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A study on the distribution of the foreclosure lag, its expected capital opportunity cost and its analyses

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ABSTRACT

This paper presents models that help lenders to calculate the foreclosure lag and its expected capital opportunity cost. The empirical results show the foreclosure lag fits well with the exponential distribution after linear transformation. The value of the expected capital opportunity cost is nearly twice the mortgage rate. In addition, the economic situations, loan characteristic, and state foreclosure policies significantly influence the foreclosure lag. The extra foreclosure lag tends to be longer in judicial foreclosure states than in states with a redemption policy. Moreover, new U.S. foreclosure laws, enacted after 2008, effectively shorten the foreclosure lag and decrease its volatilities.

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1. Introduction

In the mortgage market, lenders unavoidably face default risk from mortgage loans. To minimize potential losses given default, lenders usually require the borrower's house to be put down as collateral when the mortgage contract is created. When a mortgage becomes delinquent, the first step for the lender is to send a "Notice of Default and Election to Sell" to the borrower. If the borrower does not pay off the mortgage during a period of at least three months after receiving the notice, the lender may begin foreclosure proceedings by forcing the sale of the house. Prior studies empirically demonstrated that the longer foreclosure lag, the more foreclosure costs and loss-given-default (Wilson, 1995; Park and Bang, 2014). Thus, it is important for lenders to analyze the issues related to the length of the foreclosure process (hereafter called the "foreclosure lag"). Understanding these issues can help lenders to more effectively estimate how quickly they can recover from the collateral.

In the literature concerning the foreclosure lag, the foreclosure lag ranges from 7.5 months to 6.5 years, depending on the estimated mortgage type and the location of the house (see Ambrose and Capone (1996), Capozza and Thomson (2006), Cutts and Merrill (2008), Pennington-Cross (2010)). Moreover, FHA data used in our study show that lending banks need on

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average nearly two years to complete the foreclosure process (see the summary in [Table 1](#)). In extreme cases, the foreclosure lag can be nearly 12 years. The great variation in the foreclosure lag may induce difficult forecast for lenders. In view of that, the first purpose of this study is to demonstrate how to accurately depict the pattern of the foreclosure lag by a reasonable model.

Investigating the foreclosure lag is important because there is a foreclosure cost incurred during this period and this cost may influence the posted mortgage rate. Prior studies have emphasized estimation of the explicit total loss the lender incurs during the foreclosure process ([Russell, 1937](#)). In addition to the depreciation of the value of the foreclosed housing, the loss includes the fees associated with the foreclosure. Examples of the latter are legal costs, administrative fees including court fees, auctioneer fees, and title fees. Several studies found that the lender's incurred foreclosure cost is a significant amount when compared with the housing price or the unpaid balance (e.g. [Russell \(1937\)](#), [Cutts and Green \(2005\)](#), [Posner and Zingales \(2009\)](#), [Cordell et al. \(2013\)](#)). Some studies showed that the borrower's default behavior and the foreclosure procedure have a significant influence on the mortgage yield and the mortgage rates quoted by lenders (e.g. [Ambrose and Capone \(1998\)](#), [Harrison and Seiler \(2015\)](#)). Thus, estimating the foreclosure costs incurred during foreclosure lag is important for market practitioners.

The foreclosure costs calculated in previous studies mainly reflect the lender's explicit loss. Because default on the mortgage during the foreclosure lag causes lenders to use their capital inefficiently, expected capital opportunity cost (hereafter denoted as ECOC) is realized during the foreclosure lag. The ECOC is defined as the maximum interest the lender can earn from the outstanding balance of the mortgage loan during the lag period. As mentioned, empirical studies have found the length of time to complete foreclosure has a wide range. This implies that the uncertainty of the foreclosure lag period could cause a lender's ECOC to vary widely. The calculated foreclosure costs in previous literature usually ignore the ECOC, which causes an inadequate reflection of all possible foreclosure costs. Thus the estimation of ECOC for foreclosure lag is important for the lenders who want to reasonably estimate their possible costs and control their potential losses from defaulted mortgages. Our study can help lenders to measure the ECOC incurred during foreclosure lag.

Lending banks can hold two types of mortgages: uninsured mortgages and mortgages insured by the FHA. To construct an accurate model for analyzing the foreclosure lag and its ECOC are important for both types of mortgages. However, foreclosures influence these two types of mortgages in different ways. If the mortgage is uninsured, the lender incurs possible losses during the foreclosure process if the mortgage ends up in foreclosure. In such type of mortgage, lenders can control the length of the foreclosure lag because they can decide to sell the property quickly by asking a very low auction price. However, lenders may prefer not to do so because a lower auction price means higher loss given default. Thus, lenders can charge a high auction price for the foreclosed house for reducing the loss given default, but that increases the foreclosure lag, which in turn increases their total ECOCs. This presents lenders with a trade-off problem: should they sell the foreclosed property quickly or hold onto it longer, hoping to sell at a higher price. This is why it is important to model the foreclosure lag as a step in estimating the ECOC for lenders who own uninsured mortgages.

If the mortgage is insured, lenders can recover the interest lost during the foreclosure lag from the FHA. This gives them an incentive to increase the foreclosure lag, because the FHA reimbursement will then be at the mortgage contract rate. Thus, the interest during foreclosure is not a potential loss for lenders, but is a potential loss for insurers. Regardless of whether the loss is burdened by the lender or the insurer, it is important to limit the losses given default and to more effectively manage the risk from defaulting mortgages. This study provides a model that can help both lenders and insurer accurately appraise the ECOC during foreclosure lags.

According to the above discussions, in this study, we mainly analyze the foreclosure lag for a pool of foreclosed mortgages. For simplicity, we assume that the foreclosure lag is a random variable for a pool of foreclosed mortgages. For finding a suitable probability density function (hereafter denoted as PDF) for the foreclosure lag of this pool, we use the gamma and exponential distributions to model the distribution for foreclosure lags because the foreclosure lag always takes a positive value. Lenders can use our constructed PDF model to analyze the characteristics of the length of foreclosure lag, such as its possible range, its expected value, its quantile values, and its standard deviation. Because the lender's ECOC depends on the foreclosure lag, the second purpose of this paper is to show a model that calculates the ECOC for foreclosure lag based on each of these distributions.

Several studies show that the extra foreclosure lag may come from legal proceedings when the court is overburdened or from the borrowers when they protest the process or file for bankruptcy, from the investor's collection and/or foreclosure efforts, or from third-party servicers who may have different incentives from the investors or the lenders ([Cutts and Merrill, 2008](#); [Levitin, 2010](#)). Previous studies also showed that the foreclosure lag is impacted by many factors including contemporaneous housing market condition, the prior delinquency records of the loan, and the state-level judicial and other legal constraints ([Pennington-Cross, 2010](#)). Thus the foreclosure process for individual foreclosed houses may also take longer than expected for many reasons (e.g. the house condition, the difference between the market house price and lender's listed price, buyer's bargain power). Lenders may be interested to know how the foreclosure lag of a pool of foreclosed mortgages is influenced by common factors, such as economic circumstances, characteristics of the loan, and foreclosure policies. The third purpose of this study is to perform empirical analyses to demonstrate the effect of influential factors on the foreclosure lag.

We designated economic circumstances to be the primary influential factor on the foreclosure lag because economic circumstances are likely to influence the strength of the investor's desire to buy the house and also have effects on the lender's desire to sell the collateral (i.e., house) for the defaulted mortgage. These influence the foreclosure lag. For simplicity, we adopt the interest rate and housing return as variables for describing the economic circumstances.

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