



# Effects of government bailouts on mortgage modification

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## ABSTRACT

This paper shows how liquidity infusions affect loan modification in the mortgage market. The design of pooling and servicing agreements leads mortgage servicers to prefer foreclosure over modification when they are liquidity constrained. Therefore, a positive liquidity shock is expected to boost modification rates. Using a residential mortgage dataset that includes loan-level information, we find that the Troubled Asset Relief Program significantly increased the modification rate. Our findings help us better understand the economic consequences of government intervention and have important policy implications for the renegotiation of distressed mortgages.

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## 1. Introduction

This paper examines how liquidity infusions affect debt renegotiation in the mortgage market – the origin of the global financial crisis that began at the end of 2007. This crisis induced a global economic recession. Many financial institutions went bankrupt, and the financial status of many institutions seriously deteriorated (Beltratti and Stulz, 2012; Gorton and Metrick, 2012).

The financial crisis was triggered by mortgage defaults and foreclosures. One important way to avoid foreclosure is mortgage modification: if a mortgage is in default because of the deterioration of the borrower's financial status, the borrower can seek to modify the mortgage contract. Mortgage modifications include interest rate reductions, term extensions, and principal write-downs, and they can reduce monthly payments so that the borrower can resume making scheduled payments and avoid foreclosure, which involves large losses. Foreclosures aggravated the financial crisis by pulling down housing prices in the neighborhoods where affected houses were located.

Mortgage modification has garnered the attention of academics and regulators because of its role in stemming the financial cri-

sis, and an extensive body of literature examines various aspects of mortgage modification. However, there is little empirical research on the impacts of government policy on modification rates. This paper examines how capital purchases through the Troubled Assets Relief Program (TARP) affected mortgage modification and thus has important policy implications for addressing financial crises.

Servicers (usually banks or their subsidiaries) play an important role in mortgage modification. If a borrower defaults and wants to modify a loan, he or she must petition the servicer, who then decides whether to modify the mortgage on behalf of the holder. In the U.S. residential mortgage market, most mortgages are securitized, and servicers have a large impact on modification (Thompson, 2011).<sup>1</sup>

The liquidity constraints of servicers during the financial crisis seriously reduced their willingness to modify mortgages. Mortgage modification requires servicers to have sufficient liquidity. After a mortgage borrower defaults, the servicer needs to advance monthly payments to the mortgage holder until a foreclosure or a mortgage modification is completed. In addition, the servicer needs to pay third parties for default services. The servicer obtains immediate compensation for these advances if the mortgage is

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<sup>1</sup> Agarwal et al. (2011) use a dataset covering 64% of U.S. residential mortgages. In the dataset, approximately 61% of delinquent mortgages are securitized.

foreclosed: reimbursement can be obtained from the proceeds of a sale of a home in foreclosure before the proceeds are transferred to the mortgage holder. By contrast, it takes much longer for the servicer to receive full compensation through a modification agreement because the servicer is compensated only for the advances from the monthly mortgage payments, which are much less than the lump-sum proceeds from the foreclosure sale. During the financial crisis, the deterioration of banks' asset liquidity and their liquidity hoarding behavior made them unwilling to pay these advances, so they preferred foreclosure to modification.

Therefore, servicers' propensity to modify mortgages may increase significantly if their liquidity is substantially improved during a financial crisis. In October 2008, the Emergency Economic Stabilization Act was enacted, and the government started TARP. There were thirteen programs under TARP, and the main one was the Capital Purchase Program (CPP), which invested \$204.9 billion in the financial system. We focus on capital purchases and hereafter use the term "TARP" to refer to the CPP, following the literature (Berger and Roman, 2017). Capital purchases through TARP represented huge positive liquidity shocks that might have dramatically enhanced servicers' willingness to modify delinquent mortgages. These shocks included not only the funds directly injected by TARP but also the fund inflows from the markets because TARP was a signal of government support and might have increased the market expectations for the performance of TARP recipients.

The research question addressed in this paper is whether the liquidity shock by TARP increased the mortgage modification behaviors of banks. We exploit a residential mortgage dataset from the Federal National Mortgage Association (Fannie Mae). This dataset contains detailed information on loan origination and performance. Specifically, it contains precise information on mortgage modification and servicers, which enables us to accurately assess the effects of TARP.

We use a difference-in-difference strategy to evaluate the impact of TARP. The treatment group includes mortgages whose servicers received funds through TARP, and the control group includes mortgages whose servicers were not exposed to TARP. We find that TARP increased the likelihood of modification by approximately 50%. This substantial impact was not related to loan characteristics, origination year, default time, borrower credit quality, region fixed effects, servicer type, changes in default rates, or other government bailout programs. We also address potential selection problems by considering the initial TARP recipients who were "forced" to take the bailout. We control for the liquidity conditions of the banks and find that liquidity injection explains at least 56% of the effect. We also conduct several robustness tests considering deposit inflows, unused loan commitments, capital adequacy, and non-first-round TARP recipients to confirm our findings.

This paper makes three contributions to the literature. First, an increasing number of empirical studies address government assistance because of the recent bailouts. Many studies examine how TARP affected bank lending behaviors and risk taking (Black and Hazelwood, 2013; Li, 2013; Puddu and Waelchli, 2013; Duchin and Sosyura, 2014; Bassett et al., 2017; Berger et al., 2017b). Another strand of the literature goes one step further and investigates how changes in bank lending behaviors affect firms (Norden et al., 2013; Lin et al., 2014; Berger et al., 2017a). Additionally, a body of literature analyzes the effects of TARP on bank value and performance (Veronesi and Zingales, 2010; Bayazitova and Shivdasani, 2011; Kim and Stock, 2012; Liu et al., 2013; Berger and Roman, 2015; Ng et al., 2016).<sup>2</sup>

These studies analyze the consequences of government bailouts from different perspectives and substantially advance research in this field. However, few studies have considered how bailouts affect debt renegotiation. In the recent financial crisis, debt renegotiation, especially in the mortgage market, was considered an important way of preventing the crisis from deepening, so both the government and financial institutions tried to promote modification.<sup>3</sup> Our study of the effects of government bailouts on mortgage modification fills this research gap and improves our understanding of the consequences of government bailouts.

The second related body of literature examines mortgage modification, which has been a popular topic since the onset of the financial crisis. An increasing number of studies have comprehensively analyzed mortgage modification (Clauretie and Jameson, 1995; Harding and Sirmans, 2002; Eggert, 2007; Stegman et al., 2007; Brinkmann, 2008; Cutts and Merrill, 2008; Gelpert and Levitin, 2008; Cordell et al., 2009; Magder, 2009; Posner and Zingales, 2009; Piskorski et al., 2010; Agarwal et al., 2011; Ghent, 2011; Ghent and Kudlyak, 2011; Rose, 2011; Adelino et al., 2013; Das and Meadows, 2013; Mayer et al., 2014; Agarwal et al., 2018). For instance, many studies discuss factors that negatively affect mortgage modification. Piskorski et al. (2010) and Agarwal et al. (2011) provide empirical evidence that securitization reduces the potential for mortgage modification. Likewise, Agarwal et al. (2014) argue that if the servicer of a first-lien mortgage is also the second-lien mortgage holder, mortgage modification will be deferred. Nonetheless, empirical research regarding government attempts to increase modification rates is scarce. One study by Agarwal et al. (2017), which quantifies the extent to which the Home Affordable Modification Program (HAMP) promoted mortgage modification, is closely related to ours. They find that this program increased the overall likelihood of mortgage modification but did not reach its target. HAMP provided subsidies to servicers, borrowers, and lenders for each successful modification. By contrast, TARP provided a lump-sum liquidity infusion, and it remains unclear how this type of government assistance affects mortgage modification. Our findings provide evidence of positive effects of liquidity infusions on mortgage modification and have meaningful policy implications for the promotion of mortgage modification.

Finally, our paper adds to the literature regarding the importance of liquidity during the recent financial crisis. DeYoung et al. (2012) estimate the business loan supply function for small U.S. banks between 1990 and 2010 and find that illiquidity and information asymmetry led to risk overhang, which forced banks to reduce the credit supply. Overhang effects are exacerbated by loan illiquidity and lower risk tolerance. Puri et al. (2011) disentangle the supply effects of the financial crisis on bank lending from the demand effects using a unique dataset on retail bank lending in Germany. They find that the subprime mortgage crisis induced a contraction in the supply of retail lending and that this contraction was particularly severe for liquidity-constrained banks. These studies highlight the role of bank liquidity in the credit supply, while in our research, we demonstrate that the improvement of liquidity boosts the mortgage modification rate. Therefore, this study enhances our understanding of the importance of liquidity constraints during the financial crisis.

The rest of this article is organized as follows. Section 2 introduces the background and intuition in detail. Then, Section 3 describes our data and the methodology. Sections 4–7 present the

<sup>2</sup> There are also some studies regarding German government interventions. Gropp et al. (2013) show that banks reduced risk-taking after government guarantees were removed, implying that public guarantees may be associated with substantial moral hazard. Berger et al. (2016) find that both regulatory interventions

and capital infusion reduce bank risk-taking. However, regulatory interventions also trigger decreases in liquidity creation, which is a core function of banks that supports the macroeconomy.

<sup>3</sup> For instance, the U.S. government launched the Home Affordable Modification Program in 2009.

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