Policy Bias with Outside Options*

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Abstract

When analyzing voting behavior, most analyses focus on policy preferences of individuals who are bound by the policies implemented by the electorate of those politicians that win office. In many policy realms, however, the constituent voters are subjected to the implemented policy only if they choose to engage in certain activities. This project focuses on one such policy area: foreclosure law. While elected politicians enact relevant policies, only those voters that choose to participate in the mortgage market are directly affected by those policies. Individuals that do not wish to participate in the mortgage market may instead choose to rent their homes, pay cash, or live with other family members and thereby avoid falling subject to foreclosure law. This paper develops a formal model and empirical analysis of policy-making in such environments, and offers a simple empirical analysis of home ownership in the United States as affected by both foreclosure policy and the workforce demographics of the region. I identify a clear nonmonotonic relationship between the number of debtor protections in place and the home ownership rate within a state, offering support for moderate policies despite a clear majority of the population being in a position to favor unbounded protections under traditional voting models.

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1 Introduction

Voting models in most contexts assume that voters are directly subjected to the policies that are implemented as a result of their collective voting decisions. What happens, however, when voters have outside options that allow them to avoid the policies that are implemented? What happens when voters can choose to bypass the laws that are implement? This is an important caveat in many policy areas where the laws only directly affect those who choose to participate in particular voluntary activities. These areas include such common activities as driving, running a business, and—following the focus of this paper—buying a house.

Furthermore, most voting models assume that voters' behavior is independent. Voters' effects on each other are nonexistent, or at least limited. At the very least, each individual's effect on others is minuscule and falls back to an aggregate effect on society at large. What happens when one voter's decision has a direct and identifiable effect on another's?

This paper addresses some of these questions by analyzing the behavior of different actors in the housing market with respect to local rules in places governing the foreclosure process in the event of a mortgage default. While some states offer relatively strong protections to creditors by instituting nonjudicial proceedings, limiting notice, and permitting large deficiency judgments, other states offer many more protections to debtors, such as judicial proceedings, redemption and reinstatement periods, and outright bans in foreclosing under certain circumstances. In every state, it is clear that the majority of residents—and more particularly voting residents—are more likely to find themselves as debtors and so should prefer those policies, yet their implementation is limited to a few environments.

I argue that the availability of an outside option for both parties—alternative investments for the lender and renting for the borrower—together with the interdependence of the lender and the creditor drive this moderation by demonstrating that if the policy too-strongly favors one party in the transaction over the other, the disfavored party will drop out of the market, forcing her would-be trading partner to either drop out herself or renegotiate with a different partner in the resulting more-competitive market. I develop a simple formal model to demonstrate the induced policy outcomes, and I subsequently test the model empirically by analyzing home ownership against the backdrop existing foreclosure policies across the United States.

2 Literature

There is a large literature dating back to Black (1948) and Downs (1957) which considers how legislators make decisions over which policies to implement. Perhaps the most well-known of these is the median voter theorem, which suggests that the policy which is ultimately implemented will be the one most-preferred by the median voter, and the politician elected will be the one whose platform is closest to that of the median voter. This models, however, comes with several strict condition, particularly when placed in multiple dimensions. Even in one-dimension, however, the model is not foolproof. voters must satisfy appropriate single-crossing conditions to prevent cycling in voting outcomes. Moreover, unrelated outside options should not affect the policies favored by individuals. This paper addresses the outcome when these conditions are not strictly satisfied, focusing on the effect that one outside option—renting—can have on the choices of voters and politicians in a particular policy area—foreclosure law.

Foreclosure procedures vary significantly across the United States. Each state has slightly different procedures and laws governing how mortgagees may take transfer or take possession of the houses held as collateral for the debts owed by mortgagors. In many cases, these laws further vary within different cities and counties within individual states as politicians pander to their respective bases and the industry groups that inform them. This is useful from an empirical perspective, as it allows for the variation that makes my analysis viable, but it also makes it more difficult to gain an understanding of the precise rules that govern any single mortgage, Bucks and Pence (2008) considers how this plays into individuals' ability to understand the terms of their own mortgages and the tools available to them under the law. Deng and van Order (2000) and Campbell and Cocco (2003) also give conditions under which different tools available to actors under the terms of a mortgage may be implemented. Most importantly from the perspective of this analysis, however, Mian, Sufi, and Trebbi (2014), provides a detailed look at the role of judicial foreclosure rules on the pricing and demand for housing across jurisdictional boundaries from the state level down to the zip code level. This paper builds on this analysis to explore not only how policies such as judicial foreclosure requirements affect home ownership and pricing, but also how the demographics within a region affect whether or not such policies are implemented.

Several more analyses focus on the determinants of failure in mortgages, both due to applications being denied—as in the case of Munnell et al. (1996)—and due to default and eventual foreclosure—as in the case of Mayer, Pence, and Sherlund (2009) and Deng, Quigley, and Robert Van Order (1996). Each of these focuses primarily on the determinants of failure from the mortgagor's side. Meanwhile, the decisions of the mortgagee, which have an equally-large if not bigger effect on the level of credit available in a market relate closely to a number of classical industrial economics concerns such as those addressed by Olley and Pakes (1996) and Hopenhayn (1992). These classic empirical exercises inspire relevant questions as to the conditions under which lending firms are likely to enter into a market or a particular transaction with a potential mortgagor at any given time. LaCour-Little and Zhang (2017) also provides an analysis of adverse selection in the mortgage market with respect to the structure of mortgage-backed securities that speaks to how policies governing lending are likely to affect market participation and the ability of borrowers and lenders to come to terms. In line with this literature, there are numerous analyses of the economic consequences of overly restrictive and, more recently, overly loose credit leading to inefficient levels of spending on home equity. Some recent projects focusing on these outcomes include Cooper (2009); Mian and Sufi (2009), and Mian and Sufi (2011).

Overshadowing each of these concerns, though, are politicians own decisions dictating what actions are or are not allowed by either party to a mortgage transaction. While relatively little relief has been provided to most mortgagors in recent years—contrary to what would be expected under many traditional median voter models—there has been a long history of debt relief in the united states during the 19th Century and in the 1930s (Rucker and Alston, 1987). This project attempts to motivate the reasoning behind the lack of such relief in the current era.

The legislator, keeping in mind her connection to the selectorate, may decide to implement populist policies aimed at pleasing debtors, but she does so at the risk of damaging relations with creditors and possibly driving them out of the market or individual segments thereof. Concerns about the effects of these actions—and the alternative of no action in extreme conditions—is the focus of Renuart (2013), as well as Cordell and Lambie-Hanson (2015). In a similar vein, Bolton and Rosenthal (2002) address a similar question from the perspective of the electorate in popular referendums, demonstrating the conditions under which debtors—in this case farmers—are likely

to support debt a moratorium to avoid foreclosure. This particular model applies many of the same characteristics as the one presented below but which focuses on *ex post* intervention by the government, whereas the model presented here focuses on *ex ante* policy interventions.

3 Model

Let there be a population of *citizens*, K, with mass one, consisting of individuals that are indexed in two dimensions. First, they are indexed by one of two economic types, $\tau \in \{c, d\}$, where c refers to *creditors* and d refers to *debtors*. Second, each citizen is indexed by her value type, $j \in \mathbb{R}^{++}$, representing the value she places on a debt transaction. This can be interpreted as a measure of efficiency or need that characterizes the actor, such that a wealthy financier may be able to offer diversified, safe loans that are highly profitable, while a small town manager of a savings and loan can finance little more than local home mortgages that are highly tied into the local economy. Similarly, a wealthy entrepreneur may be able to obtain extensive leverage at relatively low cost, while an overextended blue-collar laborer may only be able to obtain expensive payday loans. Denoting the marginal mass of each type $k_{\tau j}$, we have

$$\int_0^\infty (k_{cj} + k_{dj})\,\mathrm{d}j = |K| = 1 \tag{1}$$

Also, define $K_\tau = \int_0^\infty k_{\tau_j} dj$, measuring the proportion of the population belonging to each type, so that $K_c + K_d = 1$. Denote the minimum and maximum value types, j, for each economic type as $\underline{j}_\tau$ and $\overline{j}_\tau$, respectively.

In this environment, any two citizens of different types may meet and engage in a debt transaction whereby the creditor provides a loan to the debtor and the two individuals realize returns,

$$r_{\tau_j}(\tilde{\tau}_i) \tag{2}$$

on the transaction.

Since creditors are often institutional, I also allow creditors to engage with multiple debtors. Specifically, each creditor may conduct transactions with up to $N \in \mathbb{R}^{++}$ debtors, and let the set of debtors with whom she engages be denoted by $\tilde{k}_{c_j}$. Conversely, denote the set of creditors that debtor i engages with be denoted $\tilde{k}_{d_i}$. Formally, define $\tilde{k}_{\tau_j}$ to be the set of values, i, such that τ_j is partnered with $\tilde{\tau}_i$, subject to the constraint that $|\tilde{k}_{c_j}| \leq N$ for every j. Also, assume this constraint is exactly binding so that $K_d \geq NK_c$ so that the total profit realized by each citizen becomes,

$$\pi_{c_j} = \sum_{i \in \tilde{k}_{c_j}} r_{c_j}(d_i) t_{c_j d_i} \tag{3a}$$

$$\pi_{d_i} = r_{d_i}(c_j) t_{d_i c_j} \tag{3b}$$

for creditors and debtors, respectively, where $t_{\tau_j \tilde{\tau}_i} \in \{0, 1\}$ is an indicator variable determining whether a transaction takes place between citizens $\tilde{\tau}_i$ and τ_j.[1] If this assumption does not hold, so that there is either a surplus or deficit of creditors, those players which are excluded from the market

[1] Note that since both parties must participate for a transaction to occur, we must have $t_{\tau_j \tilde{\tau}_i} = t_{\tilde{\tau}_i \tau_j}$.

will earn a constant payoff of zero; however, it is not unreasonable that they may reente the market by competing on price, saturating the market exactly. Of course, if a citizen does not participate in any transactions voluntarily, she earns a baseline payoff of zero. In practical terms, the creditors and debtors in the population saturate the market for debt exactly under this assumption, earning payoffs as an increasing function of all of the transactions in which they participate.

Specifically, let the payoff function, r_{τ_j}, take the following form:

$$r_{\tau_j}(\tilde{\tau}_i) = f(\tilde{\tau}_i, \tau_j) - (-\epsilon)^{\top(\tau=d)}p \tag{4}$$

where $f(\tilde{\tau}_i, \tau_j)$ is a non-decreasing function of τ_j and $\tilde{\tau}_i$, $\epsilon \in \mathbb{R}^{++}$ is a measure of efficiency, and $p \in \mathbb{R}$ denotes a policy chosen by a politician, and $\top(\tau = d)$ is an indicator variable taking the value, 1, whenever $\tau = d$. The policy takes the form of a lump-sum transfer between the parties in a transaction and may be thought of as rules limiting debt collection, restrictions on interest rates, and other similar rules. Wherever $p > 0$, the policy favors debtors, and when $p < 0$, it favors creditors. When $p = 0$, the policy is neutral.[2] [3] Thus, debt transactions yield increasing payoffs with respect to the type of the debtors and creditors participating, but these payoffs may be negated by the imposition of a nonzero policy. Moreover, the first-order value of this policy is zero sum—policies that favor debtors harm creditors and vice versa.

Within this environment, the politician is chosen by a selectorate, $S \subseteq K$, in a competitive election between an incumbent, I, and an opposition candidate, O. In the lead-up to the election, the incumbent first commits to a policy platform, $p_I \in \mathbb{R}$, and then the opposition counters with her own platform, $p_O \in \mathbb{R}$. Members of the selectorate then vote according to simple majority rule on the basis of these platforms to maximize their own utility. Both candidates are assumed to be purely office-motivated and are able to commit to enacting their proposed platforms.[4] [5] Also, whenever voters are indifferent between candidates, they are assumed to vote for the incumbent.[6] Electoral ties are also decided in favor of the incumbent. Define the set of all voters' choices as V, with individual elements, $v_{\tau j} \in \{0, 1\}$ representing votes for the incumbent ($v_{\tau j} = 1$) and for the opposition ($v_{\tau j} = 0$). Also define v_P to be the number of votes for candidate $P \in \{I, O\}$ so that $v_I + v_O = |V| = |S|$, and let $w = \top(v_I \geq v_O)$. As a result of the electoral process, this leaves

$$p = wp_I + (1 - w)p_O \tag{5}$$

Finally, define the choice to make a transaction by the parameter, $t_{\tau_j} \in \{0, 1\}$, where $t_{\tau_j} = 1$ denotes the decision to participate and $t_{\tau_j} = 0$ denotes the decision to decline a transaction. Since both parties must volunteer their participation for a transaction to take place, we get

$$t_{\tilde{\tau}_i \tau_j} = t_{\tau_j \tilde{\tau}_i} = t_{\tilde{\tau}_i} t_{\tau_j} \tag{6}$$

[2]Consider a version where individualized efficiency of transfer replaces the zero-sum example used here, i.e. where there is a difference between what is taken from one and given to the other, and the difference represents the various costs associated with the policy exemplified by court costs and fees often associated with debt transactions. Make sure to consider the politician's budget constraint. If the politician can extract private rents, he may take a slice of the pie for himself.

[3]Also consider adding a linear term to the policy, i.e. $p = Af(\tilde{\tau}_i, \tau_j) + B$. Note that it is not immediately obvious that this is a valuable extension, since it merely stretches the as-now arbitrary distribution of types, i and j.

[4]In the case of the incumbent, this policy may be viewed as a *status quo* rule that is in place prior to the election.

[5]The results obtained under this structure are identical to those that would result when the policy is chosen directly by a committee of the whole under open amendment procedures.

[6]This assumption is not necessary on a continuum, but is required to obtain a pure strategy equilibrium in certain cases where there is a discrete selectorate.

Denote the set of all such decisions T. Utility is now realized as in equation (3), the full profit function for a citizen, τ_j paired with all other available citizens, $\tilde{\tau}_i \; \forall \; i \in k_{\tilde{\tau}}$:

$$\pi_{c_j} = \sum_{i \in \tilde{k}_{c_j}} r_{c_j}(d_i) t_{c_j d_i} \tag{7a}$$

$$\pi_{d_i} = r_{d_i}(c_j) t_{d_i c_j} \tag{7b}$$

In long form, this is

$$\pi_{c_j} = \sum_{i \in \tilde{k}_{c_j}} t_{c_j d_i} \left(f(d_i, c_j) - (w p_I + (1-w) p_O) \right) \tag{8a}$$

$$\pi_{d_i} = t_{d_i c_j} \left(f(c_j, d_i) + \epsilon \left(w p_I + (1-w) p_O \right) \right) \tag{8b}$$

Figure 1: Game tree. Here, the action of the voters, V, is the action preferred by the voters according to a preference aggregation procedure (Simple majority rule in this analysis).

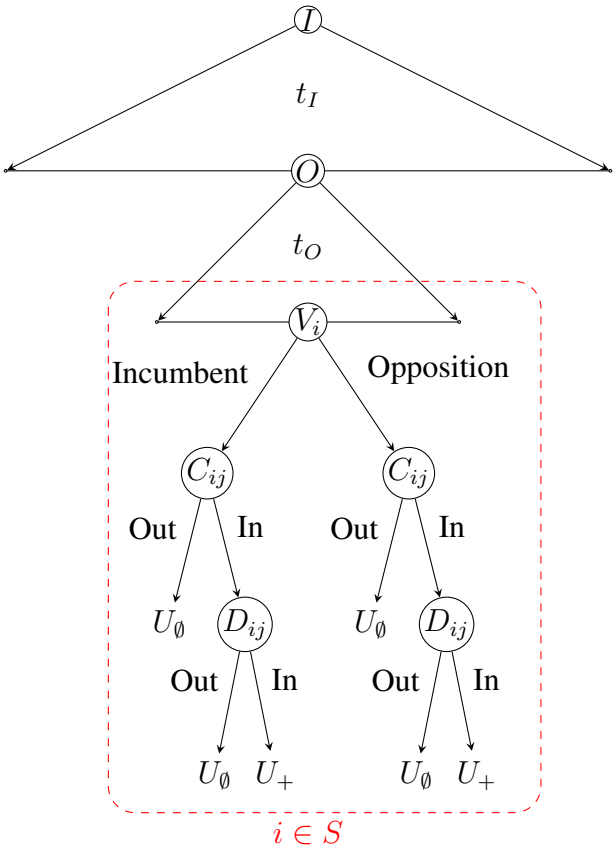

Figure 1 demonstrates the game tree describing this environment which, to recap, proceeds as follows:

1. The incumbent offers a platform.

2. The opposition offers a platform.

3. The selectorate votes.

4. Creditors decide whether to offer loans.

5. Debtors decide whether to accept loans if offered.

6. Outcomes are realized.

4 Equilibrium Behavior

4.1 Universal Voting

This section identifies a Subgame Perfect Equilibrium of the game described above under various conditions. First I analyze the simplest case of a selectorate that coincides perfectly with the set of citizens so that $S = K$ and has an equal number of citizens of each type so that $k_c = k_d$ and $N = 1$. Furthermore, I assume that $f(\tilde{\tau}_i, \tau_j) = j$ so that each transaction is uniform with respect to its value to the participating actors. This will serve as a baseline analysis.

Baseline

Using backward induction, debtors only accept offers of loans whenever they are better-off doing so than they are when they do not participate in any transaction; that is whenever

$$j + p \geq 0 \ \rightarrow \ j \geq -p \tag{9}$$

Similarly, creditors only offer loans whenever

$$j - p \geq 0 \ \rightarrow \ j \geq p \tag{10}$$

At this stage, consider the preferences of each voter. Voters (indeed, all citizens) earn a payoff of 0 whenever they do not participate in a transaction, regardless of whether they or their potential partner rejected the transaction. Whenever they do engage in a transaction, the debtor, d_i, earns $i + p$, and the creditor, c_j, earns $j - p$. Thus, the debtor is willing to engage in a transaction whenever $i \geq -p$. Similarly, the creditor will agree to a transaction whenever $j \geq p$. As a result, the transaction in question will occur whenever $-i \leq p \leq j$. For simplicity, assume that the most productive citizens of each type are paired with each other so that citizen $\overline{c}$ is paired with $\overline{d}$ and the debtors holding the next $N - 1$ highest indexes, i.[7] Since there is a continuous distribution of citizens of each type, we can reduce each $\tilde{k}_{c_j}$ to a single index, i_j, which describes the pairs. This can also be reversed for the opposite perspective, j_i.[8] Applying this to the profit functions of the

[7] This pairing allows the pairs to remain unchanged in the event that there is a price shift affecting the value of the transaction to either type of party. This is also supported by pricing changes such as those observed in Mian, Sufi, and Trebbi (2014). (Also, the ϵ is important for pricing argument.)

[8] The relationship between j and i can be described by the simple ODE, $\frac{di_j}{dj_i} = N(k_{c_{j_i}} - k_{d_{i_j}})$ subject to the initial condition, $(\overline{c}, \overline{d})$.

voters, we obtain

$$\pi_{c_j} = \begin{cases} N\left(j - p\right) & : i_j \leq p \leq j \\ 0 & : \text{otherwise} \end{cases} \tag{11a}$$

$$\pi_{d_i} = \begin{cases} (i + \epsilon p) & : -i \leq p \leq j_i \\ 0 & : \text{otherwise} \end{cases} \tag{11b}$$

Any voter will support a candidate that offers a policy which induces both her and her economic partner—the other party in the debt transaction—to participate in the market whenever the other candidate offers a policy proposal that does not induce this type of behavior. This implies that given any platform, $p \in (-i, j_i]$, a debtor will support that policy against any alternative, $p^{'} \notin (-i, j_i]$. Furthermore, provided any viable platform, $p^{''} \in (-i, \hat{p})$, that debtor will prefer any alternative platform, $p \in [\hat{p}, j_i]$, so that her most-preferred platform is $p_i^* = j_i$. Mirroring this logic, a creditor will prefer any $p \in [-i_j, j)$ to any $p^{'} \notin [-i_j, j)$ and will prefer any p such that $p \in [-i_j, \hat{p}]$ to any $p^{''} \in (\hat{p}, j)$. That creditor's most-preferred policy is $p_j^* = -i_j$. As there is only one round of voting, there are never incentives to vote strategically, so these preferences are consistent for all members of the selectorate and the electoral outcome, w, is determined by the sincere votes of these actors over the two proposals.

Now consider the choice of the opposition candidate. Since she is office-motivated, her goal is simply to get more than half of the available votes. Again, we begin with an selectorate with a one-to-one pairing between creditors and debtors, all of whom are voters. First consider the case where the incumbent has proposed $p_I < -\underline{d}$ so that the debtor type which least-values the transaction will reject any loan offers. Any creditors matched with those debtors, $i \in (p_I, -\underline{d}]$, will likewise be excluded from the market under such a policy. The opposition candidate may then offer $p_O = 0$. This proposal makes any creditors who would otherwise be engaged in the market worse-off as a result of the reduced benefits due to a biased policy. However, all of the debtors who would otherwise participate in the market are made better off by the opposition's proposal. Moreover, with $p = 0$, all of the creditors and all of the debtors are better-off if they participate in the transaction than they would be if they did not participate. As a result, any debtors that would decline an offer under p_I are better-off if they can instead accept an offer under p_O and so they will prefer the opposition candidate. Similarly, the creditors that would be forced out of the market under p_I prefer to accept the reduced benefits of bias in exchange for the opportunity to participate in the market. This then suggests that all debtors prefer p_O to p_I and a strictly positive mass of creditors also prefers the opposition candidate's platform. Since $k_d = \frac{1}{2}$, this implies that a strict majority will vote for the opposition candidate, giving her the office. As there is no possible higher payoff for the opposition candidate than winning the office, choosing $p_O = 0$ is thus a (generally non-unique) best response to any $p_I < -\underline{d}$. Mirroring the logic applied to this case demonstrates that the same strategy is a best response to any $p_I > \underline{c}$. Indeed, for $p_I \notin [-\underline{d}, \underline{c}]$, any $p_O \in (-\underline{d}, \underline{c})$ is a best response for the opposition.[9]

If the incumbent proposes $p_I \in [-\underline{d}, \underline{c}]$, there are two possibilities for the opposition, $p_O \notin [-\underline{d}, \underline{c}]$ and $p_O \in [-\underline{d}, \underline{c}]$. In the former case, the voters simply reverse their preferences as compared to the case where the incumbent offers a proposal beyond the minimal cutpoints. In such a scenario, the opposition cannot secure a majority and thus loses the election. Suppose instead the

[9]This range may be larger if the magnitude of p_I is sufficiently large.

opposition candidate chooses a proposal, $p_O \in [-\underline{d}, \underline{c}]$. In this case, every voter participates in a transaction. If p_O is to the left of p_I, the creditors all prefer the opposition proposal. However, the incumbent gains the support of every debtor in this condition so that there is a tie in the final voting outcome and the incumbent wins the election. If the opposition proposes a p_O to the right of p_I, the electoral support is flipped between the candidates and again the incumbent wins. Finally, if $p_O = p_I$, the voters are all indifferent between the two candidates and so the incumbent wins the full support of the electorate. Thus, for $p_I \in [-\underline{d}, \underline{c}]$, the opposition can never win the election and any choice of p_O is a best response to the incumbent.

This discussion also illuminated the optimal strategy for the incumbent. If she chooses $p_I \notin [-\underline{d}, \underline{c}]$, the challenger can choose any $p_O \in [-\underline{d}, \underline{c}]$ and the incumbent will lose. On the other hand, if the incumbent chooses $p_I \in [-\underline{d}, \underline{c}]$, then she will always defeat the opposition. Thus, this is a best response for the incumbent. This establishes the last piece of the equilibrium.

Moving down the game tree, the players' equilibrium strategies are as follows. The incumbent offers

$$p_I^* \in [-\underline{d}, \underline{c}] \tag{12}$$

The opposition offers

$$p_O^* \in \begin{cases} \mathbb{R} & \text{if } p_I \in [-\underline{d}, \underline{c}] \\ (-\underline{d}, \underline{c}) & \text{otherwise} \end{cases} \tag{13}$$

For each τ and j, voter τ_j votes

$$v_{\tau_j}^* = \begin{cases} 0 & \text{if } \tau = c \ \wedge \ p_I \notin [-i_j, j] \ \wedge \ p_O \in (-i_j, j) \\ & \text{or if } \tau = c \ \wedge \ p_I \in (-i_j, j] \ \wedge \ p_O \in [-i_j, p_I) \\ & \text{or if } \tau = d \ \wedge \ p_I \notin [-i, j_i] \ \wedge \ p_O \in (-i, j_i) \\ & \text{or if } \tau = d \ \wedge \ p_I \in [-i, j_i) \ \wedge \ p_O \in (p_O, j_i] \\ 1 & \text{otherwise} \end{cases} \tag{14}$$

creditors make the following decisions on offers:

$$t_{c_j}^* = \begin{cases} 0 & \text{if } p > j \\ 1 & \text{otherwise} \end{cases} \tag{15}$$

and debtors make the following decisions on whether to accept any offers made by creditors:

$$t_{d_i}^* = \begin{cases} 0 & \text{if } p < -i \\ 1 & \text{otherwise} \end{cases} \tag{16}$$

In this equilibrium, the incumbent wins every election with either 50 percent of the selectorate in the case of a moderate opposition candidate and progressively higher percentages for more extreme opposition candidates. Every creditor offers credit under the resulting policy, and finally every debtor accepts the offer that she receives.

Preponderance of debtors

Now consider the case where there is a preponderance of debtors relative to creditors, so that each creditor is assigned to $N > 1$ debtors (reflective of an $N : 1$ ratio). In this case, the equilibrium will shift in favor of debtors generally, but that shift will come at the cost of driving some creditors—and the corresponding debtors—out of the market.

Consider the equilibrium choice of the incumbent in the baseline scenario. If she offers any $p_I \in [-\underline{d}, \underline{c})$, then the opposition can offer $p_O = \underline{c}$ and gain the support of every debtor, which for $N > 1$ represents more than half of the selectorate when every citizen votes. This results in the incumbent losing the race. Moreover, provided there is a sufficiently small mass of creditors at $i = \underline{c}$, even if the incumbent offers $p_I = \underline{c}$, the opposition can offer $p_O = \underline{c} + \varepsilon$ and still win the election. Thus, we must identify a different equilibrium.

The incentives of the individual citizens remain unchanged in this environments, so we need only consider the behavior of the candidates. Define $\underline{c}_N$ and $\overline{c}_N$ respectively to be the minimum and maximum values of $\hat{j}$ satisfying

$$\int_0^\infty k_{d_i} \mathrm{d}i - N \int_0^{\hat{j}} k_{c_j} \mathrm{d}j = \frac{N}{N+1} - N \int_0^j k_{c_j} \mathrm{d}j = \frac{1}{2} \tag{17}$$

which can be rewritten as

$$\int_0^{\hat{j}} k_{cj} \mathrm{d}j = \frac{N-1}{2N(N+1)} \tag{18}$$

Suppose the incumbent offers $p_I < \underline{c}_N$. The opposition candidate can then offer any $p_O \in (p_I, \underline{c}_N)$ and gain the support of all of the debtors who are not excluded from the market. From the definition of $\underline{c}_N$, this constitutes a strict majority of the selectorate and therefore lets the opposition candidate win. On the other hand, suppose the incumbent offers $p_I > \overline{c}_N$. The opposition can then offer $p_O \in (-\underline{d}, \underline{c})$ and thereby gain the support of every creditor, as well as any debtor excluded from the market under the incumbent's proposal. This earns the opposition the support of a total of $\frac{1}{N+1} + N \int_0^{p_I} k_{c_j} \mathrm{d}j > \frac{1}{2}$ of the selectorate and an electoral victory. The opposition can also offer any $p_O \in [\underline{c}, c^*)$, where c^* is the minimal value which satisfies

$$\int_{c^*}^\infty k_{c_j} \mathrm{d}j + N \int_{c^*}^{p_I} k_{c_j} \mathrm{d}j \leq \frac{1}{2} \tag{19}$$

Finally, if the incumbent offers $p_I \in [\underline{c}_N, \overline{c}_N]$, any choice by the opposition will fail to gain the support of more than $\frac{1}{2}$ of the selectorate and the incumbent will win the election. The equilibrium behavior by the candidates is then described by

$$p_I^* \in [\underline{c}_N, \overline{c}_N] \tag{20a}$$

$$p_O^* \in \begin{cases} (-\underline{d}, c^*) & \text{if } p_I > \overline{c}_N \\ (p_I, \underline{c}_N) & \text{if } p_I < \underline{c}_N \\ \mathbb{R} & \text{if } p_I \in [\underline{c}_N, \overline{c}_N] \end{cases} \tag{20b}$$

In this equilibrium, as before, the incumbent wins the election with at least 50 percent of the vote.

If the scenario is reversed and $N < 1$ so that creditors outnumber debtors, the equilibrium is simply reversed so that we have

$$p_I^* \in [-\overline{d}_N, -\underline{d}_N] \tag{21a}$$

$$p_O^* \in \begin{cases} (-d^*, \underline{c}) & \text{if } p_I < -\overline{d}_N \\ (-\underline{d}_N, p_I) & \text{if } p_I > -\underline{d}_N \\ \mathbb{R} & \text{if } p_I \in [-\overline{d}_N, -\underline{d}_N] \end{cases} \tag{21b}$$

using appropriate analogs for the critical debtors.

4.2 Nonvoting citizens

So far the analysis has focus on the case where the selectorate is identical to the population so that $S = K$. In many environments, however, this is not the case. For example, while the branch staff of a bank are likely to be residents of the jurisdiction in which they work, many stakeholders interested in the bank's fate will not be. Stockholders and directors will be located in different regions and unable to vote in local elections despite still having clear policy concerns locally. This subsection and the following ones focus on cases where the selectorate is a strict subset of the population, $S \subset K$. Here we begin with the case where $N = 1$ so that there are equal numbers of creditors and debtors in the citizenry but in which only a proportion, $\gamma_\tau \in [0, 1]$ are eligible to vote for each economic type. The total mass of voters in this condition is $\gamma_d \frac{N}{N+1} + \gamma_c \frac{1}{N+1} < 1$, and the incumbent can therefore win with the support of $\frac{\gamma_d N + \gamma_c}{2N+2}$ citizens who constitute half of the selectorate. This can be done by choosing p_I such that it satisfies

$$\gamma_d N \int_{p_I}^{\infty} k_{c_j} \mathrm{d}j = \frac{\gamma_d N + \gamma_c}{2N + 2} \tag{22}$$

Nonvoting Minority

Begin with the case where $\gamma_d = 1$ so that every debtor votes. Further assume that the citizens who are ineligible to vote are distributed randomly throughout the population of a given type, and again let the initial ratio of debtors to creditors be $N : 1$ with $N \geq 1$. The equilibrium policy proposal by the incumbent then reduces to

$$N \int_{p_I}^{\infty} k_{c_j} \mathrm{d}j = \frac{N + \gamma_c}{2N + 2} \tag{23}$$

Nonvoting Majority

If, on the other hand, the nonvoting citizens are disproportionately members of the majority economic type, the calculus may change for the candidates. In particular, if a sufficiently large proportion of the debtors are nonvoting citizens, the directional incentives of the candidates may be reversed so that they are incentivized to pander to the creditors who, despite representing a popular minority, nonetheless represent a voting majority. This occurs whenever $\gamma_d < \frac{\gamma_c}{N}$ and incentivizes the incumbent to choose

$$\frac{\gamma_c}{N} \int_{p_I}^{\infty} k_{d_i} \mathrm{d}i = \frac{\gamma_d N + \gamma_c}{2N + 2} \tag{24}$$

4.3 A Simple Example

Consider a simple case where there are six voters, three creditors and three debtors matched one-to-one with each other. Assume that the citizens are distributed with $j = 1, 2, 3$ for both economic types, so that the relevant cutpoints in policy space are -3, -2, -1, 1, 2, and 3. Assume citizens are matched according to their value type, so that creditor $i = 1$ is matched with debtor $i = 1$. First assume every citizen votes. If the incumbent proposes $p_I \in [-1, 1]$, then every citizen prefers to participate in the economy under that proposal. However, if the opposition offers $p_O \in (p_I, 1]$, then every debtor would prefer and vote for the opposition candidate. On the other hand, every creditor would prefer the incumbent's more-moderate offer and vote accordingly. In this case there is a tie, which is won by the incumbent by assumption. Conversely, if the opposition offers $p_O \in [-1, p_I)$, the debtors prefer the incumbent and the creditors prefer the opposition. There remains a tie, however, and the incumbent still wins. If the opposition chooses to offer $p_O = p_I$, then voters are indifferent between the two proposals and the incumbent receives all votes, again by assumption. Finally, if the opposition offers any $p_O > 1$, then all of the creditors support the incumbent, and at least one debtor supports the incumbent to avoid being forced out of the market when her creditor drop out under the opposition candidate's proposal. This gives the incumbent a strict majority. The logic of the voter behavior here is reversed under a scenario where the opposition offers $p_O < -1$, and again the incumbent wins with a strict majority.

If only the debtors are voting so that $\gamma_d = 1$ and $\gamma_c = 0$, then the situation changes. A moderate proposal by the incumbent, $p_I \in [-1, 1]$ could then be defeated by any $p_O \in (p_I, 2]$, since such an opposition proposal would, at minimum, gain the support of the two higher-value debtors, $i = 2, 3$ without any electoral push-back from the creditors. This would hold even if the opposition proposal was sufficiently extreme to drive the low value debtor and creditor out of the market. Instead, in equilibrium, the incumbent would choose $p_I = 2$. Any $p_O > 2$ would then gain the support of the highest value debtor who would remain in the market with the high value creditor, but it would cost the support of the middle debtor who would be forced out of the market. The low value creditor, who is forced out of the market under both proposals is indifferent and supports the incumbent by assumption, yielding a majority for the incumbent. If the opposition offers $p_O \in (1, 2] \cup (-\infty, -1]$, she gains no support, since the proposal is weakly worse for both of the higher value debtors and offers no change to the low value creditor. Finally, if the opposition offers $p_O \in (-1, 1]$, then she gains the support of the low value debtor, who has access to the market under that proposal, but by offering lower levels of bias in favor of the debtors, she loses the support of the higher value debtors who already had market access under the incumbent's proposal. Thus, $p_I = 2$ is a winning proposal for the incumbent.

5 Housing Market

The housing market readily fits this model. Heads of household have the option of buying a house—almost always taking out a mortgage to do so—or they may forego that market and rent instead. By choosing the latter, they avoid the high-stakes potential of entering into a conflict with their creditors with their house at stake. On the other hand, their creditors, such as banks, may choose to offer mortgages on easy terms or to restrict access to mortgages, especially for high-risk buyers. If either the head-of-household or the bank chooses to forego the purchasing transaction,

no transaction takes place and both parties lose out on the benefits of that transaction—a personal home and interest, respectively—but they also avoid the potential for an adversarial foreclosure process.

This foreclosure process varies across states in a number of ways and at several stages. However, the most prominent differences between states in the United States lies in the distinction between judicial and non-judicial states. Those states which impose judicial foreclosure laws require all such actions to be supervised by a judge and thereby impose significant costs on creditors when their debtors fall into arrears. These costs come in many forms, from temporal delays to legal fees to attempted foreclosures being outright rejected. In turn, this gives debtors in those states extra time to live in their homes and potentially avoid foreclosure altogether. Judicial foreclosure also incentivizes lenders to enhance their efforts to find solutions for delinquent debtors that are less-extreme than foreclosure, since the process of moving through the courts adds a new layer of time and costly legal expenses. These alternatives, though, may remain less-than-optimal for creditors in the long term.

Even under nonjudicial processes, other tools are available to legislators to complicate the foreclosure process for delinquent homeowners. They may implement laws giving delinquent mortgagors greater abilities to reinstate their mortgages, or to redeem their homes after a foreclosure sale. Homeowners may be protected from eviction until after the foreclosure process is complete, and even then be protected until separate legal proceedings are completed, or they may also receive specialized protections such as those which exist in many jurisdictions for high-cost mortgages or service members. Indeed, the unpredictability of many of these latter policy options can make them significantly more troublesome from the perspective of creditors.

Hypothesis 1. *Debtor protections, including reinstatement, servicemember protections, and protections for high-cost borrowers are less likely in states that have larger financial sectors. Longer redemption period and notice of sale requirements will be affected similarly.*

On the other hand, areas with strong financial institutions may implement protections that favor mortgagees to counter these policies. They may allow for deficiency judgments to recover the balance of debts on underwater homes, and they may secure limits to the protections available to debtors under bankruptcy. While the breadth of these policies is somewhat limited by the political reality that homeowners are a major constituency, they do provide a partial counter to those policies designed to protect mortgagors.

Hypothesis 2. *Deficiency judgments are much more likely to be permitted where the financial sector is strongest.*

5.1 Home Ownership Rates

The primary policy tools that this paper will focus on include seven policies that are commonly perceived to favor mortgagors and one that favors mortgagees during the foreclosure process. The first of these—and the most theoretically straightforward—is the use of judicial foreclosure. As discussed above, judicial foreclosure is a lengthy process with many of the attendant difficulties associated with any legal proceeding. However, it is not obvious how mortgagees are likely to respond to this type of policy. While on the face they may be incentivized to scale back their lending,

especially to those most-likely to default, these same mortgagors are the most likely to lack the resources to take full advantage of the judicial process in the face of a large institutional mortgagee. Moreover, despite the extra expense, the nature of the process is, for most lenders, relatively predictable. This allows them to incorporate the extra cost of processing potential foreclosures into the price of the mortgage. This is likely to primarily have the effect of driving down the value of homes which individual mortgagors are able to afford and only drive those nearest the bottom of the distribution out of the market. On the other hand, it may be the very protections that are built-in to the judicial process that make a mortgage viable for those individuals in the first place. This does indeed seem to be supported by Mian, Sufi, and Trebbi (2014), which identifies an increase in demand for home ownership as measured by prices in districts with judicial foreclosure. In light of this, I propose the following hypothesis:

Hypothesis 3. *Home ownership weakly increases in states with judicial foreclosure.*

The second and third protections favoring debtors are two that elongate the foreclosure process. Indeed, these represent a broader generalization of one particular feature of the judicial foreclosure process that make it attractive to mortgagors. Lengthy notice periods during the foreclosure process, including (a) those that prevent the mortgagee from initiating and completing the foreclosure process and (b) those preventing a quick and quiet sale of the property, prevent creditors from extracting themselves from the relationship quickly and tie up resources and cash that might otherwise be available for outside activities. In moderation, both types of delays can help debtors hold on to their properties for longer periods after a default and potentially identify and alternative to losing the house through mediation or redemption.

Hypothesis 4. *Delays, whether incurred while processing the foreclosure or in the lead-up to sale, provide a weak benefit to the mortgagor, increasing home ownership initially, but extensive delays lead to a drop-off in that same ownership.*

This leads directly into the fourth policy choice, reinstatement. States may choose to allow reinstatement during the foreclosure process and in the lead-up to any sale under which a mortgagor that is able to pay off their immediate debt is entitled to halt the foreclosure. While this is ostensibly the action preferred by the mortgagee, it generally does not provide full relief for the costs in time and money incurred by the lender during the foreclosure process. It also introduces uncertainty that comes with less-reliable borrowers who may or may not honor their commitments on a consistent basis. To mitigate this last challenge, some states to moderate the reinstatement process somewhat by restricting the length of time during which it available and the number of times it may be used by a mortgagor. Moreover, while only a subset of mortgagors will default on their loans, it is a still-smaller subset that will both default and have the resources to reinstate after a foreclosure is initiated, so that while the potential costs are imposed on lenders, very few borrowers are likely to be willing to pay extra for the benefit as they were in the case of judicial proceedings, so the lender is unlikely to be able to find room for associated price increases and will instead have a stronger incentive to reduce the number of transactions and cut potential home buyers out of the market.

Hypothesis 5. *Reinstatement reduces the rate of home ownership.*

Taking this a step further, some states provide a statutory right of redemption after the sale which permits debtors to redeem their property if they pay off the value of their mortgage after

foreclosure. These rules, despite being promoted as a tool to ensure fair bids are made at sale, have a two-pronged effect on the mortgagees welfare. First, if the bid is too low, the mortgagee will not be able to secure the full value of the loan while the mortgagor is able to use the device to maintain the property without paying the initially-agreed amount, a scenario that is especially likely when homeowners are underwater. Second, the threat of redemption may have an adverse effect on bidding itself, as potential buyers consider the likelihood that they will never be able to take possession of the foreclosed property.

Hypothesis 6. *Statutory redemption has a chilling effect on home ownership.*

Finally, the last two types of pro-debtor policies analyzed here focus on special protections that some states provide for servicemen and women and for those mortgagors that take out high-cost loans. Both of these policies target particular populations that are least-likely to be able to keep up with their mortgage payments. In the former case, the policy is likely to have a relatively narrow reach, as such protections are typically limited to active-duty soldiers serving in combat or overseas. On the other hand, those protections aimed at high-cost mortgages are likely to affect the relatively large pool of potential home buyers that have marginal incomes to support such mortgages. Besides representing a relatively large class of potential buyers, these buyers are also the most sensitive to prices among the universe of households, as they may be willing to stretch pennies for a house at one price, but quickly revert to the rental market at a slightly higher price. At the same time, the instability of their financial condition makes potential mortgagees particularly wary of transactions with those individuals. Indeed, as the protections afforded to high-cost borrowers specifically kick in as prices increase, these protections are likely to be the most damaging to a creditor's willingness to complete a transaction.

Hypothesis 7. *Protections for servicemembers have a small, negative effect on home ownership. Protections for high-cost borrowers, on the other hand have a large deleterious effect.*

Lastly, I consider the effect of one type of policy which states may implement favoring the mortgagee. Where they are available, deficiency judgments allow creditors to recoup from borrowers all or part of the difference between the sale price of the foreclosed property and the outstanding debt. This not only allows the mortgagee to maintain a fallback against any declines in property values, but it also incentivizes the mortgagor to seek a solution short of foreclosure, as the latter will fail to eliminate the debt.

Hypothesis 8. *Deficiency judgments expand the willingness of financiers to lend and correspondingly increase home ownership.*

6 Empirical Support

I derive data on foreclosure laws across the states from summaries provided from a number of sources, including *Nolo*, *Foreclosurelaw.org*, and *RealtyTrac.com*, as well as readings of individual laws themselves. Binary indicators code for the presence of a judicial foreclosure regime, reinstatement allowances, access to deficiency judgments, and of protections for members of the armed services and high-cost borrowers. Continuous values measure the length of time required

for processing and publishing notice of sale, as well as the period during which redemption is allowed after sale. In the case of the processing period, I use the typical processing time as reported by *Foreclosurelaw.com* rather than the minimum legal processing time allowable under the law. While this measure loses the clarity of precise legal values in the data, it more accurately reflects the challenges presented to lenders in recovering delinquent accounts, and correspondingly the procedural protections available to borrowers.

Table 1: Summary Statistics For State Data

Statistic	Mean	St. Dev.	Min	Max
Home Ownership	68.630	5.961	41.530	81.330
Judicial	0.471	0.490	0.000	1.000
Processing Period	136.020	83.267	27	445
Sale Notice	24.196	26.359	0	120
Redemption Period	86.176	156.323	0	730
Reinstatement	0.588	0.493	0	1
High Cost	0.314	0.464	0	1
Servicemember	0.745	0.436	0	1
Deficiency	0.765	0.425	0	1
N Protections	2.686	1.181	0	5
Construction	6.950	1.361	2.480	12.160
Finance	6.482	1.298	3.720	11.290

Across all states, home ownership rates are roughly 68% throughout the period analyzed, extending from 2005 through 2014 for the state-level analysis. Notably, this includes the recent foreclosure crisis and subsequent adjustments in lending behavior imposed by the financial industry as housing prices collapsed and many borrowers faced increasing doubts about their financial stability. Roughly half of the states have judicial foreclosure requirements statewide, while a clear majority, roughly 75% offer protections for servicemembers and deficiency judgments. Fewer than $\frac{1}{3}$ of the states offer protections for high-cost borrowers, while reinstatement must be an option in a majority. The average notice of sale required, reported in days, is just under one month, however many states have requirements of 28 days or one month exactly. The typical redemption period that is required is approximately three months, although two years is permitted in Tennessee, lending significant risk to any earlier purchase. Typically, the entire processing period comes in at slightly over four months. As an extra measure, I have also recorded how many of the clear mortgagor-protections are present in each state—the number of statutory protections. I count any of the following toward this measure of the number of protections: a statutory requirement to allow reinstatement, protections for high-cost mortgages, protections for servicemembers, a notice-of-sale requirement, or a required redemption period. Ido not include statutory processing periods, since these may be conflated with other processing requirements. Also, I do not include judicial foreclosure since it is not unambiguously beneficial to mortgagors.

In this section, I analyze the link between these policies and both home ownership characteristics, including both the home ownership rate and the price-to-rent ration for home owners across the United States and the relative size of major industries in terms of employment, including the

financial industry, the manufacturing industry, and the construction industry. I obtain industry characteristics from the United States Census and pricing information from Zillow.

Remaining variables on demographics and population characteristics forming a standard battery of control variables on race, income, and housing stock are derived from the United States Census and American Communities Survey (ACS) between the years 2005 and 2014, inclusive, for state-level analyses. As the ACS does not provide full data on ZIP codes in non-census years, the full analysis of ZIP codes is only available for the year, 2010. However, Analyses for remaining years is included without the full battery of demographic controls. In all analyses, I use linear models to analyze all continuous variables and logistic models for binary dependent variables.

6.1 State Home-Ownership

The first analysis I conduct is a baseline model at the state level, focusing on demographic characteristics at the state level. I consider two demographics in particular as my independent variable: the proportion of the population employed in finance and the proportion of the population employed in construction. Each of these industries are closely tied to home ownership, as construction crews' employment depends heavily on new construction and the financial industry likewise depends on healthy debt activity, particularly in the form of mortgages as made clear during the housing crisis in the mid 2000s.

As the policy variables, I use those described above, including the presence of a judicial foreclosure regime, reinstatement allowances, access to deficiency judgments, and of protections for members of the armed services and high-cost borrowers. Continuous values measure the length of time required for processing and publishing notice of sale, as well as the period during which redemption is allowed after sale. Both the demographic and policy variables affect home ownership outcomes—in the first case through wealth and similar attributes affecting the ability to purchase a home and in the second through the resulting restrictions on mortgage lending that may discourage marginal buyers from entering the market. This forms the basis of the first mediation analysis.

Basic linear and logistic regressions, as appropriate to each policy variable, generate strong relationships between both the construction and Financial industries across all policy areas measured with the exception of the construction industry on the likelihood of service member protections and the financial industry on the likelihood of deficiency judgments. In the former case, finance remains a significant predictor of service member protections in the correct direction—negative—and in the latter, a robust construction industry reduces the likelihood of deficiency judgment is significantly reduced.

The likelihood of reinstatement and high-cost borrowing protections both decrease as employment in either industry grows, while the redemption period and total number of borrower protections are similarly decreased with such an increase in employment within these two industries that both rely on a strong housing market. In the case of financial employment, the effect is notably larger in magnitude for reinstatement, high-cost, and the total number of protections.

For the remaining three policies, judicial foreclosure, notice of sale, and total processing period, the two industries have opposing significant effects, with finance increasing the likelihood of judicial foreclosure and stretching out the processing period while reducing requirements for notice of sale. On the other hand, the construction industry reduces the likelihood of judicial foreclosure, reduces the processing period, and increases notice requirements for any sale.

Table 2: State Level Demographic Effects on Policy

	Judicial	Log Process Period	Log Sale Notice
	logistic	*OLS*	*OLS*
Construction	-0.471^{***}	-0.169^{***}	0.299^{***}
	(0.128)	(0.028)	(0.080)
Finance	0.352^{***}	0.099^{***}	-0.102
	(0.119)	(0.025)	(0.072)
Adjusted R^2		0.238	0.189
Akaike Inf. Crit.	578.496		

	Log Redemption	Reinstatement	High Cost
	OLS	*logistic*	*logistic*
Construction	-0.528^{***}	-0.421^{***}	-0.596^{***}
	(0.112)	(0.135)	(0.158)
Finance	-0.215^{**}	-0.791^{***}	-0.604^{***}
	(0.100)	(0.140)	(0.170)
Adjusted R^2	0.245		
Akaike Inf. Crit.		589.263	445.871

	Servicemember	Deficiency	N Protections
	logistic	*logistic*	*OLS*
Construction	-0.161	-0.386^{***}	-0.227^{***}
	(0.163)	(0.143)	(0.053)
Finance	-0.765^{***}	-0.109	-0.273^{***}
	(0.142)	(0.132)	(0.047)
Adjusted R^2			0.249
Akaike Inf. Crit.	454.398	485.729	
Controls	Y	Y	Y
Observations	510	510	510

Note: *p<0.1; **p<0.05; ***p<0.01

These results largely conform to the predictions presented in the preceding section (Hypotheses 1 and 2), as those policies which clearly favor the debtor—longer redemption periods, reinstatement, high-cost protections, service member protections, and the total number of debtor protections—are all less likely or smaller in states with greater financial sectors. On the other hand, the one measure that clearly protects creditors—deficiency judgments—are more likely to appear in states with large financial sectors.

Transitioning to the effects of policies on home ownership in the states likewise yields results that are largely consistent with the hypotheses presented above. Without accounting for the total number of debtor protections, servicemember protections, reinstatement and redemption periods increase home ownership, with all significant when including quadratic terms for continuous variables. In the absence of these quadratic terms, the redemption period remains positive, but loses significance, which is consistent (albeit not necessary) with a nonlinear relationship. This counters the prediction of Hypothesis 6, though I address the nonlinear term further below. The positive effect of servicemember protections also counters Hypothesis 7, and The coefficient on reinstatement counters Hypothesis 5, although these effects become correctly negative once accounting for the total number of protections as discussed below.

Notice of sale and high cost protections—in line with Hypothesis 7—meanwhile have a deleterious effect on home ownership, although again, notice of sale in not significant across all models, losing significance when quadratic terms are included. The processing period remains significant, but inconsistent in these models. Deficiency judgment, meanwhile is highly significant and positive for home ownership, offering a two to three percent increase in home ownership rates as the lenders are provided with an explicit tool to recover losses beyond the value of the collateral under the mortgage. This is by far the largest and most robust effect of those measured and falls squarely in line with the incentives of the creditors to minimize risky lending as per Hypothesis 8. Judicial foreclosure is positive but insignificant.

Beyond the straightforward linear analysis, I also explore higher-order relations between policies and home ownership rates in the states. Specifically, I explore the quadratic relationship between continuous policies such as the redemption period and notice of sale requirements, as well as the total number of debtor protections, and home ownership. In line with the theory, the relationship between these variables should be non-monotonic, as initial gains by debtors in the form of greater protections give way to eventual decisions by lenders to scale back in markets that offer too many protections to debtors. All three of the continuous protections, processing period, redemption period, and notice of sale, exhibit a negative quadratic relationship in line with the theory above predicting moderate debtor protections offer maximal market participation (Hypothesis 4). The first two of these protections are highly significant.

Accounting for the total number of debtor protections, each of the debtor protections generates a large, significant and negative effect; however this is washed out when adding a quadratic term for the total number of protections, which leaves only the processing period significant among debtor protections. While not providing meaningful support for the hypotheses above, these coefficient do not provide strong evidence against the hypotheses either. In both models with the number of protections accounted, deficiency judgment remains a strong positive predictor of home ownership rates. Also losing significance and dramatically falling in magnitude, the continuous policies do not, on their own, exhibit a significant effect when accounting for the squared number of protections. This suggests that the varied protections may in fact be substitutes to some degree, with the presence of one offsetting the lack of another. Moreover, the significant negative coefficient on

Table 3: State Level Policy Effects on Home Ownership

	Home Ownership			
Judicial	0.819	0.940	2.584***	1.173*
	(0.577)	(0.614)	(0.594)	(0.660)
Log Process Period	−2.339***	15.438***	−2.597***	13.394***
	(0.421)	(4.229)	(0.400)	(4.438)
Log Sale Notice	−0.362***	−0.039	−2.260***	−2.518
	(0.118)	(0.597)	(0.274)	(1.968)
Log Redemption	0.044	2.356***	−1.508***	0.319
	(0.075)	(0.387)	(0.217)	(1.620)
Reinstatement	1.459***	1.631***	−5.730***	−2.979
	(0.379)	(0.365)	(1.014)	(3.495)
High Cost	−1.135**	−0.865*	−9.119***	−5.657
	(0.451)	(0.451)	(1.136)	(3.626)
Servicemember	0.840**	0.934**	−7.181***	−3.695
	(0.412)	(0.412)	(1.127)	(3.553)
Deficiency	2.485***	2.231***	1.949***	2.111***
	(0.426)	(0.416)	(0.409)	(0.424)
N Protections			7.558***	4.142
			(0.997)	(3.511)
Processing Period Squared		−1.924***		0.228
		(0.444)		(0.289)
Sale Notice Squared		−0.108		−0.208
		(0.146)		(0.177)
Redemption Period Squared		−0.416***		0.088
		(0.067)		(0.098)
N Protections Squared				−1.715***
				(0.465)
Controls	Y	Y	Y	Y
Observations	510	510	510	510
Adjusted R^2	0.689	0.733	0.721	0.733

Note: *p<0.1; **p<0.05; ***p<0.01

Table 4

Concentration of Value:Income Ratio		
	< 2	> 4
Judicial	0.295**	-0.281**
	(0.100)	(0.103)
Reinstatement	0.247***	-0.296***
	(0.070)	(0.072)
High-Cost	-0.043	0.015
	(0.087)	(0.090)
Servicemember	-0.239**	0.123
	(0.079)	(0.082)
Deficiency	0.226**	-0.167
	(0.083)	(0.086)
Processing Period	-0.236***	0.345***
	(0.043)	(0.045)
Sale Notice	-0.208***	0.283***
	(0.038)	(0.039)
Redemption Period	0.066	-0.080*
	(0.035)	(0.036)
Controls	Y	Y
Adj. R^2	0.566	0.536
N	510	510

the quadratic term for the number of predictions also suggests a moderate number of policies will maximize ownership. Taking the first order condition with respect to the number of protections, the empirical model predicts home ownership to be maximized at (N Protections) $= \frac{4.142}{1.715} \approx 2.4$. That is; below roughly 2.4 protections, each additional protection makes home ownership more attractive and accessible to buyer, while above 2.4 unique protections, that trend is reversed.

In this model, judicial foreclosure becomes significant as well, yielding a slight increase in home ownership rates, which may be a result of the confidence-building effect of the judicial process. While judicial foreclosures are more time consuming and costly to lenders on the front end, they also offer greater procedural oversight and reduce the likelihood of even more costly legal action that might arise after a contested nonjudicial foreclosure. In this way, judicial foreclosure can build confidence and reduce risk for both parties in the debt transaction, yielding more transactions and higher ownership rates consistent with Hypothesis 3.

Value to Income Ratios

Lending further support to the argument that price shocks absorb much of the effect of the various policies, especially with respect to debtor protections, a second analysis reveals the pattern of shifts in home value to income ratios as a result of those policies. Judicial foreclosure requirements cause a significant decrease in the proportion of houses with a high value-to-income ration, as does reinstatement and, to a lesser extent, extended redemption periods and deficiency judgments. On the other hand, extended notice of sale and processing times have a strong positive effect on the value-to-income ratio, while service member protections have a somewhat smaller effect in the same direction.

The effects of notice of sale and redemption periods are likely relics of the interests of buyers who bid higher in more competitive auctions and who likewise bid higher when their investment is most secure. Deficiency judgments here show a deleterious effect on home values, reducing the proportion of people in homes that significantly outpace their income in part due to the possibility that they may be held liable for outstanding balances in the event of a default, while high-cost protections and protections for service members marginally increase the concentration of mortgagors living in homes values well above their income as the protections make home-buying less risky for those particular borrowers. These results are displayed in Table 4.

6.2 ZIP Code Level Home-Ownership

In a second econometric model, I conduct a similar analysis focusing on ZIP code level data for metropolitan areas that cross state lines. These 27 metropolitan areas form 60 state-metro pairings across 31 unique states. While subject to greater concern regarding Tiebout sorting than the state data, this allows me to focus on higher resolution data and eliminates unobserved variation that occurs within states between rural and urban environments.

These results are largely consistent in direction with the results from the state level analysis of policy. However, the demographic effects on policies fall dramatically across the board. Moreover, the effects of finance on on redemption periods, reinstatement, and high-cost protection, as well as the total number of protections all flip signs and maintain significance—even with substantively smaller magnitudes—indicating a correlation between a large financial industry and greater debtor protections in these areas. The sign is also flipped on the construction coefficient for redemption periods but is insignificant. Moreover, the effects on the first three measures of protection are not surprisingly correlated with the effects on the total number of protections in the last measure.

These deviations from the state analysis, particularly the latter ones regarding the financial industry, leave open the suggestion that there is indeed a measure of sorting occurring within the metro areas as professional industries, especially the financial industry, congregate in urban areas. This opens the likely possibility that there is a nontrivial rural-urban divide in which non-urban voters compete with—and in this area often win against—their urban counterparts where the financial industry is too concentrated in a single area. This matches an intuitive view of rural-urban politics exemplified in such cases as the well publicized conflicts that regularly arise between New York City and New York State, where a large urban population competes with a rural counterpart. The effects are even less surprising when considering that as the financial industry becomes increasingly concentrated in a few districts, it is less likely to prevail in other districts in a republican form of government, so that a large financial sector in one urban center might ultimately be

Table 5: ZIP Level Demographic Effects on Policy

	Judicial	Log Process Period	Log Sale Notice
	logistic	*OLS*	*OLS*
Construction	-0.102^{***}	-0.038^{***}	0.061^{***}
	(0.016)	(0.005)	(0.011)
Finance	0.053^{***}	0.049^{***}	-0.097^{***}
	(0.014)	(0.004)	(0.009)
Adjusted R^2		0.209	0.120
Akaike Inf. Crit.	3,628.534		

	Log Redemption	Reinstatement	High Cost
	OLS	*logistic*	*logistic*
Construction	0.018	-0.144^{***}	-0.125^{***}
	(0.015)	(0.018)	(0.016)
Finance	0.126^{***}	0.059^{***}	0.098^{***}
	(0.012)	(0.015)	(0.014)
Adjusted R^2	0.181		
Akaike Inf. Crit.		3,007.705	3,928.410

	Servicemember	Deficiency	N Protections
	logistic	*logistic*	*OLS*
Construction	-0.162^{***}	-0.005	-0.040^{***}
	(0.023)	(0.022)	(0.006)
Finance	-0.008	-0.051^{***}	0.026^{***}
	(0.020)	(0.017)	(0.005)
Adjusted R^2			0.140
Akaike Inf. Crit.	1,758.989	2,187.731	
Controls	Y	Y	Y
Observations	3,330	3,330	3,330

Note: *p<0.1; **p<0.05; ***p<0.01

less-supported in its legislature than a more dispersed financial sector.

Table 6: ZIP Level Policy Effects on Home Ownership

	Home Ownership			
Judicial	−1.356**	−2.410***	−2.013***	−3.344***
	(0.600)	(0.762)	(0.627)	(0.781)
Log Process Period	1.863***	6.575	1.338***	6.876
	(0.386)	(4.935)	(0.413)	(5.011)
Log Sale Notice	0.136	−1.813*	0.650***	3.767***
	(0.159)	(0.949)	(0.215)	(1.426)
Log Redemption	0.206***	−0.395	0.825***	5.014***
	(0.078)	(0.391)	(0.191)	(1.121)
Reinstatement	−0.658	−0.255	2.914***	10.327***
	(0.511)	(0.552)	(1.129)	(2.108)
High Cost	0.778**	0.843*	3.979***	11.502***
	(0.382)	(0.441)	(0.979)	(2.107)
Servicemember	−0.259	−0.334	2.831***	9.955***
	(0.541)	(0.544)	(1.024)	(2.053)
Deficiency	−2.132***	−2.005***	−2.189***	−1.569**
	(0.605)	(0.646)	(0.604)	(0.654)
N Protections			−3.099***	−11.433***
			(0.873)	(2.293)
Processing Period Squared		−0.551		−0.330
		(0.501)		(0.255)
Sale Notice Squared		0.413*		−0.503***
		(0.212)		(0.138)
Redemption Period Squared		0.113*		0.157
		(0.068)		(0.184)
N Protections Squared				−0.594
				(0.513)
Controls	Y	Y	Y	Y
Observations	3,330	3,330	3,330	3,330
Adjusted R^2	0.809	0.809	0.809	0.810
Note:				*p<0.1; **p<0.05; ***p<0.01

As with the first-stage effects, many of the policy coefficients on home ownership in the ZIP code level analysis have signs that are flipped relative to the state-level analysis. In line with the

same sorting arguments above, the driving force behind these results is enigmatic, but unsurprising, since those same forces driving the counterintuitive results on policy outcomes are likely to drive equally counterintuitive results in ownership outcomes. That is; the net effects on ownership are likely to translate through policy (and directly) from demographic sorting. Also of note, while losing significance, the quadratic term on the number of protections remains negative in this analysis, as do both quadratics on the processing period and the highly significant coefficient on notice of sale.

7 Conclusion

This paper has developed a new model to describe how voters interact with policy-makers when there are outside options for the voters which may shield them from the effects of a given policy. This model has shown that where individuals have the opportunity to cease participating in activities subject to a given policy, they can leverage that option in two ways. First, they can shield themselves from harm under the policy if a harsh policy is implemented. Second, they can in many cases impose a burden on others with their departure. I tested this model empirically by exploiting the variation in housing foreclosure policies across the United States, which allowed me to identify particular policies that mediated the preferences of particular demographics—especially the financial industry—with respect to their decision to enter the market. In particular, I identified the non-monotonic role of the total number of debtor protections in first drawing more individuals into home ownership but ultimately reducing the number of home owners if they became too numerous. While small in magnitude, changing home ownership rates by only a few percentage points, this is consistent with the primary result of the model which predicts moderate policies even if there is a large majority of potential debtors relative to the number of creditors and moreover predicts that market participation will peak with such moderate policies as both creditors and debtors will find that participation to be profitable. Indeed, with home ownership around 68% on average compared to a maximum of 11% of the workforce in the financial industry—and large overlap—this policy moderation is striking, especially in light of the effects of the housing crisis beginning in 2006 and 2007, during which time there was widespread popular support more pro-debtor action that nonetheless failed to materialize into hard policy change.

Also, while this model has been applied to the United States mortgage market and foreclosure policies here, it remains sufficiently flexible to be applied to a wide range of similar policies. In particular, the model is relevant to any transactional policy area in which selection into the market affected by the policy is voluntary and where the payoff to one party depends on the participation of another party. Such flexibility leaves room for numerous extensions analysis market participation in a wide range of contexts, but especially with respect to interstate or international trade policy in which local jurisdictions are able to set policy unilaterally according to the demands of their local constituencies but may nonetheless suffer if outside parties choose not to participate in local markets as a result of those policies.

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