idea that holdup servicers encourage second-lien holders to remain current on their loans.



## References

- Agarwal, Sumit, Gene Amromin, Itzhak Ben-David, Souphala Chomsisengphet, and Douglas D. Evanoff, 2011a, The Role of Securitization in Mortgage Renegotiation, *Journal of Financial Economics* 102(3), 559-578.
- Agarwal, Sumit, Gene Amromin, Itzhak Ben-David, Souphala Chomsisengphet, Tomasz Piskorski, and Amit Seru, 2011b, Policy Intervention in Debt Renegotiation: Evidence from the Home Affordable Modification Program, Working Paper, The Ohio State University.
- Agarwal Sumit, Gene Amromin, Itzhak Ben-David, and Serdar Dinc, 2011c, Legislation and Mortgage Foreclosures, Working Paper, The Ohio State University.
- Agarwal, Sumit, Yan Chang, and Abdullah Yavas, 2011d, Securitization and Adverse Selection in Mortgage Lending, *Journal of Financial Economics*, forthcoming.
- Armour, John and David Skeel, 2007, Who Writes the Rules for Hostile Takeovers, and Why? The Particular Divergence of U.S. and U.K. Takeover Regulation, *Georgetown Law Journal* 95 (6), 1727-1794.
- Campbell, John Y., Stefano Gilio, and Parag Pathak, 2011, Forced Sales and House Prices, *American Economic Review* 101(5), 2108-2131.
- Cordell, Larry, Karen Dynan, Andreas Lehnert, Nellie Liang, and Eileen Mauskopf, 2011, The Incentives of Mortgage Servicers and Designing Loan Modifications to Address the Mortgage Crisis, in *Lessons from the Financial Crisis: Causes, Consequences, and Our Economic Future*, ed. Robert W. Kolb, Hoboken, NJ: John Wiley & Sons, Inc.
- Elul, Ronel, 2011, Adverse Selection in Mortgage Markets, Working Paper, Philadelphia Federal Reserve Bank.
- Enger, Kathleen, and Patricia McCoy, 2011, The Subprime Virus: Reckless Credit, Regulatory Failure, and Next Steps, Oxford: Oxford University Press.
- Goodman, Laurie, 2011a, National Mortgage Servicing Standards and Conflicts of Interest, Testimony to the Subcommittee on Housing, Transportation and Community Development of the Senate Committee of Banking, Housing, and Urban Affairs, May 11, 2011.
- Goodman, Laurie S., 2011b, Examining Lien-Position Conflicts, *MortgageOrb.com*, June 3, 2011.
- Goodman, Laurie S., Roger Ashworth, Brian Landy, and Lidan Yang, 2011, Strategic Default and 1st /2nd Lien Payment Priority, Industry Report, Amherst Mortgage Insight.
- Goodman, Laurie S., Roger Ashworth, Brian Landy and Ke Yin, 2010, Second Liens: How Important? *Journal of Fixed Income* 20(2), 19-30.
- Keys, Benjamin, Tanmoy Mukherjee, Amit Seru, and Vikrant Vig, 2010, Did Securitization Lead to Lax Screening? Evidence from Subprime Loans, *Quarterly Journal of Economics*, 125, 307-362.
- Kominers, Scott Duke, and E. Glen Weyl, 2011, Concordance among Holdouts, Working Paper, University of Chicago.
- Lee, Donghoon, Christopher Mayer, and Joseph Tracy, 2012, A New Look at Second Liens, Working Paper, FRB-NY and Columbia University.

- Mayer, Christopher, Edward Morrison, and Tomasz Piskorski, 2009a, Essay: A New Proposal for Loan Modifications, *Yale Journal on Regulation* 26(2).
- Mayer, Christopher, Karen Pence, and Shane M. Sherlund, 2009b, The Rise in Mortgage Defaults, *Journal of Economic Perspectives* 23(1), 27-50.
- Mailath, George J., and Andrew Postelwaite, 1990, Asymmetric Information Bargaining Problems with Many Agents, *Review of Economic Studies* 57 (3), 351-367.
- McCoy, Patricia A., 2012, Barriers to Home Mortgage Modifications during the Financial Crisis, Working Paper, Pew Center on the States.
- Mian, Atif and Amir Sufi, 2009, The Consequences of Mortgage Credit Expansion: Evidence from the U.S. Mortgage Default Crisis, *Quarterly Journal of Economics* 124(4), 1449-1496.
- Pinedo, Anna T., and Amy Moorhus Baumgardner, 2009, Federal Mortgage Modification and Foreclosure Prevention Efforts, *Uniform Commercial Code Law Journal* 41(4), 319-345.
- Piskorski, Tomasz, Amit Seru, and Vikrant Vig, 2010, Securitization and Distressed Loan Renegotiation: Evidence from the Subprime Mortgage Crisis, *Journal of Financial Economics* 97, 369-397.
- Posner, Richard A., 2005, Foreword: A Political Court, *Harvard Law Review* 119 (1), 31-102.
- Warner, Jerold B., 1977, Bankruptcy, Absolute Priority, and the Pricing of Risky Claims, *Journal of Financial Economics* 4(3), 239-276.
- White, Michelle J., 1983, Bankruptcy Costs and the New Bankruptcy Code, *Journal of Finance* 38(2), 477-488.
- Zhang, Yan, 2012, Does Loan Renegotiation Differ by Securitization Status: An Empirical Study? Working Paper, Office of the Comptroller of the Currency.

**Table 1. Summary Statistics**

The table gives summary statistics for the subsamples used in the paper. Panel A shows statistics about the loss mitigation actions for the different types of subsamples by investor type. Panel B presents summary statistics for the treatment and control groups for the 6- and 12-month horizons.

**Panel A: Control and Test Samples**

Group	Private-Label Securitizations (PLS)		Government Sponsored Entity Securitizations (GSE)	
	Treatment	Control	Treatment	Control
	APAA	APBB	AGAA	AGBB
1st lien servicer	A	A	A	A
1st lien holder	P	P	G	G
2nd lien servicer	A	B	A	B
2nd lien holder	A	B	A	B

Action on 1st lien within 6 months				
N =	29,560	24,274	100,084	56,053
<u>1st lien</u>				
No action	57.9	51.3	57.4	55.8
In foreclosure process	28.8	31.8	26.9	27.9
Liquidated	2.1	1.8	2.5	2.4
Modified	5.8	8.7	6.6	6.4
Repayment/Prepaid (incl. voluntary liq)	6.8	7.5	7.8	8.1
2nd lien performing at beginning	50.4	55.6	51.9	58.8

Action on 1st lien within 12 months				
N =	24,055	20,244	83,117	45,623
<u>1st lien</u>				
No action	44.2	37.4	43.6	41.3
In foreclosure process	32.0	33.6	27.5	28.2
Liquidated	5.0	5.2	4.8	5.3
Modified	11.9	16.0	16.4	16.7
Repayment/Prepaid (incl. voluntary liq)	9.8	10.4	10.7	11.2
2nd lien performing at beginning	52.5	57.7	53.5	61.1

**Table 1. Summary Statistics (Cont.)**

**Panel B: Summary Statistics**

Group	Private Label Securitizations (PLS)				Government Sponsored Entity Securitizations (GSE)			
	6 months		12 months		6 months		12 months	
	Treatment	Control	Treatment	Control	Treatment	Control	Treatment	Control
	APAA	APBB	APAA	APBB	AGAA	AGBB	AGAA	AGBB
FICO group 1	0.006	0.012	0.006	0.011	0.035	0.049	0.034	0.047
FICO group 2	0.460	0.497	0.460	0.502	0.477	0.463	0.478	0.460
FICO group 3	0.349	0.322	0.344	0.316	0.299	0.294	0.294	0.290
FICO group 4	0.119	0.110	0.125	0.112	0.115	0.122	0.120	0.127
FICO group 5	0.050	0.048	0.051	0.047	0.056	0.056	0.058	0.058
FICO group 6	0.015	0.012	0.015	0.012	0.018	0.017	0.017	0.017
LTV group 1	0.158	0.176	0.151	0.171	0.326	0.359	0.323	0.355
LTV group 2	0.181	0.189	0.179	0.183	0.240	0.227	0.240	0.225
LTV group 3	0.199	0.198	0.199	0.196	0.155	0.150	0.156	0.150
LTV group 4	0.369	0.337	0.367	0.337	0.210	0.198	0.206	0.200
LTV group 5	0.092	0.100	0.104	0.112	0.070	0.067	0.075	0.070
2nd lien is covered (%)	0.050	0.083	0.057	0.090	0.290	0.306	0.296	0.307
1st lien unpaid balance group 1	0.106	0.109	0.098	0.105	0.272	0.269	0.266	0.261
1st lien unpaid balance group 2	0.128	0.159	0.126	0.158	0.282	0.304	0.279	0.302
1st lien unpaid balance group 3	0.157	0.192	0.155	0.191	0.276	0.288	0.278	0.293
1st lien unpaid balance group 4	0.547	0.477	0.548	0.475	0.128	0.101	0.133	0.105
1st lien unpaid balance group 5	0.062	0.062	0.072	0.071	0.041	0.039	0.044	0.039
2nd lien unpaid balance group 1	0.142	0.137	0.138	0.137	0.285	0.247	0.281	0.245
2nd lien unpaid balance group 2	0.181	0.182	0.179	0.181	0.276	0.255	0.279	0.253
2nd lien unpaid balance group 3	0.279	0.256	0.283	0.257	0.238	0.251	0.241	0.252
2nd lien unpaid balance group 4	0.374	0.407	0.377	0.407	0.178	0.227	0.179	0.229
2nd lien unpaid balance group 5	0.024	0.019	0.023	0.019	0.023	0.020	0.021	0.020
1st lien term group 1	0.026	0.022	0.024	0.021	0.075	0.078	0.074	0.076
1st lien term group 2	0.928	0.923	0.929	0.918	0.866	0.863	0.858	0.854
1st lien term group 3	0.046	0.056	0.047	0.061	0.058	0.059	0.068	0.070
2nd lien term group 1	0.350	0.267	0.357	0.278	0.331	0.266	0.331	0.277
2nd lien term group 2	0.073	0.155	0.074	0.155	0.112	0.139	0.113	0.140
2nd lien term group 3	0.028	0.063	0.024	0.061	0.058	0.085	0.051	0.078
2nd lien term group 4	0.331	0.357	0.276	0.318	0.357	0.328	0.333	0.287
2nd lien term group 5	0.219	0.159	0.269	0.188	0.142	0.182	0.171	0.218
1st lien is low doc	0.617	0.754	0.616	0.760	0.415	0.562	0.412	0.566
2nd lien is low doc	0.942	0.903	0.940	0.904	0.890	0.894	0.889	0.893
1st lien is ARM	0.547	0.476	0.534	0.470	0.193	0.154	0.191	0.153
1st lien is interest only (IO)	0.349	0.322	0.349	0.317	0.130	0.114	0.126	0.110
2nd lien is interest only (IO)	0.584	0.506	0.557	0.487	0.465	0.446	0.437	0.425
1st lien is non-recourse	0.564	0.554	0.563	0.550	0.370	0.367	0.370	0.362
2nd lien is non-recourse	0.014	0.021	0.015	0.021	0.027	0.028	0.027	0.029
1st lien is judicial state	0.302	0.298	0.303	0.303	0.444	0.429	0.445	0.433
2nd lien is HELOC	0.710	0.653	0.708	0.653	0.604	0.635	0.596	0.639
2nd lien is fully drawn	0.145	0.116	0.147	0.119	0.106	0.089	0.107	0.093
2nd lien is frozen	0.482	0.456	0.465	0.446	0.413	0.433	0.397	0.428

**Table 2. Holdup and No Action**

The table shows the results of regressions of an indicator of whether the first-lien loan had no action on determinants. All regressions are OLS regressions. The sample includes the groups ASAA (treatment) and ASBB (control). Columns (1) and (2) measure the dependent variable over the 6-month period since the loan was identified as distressed. Columns (3) and (4) measure the dependent variable over the 12-month period since the loan was identified as distressed. The sample covers loans that became distressed between December 2009 and December 2011. *Holdup* indicates whether the observation belongs to the treatment group. Controls include: an indicator as to whether the second lien has defaulted at the time of delinquency, indicators for buckets of FICO at the time of delinquency, indicators for buckets of the leverage of the first-lien loan at the time of delinquency, an indicator as to whether the leverage covers the second-lien loan, indicators for buckets of the unpaid balance (in dollars) of the first- and second-lien loans, the fraction of the second-lien loan that could be covered by the current value of the house, indicators for the original terms of the first- and second-lien loans, indicators as to whether the first- and second-lien loans have a low documentation level, an indicator as to whether the first-lien loan is an ARM, indicators as to whether the first- and second-lien loans are interest only loans, an indicator as to whether the state of the borrower considers the first- and second-lien loans as non-recourse, an indicator as to whether the state of the borrower is a judicial state, an indicator as to whether the second-lien loan is a home equity line of credit, an indicator as to whether the second-lien loan is fully drawn, an indicator as to whether the second-lien loan is a credit line and is frozen, an indicator to whether the second lien loan is a piggyback loan (i.e., originated within two months of the origination of the first lien loan), indicators for the delinquency month, and indicators for the origination year of the first-lien loan. Standard errors are clustered at the zip code level. *t*-statistics are presented in brackets. \*, \*\*, \*\*\* denote two-tailed significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	No action within...			
	6 months		12 months	
	PLS	GSE	PLS	GSE
Horizon:				
Sample:	(1)	(2)	(3)	(4)
Unconditional mean	54.9	56.8	41.1	42.8
Holdup	4.187*** [7.689]	0.989*** [3.376]	4.030*** [6.622]	1.015*** [3.084]
1st lien controls	Yes	Yes	Yes	Yes
2nd lien controls	Yes	Yes	Yes	Yes
1st lien servicer FE	Yes	Yes	Yes	Yes
Delinquency month FE	Yes	Yes	Yes	Yes
Observations	53,834	156,137	44,299	128,740
Adj R <sup>2</sup>	0.259	0.227	0.277	0.217

**Table 3. Holdup and Liquidation (Voluntary, Involuntary, and Foreclosure Process)**

The table shows the results of regressions of an indicator of whether the first-lien loan had a liquidation or foreclosure on determinants. All regressions are OLS regressions. The sample includes the groups ASAA (treatment) and ASBB (control). Columns (1), (2), (5), and (6) measure the dependent variable over the 6-month period since the loan was identified as distressed. Columns (3), (4), (7) and (8) measure the dependent variable over the 12-month period since the loan was identified as distressed. The sample covers loans that became distressed between December 2009 and December 2011. *Holdup* indicates whether the observation belongs to the treatment group. Controls include: an indicator as to whether the second lien has defaulted at the time of delinquency, five indicators for buckets of FICO at the time of delinquency, indicators for buckets of the leverage of the first-lien loan at the time of delinquency, an indicator as to whether the leverage covers the second-lien loan, indicators for buckets of the unpaid balance (in dollars) of the first- and second-lien loans, the fraction of the second-lien loan that could be covered by the current value of the house, indicators for the original terms of the first- and second-lien loans, indicators as to whether the first- and second-lien loans have a low documentation level, an indicator as to whether the first-lien loan is an ARM, indicators as to whether the first- and second-lien loans are interest only loans, an indicator as to whether the state of the borrower considers the first- and second-lien loans as non-recourse, an indicator as to whether the state of the borrower is a judicial state, an indicator as to whether the second-lien loan is a home equity line of credit, an indicator as to whether the second-lien loan is fully drawn, an indicator as to whether the second-lien loan is a credit line and is frozen, an indicator to whether the second lien loan is a piggyback loan (i.e., originated within two months of the origination of the first lien loan), indicators for the delinquency month, and indicators for the origination year of the first-lien loan. Standard errors are clustered at the zip code level. *t*-statistics are presented in brackets. \*, \*\*, \*\*\* denote two-tailed significance at the 10%, 5%, and 1% levels, respectively.

**Panel A: Probability of Liquidation and Foreclosure Process**

Dependent variable:	Liquidation + Foreclosure process within...							
	6 months		12 months		6 months		12 months	
	All mortgages		All mortgages		Action taken		Action taken	
Sample restriction:	PLS	GSE	PLS	GSE	PLS	GSE	PLS	GSE
Sample:	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Unconditional mean	32.1	29.7	37.8	32.7	71.3	68.9	64.2	57.1
Holdup	-3.350***	-2.123***	-2.692***	-2.809***	-0.276	-3.716***	0.047	-4.367***
	[-6.746]	[-8.106]	[-4.509]	[-9.170]	[-0.360]	[-9.241]	[0.0591]	[-10.40]
1st lien controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2nd lien controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1st lien servicer FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Delinquency month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	53,834	156,137	44,299	128,740	24,264	67,410	26,098	73,665
Adj R <sup>2</sup>	0.267	0.254	0.281	0.242	0.437	0.414	0.440	0.400

**Table 3. Holdup and Liquidation (Voluntary, Involuntary, and Foreclosure Process)  
(Cont.)**

**Panel B: Liquidation Breakdown**

Dependent variable:	Voluntary liquidation		Involuntary liquidation		In foreclosure process	
Horizon:	12 months		12 months		12 months	
Sample restriction:	All mortgages		All mortgages		All mortgages	
Sample:	PLS	GSE	PLS	GSE	PLS	GSE
	(1)	(2)	(3)	(4)	(5)	(6)
Unconditional mean	1.7	1.1	5.1	4.9	32.7	27.7
Holdup	0.538***	0.314***	-0.947***	-0.799***	-2.283***	-2.323***
	[3.242]	[4.267]	[-4.235]	[-6.122]	[-3.963]	[-7.824]
1st lien controls	Yes	Yes	Yes	Yes	Yes	Yes
2nd lien controls	Yes	Yes	Yes	Yes	Yes	Yes
1st lien servicer FE	Yes	Yes	Yes	Yes	Yes	Yes
Delinquency month FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	44,299	128,740	44,299	128,740	44,299	128,740
Adj R <sup>2</sup>	0.204	0.132	0.254	0.186	0.248	0.204

**Table 4. Holdup and Modification**

The table shows the results of regressions of an indicator of whether the first-lien loan had a modification on determinants. All regressions are OLS regressions. The sample includes the groups ASAA (treatment) and ASBB (control). Columns (1), (2), (5), and (6) measure the dependent variable over the 6-month period since the loan was identified as distressed. Columns (3), (4), (7) and (8) measure the dependent variable over the 12-month period since the loan was identified as distressed. The sample covers loans that became distressed between December 2009 and December 2011. *Holdup* indicates whether the observation belongs to the treatment group. Controls include: an indicator as to whether the second lien has defaulted at the time of delinquency, five indicators for buckets of FICO at the time of delinquency, indicators for buckets of the leverage of the first-lien loan at the time of delinquency, an indicator as to whether the leverage covers the second-lien loan, indicators for buckets of the unpaid balance (in dollars) of the first- and second-lien loans, the fraction of the second-lien loan that could be covered by the current value of the house, indicators for the original terms of the first- and second-lien loans, indicators as to whether the first- and second-lien loans have a low documentation level, an indicator as to whether the first-lien loan is an ARM, indicators as to whether the first- and second-lien loans are interest only loans, an indicator as to whether the state of the borrower considers the first- and second-lien loans as non-recourse, an indicator as to whether the state of the borrower is a judicial state, an indicator as to whether the second-lien loan is a home equity line of credit, an indicator as to whether the second-lien loan is fully drawn, an indicator as to whether the second-lien loan is a credit line and is frozen, an indicator to whether the second lien loan is a piggyback loan (i.e., originated within two months of the origination of the first lien loan), indicators for the delinquency month, and indicators for the origination year of the first-lien loan. Standard errors are clustered at the zip code level. *t*-statistics are presented in brackets. \*, \*\*, \*\*\* denote two-tailed significance at the 10%, 5%, and 1% levels, respectively.

**Panel A: Likelihood of Modification**

Dependent variable:	Modification within...								
	Horizon:	6 months		12 months		6 months		12 months	
	Sample restriction:	All mortgages		All mortgages		Action taken		Action taken	
	Sample:	PLS	GSE	PLS	GSE	PLS	GSE	PLS	GSE
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	
Unconditional mean	7.1	6.5	13.8	16.5	15.7	15.0	23.4	28.8	
Holdup	-1.537***	1.178***	-1.963***	1.990***	-1.587**	3.197***	-1.025	4.369***	
	[-5.457]	[7.888]	[-4.626]	[8.261]	[-2.478]	[9.687]	[-1.414]	[11.19]	
1st lien controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
2nd lien controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
1st lien servicer FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Delinquency month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
Observations	53,834	156,137	44,299	128,740	24,264	67,410	26,098	73,665	
Adj R <sup>2</sup>	0.236	0.164	0.305	0.255	0.403	0.342	0.411	0.374	



**Table 4. Holdup and Modification (Cont.)**

**Panel B: Modification Types (Government-Sponsored Entities)**

Modification type:	Sample: First-lien was modified						Rate reduction			
	Principal defer	Principal writedown	Capitalization	Interest rate reduction	Interest rate frozen	Term extension	Change in interest rate diff (premod-postmod)	Change in interest rate percent ((premod-postmod)/premod)	Change in interest rate diff (premod-postmod)	Change in interest rate percent ((premod-postmod)/premod)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Holdup	-1.494** [-2.266]	0.021 [0.590]	-0.984 [-1.505]	-1.080 [-1.212]	-0.041 [-0.082]	-1.104 [-1.058]	-0.092*** [-2.622]	-1.345** [-2.380]	-0.079** [-2.010]	-0.933 [-1.511]
1st lien controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2nd lien controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1st lien servicer FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Delinquency month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	21,211	21,211	21,211	21,211	21,211	21,211	21,211	21,211	13,346	13,346
Adj R <sup>2</sup>	0.331	0.088	0.554	0.526	0.508	0.447	0.537	0.543	0.489	0.482

**Panel C: Modification Types (Private-Label Securitizations)**

Modification type:	Sample: Modified						Rate reduction			
	Principal defer	Principal writedown	Capitalization	Interest rate reduction	Interest rate frozen	Term extension	Change in interest rate diff (premod-postmod)	Change in interest rate percent ((premod-postmod)/premod)	Change in interest rate diff (premod-postmod)	Change in interest rate percent ((premod-postmod)/premod)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Holdup	1.042 [0.770]	-0.519 [-1.292]	0.812 [0.403]	-1.041 [-0.433]	-0.149 [-0.110]	3.941 [1.634]	-0.117 [-1.361]	-0.914 [-0.692]	-0.178* [-1.694]	-0.942 [-0.609]
1st lien controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
2nd lien controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
1st lien servicer FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Delinquency month FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6116	6116	6116	6116	6116	6116	6116	6116	3830	3830
Adj R <sup>2</sup>	0.529	0.892	0.677	0.631	0.577	0.628	0.633	0.626	0.663	0.653

**Table 5. Holdup and First-Lien Loan Performance**

The table shows the results of regressions of an indicator of whether the first-lien loan performs after 12 months on determinants. All regressions are OLS regressions. The sample includes the groups ASAA (treatment) and ASBB (control). The sample covers loans that became distressed between December 2009 and December 2011. *Holdup* indicates whether the observation belongs to the treatment group. Controls include: an indicator as to whether the second lien has defaulted at the time of delinquency, five indicators for buckets of FICO at the time of delinquency, indicators for buckets of the leverage of the first-lien loan at the time of delinquency, an indicator as to whether the leverage covers the second-lien loan, indicators for buckets of the unpaid balance (in dollars) of the first- and second-lien loans, the fraction of the second-lien loan that could be covered by the current value of the house, indicators for the original terms of the first- and second-lien loans, indicators as to whether the first- and second-lien loans have a low documentation level, an indicator as to whether the first-lien loan is an ARM, indicators as to whether the first- and second-lien loans are interest only loans, an indicator as to whether the state of the borrower considers the first- and second-lien loans as non-recourse, an indicator as to whether the state of the borrower is a judicial state, an indicator as to whether the second-lien loan is a home equity line of credit, an indicator as to whether the second-lien loan is fully drawn, an indicator as to whether the second-lien loan is a credit line and is frozen, an indicator to whether the second lien loan is a piggyback loan (i.e., originated within two months of the origination of the first lien loan), indicators for the delinquency month, and indicators for the origination year of the first-lien loan. Standard errors are clustered at the zip code level. *t*-statistics are presented in brackets. \*, \*\*, \*\*\* denote two-tailed significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	First-lien loan performs after...			
	Horizon: 12 months		12 months	
Sample restriction:	No action taken at month = 6		Modified loans at month = 6	
Sample:	PLS	GSE	PLS	GSE
	(1)	(2)	(3)	(4)
Unconditional mean	24.0	35.4	62.4	75.4
Holdup	-0.385 [-0.568]	1.613*** [3.992]	5.912 [1.551]	0.602 [0.366]
1st lien controls	Yes	Yes	Yes	Yes
2nd lien controls	Yes	Yes	Yes	Yes
1st lien servicer FE	Yes	Yes	Yes	Yes
Delinquency month FE	Yes	Yes	Yes	Yes
Observations	28,558	85,400	3,530	9,435
Adj R <sup>2</sup>	0.399	0.314	0.780	0.692

**Table 6. Holdup and Second-Lien Loan Performance**

The table shows the results of regressions of an indicator of whether the second-lien loan performs after 12 months on determinants. All regressions are OLS regressions. The sample includes the groups ASAA (treatment) and ASBB (control). The sample covers loans that became distressed between December 2009 and December 2011. The sample includes only loans in which the second-lien loan was not delinquent when the first-lien loan became delinquent. *Holdup* indicates whether the observation belongs to the treatment group. Controls include: an indicator as to whether the second lien has defaulted at the time of delinquency, five indicators for buckets of FICO at the time of delinquency, indicators for buckets of the leverage of the first-lien loan at the time of delinquency, an indicator as to whether the leverage covers the second-lien loan, indicators for buckets of the unpaid balance (in dollars) of the first- and second-lien loans, the fraction of the second-lien loan that could be covered by the current value of the house, indicators for the original terms of the first- and second-lien loans, indicators as to whether the first- and second-lien loans have a low documentation level, an indicator as to whether the first-lien loan is an ARM, indicators as to whether the first- and second-lien loans are interest only loans, an indicator as to whether the state of the borrower considers the first- and second-lien loans as non-recourse, an indicator as to whether the state of the borrower is a judicial state, an indicator as to whether the second-lien loan is a home equity line of credit, an indicator as to whether the second-lien loan is fully drawn, an indicator as to whether the second-lien loan is a credit line and is frozen, an indicator to whether the second lien loan is a piggyback loan (i.e., originated within two months of the origination of the first lien loan), indicators for the delinquency month, and indicators for the origination year of the first-lien loan. Standard errors are clustered at the zip code level. *t*-statistics are presented in brackets. \*, \*\*, \*\*\* denote two-tailed significance at the 10%, 5%, and 1% levels, respectively.

Dependent variable:	Second-lien loan performs after...					
	12 months		12 months		12 months	
	All loans		No action taken at month = 6		Modified loans at month = 6	
Sample:	PLS	GSE	PLS	GSE	PLS	GSE
	(1)	(2)	(3)	(4)	(5)	(6)
Unconditional mean	68.4	73.5	73.9	78.1	80.3	86.3
Holdup	2.117***	0.185	2.194*	-0.490	0.525	0.172
	[2.642]	[0.483]	[1.899]	[-1.008]	[0.111]	[0.0897]
1st lien controls	Yes	Yes	Yes	Yes	Yes	Yes
2nd lien controls	Yes	Yes	Yes	Yes	Yes	Yes
1st lien servicer FE	Yes	Yes	Yes	Yes	Yes	Yes
Delinquency month FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	25,948	78,077	15,177	49,961	2,481	7,206
Adj R <sup>2</sup>	0.361	0.261	0.424	0.287	0.776	0.641

**Figure 1. Timing of Second Lien Loan Delinquency Relative to Delinquency on the Associated First Lien Loan**

This figure depicts the distribution of times at which the second lien loan becomes delinquent relative to the delinquency on the associated first-lien loan. The results are presented separately for borrowers whose first-lien loans are securitized through the GSEs and those whose first-lien loans are securitized through PLS.















