Foreclosure Moratorium and Strategic Default*

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Abstract

Strategic defaults in mortgage markets are de facto unobservable events. We exploit a foreclosure moratorium in Greece that allows homeowners to default without losing their primary residence to study whether people default despite their ability to pay. Using data from a large Greek bank, we identify strategic defaulters by observing mortgagors' choice not to apply for a bankruptcy process that provides generous debt-relief to over-indebted households. We find extensive evidence of moral hazard among individuals with higher income, high financial and legal sophistication, as well as among self-employed persons. Consistent with a learning mechanism, strategic defaults spread through homeowners social networks.

Keywords: Strategic default, Foreclosure moratorium, Mortgage default, Moral hazard.

JEL classification: G21, D10, K35.

Moral hazard and adverse selection problems permeate financial markets and complicate the effectiveness of government policy making (Stiglitz and Weiss (1981)). The recent mortgage crisis in the United States revived the debate around the costs and benefits of government intervention when a severe recession strikes. For instance, mortgage debt restructuring programs for over-indebted households that promote efficient renegotiation of mortgages can reduce the overall rate of foreclosures. However, such policies also entail moral hazard because they encourage even solvent homeowners to seek debt forgiveness (Mayer et al. (2014)). This paper exploits a unique setting in Greece that allows us to separate strategic from liquidity defaulters and examine their characteristics.

Due to the ongoing financial crisis in Greece, legislators introduced a set of measures in June 2010 to provide relief to households. Specifically, the government introduced a personal bankruptcy law that excluded primary residences from liquidation for homeowners that undergo a multi-stage application and auditing process to prove over-indebtedness and inability to service their loans. Concurrently, the government introduced an almost universal foreclosure moratorium preventing banks from foreclosing primary residences. Importantly, the moratorium was independent of the debt discharge process and, therefore, was effective as a stand-alone provision. In other words, the legislative framework gave the opportunity to borrowers to stop servicing their primary residence mortgage without declaring bankruptcy, and still prevent banks from foreclosing the collateral.

To identify customers who default strategically, we combine several proprietary datasets from a large Greek bank. Our sample includes the universe of primary residence mortgages in the bank's portfolio, and contains detailed information regarding customer and mortgage characteristics from the original application files. We complement our data with monthly information on mortgage performance, as well as dwelling and borrower datasets, allowing us to focus only on residences protected by the foreclosure moratorium and on customers that are eligible to apply for debt discharge.

We define *strategic defaulters* as borrowers who default on their mortgages, but do not to apply for debt discharge. The rationale behind our criterion is that for liquidity defaulters

the cost of applying for debt restructuring is minimal compared to the benefits of a successful application for debt-haircut that could reach up to 80-90% of debt outstanding. Therefore, we interpret the choice not to apply for debt restructuring as proof that additional real assets or wealth exist, which borrowers want to protect from liquidation. Accordingly, we define *liquidity defaulters* as borrowers that default on their mortgages and apply for the debt discharge process, indicating their inability to pay, as they consent to the liquidation of their wealth or assets (other than the primary residence), if any, before the debt restructuring.

We focus on the Greek regulatory environment in Greece because it offers a unique setting to identify and separate strategic from liquidity defaulters. Previous studies of strategic default in mortgages assess borrowers' ability to pay by relying on survey responses or observable customer characteristics. In contrast, our criterion is based on the behavior of the agent with superior information regarding ability to pay; *the borrower*. Specifically, we let strategic defaulters self-identify themselves based on the preference for the debt discharge process, which requires the disclosure and liquidation of additional (to the primary residence) wealth in return for a generous debt relief. Thus, our approach is free of self-reporting biases that may hinder survey methods (see Hurst et al. (2014)), or limitations of financial and banking data to proxy for the customers' true ability to pay (see Guiso et al. (2013)).

With our criterion, we estimate the incidence of strategic default for a wide, population-representative sample of borrowers. We conservatively estimate that, by the end of 2013, 28% of defaults are strategic, which aggregates to 5-6 billion euros in non-performing loans across the Greek banking system. Delinquency is more likely for people that borrow a larger amount, have higher CLTV, and lower credit scores. Interestingly, however, we show that strategic defaulters have higher initial credit scores and reported income, and their mortgages have lower CLTVs than liquidity defaulters, in line with the findings of Guiso et al. (2013) and Gerardi et al. (2015). These results are consistent with delinquency, despite (relative) ability to pay.

We extend our analysis to examine the distribution of strategic default behavior across borrower characteristics. We find the highest concentrations of strategic defaulters in the

industries of law and finance (47% and 41% of defaults, respectively), even though these professionals have very low overall default rates. We also find that highly educated individuals are also more likely to default strategically. These results are consistent with the ability of these groups to understand legislative provisions and benefit from them. Additionally, strategic default rates for self-employed professionals are significantly higher compared to wage-workers. Artavanis, Morse, and Tsoutsoura (2016) show that self-employed in Greece exhibit significantly higher tax-evasion rates, therefore they are more likely to hide their true assets and income. As a result, these borrowers have a greater incentive to avoid the rigorous auditing of the debt discharge process, and instead, choose to default strategically.

On the other hand, military and security personnel exhibit the lowest levels of strategic default. This behavior is potentially related to moral factors, involving increased sense of duty and social stigma around what people may perceive as an unethical practice. We also find relatively low percentages of strategic default in financially weak groups, which also exhibit high overall default rates. Apart from individuals with lower income and education, we document that pensioners and single-parent families are also less likely to default strategically. We attribute this finding to increased risk aversion, as the succeeding phase after the discontinuation of the moratorium remains uncertain during our sample period. Furthermore, we find that the existence of a consignor or a guarantor reduces the likelihood of strategic default, consistent with the idea that strategic behavior requires coordination.

Finally, we find evidence that strategic defaults spread and progressively increase through home-owners' social networks. One standard deviation increase in the rate of strategic defaults in a customers' zip code increases the likelihood of defaulting strategically by roughly 5%. These results suggest that strategic defaults have a strong contagious effect; using a Cox model, we find that a borrower that moves from a zip code where no one defaults strategically to a zip code where half of the delinquencies are strategic, the likelihood that this borrower will default strategically within a year increases approximately by 15%. The results are robust after controlling for the overall rate of defaults at the zip code level, which

further suggests that strategic defaults are concentrated in areas where customers are not facing financial hardship.

The magnitude and the incidence of strategic defaults documented in this paper imply that our results have important policy implications. First, we show that the imposed foreclosure moratorium had a substantial impact on the deterioration of the Greek banking system by fostering moral hazard. We conservatively estimate that the cost of the moratorium reaches 5-6 billion euros in delinquent loans, which was predominantly borne by the Greek state through recapitalizations. Second, we find that the distribution of strategic defaults is consistent with an adverse selection story, since the moratorium as a stand-alone provision is mainly exploited by relatively privileged groups.

Additionally, our findings support the view that policymakers should only use broad intervention measures (moratoria) temporarily due to the contagious nature of strategic defaults, which progressively spread through social networks. Finally, as Greek banks attempt to resolve the issue of non-performing loans, identifying that a large portion of these delinquencies are strategic can significantly efficient renegotiation. Therefore, the identification of strategic defaulters is imperative prior to the renegotiation of non-performing loans.

Our study contributes to the literature of strategic default, which has been examined in the context of corporate debt (Giroud et al. (2012)), unsecured debt (Gross and Souleles (2002)), student loans (Yannelis (2016)), and mortgages (Guiso et al. (2013), Mayer et al. (2014), Gerardi et al. (2015)). The greatest challenge of studying strategic default remains its identification, and more specifically, estimating whether a defaulting borrower has the ability to pay. On this front, our approach to identify strategic defaulters is novel because it exploits a special regulatory framework and is based on observing the behavior of the party with superior information regarding the ability to pay. As such, our criterion is free of self-reporting biases or limitations of financial datasets. More interestingly, since we do not condition on borrowers' features (i.e. credit scores) to identify strategic default, we can include these characteristics in our analysis (see Guiso et al. (2013)).

Additionally, this paper contributes to the literature on the determinants of strategic default, and suggests that customers default strategically even in positive equity mortgages. Disentangling the effects of negative equity and cash flow shocks on strategic defaults is difficult because the 2007 mortgage crisis in the U.S. led to a spiral of falling home prices and unemployment (Mian and Sufi (2014)). Because the majority of primary residence mortgages in Greece are overwhelmingly positive equity, we can isolate cash flow shocks from the austerity measures as the main cause of defaults. The results also complement the household finance literature and suggest that customers with financial literacy exploit the new regulation to maintain precautionary liquidity due to high economic uncertainty (Cohen-Cole and Morse (2010)).

Our results highlight the importance of social networks in spreading strategic default behavior among borrowers, consistent with the findings of Guiso et al. (2013) and Bradley et al. (2015). This outcome may reflect the existence of a learning mechanism (Goodstein et al. (2011)), or the reduction of the social stigma associated with strategic default (Guiso et al. (2013)), which can accelerate mortgagors' willingness to engage in this type of moral hazard. However, our paper is the first, to our knowledge, that documents the contagious nature of strategic default as a separate effect from the incidence of overall defaults at the local level.

Finally, our study highlights the role of collateral in enforcing contracts. However, it is more difficult to establish the effect of collateral on repayments due the lack of a testable counter-factual.[1] In this context, our setting serves as a natural experiment, where previously imposed covenants on foreclosures are invalidated unexpectedly for a prolonged period. The limited literature around the scarce cases of moratoria focuses on their effect on the supply of new loans (Alston (1984), Pence (2006)); more notably, Morse and Tsoutsoura (2013) show that the foreclosure moratorium in Greece was followed by a sharp decrease in

[1] This is particularly true for mortgages, where collateral is internal. But even in loans types, where collateral is external, ex-ante differences on collateral covenants are subject to differential treatment by lenders.

new loans. We compliment these findings, by examining the effect of the moratorium on repayment patterns and moral hazard behavior by borrowers.

The remainder of the study is organized as follows. The next section provides details for the legal framework and the definitions of strategic and liquidity defaulters. Section II. describes our data. Section III. presents our empirical results regarding the incidence and the distribution of strategic default. Section IV. discusses the policy implications of our results, and section V. concludes the study.

I. Legal Framework

A. Legal Framework for Personal Bankruptcy and Foreclosure Moratoria

Before 2010, Greece did not have any personal default framework for individuals.[2] In June of 2010, the Greek Parliament legislated new provisions that aimed to provide relief to households that had become financially-constrained due to the ongoing financial crisis. Law N.3869/2010, also known as the law for "over-indebted households" or the "Katseli law", introduced a *primary residence mortgage moratorium* and a *debt discharge process*. The law originally deferred foreclosures of primary residences for six months, but was subsequently extended without any change until the end of 2013.[3]

Importantly, the aforementioned regulation had the unanimous support of all political parties in Greece, thus borrowers anticipated that the government would maintain the status quo for at least until the end of 2013. The electorate provided strong support for politicians to protect homeowners both for humanitarian reasons, and out of concern for the negative spillover effects that a wave of foreclosures could have on house prices and aggregate economic activity, simiraly to a Bolton and Rosenthal (2002) setting.

[2]The ability to default was only available to commercials with N.3855/2007. See Vallender et al. (2013) for more details on personal debt charge provisions in Greece and other European countries.

[3]The protection of the primary residence, prescribed in N.3869/2010 was extended with N.3886/2011, N.4047/2012, and N.4128/2013. Starting from 1/1/2014, N.4224/2013 added additional criteria for inclusion based on the objective value of the primary residence and income, while in 2015 the aforementioned criteria became stricter, but still protects approximately two thirds of the existing borrowers with primary residence mortgages).

The new regulations provides *dual protection* for primary residences, a feature that we exploit to identify strategic default. First, a foreclosure moratorium was imposed for dwellings that serve as a primary residence with objective value below 300,000 euros.[4,5] In practice, the moratorium protected the vast majority of primary residences from foreclosure, making the effect of the provision almost universal. Figure 1 plots the objective values of primary dwellings in our sample; the median objective value is 71,000 euros, while 98.7% of dwellings in our sample falls below the 300,000 euro threshold.

Second, the law for over-indebted households (N.3869/2010) introduced a personal debt discharge procedure, which *excluded primary residences from liquidation.*[6] The following three stages summarize the steps for debt discharge:

- *Stage 1 (Application)*: The borrower applies for personal bankruptcy protection, which results to an automatic stay of any actions from creditors. From the time of the application, mortgages continue to accrue at the non-delinquency rate, regardless of the status of the borrower.

- *Stage 2 (Out-of-Court Settlement)*: The borrower provides to creditors a list of eligible debt obligations to be settled, a comprehensive report that discloses her current financial state (financial/real assets and income), along with a proposed repayment plan. The settlement is successful if the borrower and the bank agree on the repayment plan within three months.

- *Stage 3 (In-Court Settlement)*: If the out-of-court settlement is unsuccessful, then the case is deferred to the court. The court orders for the liquidation of the borrower's assets, excluding the (eligible) primary residence, and then sets a monthly payment for the next four years, at a level that allows the borrower to "maintain decent living

[4]Objective values correspond to presumed values used by tax authorities to estimate tax liabilities. At the time of the implementation, objective values were significant lower than market values.

[5]This threshold applied to for single individuals, was increased to 350,000 euros for married borrowers, and by 50,000 euros for each child, up to 450,000 euros

[6]For the exclusion of the primary residence from liquidation, the same thresholds on objective value, as in the case of the foreclosure moratorium, applied.

standards". The court eliminates the residual debt, so the borrower receives a *debt haircut*. If the primary residence is excluded from liquidation, then the court *may* rule for additional payments that do not exceed *in total* the 85% of the current commercial value of the house, in a period of up to 35 years with low interest rate.

In practice, this framework proved to be incomplete, dysfunctional, and prone to abuse (Paulus et al. (2015)). The provisions applied only to private debt, thus failing to provide full discharge for a wide range of liabilities, mainly towards the state (i.e. taxes, social security). Due to the overload in Greek courts, cases may take more than 10 years to settle, a period during which the applicant continues to enjoy the protection of the law.[7] Additionally, the vagueness of the law allowed for subjective interpretation that usually favored the borrower. For example, in cases that have been settled so far, the requirement to "maintain decent living standards" resulted to the exception of additional assets from liquidation, such as secondary residences and automobiles. In practice, courts rarely ruled for additional payments, when the primary residence was excluded from liquidation, even in cases that the borrower received 80-90% debt haircut.

In summary, law N.3869/2010 deferred foreclosures for eligible primary residences, and provided the opportunity for significant debt discharges, while protecting these dwellings from liquidation. This overlap of protection for primary homes is critical for the identification of strategic defaulters, as we explain in detail in the next section.

B. Indentification of Strategic Default

Strategic default is the deliberate decision of a borrower to become delinquent despite ability to service her debt (see Mian and Sufi (2009), Guiso et al. (2013)). The greatest challenge in identifying strategic default is that we cannot observe whether a borrower has the ability to pay or not. Detecting such behavior presupposes that the researcher has a comprehensive view of the borrower's financial state to access whether she can afford making

[7] For an overview of the weaknesses of the Greek judicial system, see "Report on "European judicial systems: Efficiency and quality of Justice"" [European Comission (2014)].

debt payments. However, in reality this information is not attainable, as individuals may hold hidden assets or have access to informal sources of financing. The past literature has used different methods to evaluate a borrower's "ability to pay", ranging from survey data (Guiso et al. (2013), Gerardi et al. (2015)) to exploiting banking information (Tiruppatur et al. (2010)); each method having its own merits and weaknesses.

In this paper, we exploit the simultaneous introduction of the personal bankruptcy procedure and the foreclosure moratorium to detect strategic default. Since both provisions protect primary homes from foreclosure, we identify strategic defaulters based on their preference towards the debt discharge process, which additionally requires the disclosure and liquidation of any additional (to the primary residence) assets. Thus, our criterion assesses strategic default by directly observing the behavior of the agents with superior information regarding their ability to pay; the borrowers. As such, our identification strategy avoids self-reporting biases that may contaminate survey data (see Hurst et al. (2014)), and is not subject to data limitations that may fail to capture the comprehensive financial state of borrowers.

For our analysis, we focus on a sample for which the primary residence is protected by the foreclosure moratorium, and additionally the borrowers are expected to receive a significant debt haircut by applying for the debt discharge process, unless they have additional assets. Thus, we separate strategic from liquidity defaulters as follows:

- *Strategic Defaulters*: Primary residence mortgage holders, who become delinquent, but do not apply for inclusion to the debt discharge provisions of N.3869/2010.

- *Liquidity Defaulters*: Primary residence mortgage holders, who become delinquent, and apply for inclusion to the debt discharge provisions of N.3869/2010.

The intuition behind our criterion is that a customer that defaults and is truly unable to service her mortgage should strictly prefer applying for permanent debt discharge, rather than relying only on the temporary protection of the foreclosure moratorium. That is, an individual with true inability to pay her mortgage can only gain from inclusion in

the bankruptcy process; the primary residence remains protected from liquidation, while additionally a significant reduction in monthly installments and a debt haircut is expected, based on her total debt outstanding, in absence of additional assets.

On the other hand, debtors who choose to passively default on mortgage payments without applying for inclusion to the debt discharge process, indicate that there are significant costs associated with the disclosure of their true financial state to creditors. We interpret this choice as a signal for the existence of additional—to the primary residence— financial or real assets that the borrower attempts to protect from liquidation, and therefore ability to pay. Thus, the reluctance to apply for the provisions of the debt discharge process reveals that the debtor has defaulted strategically.

It is important to note that the above criterion is conservative, since there are reasons for borrowers, who can afford to service their mortgage, to apply for the provisions of the debt discharge law. For example, individuals with ability to pay may apply for bankruptcy, in order to enjoy favorable law provisions (i.e. non-delinquency rate) during the prolonged period until the case is settled in court, assuming the risk of an unfavorable ruling in the long-term horizon.

Collectively, the provisions of law N.3869/2010 created a unique setting for examining strategic default behavior. Strategic defaulters can exploit the foreclosure moratorium to defer mortgage payments in the future without foregoing the collateral. From this angle, the moratorium can be viewed as an exogenous shock that transformed mortgages to unsecured debt for the duration of the law, an option that may be more valuable in recession periods, when marginal utility of liquidity is higher (Cohen-Cole and Morse (2010)).

On the other hand, the status of delinquent loans outside the personal bankruptcy process after the discontinuation of the law provisions, remained unknown; expectations ranged from significant loan haircuts to a very aggressive stance from banks, when these restrictions were to be lifted. Nevertheless, the absence of information regarding the post-law treatment of delinquent accounts that were not covered by the bankruptcy process, means that the choice

to strategically default involved increased uncertainty, making it less appealing to more risk-averse individuals.

II. Data & Samples

Our dataset includes the universe of primary residence mortgages from a large Greek bank. We focus only on primary residence mortgages, in order to exploit the overlap of protection for the primary home by the foreclosure moratorium and the personal bankruptcy process. We also restrict our sample to mortgages originated after 2006, for which both the application and the performance files are available. We exclude any loans that were made after 2010 (post-legislation). These restrictions yield a sample that is representative of our entire mortgage pool, since the household credit boom occurred mainly post-2004, as a result of the financial liberalization of the Greek banking system and the introduction of euro (see Haliassos et al. (2016)). Our sample includes tens of thousands of mortgages.[8]

From the application files, we obtain important information for loan terms (amount approved, monthly installment, interest rate, interest rate type, maturity, existence of consignors) and customer characteristics (credit score, reported personal and total income, age, occupation, marital status, number of children, and education level). For each borrower, we are provided with the total debt outstanding towards the bank and other financial institutions, which allows us to calculate the total bank debt at the time of application. We also observe the initial loan-to-value (LTV) and combined loan-to-value (CLTV) ratios, and the initial market value of the property.

From performance files, we observe monthly repayment patterns, which we collapse at a quarterly frequency. From these data, we can specify the exact time a borrower becomes delinquent. Additionally, the performance files track changes in market values of dwellings, calculated based on a detailed, annually updated real-estate index, which allows the estimation of current LTVs and CLTVs. We compliment these data with hand-collected objective values for each dwelling, to determine eligibility for the foreclosure moratorium. Finally, if

[8] We do not report numbers of observations in tables for confidentiality reasons.

the borrower applies for the debt discharge procedure, we use a separate dataset that depicts the exact timing of entrance in each of the 3 stages of the process.

Our sample period is from 2007 to 2013. We define defaulters as borrowers that are delinquent for 180 days in delay (t+6 rule) or become delinquent on a previously restructured loan. Following the specification of the previous section, liquidity defaulters are identified as the ones that have defaulted before the implantation of law N.3869/2010, or have become delinquent after, but applied for inclusion to its provisions, up to six months past our sample period (June 2014).[9]

In order to obtain a sample that is eligible for both provisions, we make the following adjustments:

1. Since law N.3869/2010 applies only to non-commercials, we exclude commercials.[10]

2. We exclude mortgages on primary residences with objective values above the threshold, based on the demographics of the borrower (i.e. marital status, children) at the time of contracting.

3. We require that the total debt obligations towards our bank exceed the 50% of the current market value of the primary residence.[11] This requirement ensures that borrowers qualify for significant debt haircut by applying to the debt discharge process, unless they have additional real income or wealth (on top of their primary residence)

[9] In an additional attempt to be conservative, we define liquidity defaulters as delinquent borrowers who apply for the debt discharge process *anytime* until June 2014, regardless of the time of default. This entails the risk that strategic defaulters might apply in expectation that the law provision might change. For example, the change of the foreclosure moratorium threshold in 2016 resulted in the submission of over 200,000 debt discharge applications during the last three months of 2015. We examine the timing of applications, and we find that the this is not a concern for our sample period (2010-2013).

[10] For the purpose of the law, commercials are defined as individuals, who profit from commercial activity. This definition excludes self-employed individuals, as doctors, engineers, lawyers, and low-scale commercials that are mainly compensated for their personal labor. We define commercials based on their detailed occupation description for professionals that report more than 50,000 euros in annual income. We also use an alternative threshold of 30,000 euros, with no significant changes in our main results.

[11] The covenant of the law that gives to the court the right to rule for additional payments up to 85% of the current market value of the house, in the event that the primary residence is excluded from liquidation, ignores the time value of money. Our imposed threshold of 50% corresponds to the case that the court rules for the maximum amount to be paid in a period of 20 years with a discount rate of 5%.

We construct our final sample by applying the above three filters. It is important to note that the third adjustment makes our estimates on strategic default more conservative for two reasons. First, judicial practice suggests that ruling for additional payments, in the event of excluding primary residence from liquidation, is quite uncommon. Second, our proxy for the debt exposure of the borrower is imperfect; our measure uses the total bank debt of the borrower at the time of contracting (from application files). Hence, it underestimates eligible debt obligations, if the borrower has personal, non-bank debt or has accumulated additional debt since the (mortgage) application date. In unreported robustness tests, we relax the total debt threshold to 25% of the current value of the primary residence, and our results become economically larger.

Table 1 presents summary statistics for our main sample, after applying the aforementioned conditions. On the law implementation date (July 2010), our average mortgage exceeds 100,000 euros with average interest rate 4% and maturity 25 years. Commercial values are significantly higher than objective values, and the average CLTV in our sample is 0.70. Our typical borrower is 51 years old, reports personal income just below 15,000 Euros and has a cosigner or a guarantor.

III. Empirical Results

A. Foreclosure Moratoria and Defaults

The Greek banking system is experiencing an unprecedented period of high delinquency rates across all credit products during the ongoing economic crisis (Haliassos et al. (2016)). Given than residential mortgages are a large part of banks' portfolio, it is very important to assess whether the observed rates of mortgage defaults rates is due to the introduction of the foreclosure moratorium in July of 2010.

Figure 2 plots default rates for the entire portfolio of primary and secondary residence mortgages contracted after 2007 by our bank. Default rates increase dramatically in the post-crisis period, exceeding 35% for the primary and 23% for the secondary mortgage

portfolio by the end of 2013.[12] To put these numbers in perspective, the foreclosure rate in the U.S. mortgage market reached 4.6% in 2009 (Frame (2010)). Interestingly, the slope of both curves becomes steeper after the introduction of the moratorium, which invalidates the enforcement role of foreclosures, consistent with the findings of Morse and Tsoutsoura (2013) and Dendramis et al. (2017).[13]

Since the Greek economy was in a deep recession during our sample period, we cannot fully attribute the increase in mortgage defaults to the new regulations. However, the increase in difference of delinquency rates between primary and secondary residences suggests that the foreclosure moratorium played an important role on default rates of the former.[14] Even though suggestive, we do not draw any conclusions from Figure 2, due to wealth effect considerations; borrowers that have a secondary residence may be wealthier, which in turn can affect their probability of default. Instead, we focus our empirical analysis only on primary residences and detect strategic defaults by observing the behavior of borrowers to the chances in the regulation.

B. Incidence and Distribution of Strategic Default

One of the advantages of our criterion for the identification of strategic default is that we do not impose any restrictions on borrower or loan characteristics. Instead, we observe the behavior of borrowers who default on their mortgage and reveal their preference toward applying for the provisions of the new personal bankruptcy law. This novel feature of our identification allows us to include these characteristics in our analysis.

We find that by the end of 2013 the default rate of primary residence mortgages reaches 41.5%. We estimate that 28.4% of defaulters (11.8% of total borrowers in our sample) default strategically, by becoming passively deliquient without applying for bankruptcy. Because for our sample, borrowers who are included in the debt discharge provision are expected

[12] Figure 2 refers to the total sample, before the implementation of the criteria described in section I.B., while default rates in the next section refer to our main sample.

[13] Notice that the curves steepen with a lag from the voting of the law, since for mortgage defaults a delinquency period of 6 months is required.

[14] Note that secondary mortgages were receiving more limited protection by a general foreclosure moratorium based on the total delinquent debt (N.3858/2010).

to receive a significant haircut without liquidating their primary home, the choice not to apply for personal bankruptcy indicates the existence of additional wealth. Our findings suggest that many households exploit the new regulation that induces moral hazard, and the incidence of strategic default is considerably larger than reported in previous studies (Mayer et al. (2014), Gerardi et al. (2015)), and closer to the estimates of Guiso et al. (2013).

Given the extent of the moral hazard problem induced by the foreclosure moratorium, we examine the factors that explain the variation in strategic defaults. Specifically, in the next sections we investigate customer and loan characteristics that affect whether a customer defaults strategically. We also examine the heterogeneity in strategic defaults across different occupation industries.

Table II reports univariate differences on loan and borrower characteristics as of July 2010. Columns 1-3 show the average characteristics between defaulting and non-defaulting customers. The first columns are consistent with previous findings in the literature suggesting that defaulters have significantly higher loan amounts and CLTVs, but lower initial reported income and credit scores (Campbell and Dietrich (1983), Elul et al. (2010), Demyanyk and Van Hemert (2011)). Columns 4-6 show the average characteristics (and the univariate differences) between customers who default strategically or not. We find that strategic defaulters have, on average, higher initial credit scores and total income, and lower CLTVs. These results suggest that customer who default strategically are significantly less financially constrained than liquidity defaulters, consistent with the insights of Guiso et al. (2013) and Gerardi et al. (2015).

B.1. Loan and Borrower Characteristics

The heterogeneity in borrower and loan characteristics between customers who defaulted strategically or not reveals some interesting patterns. Figure 3 presents strategic default ratios, defined as the percentage of strategic defaulters among defaulters, and default rates for selected demographics. Professionals employed in private sector are more prone to default

than public employees, but the differences in strategic default are relatively small. In contrast, self-employed exhibit significantly higher strategic default ratios (35.7%) than wage workers (27%). These results suggest that the type of employment (self-employed or wage-worker) matters more for the incidence of strategic default than the type of the employer (public or private). One possible explanation for this result is the pervasive tax evasion among self-employed professionals in Greece (see Artavanis et al. (2016)). Applying for personal bankruptcy is less appealing for tax evading individuals, who prefer not to disclose their true financial status as they would not qualify for debt discharge.

Tables III presents OLS regressions for the probability of default (1-3) and strategic default (4-6) controlling for multiple loan and borrower characteristics. The main variables related to homeowners' ability to pay, and the characteristics of the loans in specifications (1) and (4) are very robust. Borrowers with lower income, lower credit score, higher outstanding amount, and higher CLTV are more likely to default. One standard deviation increase in CLTV (22%) increases the likelihood of default by 6.5-7.5%, and a one standard deviation increase in borrowers' income (21K) decreases the likelihood of default by 4-6.5%.[15]

Interestingly, the effect of these characteristics on strategic default are typically reversed. Specifically, we find that a standard deviation increase in homeowners' credit score and income increase the likelihood that a customer will default strategically by 6.3-8.3%. The regressions include zip code fixed effects, so we partial out potential unobservable region characteristics affecting these estimates. The tendency of higher income households to default strategically is the first sign that homeowners engage in moral hazard, consistent with the idea that high income households exploit the moratorium to stop servicing their loans.

We also investigate in more depth additional loan and borrower characteristics that predict strategic defaults. A higher interest rate increases the probability of default, consistent with the existence of hidden information problems (Karlan and Zinman (2009)), although the interest rate does not significantly affect the incidence of strategic default. Interestingly, the existence of a cosigner or a guarantor reduces the probability of strategic default; adding

[15] Using probit regressions we find that these estimates become economically larger (not tabulated here).

a co-signer increases the likelihood of strategic default by 6.3%. This finding is consistent with the idea that acting strategically is harder in mortgages with multiple people involved because it requires coordination.

In columns (3) and (6) of Table III we include additional customer characteristics. College graduates are less likely to default on their mortgage, but we find (relatively weak) evidence that they are more likely to default strategically. Self-employed professionals are more likely to default, suggesting that this group of customers faces stronger cash flow problems during the economic crisis. However, self-employed customers are also 7.2% more likely to default strategically. Unlike wage workers, self-employed borrowers can more easily hide their true sources of income through tax evasion (see Kleven et al. (2011), Artavanis et al. (2016)), so they choose to stop servicing their loan strategically, and not apply for the debt discharge process.

In sharp contrast to self-employed customers, pensioners are less likely to default or default strategically. The former outcome can be attirbutred to the fact that this group has relatively more stable income streams compared to active workforce during the crisis period. The lower propensity of pensioners to default strategically may reflect increased aversion to the uncertainty regarding the legal implications of their decision. We do not find evidence that being married or having children affects the likelihood of strategic default, consistent with Guiso et al. (2013). Interestingly, we find that single-parent families are more likely to default, consistent with reduced resources that the absence of a spouse may entail. However, these individuals exhibit among the lowest levels of strategic default (21.3%) among all demographic groups, which can be attributed, similarly to pensioners, to increased risk aversion related to the uncertainty around the succeeding phase following the termination of the moratorium.

B.2. Industry Distribution

Next, we examine the distribution of strategic defaults across different industries. Employment specialization could offer unique insights about the financial education of home-

owners. Figure 4 presents default and strategic-default ratios for people in ten broad industries. We find the economic crisis had a large impact on farmers, retailers, and blue collar workers, as one out of two homeowners are in default. In contrast, the economic crisis had a smaller impact on professionals in industries such as law, finance, and medicine, so these groups exhibit significantly lower default rates.

We observe significant heterogeneity in strategic defaults across professionals working in different industries. The highest ratio of strategic defaults is from professionals working in law or finance—47.5% and 41.1% respectively. Teachers, doctors, and other scientists are less likely to act strategically, and the rate of strategic defaults among these groups are closer to the sample average (28%). In sharp contrast to other groups, military personnel exhibits the lowest incidence of strategic default (21%), which suggests that moral attributes, such as sense of duty or social stigma, affect borrowers' willingness to engage in moral hazard.[16]

It is important to emphasize another pattern that arises from Figure 4. The rate of strategic default is high in groups of professionals that are less likely to be financially distressed and exhibit low default rates (correlation: -0.38). This finding supports the view that more privileged individuals exploit the provisions of the moratorium by defaulting strategically.

The results suggest that homeowners who understand the financial and legal environment around the foreclosure moratorium are more likely to act strategically by stop paying their mortgage without declaring personal bankruptcy. We provide more evidence consistent with this hypothesis by regressing the likelihood of strategic default on professional on occupation industries, controlling for loan and borrower characteristics.

We present the results from linear probability model (LPM) in Table IV. Our findings are consistent with the hypothesis that homeowners with financial and legal education are more likely to engage in moral hazard by defaulting strategically. Specifically, we find that professionals in industries such as finance, law, and services exhibit the highest rates of strategic default. On the other hand, working in medicine or education does not predict

[16] For example, Akerlof and Kranton (2005) argue that idealistic incentives can explain differences between military and civilian organizations and pay-schedules.

whether a customer will default strategically. These results remain robust when we include additional controls for the type of employment (self-employed vs wage-worker) and college education in regressions (2) and (4).

C. Negative Equity, Cash Flow Shocks, and Strategic Default

The ongoing economic crisis in Greece had a large negative impact on both household income and property values. During the sub-prime mortgage crisis in the US, an overwhelming amount of homeowners became underwater and had negative equity in their home because of the decline in prices. In Greece, however, even at the peak of the economic crisis, the commercial value of the house was still higher than the value of the mortgage for more than half of the mortgages. Table II shows that the average CLTV for customers who default strategically is only 74%. Figure 5 shows that more than 90% of mortgages where positive equity at the time of origination and, even after the collapse of the housing market, more than half of the customers had still positive equity in their home (June 2014).

Homeowners might choose to default despite having sufficient resources to service their mortgage for two main reasons. First, because the commercial value of the house is— or is expected to become— lower than the value of the mortgage. This is the negative equity hypothesis. The second hypothesis is the negative cash flow shock hypothesis. If the government prevents banks from foreclosing primary residences, homeowners who suffer a negative income shock may choose to default to defer their mortgage payments even if they could afford to service their loan. These hypotheses are not mutually exclusive, as both factors may influence the decision to default.

To test the first hypothesis, we separate customers whose CLTV at the time of default is above one (negative equity) from those whose CLTV is below one (positive equity).[17] We regress the probability of strategic default on mortgage characteristics and the individual's industry of employment. We find that homeowners default strategically regardless of whether they have negative or positive equity in their house. However, negative equity has

[17] Our estimates become economically larger when we use a cutoff for CLTV such as 0.9. This result suggests that customers expect that home prices would continue to decline.

a heterogeneous impact on the probability of default for homeowners employed in financial services. The first two columns of Table V suggest that individuals employed in finance are almost twice as likely to default strategically if they have negative equity in their home. We also find the complementarity between negative equity and financial education using the full sample in column (3). Overall, individuals employed in finance are more likely to strategically default, but this probability increases if the homeowners is also underwater.

According to our second hypothesis, homeowners may choose to default strategically after suffering a large cash flow shock and exploit to the foreclosure moratorium to defer their mortgage payments. The challenge in testing this hypothesis is finding a clean way of identifying which individuals have suffered a negative wealth shock. To address this identification issue, we focus on pensioners. The economic adjustment program between Greece and its international creditors imposed a large reduction in high pensions (citation).

To test our second hypothesis, we classify pensioners in three groups based on the amount of their reported income. We then compare the probability of strategic default among these pensioner groups after controlling for mortgage and borrower characteristics. In Table VI we regress the probability of strategic default on an indicator variable that identifies high income and medium income pensioners (low income pensioners are omitted). The results in column (1) suggest that high and medium income pensioners are 6-10% less likely to default on their mortgage, despite having suffered a large cut in their pension. Regression (2), however, shows that high income pensioners, after suffering a considerably larger cut on their pension than low income pensioners, are almost 12% more likely to default strategically. These results corroborate our second hypothesis, and suggest that a large negative cash-flow shock increases the likelihood that homeowners will exploit the moratorium and default strategically.

D. Social Networks and Strategic Default

A number of studies documents the contagious nature of foreclosures (see Frame (2010) for a review), and the negative spillover effects from collapsing housing prices (Immergluck

and Smith (2006), Mikelbank (2008), Harding et al. (2009), Campbell et al. (2011)). However, there is little evidence around the contagious effect of strategic defaults. Using survey data, Guiso et al. (2013) show that knowing a person that has defaulted strategically increases the probability of mimicking such behavior. Bradley et al. (2015) find that local strategic default rate is significant in predicting strategic default behavior, however its importance is greatly reduced when controlling for the local foreclosure rate.

Here, we investigate whether living in close proximity to borrowers who strategically default also affects mortgagors' decision to engage in this type of moral hazard. We hypothesize that strategic defaults tend to spread through borrowers' social network. To test this hypothesis, we measure for each zip code the rate of strategic and non-strategic, or liquidity, defaults. To calculate the rate of strategic (liquidity) default in a zip code, we count the total number of customers who defaulted strategically (non-strategically) in that zip code and divide this number by the total number of homeowners.

We regress the probability that a customer defaults strategically on the zip code strategic-default rate and liquidity-default rate. Table VII shows the results from these regressions, which control for the customer's income, mortgage amount, credit score, and CLTV. The regression results in column (1) suggest that a one standard deviation increase in the rate of liquidity defaults in a mortgagor's zip code, decreases the likelihood that the customer will default strategically by 12.2%. This is consistent with the idea that strategic defaulters are on average wealthier individuals and live in neighborhoods where fewer people default overall.

In sharp contrast, the effect of local strategic default rates is positive and economically large. One standard deviation increase in the rate of strategic defaults around a borrower's neighborhood increases the likelihood that they will also default strategically approximately by 5.3%. The results are remain robust even after we control for the overall rate of defaults in the zip code.

To corroborate the findings in Table VII, we examine the timing of defaults. We test whether the probability that customers default strategically increases if customers nearby

recently engaged in this type of moral hazard. To test this hypothesis, we exploit the time-series performance of every mortgage using proportional hazards regressions. We investigate whether the rate of strategic defaults in the previous periods has a multiplicative effect on the probability that a customer will also default strategically (failure). We calculate for any given zip code and any given month the number of customers who defaulted, either strategically or not, and create two time-varying measures of default: the cumulative rate of strategic defaults and the cumulative rate of liquidity defaults.

In Table VIII we present the results of Cox regressions, where failure time is the number of months until a customer defaults strategically. The results suggest that the local incidence of strategic default significantly increases the likelihood that a customer will also default strategically in the future; a borrower that moves from a zip code where no one defaults strategically to a zip code where half of the delinquencies are strategic increases the likelihood of becoming a strategic defaulter within a year by 15%.

Taken together, these findings suggest that social networks play an important role in the spread of strategic defaults, and therefore, moral hazard becomes more intense by prolonging the regulation. We discuss potential policy implications in more detail in the next section.

IV. Policy Implications

Our empirical results have policy implications for both the effectiveness of the imposed measures and the nature of strategic default. Here, we offer some insights related to the incidence, the distribution, and the role of social networks on the propagation of moral hazard.

First, we find that the rate of strategic defaults is particularly large, and conservatively estimate that 28% of borrowers that defaulted could have afforded to make payments in the absence of the foreclosure moratorium. To aggregate the effect across the Greek banking system, we start from the total amount of mortgages as reported by the Bank of Greece; 70.6 billion euros in December 2013. Since there is no official data regarding the total amount of

primary residence mortgages, we surveyed top bank managers of the systemic Greek banks to obtain an estimate of the portion of primary residence mortgages on their portfolios. Using their responses, we conservatively estimate that non-performing loans attributable to strategic default amount from 5 to 6 billion euros across the Greek banking system, only from the primary residence mortgage portfolio.[18]

The above estimates suggest that the imposed legislation had a large adverse effect on the financial health of Greek banks, which was predominately moved to the public through recapitalizations that increased government debt and depleted state's bank holdings. During our sample period, Greek banks went through two rounds of recapitalizations. The second recapitalization, which was completed in the spring of 2014, amounted to 8.3 billion euros (Haliassos et al. (2016)), a figure is comparable to our estimated losses from strategic default in the mortgage portfolio.

Second, the analysis of borrower characteristics who default strategically suggests the existence of an adverse selection story. Our findings consistently indicate that weaker groups are more prone to apply for the debt discharge process, as the regulator initially envisioned. However, more privileged individuals, such as higher income groups, exploit the protection of the moratorium and stop paying their mortgage even though they have additional assets or wealth to liquidate that would allow them to pay their mortgage. Thus, from a social perspective, the foreclosure moratorium *as a stand-alone provision* creates significant negative externalities allowing wealthier individuals with knowledge of the institutional framework to exploit the regulation.

Third, an important implication of our results relates to the contagious nature of strategic default. Mayer et al. (2014) offer an excellent discussion for the trade-off between broad ("umbrella") mortgage adjustment programs and interventions based on strict eligibility criteria. The former might foster strategic default, while the latter may not be implemented timely to prevent liquidity defaults. Our paper offers new insights on the duration of govern-

[18] For the estimation we assume that 60-70% of the mortgage portfolio refers to primary residences, which constitutes the lower bounds of the responses.

ment intervention policies. A broad intervention program should be temporary, to minimize the contagious externalities of borrowers who engage in moral hazard.[19]

Finally, the incidence of strategic default becomes important as banks are prompted to deal with the problem of non-performing loans (NPLs). Restoring financial stability and resolving the issue of NPLs is one of the pillars of the Third Economic Adjustment Programme for Greece (2015). Along these guidelines, the Greek Parliament has voted for legislation (N.4354/2015) that facilitates the resolution of NPLs through Debt Transfer Companies. These provisions are expected to apply to mortgages as well in the near future. In this context, recognizing that a significant portion of mortgage defaults is strategic, and therefore likely to become performing once the foreclosure moratorium is lifted, can significantly reduce the extent of the problem and the respective costs for the banking system. Hence, the separation of strategic from liquidity defaults, and the discontinuation of provisions that have foster the former, *prior* to the resolution of NPLs are imperative.

V. Conclusion

Our study shows that the introduction of an almost universal foreclosure moratorium on primary residences had a significant impact on strategic default and the deterioration of the financial state of the Greek banking system. We conservatively estimate a range from 5 to 6 billion euros in delinquent mortgages, due to strategic default. Through several bank recapitalizations, the Greek government financed a large part of the cost of moral hazard, redistributing wealth from shareholders and taxpayers toward wealthier and financially literate homeowners.

Due to its unconditional nature, the foreclosure moratorium fostered strategic behavior, mostly among borrowers with high education, higher income, lower debt, and financially/legally literate. Additionally, the foreclosure moratorium was costly and deprived

[19] Consistent with this policy recommendation, recent foreclosure moratoria had been either temporary or based on strict eligibility criteria (i.e. the temporal halt of foreclosures by large financial institutions in the U.S. (2010), the two-year foreclosure moratorium for primary residences under strict eligibility criteria in Spain (2012)).

funds from other targeted provisions that could provide relief to truly over-indebted households. Individuals without college degrees, single parent families, and senior citizens exhibit lower incidence of strategic default, but are exposed to significantly higher overall default rates.

Moving forward, Greek banks attempt to return to the recovery path by resolving their non-performing loans. A significant portion of delinquent borrowers are strategic, which complicates the sale of these "toxic" assets. The results in this paper support the hypothesis that the foreclosure moratorium is responsible for a large number of strategic delinquencies. Therefore, we hypothesize that by lifting the moratorium and imposing stricter eligibility criteria for renegotiation will considerably reduce the incidence of strategic defaults, thus increasing the value of these assets.

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Figures

Figure 1: The histogram presents the distribution of objective values for the full sample of primary residence mortgages, excluding loans guaranteed by the state and loans with subsidized interest rates. A primary residence is protected from foreclosure if the objective value of the collateral is is below 300,000 Euros (vertical line). The threshold for primary residencies that are protected increases to 350,000 Euros if the borrower is married, and increases by 50,000 Euros more for each child in the household.

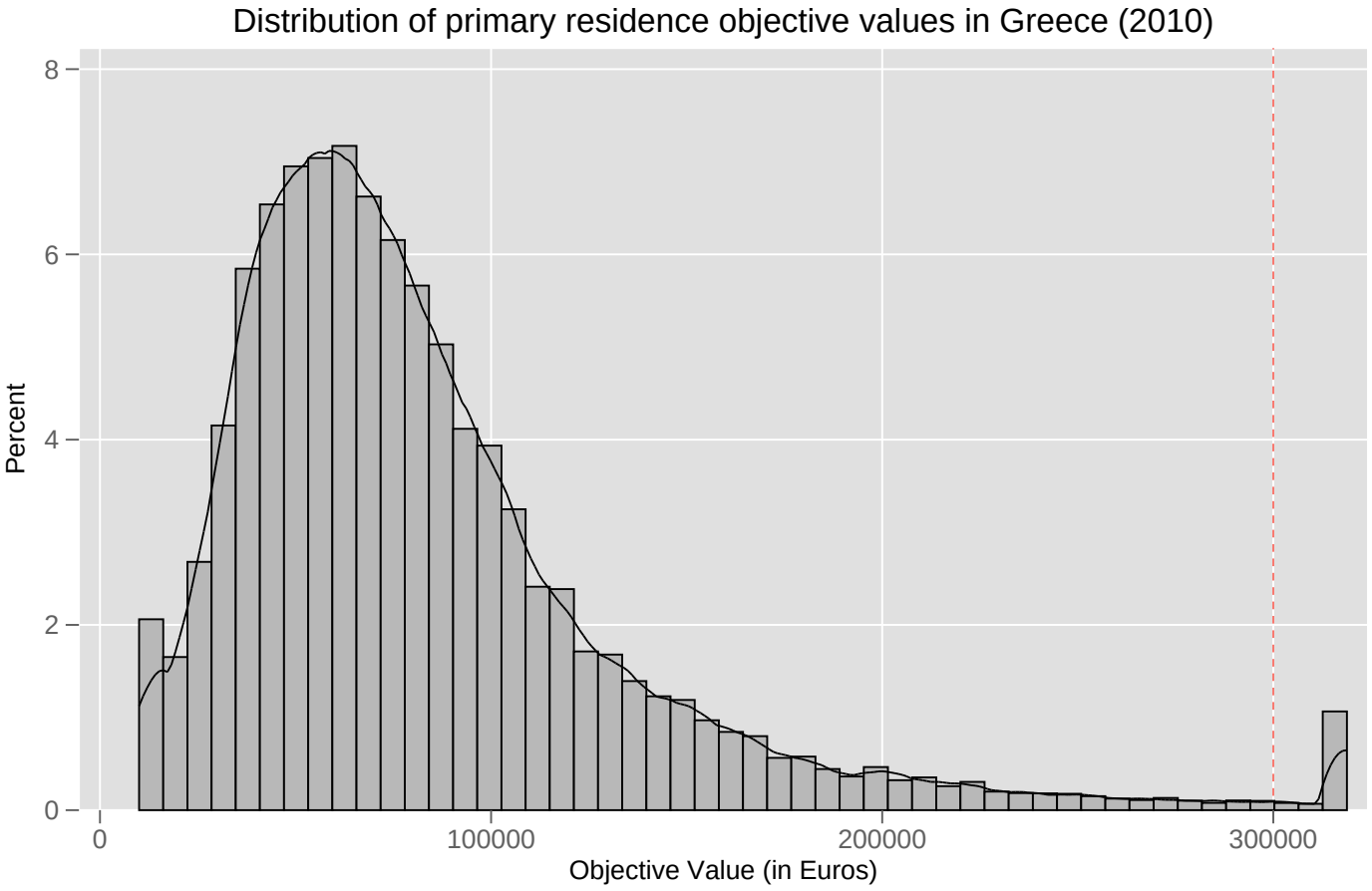


Figure 2: The graph presents cumulative default rates on a monthly frequency for the entire sample of primary residence (straight line) and secondary residence (dashed line) mortgages. The sample includes mortgages contracted after January of 2007. Mortgages guaranteed by the state and with subsidized interest rates are excluded. The dash-dot line depicts the difference in default rates between primary and secondary residence. Delinquency is defined as the delay of payment for an amount equal to 6 monthly payments (t+6 rule). The horizontal line depicts the implementation time of laws N.3869/2010 and N.3858/2010.

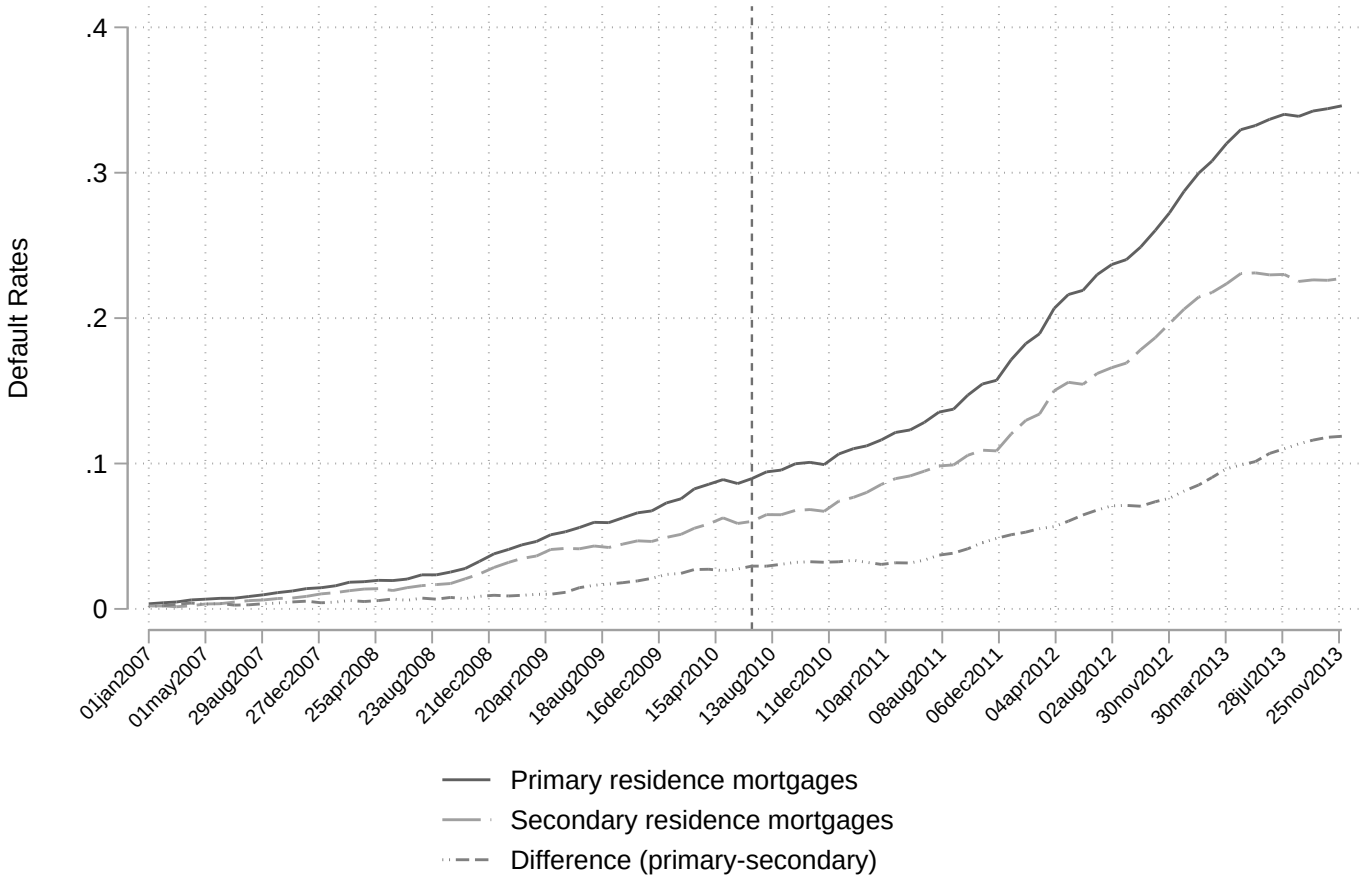


Figure 3: The graph presents strategic default ratios (indicated with triangles), defined as the ratio of strategic defaulters over liquidity defaulters, and overall default rates (indicated with bars), for selected demographic variables. Defaults and strategic defaults are as of December 2013. All demographic variables are obtained by application files.

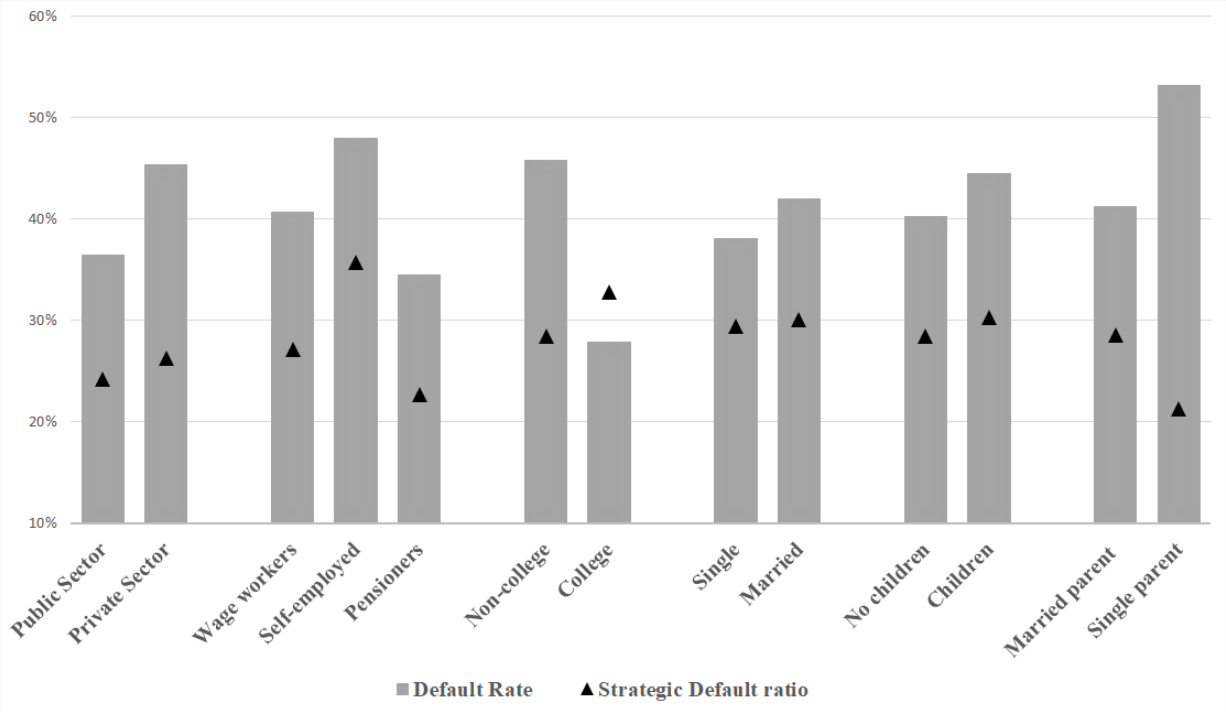


Figure 4: The graph presents strategic default ratios, defined as the ratio of strategic defaulters over liquidity defaulters, and overall default rates, across industries. Defaults and strategic defaults are as of December 2013. The horizontal line represents the sample average rate of strategic defaults (29%).

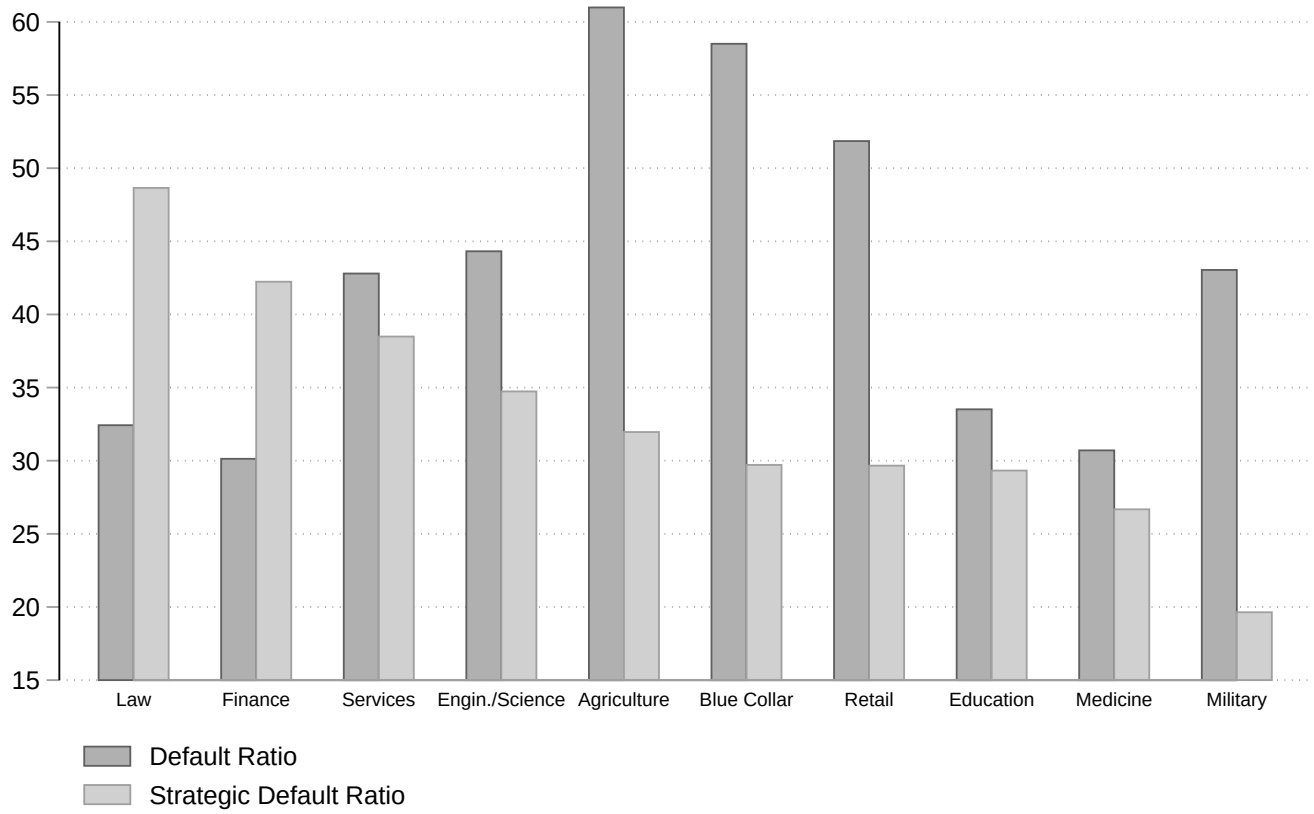
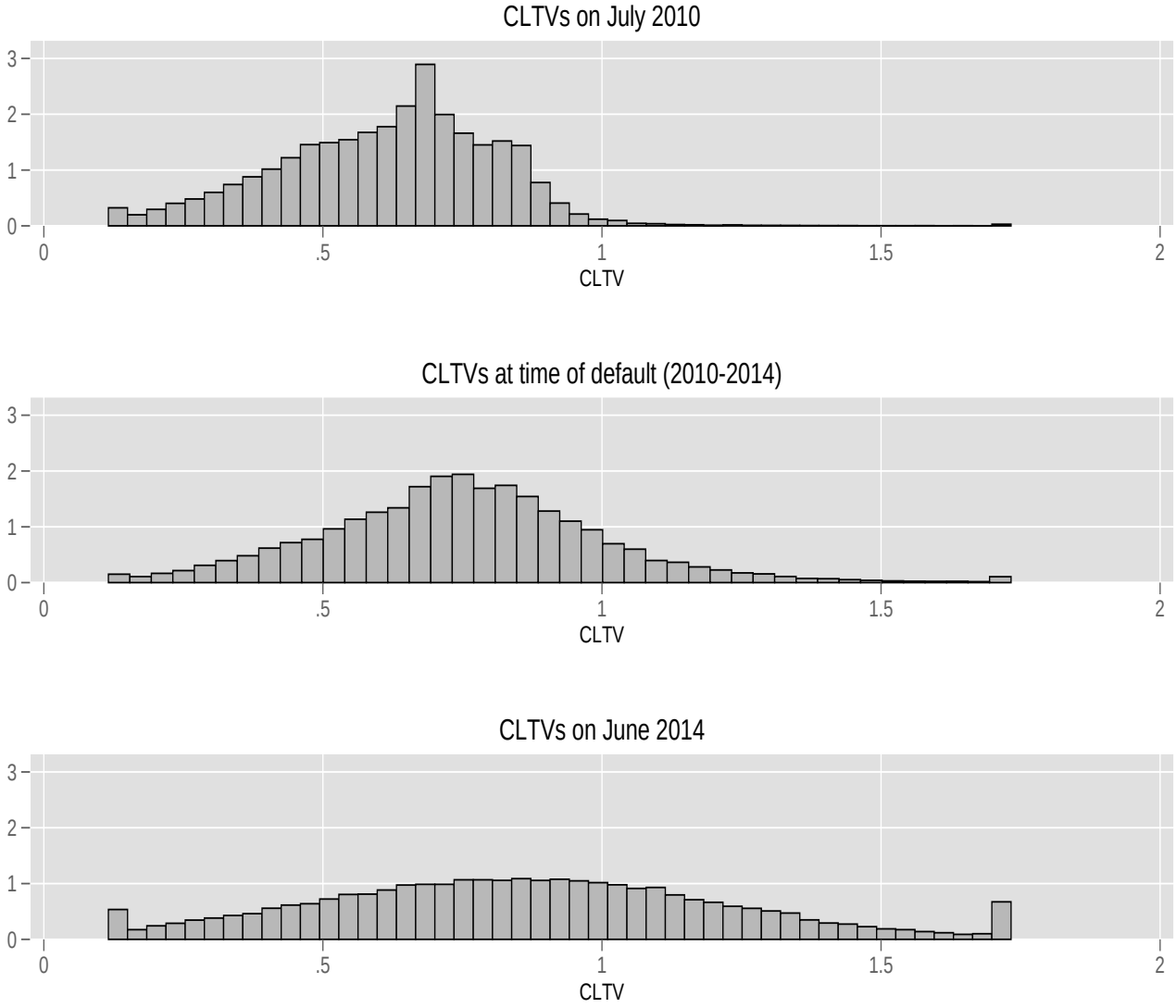


Figure 5: These histogram present the distribution of current LTV values of primary residence mortgages in three different time periods. The first plot (top left) shows the distribution of CLTVs on July 2010, which is the date of the implementation of the foreclosure moratorium and the introduction of the new personal bankruptcy regulation (Katseli Law). The plot on top right shows the distribution of CLTVs of individuals at the time they default during the period July 2010 until June 2014. The third plot (bottom left) shows the



Tables

Table I: Summary Statistics of Mortgages on Primary Residences
The table presents summary statistics of primary residential mortgages from 2007 until 2013. We use mortgage, dwelling, and customer characteristics from mortgage applications and performance information at the date of the foreclosure moratorium regulation (July 2010).

	Mean	sd	p10	p50	p90
Loan Characteristics					
Loan Amount	103.33	73.14	33.60	87.00	198.90
Monthly Installment	518.95	362.80	153.55	449.86	964.07
Interest Rate	4.08	1.09	2.62	4.07	5.42
Maturity (years)	24.52	9.27	12.00	25.00	40.00
Num. people involved	1.85	0.71	1.00	2.00	3.00
CLTV	0.62	0.20	0.35	0.64	0.85
Dwelling Characteristics					
Commercial Value	158.26	99.88	65.01	136.42	273.00
Objective Value	78.90	49.78	30.41	67.50	141.18
Customer Characteristics					
Credit Score	651.74	99.99	552.00	648.00	753.00
Reported Income	14.54	13.70	0.00	12.23	30.00
Total Income	31.13	21.04	12.16	25.72	55.23
College Education	0.29	0.45	0.00	0.00	1.00
Age	51.09	11.85	36.00	50.00	68.00

Table II: Univariate differences

This table presents average mortgage and customer characteristics for delinquent (column 1) and non-delinquent borrowers (column 2). We define a customers as *defaulter* if he has been delinquent for at least six months, and *non-defaulter* otherwise. We define as *strategic defaulter* a customer that defaults before December of 2013 and does not apply for the debt discharge provision of the "Katseli-Law". We define borrowers who default and apply for debt discharge as *liquidity defaulters*. The third column shows the univariate difference in average characteristics between defaulting and non-defaulting customers, and the last column shows the difference in the characteristics between strategic and liquidity defaulters. CLTV is based on July 2010, or at the time of default for defaulters.

	(1) Non-Defaulters	(2) Defaulters	(1)-(2)	(4) Liquidity defaults	(5) Strategic defaults	(4)-(5)
Loan Amount	99.61	108.55	-8.94***	107.96	110.08	-2.12
Monthly Installment	524.84	510.68	14.16***	494.70	551.63	-56.93***
Interest Rate	4.06	4.11	-0.05***	4.09	4.16	-0.07***
Maturity (years)	23.26	26.31	-3.05***	26.64	25.49	1.15***
Num. people involved	1.86	1.84	0.02**	1.84	1.82	0.02*
CLTV (at default)	0.59	0.75	-0.16***	0.76	0.74	0.02***
Commercial Value	155.78	161.75	-5.97***	158.82	169.22	-10.40***
Objective Value	80.19	77.23	2.96***	75.95	80.75	-4.80***
Credit Score	672.84	621.90	50.94***	614.33	640.49	-26.16***
Reported Income	15.75	12.85	2.90***	12.78	13.04	-0.27
Total Income	33.19	28.28	4.91***	27.36	30.55	-3.19***
College Education	0.35	0.20	0.15***	0.19	0.22	-0.03***
Age	51.11	51.06	0.05	51.28	50.53	0.75***

Table III: The determinants of defaults and strategic defaults in primary residence mortgages

This table presents OLS regressions of defaulting customers on borrower and mortgage characteristics. In Columns (1)-(3), the dependent variable is an indicator variable that takes the value of 1 if the customer defaulted (delinquent for six consecutive months). In Column (4)-(6) the dependent variable is an indicator variable that takes the value of 1 if the customer is delinquent for six consecutive months, and did not apply for debt discharge (defaults strategically). Standard errors are clustered by zip code and are reported below each regression coefficient. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

	(1) **Defaulter**	(2) **Defaulter**	(3) **Defaulter**	(4) **Str.Defaulter**	(5) **Str.Defaulter**	(6) **Str.Defaulter**
CLTV	0.1199***	0.0987***	0.0989***	-0.0945***	-0.0940***	-0.0914***
	(0.0158)	(0.0159)	(0.0169)	(0.0192)	(0.0200)	(0.0215)
Credit Score	-0.1955***	-0.1875***	-0.1669***	0.0776***	0.0809***	0.0792***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Total Income	-0.0670***	-0.0609***	-0.0412***	0.0579***	0.0728***	0.0702***
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0003)	(0.0003)
Loan Amount	0.0683***	0.0477***	0.0527***	0.0185**	0.0217**	0.0140
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Interest Rate		0.0168***	0.0171***		0.0152*	0.0134
		(0.0023)	(0.0025)		(0.0033)	(0.0036)
Maturity (years)		0.0733***	0.0790***		-0.0026	-0.0119
		(0.0003)	(0.0004)		(0.0004)	(0.0005)
Num. people involved		0.0094	-0.0005		-0.0503***	-0.0470***
		(0.0041)	(0.0043)		(0.0053)	(0.0061)
College Education			-0.1063***			0.0127
			(0.0068)			(0.0113)
Self-employed			0.0268***			0.0696***
			(0.0067)			(0.0098)
Pensioner			-0.0248***			-0.0290***
			(0.0099)			(0.0150)
35<age<=65			0.0568***			-0.0389***
			(0.0098)			(0.0164)
Single-Parent			0.0194***			-0.0320***
			(0.0173)			(0.0203)
Zip Code FEs	Yes	Yes	Yes	Yes	Yes	Yes
Adjusted R^2	0.099	0.103	0.117	0.039	0.041	0.047

Table IV: The determinants of default and strategic defaults — by occupation industry

In Columns (1)-(2), the dependent variable is an indicator variable that takes the value of 1 if the customer defaulted (delinquent for six consecutive months). In Column (3)-(4) the dependent variable is an indicator variable that takes the value of 1 if the customer is delinquent for six consecutive months, and did not apply for debt discharge (defaults strategically). OLS regressions include zip code fixed effects. Robust standard errors are clustered by zip code and are reported below each regression coefficient. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

	(1) **Defaulter**	(2) **Defaulter**	(3) **Str.Defaulter**	(4) **Str.Defaulter**
CLTV	0.1159***	0.1142***	-0.0972***	-0.0911***
	(0.0164)	(0.0174)	(0.0203)	(0.0218)
Credit Score	-0.1863***	-0.1754***	0.0821***	0.0844***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Total Income	-0.0515***	-0.0394***	0.0541***	0.0482***
	(0.0001)	(0.0002)	(0.0003)	(0.0003)
Loan Amount	0.0715***	0.0756***	0.0135	0.0115
	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Finance	-0.0740***	-0.0622***	0.0542***	0.0553***
	(0.0115)	(0.0121)	(0.0222)	(0.0240)
Law	-0.0179***	-0.0056	0.0437***	0.0400***
	(0.0235)	(0.0244)	(0.0485)	(0.0495)
Medicine	-0.0535***	-0.0330***	-0.0032	-0.0062
	(0.0130)	(0.0138)	(0.0271)	(0.0291)
Engin./Science	0.0012	0.0110*	0.0150	0.0032
	(0.0143)	(0.0150)	(0.0236)	(0.0250)
Blue Collar	0.0312***	0.0192***	0.0203*	0.0167
	(0.0099)	(0.0105)	(0.0140)	(0.0156)
Agriculture	0.0156**	0.0096	0.0024	-0.0054
	(0.0153)	(0.0164)	(0.0215)	(0.0233)
Military	-0.0225***	-0.0156***	-0.0295***	-0.0256***
	(0.0145)	(0.0150)	(0.0227)	(0.0240)

Services	-0.0246***	-0.0236***	0.0304***	0.0207**
	(0.0136)	(0.0145)	(0.0253)	(0.0274)
Education	-0.0369***	-0.0035	-0.0072	-0.0141
	(0.0125)	(0.0131)	(0.0240)	(0.0273)
Retail	0.0060	0.0028	0.0235*	0.0147
	(0.0079)	(0.0081)	(0.0122)	(0.0130)
Self-employed		0.0231***		0.0653***
		(0.0068)		(0.0100)
College Education		-0.1016***		0.0181
		(0.0079)		(0.0138)
Adjusted R^2	0.110	0.116	0.048	0.049

Table V: Financial education and strategic default

This table presents coefficients from cross-sectional OLS regressions of customers who strategically default. The dependent variable is an indicator variable that takes the value of one when the customer is delinquent for six consecutive months and did not apply for debt discharge (defaults strategically). *Negative Equity* is an indicator variable that takes the value of one if the CLTV of the customer at the time of default is above one. Standard errors are clustered by zip code and are reported below each regression coefficient. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

	(1) **Str.Defaulter** (Negative equity)	(2) **Str.Defaulter** (Positive equity)	(3) **Str.Defaulter** (Full sample)
Negative Equity(X)Finance			0.0208**
			(0.0448)
Negative Equity(X)Law			0.0053
			(0.1065)
Negative Equity			0.0275**
			(0.0144)
Finance	0.0892***	0.0401***	0.0429***
	(0.0439)	(0.0248)	(0.0245)
Law	0.0525**	0.0334***	0.0362***
	(0.1137)	(0.0562)	(0.0554)
Total Income	0.0699***	0.0512***	0.0566***
	(0.0006)	(0.0003)	(0.0002)
Loan Amount	-0.0187	0.0508***	0.0309***
	(0.0000)	(0.0000)	(0.0000)
Credit Score	-0.0097	-0.0075	-0.0068
	(0.0001)	(0.0001)	(0.0001)
Zip Code FEs	Yes	Yes	Yes
Adjusted R^2	0.031	0.037	0.040

Table VI: Cash flow shocks and strategic default

This table presents coefficients from cross-sectional OLS regressions of pensioners. We classify pensioners as high-income, medium-income, and low-income based on the distribution of the personal income in their mortgage applications (low-income group is omitted). The dependent variable in regression (1) is an indicator variable that is equal to one if the customer defaulted and zero otherwise. In regression (2), the dependent variable is an indicator variable that takes the value of one when the customer is delinquent for six consecutive months and did not apply for debt discharge (defaults strategically). *Negative Equity* is an indicator variable that takes the value of one if the CLTV of the customer at the time of default is above one. Standard errors are clustered by zip code and are reported below each regression coefficient. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

	(1) **Defaulter**	(2) **Str.Defaulter**
Pensioner income Q1 (low, omitted)		
Pensioner income Q2	-0.0038	0.0040
	(0.0177)	(0.0258)
Pensioner income Q3	-0.0652***	0.0388
	(0.0196)	(0.0303)
Pensioner income Q4 (high)	-0.0955***	0.1289***
	(0.0217)	(0.0327)
CLTV	0.0863***	-0.0803***
	(0.0415)	(0.0558)
Credit Score	-0.1971***	0.0739***
	(0.0001)	(0.0001)
Loan Amount	0.0698***	-0.0188
	(0.0000)	(0.0000)
Interest Rate	0.0403***	0.0156
	(0.0063)	(0.0095)
Maturity (years)	0.0332**	-0.0054
	(0.0010)	(0.0014)
Num. people involved	0.0485***	-0.0524*
	(0.0105)	(0.0158)
Zip Code FEs	Yes	Yes
Adjusted R^2	0.082	0.025

Table VII: Strategic defaults through social networks - Cross sectional regressions
This table presents coefficients from cross-sectional OLS regressions of customers who strategically default. The dependent variable is an indicator variable that takes the value of one when the customer is delinquent for six consecutive months and did not apply for debt discharge (defaults strategically). *Zip Code Rate of Liquidity Defaults* is the total number of customers that defaulted in the zip code and applied for debt discharge divided by the total number of customers in that zip code. *Zip Code Rate of Strategic Defaults* is the total number of customers that defaulted strategically divided by the total number of customers in that zip code. Standard errors are clustered by zip code and are reported below each regression coefficient. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

	(1) **Str.Defaulter**	(2) **Str.Defaulter**	(3) **Str.Defaulter**
Zip Code Rate of Liquidity Defaults	-0.1278***		-0.1183***
	(0.0189)		(0.0167)
Zip Code Rate of Strategic Defaults		0.1119***	0.1007***
		(0.0311)	(0.0265)
CLTV	-0.0926***	-0.0910***	-0.0888***
	(0.0176)	(0.0179)	(0.0176)
Credit Score	0.0750***	0.0784***	0.0777***
	(0.0000)	(0.0000)	(0.0000)
Total Income	0.0451***	0.0562***	0.0488***
	(0.0002)	(0.0002)	(0.0002)
Loan Amount	0.0117	0.0138*	0.0135*
	(0.0000)	(0.0000)	(0.0000)
Adjusted R^2	0.036	0.032	0.045

Table VIII: Strategic defaults through social networks - Cox model

This table presents coefficients from the estimation of a Cox model with time varying covariates. Failure time is the number of months after the passing of the foreclosure moratorium until a customer defaults strategically (customer who defaults and does not apply for debt discharge). *Zip Code Rate of Liquidity Defaults* is the total number of customers that defaulted in the zip code and applied for debt discharge, divided by the total number of customers in that zip code. *Zip Code Rate of Strategic Defaults* is the total number of customers that defaulted strategically, divided by the total number of customers in that zip code. Breslow's method for handling ties is used. Standard errors are clustered at the customer level and are reported next to the regression coefficients. Significance at the 10%, 5%, and 1% level is indicated by *, **, and ***, respectively.

	Strategic Default	
Control Variables		
Credit Score	0.0006***	(4.96)
Total Income	0.0039***	(5.82)
Loan Amount Total	0.0007***	(3.54)
Time-Varying Covariates		
CLTV	-0.0233***	(-10.83)
Zip Code Rate of Liquidity Defaults (Lag 1)	-0.0192**	(-2.10)
Zip Code Rate of Strategic Defaults (Lag 1)	0.0515***	(3.64)
$\chi^2(6)$	232.9331	
Pseudo R^2	0.0023	