Homeowners Associations and City Cohesion

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Abstract

Homeowner Associations (HOAs) are an increasingly common form of attempts to provide localized public goods to a subset of residents in a city. As HOAs have increased in size and scope, there have been substantial debates about their benefit, and in particular, their impact on citizens who are not HOA members. One argument against HOAs has been a perception that they lessen city cohesion by setting some citizens off from others. We investigate one channel through which HOAs might improve city cohesion: their ability to dull the desire for wealthy city residents to attempt to leave or secede from a city. We also examine the degree to which poor residents might take the secession option of wealthy residents into account when they form their preferences regarding tax levels for the city. Due to the infrequency of actual city secession attempts, we conduct an economic experiment aimed at eliciting preferences people may have under these different circumstances. We find that HOA-like options can reduce the desire of the wealthy to exit a city and that the presence or absence of an exit option or an HOA option can also impact the tax requests by the poorer residents in a city.

JEL Codes: C91, H7

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1 Introduction

Beginning in the 1970s, a novel form of collective decision-making began to proliferate in residential housing developments: homeowners associations (HOAs). These are private organizations of property owners that tax members through HOA fees and then use those fees

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to provide public services as well as regulate land and housing use. Membership is typically compulsory for residents living within the HOA. HOAs come in many forms from condominium associations and cooperative apartment buildings to planned housing developments and gated communities. The number of HOAs and their size has been growing over the last five decades as has their scope and political power. The Community Associations Institute, an HOA advocacy group, estimates that there were over 342,000 HOAs in the country as of 2016, comprising over 26 million housing units which is impressive given that HOAs barely existed as late as 1975.[1]

Given how quickly HOAs have risen in coverage and political power, it is no surprise that there is an active debate regarding the effects of HOAs on a city with disagreement over whether HOAs are good or bad for city development and governance. One might expect that HOAs should have a positive impact on those who choose to be part of these organizations. HOAs fulfill a role for homeowners who are dissatisfied with their cities' public services to supplement them through a private, club-like institution. Manzi and Smith-Bowers (2005) note that establishing an HOA can be a more socially desirable situation for residents seeking an improved environment, as opposed to abandoning the city. These supplementary services lead to concrete benefits: papers such as Meltzer and Cheung (2014) show that HOAs are capitalized into higher property values for a large sample of properties in Florida. HOAs also play a crucial role in relieving constrained city budgets; municipal authorities can offload the responsibility of providing certain services to HOAs, particularly in newer suburban housing developments.

What is less clear is the impact of HOAs on those individuals not covered by one. These citizens of a city can only avail themselves of the public goods provided by the city and there are questions regarding the impact of HOAs on the quality of public goods provision. There is evidence that there are substantial negative consequences of HOAs concerning issues that can be grouped into two broad areas: the provision of public services and the loss of city cohesion. Cheung (2008) has demonstrated that municipal governments in California cities with fast growth in HOAs tend to cut back on their public services, particularly in relatively substitutable services such as sanitation, security and parks and recreation.

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[1]https://www.caionline.org/AboutCommunityAssociations/Pages/StatisticalInformation.aspx

While this behavior may be consistent with cities recalibrating themselves to changes in the median voter's demand for services in the face of a private provider, there may be welfare losses incurred by individuals who do not belong to an HOA and now enjoy lower quality services.

The other potential negative impact of HOAs might be a decrease in city cohesion. If some members of a city are obtaining substantial services from a private HOA while others are obtaining them from city resources, one might certainly think that this could lead to those in the powerful HOAs to see themselves as set apart from the rest of the city. The rest of the city might see the HOA residents in the same way, creating the "secession of the successful," a term coined by former Labor Secretary Robert Reich and discussed in Cashin (2001). The consequence could be increased polarization and the concentration of local political power if HOA members form particularly tight voting blocs.

Our interest in this study is in examining a channel through which HOAs might instead *improve* city cohesion in the context of rising urban inequality. Much literature has documented the connection between urban areas and income inequality; Glaeser, Resseger, and Tobio (2008), for instance, notes a 45 percent correlation between county population density and the Gini coefficient. They also note that for virtually every MSA in the country, the Gini coefficient at 2008, the time of writing, was significantly higher than in 1980. Seen in the context of city services, one might expect that as cities become more unequal, the taxes to pay for city services would be increasingly born by a smaller and smaller fraction of the total population consisting of the relatively wealthy.

In this situation, a wealthy household who prefers not to subsidize the public good consumption for its poorer neighbors has a few options. An obvious one is that it could move to a more homogeneously affluent suburb. While the flight to the suburbs is a well-studied phenomenon, we are interested in what happens when the feelings of resentment occur on a broad neighborhood level. A neighborhood that feels deeply dissatisfied with the distribution of tax burdens could instead attempt to secede from the city and form their own municipality excluding the poorer sections of the city. Secession is generally a well-defined option in most cities, as each state has laws which allow cities to annex areas to grow as well as de-annex areas that wish to secede.

There have been many high-profile attempts at city secession, with perhaps the best known example being the San Fernando Valley having tried many times to secede from Los Angeles, the most recent referendum taking place (and failing) in 2002. The residents in the Valley pushing for secession were indeed largely concerned about the degree to which they, being the relatively wealthier parts of the city, were subsidizing the poorer parts of the city. Hogen-Esch (2001) documents the founding of Valley VOTE, a coalition of Valley home-owners and businesses, that began with lobbying for greater local control of regulations and public services. The coalition eventually became a leading voice in the political campaign to secede. Hasselhoff (2002) notes that support for secession was positively correlated with dissatisfaction with public services and with income, indicating that secession was largely based on economic differentials.

At the end of the day, however, examples of secession are relatively uncommon because of the complexity of the process. Successful examples are even rarer still. There are significant coordination costs to organize a set of dissatisfied residents, to convince them of the feasibility of secession and to mount an effective referendum campaign. The fact that the San Fernando example went as far as it did demonstrates the significant costs secession proponents were willing to incur based on their desire to secede.

The main argument in our paper is that the HOA represents another way for select residents improve their standard of living at a much lower cost than secession and without subsidizing their neighbors. We examine whether the existence of this HOA option blunts the desire of wealthy city residents to exit the city. If so, the HOA may instead offer a way to increase city cohesion.[2] Given that many city secession attempts fail anyway, one might not see this as much of a benefit but as Ahn, Isaac, and Salmon (2008) and Ahn, Isaac, and Salmon (2009) show, there can be substantial negative consequences from denying high contributing group members from being able to exit from a group they have decided they wish to leave. If the formation of an HOA can prevent these high contributors from wanting to leave, that is a benefit even if they would not be able to leave after attempting it.

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[2]We note that there are a large number of other forces pushing back on city secession. We do not intend to examine them all here or suggest that the HOA option is the dominant reason wealthy parts of cities have not been observed trying to secede in greater numbers. Rather we are only interested in establishing whether the HOA may be a contributing factor and to understand the mechanism for how they might be affecting the decisions of the citizens.

Given that we do not observe a large number of attempts at city secession, these questions are ones that would be impossible to examine with field data. We therefore conduct an economic experiment as a means of trying to understand what might affect the preferences of individuals faced with these tradeoffs.

In our experiment we assemble groups of individuals into virtual cities consisting of rich and poor residents. These residents vote on city taxes to fund public goods. After they have gone through some periods and understand the incentives, we allow the wealthy residents to vote on whether they wish to secede from the city. If they vote to exit, their welfare increases, but cause substantial welfare loss to the poorer residents no longer receiving the subsidy of their public goods. Our incentives are structured such that the wealthy always do better exiting the city than remaining in.

In some rounds we offer an HOA-like option in which the rich individuals would stay in the city, preserving the subsidy for the poor, but also allowing them to engage in some excludable provision of public goods that increases their welfare – though not as high as if they had seceded. In rounds where secession is an option, we allow the poor residents full power to set the tax rate used in the city as a way of determining whether these individuals might form the strategic understanding that it could be in their best interests to reduce their demand on the wealthy citizens to keep them in the city.

Our interest in these experiments is not to try to match anything about secession rates in actual cities, but rather to understand what affects the preferences of wealthy individuals to secede and whether the poorer individuals might adopt a strategic stance on taxes as a means of retaining the wealthy. By comparing the exit preferences of the wealthy when the HOA option is present to when it is not, we can determine if this option decreases their preferences for exiting. Our additional treatments will also better allow us to understand why they might be making that choice.

As noted above, another important element in the drive to secede is the cost of the political campaign to get secession approved. We will incorporate this into our experiment by having a treatment in which wealthy residents wishing to exit face a coordination problem and face a cost if they fail to get enough support to exit. Finally, to test the degree to which coordination concerns and other regarding preferences could be driving exit decisions, we

add another treatment where we remove the negative externality from the wealthy exiting.

One component of our analysis is to provide a theoretical characterization for why wealthy individuals may choose to remain in a city even if secession would improve their welfare. In the field, there are many possible explanations for this that focus on the cost of setting up a new city, but in our experiment the wealthy are clearly better off from exiting. If we see some not choosing that option, it is important to understand why that might be the case. We provide two different models of social preferences, norm compliance and inequity aversion, which can produce this behavior. Further we show that these two models predict very different patterns of behavior which will allow us to distinguish which form of preferences might be in use.

In the end, we find that indeed many of the wealthy citizens of our virtual cities do choose to sacrifice their own welfare to remain in the city even at relatively high tax rates. When an HOA option is allowed, they choose to remain in the city up to even higher tax rates. This suggests that the HOA option diminishes the desire to exit. Adding in the coordination option diminishes exits over all, though the HOA option is still effective at diminishing them further. When we remove the negative externality but leave the coordination problem for the wealthy, we find no difference in exit rates. This suggests that while other regarding preferences may drive some exit choices, the coordination problem may crowd much of those concerns out. In our results section, we will provide support for all of these claims as well as provide a much more detailed and nuanced examination of the behavior.

The paper proceeds as follows. Section 2 outlines the experiment, and Section 3 describes the theoretical framework and hypotheses tested. Section 4 provides the results and the analysis. Section 5 concludes.

2   Experiment Design

To examine these issues of city secession, we construct groups of subjects to form virtual cities. These virtual cities comprise 6 subjects. These groupings of 6 are formed at the beginning of the experiment and stay matched throughout all phases of the experiment. To induce inequality in these cities, we divide the groups into 3 type A or wealthy citizens

and 3 type B or poor citizens. These types are assigned at the beginning of a session and remain constant through the session. Subjects are informed of all of this up front. In every period of the experiment, Type A subjects are endowed with 30 experimental currency units (ECUs) and Type B are endowed with 10.

2.1 Phase 1

All experiment sessions begin with an identical phase involving 10 periods of these 6 individuals interacting in a tax provision game in which they vote on tax rates to be used to redistribute their initial endowments. This phase is intended to get subjects acclimated to this environment as having a clear understanding of the payoffs is vital to the second phase of the experiment. Also, we can use this phase to elicit the baseline preferences the subjects have regarding redistribution. All 6 members of a group are allowed to choose taxes in 5% increments from the range 10% to 65%. One of these votes is chosen at random to implement for the group in that period. We use this random dictator mechanism to make the voting mechanism incentive compatible for the subjects to report their true preferences on taxation. No subject can possibly benefit by voting for any tax level other than their own most preferred tax rate since the only time their vote matters, their vote determines the rate to be used. After every voting period, subjects see the actual tax rate chosen though they do not see all of the votes cast. They are paid actual earnings based on one out of these ten rounds drawn at random. The round to generate earnings is chosen at the end of the experiment.

To make their decisions, subjects are presented with a graph showing them the potential payoffs to both types for any tax rate they might choose and can select a tax rate knowing for certain what payoff each type would receive if their vote is chosen as the dictator. Those potential earnings are shown by the solid lines in Figure 1. These functions reflect several important considerations from an ecological validity standpoint and from the perspective of satisfying several practical issues for designing experiment incentives. First, for city taxes of this sort, it is reasonable to assume some efficiency enhancing aspects of the taxation such that even wealthy city residents enjoy some benefit of moderate taxation. Due to the redistributive aspect, though, the majority of the benefits should accrue to the poorer
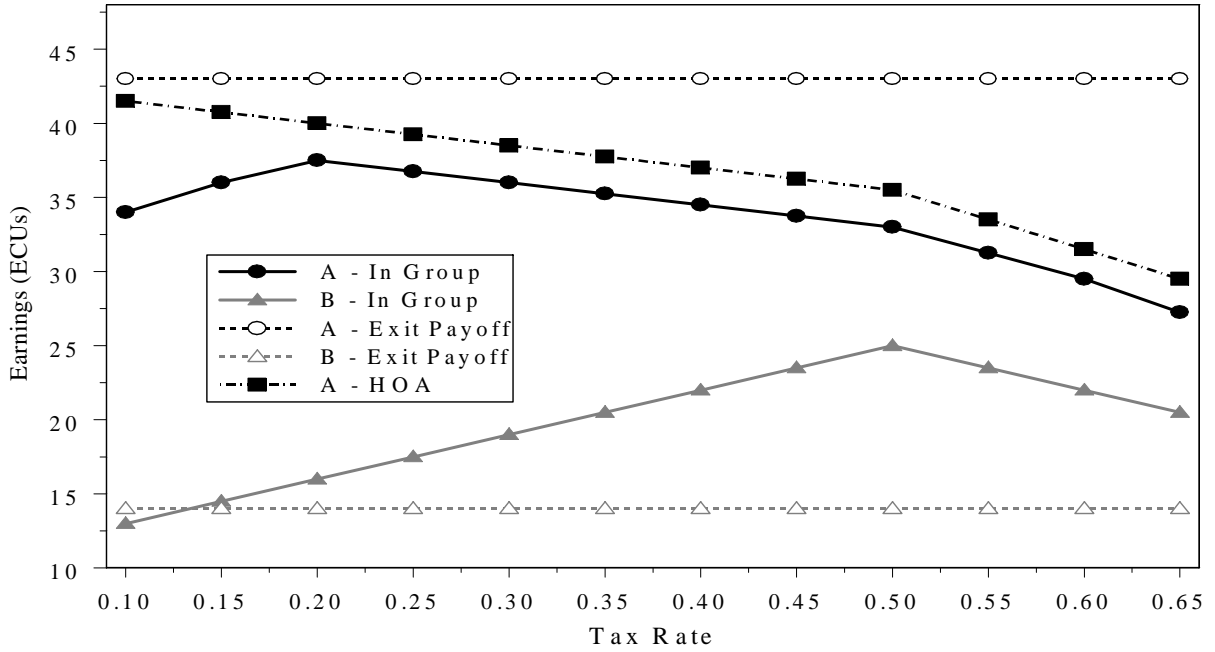
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Figure 1: Payoff functions for A and B types by tax rate and group outcome.

residents as the wealthier are subsidizing the public goods. We also wanted to avoid any boundary maxima by making certain that both A and B types had optimal tax rates away from the boundaries. Finally, the optimal tax rate for the wealthy citizens should be lower than that for the poor. Thus, we have arranged it such that the optimal tax rate is 20% for the Type A's and 50% for the Type B's. This leads to the key range of tax rates being between 20% and 50%; it is in this range that the welfare of the two types is moving in opposite directions. This allows us to observe how willing the A's are to trade-off their own welfare for the B's, and it allows us to examine how demanding the B's are for that trade-off. In this range, total social welfare is increasing in the tax rate as for every 10% point increase in tax the tax rate the payoff to the B's increases by 3 ECUs for every 1.5 given up by the A's. The most efficient tax choice is 50% as it generates the highest total social welfare.

2.2 Phase 2

Prior to phase 1, subjects are given complete instructions about phase 1 and are told that there would be a phase 2 and they would be given instructions for it after phase 1 is

complete. Phase 2 is the portion of the experiment that allows the possibility for the A types to secede from their virtual city. We will explain three different treatments that we conducted that vary aspects of the exit decisions. Each session would see only one of these three treatments.

2.2.1 Free Exit (FE) Treatment

We refer to the first treatment as our Free Exit treatment (FE). In it, A types do not vote for tax rates in phase 2 but they can choose whether they wish to stay in the group of 6 or exit to a group that would consist only of type A subjects. The B's would be left on their own.

The B types still vote for the tax rate to be used in the city exactly as in the first phase. Choices are elicited from the A types at every tax rate at 5% point intervals between 10% and 65% regarding whether they would prefer to remain in the 6 person group or exit to a group consisting only of the A's. If they remain in the group, the payoff will be the same as the payoff at that tax rate from phase 1. If they choose to exit, then each type would receive a fixed payoff not dependent on the tax rate chosen by the B players. One example of these exit payoffs is represented by the dashed lines in Figure 1. The exit payoffs are constructed such that the A types do strictly better if they choose to exit, while the B types do mostly worse. While the A subjects indicate their exit preferences, the B's vote for tax rates as in the first phase. To determine an outcome, the random dictator mechanism is again used to allow one of the votes by B players to determine the tax rate. Then the choices by the A types at that tax rate are considered and another random dictator mechanism is implemented to choose one of those votes by the A players to determine the outcome. At the end, either all type A's exit the group or all type A's remain in the group. We use these random dictator mechanisms due to our interest in eliciting preferences of the individuals despite the fact that they are not realistic depictions of processes in cities.

We take the subjects through four rounds of this interaction in which we vary the exit payoffs slightly. The set of exit payoffs are {(43,14), (40,14), (43,16), (40,16)}. The exit payoffs are varied in this way to make exiting more or less attractive to an A type concerned only for their own welfare by shifting this exit payoff between 40 and 43. The payoff they

are inflicting on the B types is also varied in a similar way. The intention is to determine whether these small shifts in the attractiveness of the exit option and the degree to which the others are harmed impacts the exit choices by the A types. The ordering of the exit payoff pairs is randomized across groups and so every group of 6 will see them in a different order. These first four rounds of phase 2 will be referred to as the No HOA segment as the only choice by the A's is to remain in the city or secede; there is no HOA option.

After those four periods, we then run them through essentially the same four rounds again but now allowing for an HOA like option. These four periods involve those same 4 different exit payoff options and the order is again randomized. The A types can now choose between three options at every tax rate; remain in the group, exit the group or remain in the full group but set up a "type A only subgroup." This latter option we will refer to as the "HOA option." This HOA choice sounds a bit complicated, but we make it very easy in the experiment. If type A's end up choosing this HOA-like option, then they remain in the full group, and thus the payoffs to the B types are the same as if the A types had simply chosen to remain in the group. This mimics the external situation in which members of HOAs located in incorporated cities still belong to and pay taxes to the city their HOA lies in.

The HOA option, though, allows the A types to realize a utility increase through an HOA-like vehicle. This mimics the supplementary nature of HOA services to the services provided by the traditional municipality. Practically, their payoffs would be according to the dot-dash line in Figure 1. The key characteristic of this line is that it lies a touch below the full exit choice while a bit above the payoffs for remaining in the group. It allows the A's to do a little better for themselves without causing any potential harm to the type B's. The A's should still clearly prefer exiting for all taxes in the range of 20-65%. Other than allowing this third option, the rounds work exactly in the same manner as the first 4 rounds of the second phase. We refer to these four rounds as the HOA segment.

One key element of the second phase of the experiment is that unlike in the first phase, subjects are not told the results of a round immediately following the conclusion of the round. Thus they are not told the tax rate the B's chose or the exit decision by the A's. After all eight rounds have concluded, we show them a table with all of this information and

pick one of the eight rounds at random for payment. The reason for this limited feedback is that we want the subjects to respond to the stimulus of this situation and the changes in the exit payoffs rather than to the history of what happened in the prior round.

2.2.2 Costly Exit (CE) Treatment

In the first treatment, Type A subjects can choose to exit their group with no cost. This is not the case in our other two treatments. The second treatment we will refer to as the Costly Exit (CE) treatment. Now the Exit decision requires coordination among the A types. In order for the A types to exit, all of the A's must have chosen Exit at the tax rate the B's chose. If at least one A type does not choose to exit, then in the No HOA segment, all A's remain in the full group. In the HOA segment, if any do not choose to exit then whether the A's setup the HOA or remain in the full group with no HOA is determined by choosing randomly from among the non-exit decisions.

Further, in the event that an A type has chosen to exit at the tax rate the B's chose and the exit is unsuccessful, the A subject pays a cost of 4 ECUs. We represent this cost on the screen for the subjects by adding in lines that parallel the full group and HOA payoff lines for the A types but are shifted down by the 4 ECU cost. In the CE treatment, the subjects still go through four periods without the HOA option and then four with. After all eight, they are shown a table indicating the outcome for all eight rounds and then one is picked at random for payment. We note that in this treatment, and our next one, that we are no longer eliciting pure preferences to exit for our A types. The coordination element adds in strategic concerns and so what we will be doing is observing how actions shift from the preferences measured in the FE treatment due to the coordination element.

2.2.3 Costly Exit - No Externality (NE) Treatment

Our final treatment will be called Costly Exit - No Externality (NE). This treatment will be the same as the CE treatment but with one key difference: the exit decision by the A's has no impact on the payoffs to the B types. While the A types can choose to exit the group and achieve the better payoff for themselves, in the NE treatment the B types are not pushed to those lower exit payoffs. Rather they simply retain the same payoff structure

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	Sessions	A's	B's	Groups
Free Exit	4	27	27	9
Costly Exit	4	27	27	9
CE / No Externality	4	24	24	8
Total	12	78	78	26

Table 1: Number of sessions and subjects per treatment.

as if the A's remained in the group. Thus, B types can impact the A's payoffs by choosing a tax level, but the A types can have no impact on the earnings by the B's. This treatment is admittedly unrealistic, as without the taxes by the rich to redistribute, the poor should suffer. We explore this option, though, to see how the choices by the A players might change if they knew that their choice would not hurt the B's.

We have conducted four sessions of each session resulting in eight or nine groups of six subjects per treatment. Details are shown in Table 1. Most sessions lasted around an hour. ECUs are converted to dollars, and subjects received $29.85 in average earnings including a $10 participation fee. A's on average received $35.31 while B's received $24.39. All sessions were conducted at the Laboratory for Research In Experimental Economics at Southern Methodist University, and subjects were recruited using an online recruitment web site maintained by the lab. Participants are all volunteers and are drawn from the general student body of SMU including undergraduates and students from several professional Master's programs on campus.

3 Hypotheses

The main questions that we wish to examine are whether the HOA option diminishes the desire of the wealthy to exit from the full group and whether the less wealthy citizens anticipate the desire of the wealthy to exit and pull back their tax demands in an attempt to retain the wealthy in the city. As we will explain in detail, according to classical preferences in our setting, the wealthy will always prefer to not remain in the city whether the HOA option is available or not. Given that, poor residents should not pull back their tax demands to keep the wealthy in, as the wealthy will prefer to exit regardless of the tax demands of the Type B's. We choose this stark environment to make it difficult to observe any choices

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to remain in the city.

On the other hand, we expect to observe some individuals choosing to remain in, and we need to provide a theoretical background to explain why they might choose this dominated option. Doing so will require exploring the possibility that individuals may have some form of other-regarding preferences and exploring the impacts of the coordination element imposed in our Costly Exit treatment.

3.1 Phase 1

We begin with phase 1 of the experiments where both A and B types are voting on tax rates. Based on Figure 1, it is very clear to see that if subjects are concerned only for their own self-interest, all A types should vote for a 20% tax rate while the B types should vote for a 50% tax rate. There is, of course, substantial prior literature suggesting that people may make choices that appear to value the welfare of others. If so, then A types could vote for tax rates above 20% if they believe the improvement to the welfare of the B types is worth the cost to themselves.

The nature of the predicted behavior changes depending on how and why an A type values the welfare of B types. One approach is to assume that the A types possess preferences represented by a simplified version of inequity aversion, as in Fehr and Schmidt (1999). As A types cannot experience disadvantageous inequality in our game, we will ignore that element of the standard inequity aversion model and, to make the calculations easier, we will assume they compare the difference between their own earnings and that of a representative B type rather than all B types.[3] This leads to a simple utility function such as

$$U_{IE}^A(x_A, x_B) = x_A - \beta(x_A - x_B). \tag{1}$$

As noted, in the range of taxes between 20% and 50%, for every 1.5 ECU drop in

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[3]The difference between their earnings and that of other A's is 0 and so that comparison falls out. In terms of comparison between the A type's earnings and that of the B's, there are a number of assumptions that could be made. We could assume that they compare themselves to the average of the B types. All B types have the same earnings, so this will match our construction. We could assume that they compare their earnings to each B type individually. Again since all B's earn the same, that would involve multiplying the loss in our model by 3. The parameter necessary to induce a certain type of behavior will change between this specification and the one we use, but only by being divided by 3. There will be no substantive difference in behavior that these alternate specifications could represent.

x_A, x_B rises by 3 ECUs. This means that if $\beta > 1/3$, then $\partial U^A/\partial t > 0$ in that range. Consequently, an A type who possesses an inequity averse utility function with a $\beta > 1/3$ would vote for a 50% tax rate. For any lower value of β, the optimal tax rate for a type A subject would remain at 20% as the decrease in inequality does not offset the personal cost. In this environment, it turns out that this form of inequity aversion is essentially the same as an individual valuing efficiency or total social welfare. Given the fact that efficiency is increasing in the tax rate up to 50%, individuals who value efficiency to a sufficient degree would also be willing to vote for a 50% tax rate. Those who value efficiency less would vote for the 20% rate.[4]

We could instead use a model similar to those examined in Andreoni (1990) and Andreoni and Bernheim (2009) which involve an individual receiving Warm Glow utility from helping others or preferences in which an individual does not want to be seen as doing things different than what they perceive as the norm. A norm compliance utility function would be something along the lines of

$$U_{NC}^A = x_A(t|t_A) - \gamma \left| t_A - \bar{t} \right|, \tag{2}$$

where $x_A(t|t_A)$ represents the earnings the A type would receive based on the tax rate chosen by the group, t, given that this person chose t_A as one of the options for t. The second term involves the norm compliance aspect with $\bar{t} \geq 20\%$ representing what the A player perceives as the tax norm.[5] This individual loses utility the farther they vote from that norm with the intensity of that loss indicated by γ. If γ is high enough, they may simply vote for $\bar{t}$. For lower values, they will vote for something less than $\bar{t}$, but at least 20%. A Warm Glow model would work similarly as the individual might have some target tax rate which would make them feel good about helping out the B's and they receive their

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[4]This binary prediction holds for linear preferences. If an individual has a utility function that values total welfare or equality but with decreasing marginal returns, one could get an optimal tax rate between 20% and 50%.

[5]There are a number of subtle differences in how one could specify this model, none of which change the fundamental predictions. We could assume that the individual only experiences the norm compliance or warm glow element when their vote was decisive. We could also specify this utility function taking into account the expected probability of being decisive and take into account how the person feels when someone else's vote was decisive. These specifications would change the nature of the preference parameters necessary to induce certain actions, but the same motivations would be active. We chose to present this simple form due to it's convenience in making these incentives clear.

	Type A	Type B
Self Interest	20%	50%
Inequity Aversion ./ Efficiency Preferring	20% or 50%	50%
Warm Glow / Norm Compliance	20%-50%	20%-50%

Table 2: Phase 1 Vote Predictions.

Warm Glow utility either if they vote for a rate close to that or possibly if the eventual rate ends up close to it. In both cases, it is possible that individuals could have an optimal tax vote ranging anywhere between 20% and 50% depending on their perception of the norm and the value of γ or based on what tax level is required to deliver the warm glow and the corresponding weight they place on that warm glow.

Given that B subjects are the disadvantaged group, they should essentially vote for self-interest under any of these models. However, if they believed there was a norm to vote for lower tax rates, and they had a desire to conform to that norm, they could find voting for a tax rate less than 50% optimal. The predictions for A and B types under these three specifications can be found in Table 2

3.2   Phase 2

Phase 2 behavior is more interesting and will be the focus of most of our analysis. We can start with the behavior of the A's as the behavior of the B's depends on their expectation of the exit decisions by the A's. Figure 1 again makes the default prediction of the exit decisions obvious, as the payoff functions were constructed so that in the range of 20% to 50% tax rates, the A players always do better exiting than remaining in the group with or without the HOA. If the A's are purely self-interested, then in the Free Exit treatment we should observe A's to choose exit at all tax rates regardless of the behavior of the B players. This prediction should be unchanged whether the HOA option is available or not as exiting is a dominant strategy for the A's in the Free Exit treatment.

In the Costly Exit and No Externality treatments, there are a number of different equilibria but they essentially come down to the two coordination options of all A's choosing to exit or all A's choosing to not exit at every tax rate.[6] The Pareto dominant equilibrium

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[6]The variety of the equilibria exists due to the possibility that anything is an equilibrium so long as at any specific tax rate, all A's are exiting or all are remaining in. The A's can be making different choices at

is all choosing exit at all tax rates and again, this is valid whether the HOA is present or not. While the A's could coordinate on an equilibrium in which they all choose not to exit at some or even all tax rates, forming the HOA or not, they would all be worse off than if they all chose to exit.

As with the voting decision, various forms of other regarding preferences can lead to different behavior in the exit decisions than the pure self-interest model. The pattern of the predicted choice behavior is substantially different depending on whether an A type has preferences that match the norm compliance model or the inequity aversion model. For the Free Exit treatment, if their preferences match some version of the norm compliance model, then the A player might derive some utility from doing the "right thing" and helping the B players out by remaining in the group. Their utility for an exit choice at any given tax rate could be defined as

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U_{NC}^{A} = \begin{cases} x_A(Exit) & if & Exit \\ x_A(t) + \delta & if & Not\ Exit \end{cases}
$$

where $x_A(Exit)$ is their payoff for exiting the group, $x_A(t)$ is their payoff at the tax rate chosen by the B's and δ is the value of complying with the norm for helping out the B's. The choice of exiting versus not is made simply by choosing to exit if $x_A(Exit) \geq x_A(t) + \delta$. The difference between $x_A(Exit)$ and $x(t)$ is lowest at $t = 20\%$ and so the most likely tax rate at which this inequality might not hold is at 20%. As the tax rate increases, the exit payoff remains constant and δ remains constant while $x_A(t)$ declines.[7] If δ is high enough such that at a tax of 20%, the individual prefers to not exit from the group, then there may be some $\widehat{t} > 20\%$ at which this is no longer true. At that rate and for any $t \geq \widehat{t}$, we would predict the individual would prefer to exit.

When the HOA is an option, the difference between the payoff from exiting and remaining in the group will be less and so for a given value of δ, the tax rate that leads to $x_A(Exit) = x_A(t|HOA) + \delta$ could be higher than $\widehat{t}$. In fact, examining Figure 1 shows that

different tax rates; they need only be coordinated at each tax rate.

[7]One might imagine that the value for complying with the norm is higher at lower taxes where perhaps the norm to remain in and help is stronger or that violating that norm makes the individual look more selfish. At some point, the value for complying with that norm might reach 0. Such an alternative specification reinforces the stated predictions.

for any $\widehat{t}$ that might induce indifference without an HOA, the tax rate 15% points higher will yield approximately the same trade-off when the HOA is an option. This should mean that the HOA option should be able to induce subjects to stay in for 2-3 more tax increments than without.

If an A instead possesses preferences closer to the inequity aversion model, the predicted pattern in exit decisions is quite different. The utility function for such preferences would be something similar to

$$U_{IE}^A = \begin{cases} x_A(Exit) - \beta(x_A(Exit) - x_B(Exit)) & if & Exit \\ x_A(t) - \beta(x_A(t) - x_B(t)) & if & Not\ Exit. \end{cases}$$

The choice by a Type A to exit or not is derived by comparing those two payoffs. Given the chosen payoff functions, it is the case that the most likely tax rate for an individual to be induced to stay in the group is at 50%. That is because it is at this tax rate, inequality is minimized and so the inequality aversion term doesn't subtract off much from the utility an A derives from their own earnings. As the tax rate decreases, $x_A(t)$ goes up but inequality is also worsened. The structure of the payoff functions is such that with a β high enough to have induced the individual to prefer to remain in the group at a 50% tax rate, the increase in own earnings is more than offset by the utility loss due to the increase in inequality. Consequently the utility to the inequality averse individual is increasing in the tax rate (as already noted above when discussing their preferences for voting for tax rates). Given that the utility for exiting is fixed, there is again the possibility of a single crossing property. In this case, while an individual may prefer to be in the group at a 50% rate, they may find staying in the full group not to be worth it at some tax rates below 50%. Therefore, individuals with these preferences would exhibit the opposite choice pattern compared to those who value norm compliance; they will choose to exit the group at low tax rates but they may choose to remain in at some higher tax rate and will then prefer to remain in at all tax rates above that point and up to 50%.

When we shift to considering the case where the HOA is an option, the inequality averse individual will still prefer the HOA to remaining in the group without the HOA, as inequality is not worsened much but their own income is better. It is still the case that we

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would expect to see fewer exits when the HOA is present than when it is not.[8]

If we shift our focus to the Costly Exit treatment where we induce the coordination problem, the analysis is similar but we must now take the strategic considerations into account to determine how they might alter behavior. Even if we assume a population purely of self-interested individuals, it is no longer the case that all A's would necessarily choose to exit. This is due to the coordination element. At any tax rate, an equilibrium can be induced with all A's choosing to exit or all choosing to remain in. Thus we can now explain decisions to remain in the group as being due to either social preferences or due to the concern that some other A would not choose to exit at that tax rate. The unfortunate aspect of coordination equilibria is that technically any pattern of behavior is reconcilable with some equilibrium as an individual's exit or failure to do so at any tax rate can be rationalized by their possessing a particular belief of what others will do. While any pattern of behavior is technically rationalizable, one might think that the more likely pattern would be one that could be broadly consistent with the pattern that the norm compliance model would generate. That is, at low taxes where the benefit to exiting is not large, perhaps A types are more likely to believe that other A types would make a "mistake" by choosing not to exit. Thus they best respond by choosing not to exit. At high tax rates, "mistakes" should be expected to be unlikely as their cost is higher leading to an increased belief that others will exit and therefore exit as a best response. There should be some critical tax rate in between such that at rates below this, their best response given their beliefs is to remain and their best response at or above that tax rate is to exit. Beliefs may be heterogenous and so this threshold could differ among subjects. This pattern is exactly the same as predicted by the norm compliance model suggesting that this behavior could be due to either motivation.

If one then adds the social preferences models in, the norm compliance model could

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[8]There is a bit of a divergence between those who value efficiency and those who dislike inequality on the predicted exit decisions. The base preference rankings are the same as the most efficient outcome is A's remaining in and then the B's voting for a 50% tax rate. The difference is small though as total social surplus if the A's exit is 57 (for the base case of outside options) and 57.25 if they remain in and the tax rate is 50%. This difference is tiny and an A would have to place a massive premium on efficiency to prefer to remain in the group. If the HOA is an option, then the total welfare is 60.5 compared to 57 from exiting. While the individual is therefore more likely to prefer to the HOA than the No HOA case, it is unlikely that individuals who value efficiency would do so strongly enough to ever prefer to remain in the group.

make choosing to remain in less unattractive for the A's and increase their belief that other A's will remain in at low taxes. Whether it leads to their choosing to remain in at higher tax rates than the coordination beliefs alone depends on the strength of the norm compliance preferences and their beliefs about their behavior of others. Finally, the inequity aversion model still predicts a pattern very different from either of these other two. An A is more likely to remain in at high rather than low taxes; though with added coordination concerns, it could to a greater likelihood of remaining in the group for all tax rates.

All of these explanations suggest a common prediction: the coordination element should make individuals with any preferences more likely to remain in the full group. This might be true for those who possess social preferences but it is also true for those who do not possess any other-regarding preferences as now remaining in the group can be considered a best response given reasonable beliefs. That was not the case under FE as there is no belief a self-interested could have in the FE treatment that would have rationalized not exiting the group.

In order to get clear identification of how many of the decisions to remain in the group in the CE treatment are due to social preferences and/or beliefs about them versus the coordination problem itself, we introduced the No Externality treatment. It is immediately clear that any individuals with preferences for norm compliance would prefer to exit at all tax rates, assuming that others are expected to choose the same. Since an A player can do nothing to help or hurt the B's, there is no reason that staying in the group should deliver a warm glow, nor should it be considered a norm to remain in the group to help out the B's. Also, any A's interested in efficiency should always prefer exiting since there is no more trade-off between own earnings and efficiency. Efficiency is maximized by A's choosing to exit and the B's voting for a 50% tax rate. For these preferences, the only reason not to exit the group is the coordination concerns which again, could well generate a pattern of behavior that possesses the same pattern of the norm compliance prediction above of remaining in the group at low rates but exiting for higher.

Inequity-averse preferences could possibly deliver a reason to prefer not exiting but only in a very extreme case. An A choosing to exit does worsen inequality by increasing the A's payoff though B's remains unchanged. This leads to an increase in inequality. The B's

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should be expected to choose a tax rate of 50% and the decrease in inequality an A might achieve by choosing to remain in at a 50% tax rate will only compensate for the very large loss in own welfare if $\beta > 1$. At $\beta < 1$, the inequality averse individual still prefers to exit. At any tax rates below 50%, while the cost of remaining in the full group drops, inequality is also not reduced as much. Therefore the inequality reduction is not worth even the slightly smaller cost. On the other hand if $\beta > 1$,, which means that an individual values a \$1 drop in inequality greater than a \$1 increase in their own welfare, then the inequality reduction is always worth the cost and a player would never choose to exit from the main group. That represents fairly extreme inequality aversion suggesting that such behavior is unlikely to be observed. So even under inequity averse preferences, the only practical reason we should expect to see exit decisions in the NE treatment is due to the coordination problem. The presence of the HOA does not appreciably change these predictions.

While all A's would prefer to exit in the No Externality treatment, there is still the coordination problem that might lead to some A's choosing not to exit. If they do, it should be unlikely to be due to the individual possessing any of the social preferences we've described above or even due to the belief that others do. The only reason to fail to choose to exit is the coordination concern. While the existence of the HOA does not change the equilibria nor does it change which equilibria is Pareto dominant, it can perhaps make it harder to coordinate on exiting since it decreases the cost of failing to coordinate on the better outcome.

With this background to support our research hypotheses, our first hypothesis concerns the central research question for this study:

Hypothesis 1 (HOA) *A types should choose to exit the main group less often when the HOA option is available in all treatments.*

While we can state and investigate this hypothesis for all treatments, the reason the effect might exist is potentially different in all three treatments. In that FE treatment, we expect that those possessing social preferences will prefer to remain in the full group with the HOA for more tax rates than without the HOA due to the reduced cost of helping others / diminishing inequity. In the CE and NE cases, the HOA could make coordinating on the

exit outcome more difficult as there is a higher payoff possible requiring no risk. For the CE treatment, these two effects might combine and augment each others. Given this, while we can test this hypothesis on all of the treatments, we should not expect any observed effect to be the same for all three. We can also look at how we expect the overall level of exit decisions to vary between treatments.

Hypothesis 2 (Coordination Problem) *There should be fewer exit decisions in the CE treatment than the FE treatment.*

Hypothesis 3 (Externality) *There should be fewer exit decisions in the CE treatment than the NE.*

Obviously the addition of a coordination problem to the Free Exit environment which delivers the Costly Exit treatment should be expected to decrease exit decisions. On the other hand, it is possible that the exit decisions in the CE treatment are due to a combination of social preferences and coordination problems. By comparing the number of exits in the CE treatment to the NE treatment, we can identify the number of exit decisions due to social preferences versus the coordination problem since the social preferences aspect should be essentially sterilized by the NE treatment.

We now turn to the hypotheses concerning voting behavior. We have already discussed voting behavior in Phase 1. We can state a clear hypothesis regarding self-interested behavior though we have already described above how we can rationalize behavior that may deviate from these narrow predictions.

Hypothesis 4 (Phase 1 Votes) *In Phase 1, A players should vote for a tax rate of 20 while B's should vote for a tax rate of 50.*

Voting behavior in Phase 2 is somewhat more interesting for the B players. If they expect that A players will exit for all tax rates, then the votes of the B players are irrelevant as their votes will not matter. If, however, the B players expect that the A players will remain in for some tax rates but not others, then it might affect their voting behavior. For example, if the B's believe that the A's possess preferences for norm compliance and will therefore be willing to remain in the group for low tax rates, but not high tax rates, then

we would predict that B's will vote for lower tax rates when exit decisions are allowed. This would be a reasonable approximation of behavior in the field in which parts of a city might compromise with the wealthier parts on tax demands in order to keep them from leaving. On the other hand, in the NE treatment the votes by the B players should be unaffected by the exit opportunity since it has no impact on their payoffs whether the A's exit or not. This leads to the next hypothesis on strategic voting:

Hypothesis 5 (Strategic Voting) *Type B players will vote for lower tax rates in phase 2 than phase 1 in the FE and CE treatments. There should be no difference in the NE treatment.*

If the B's are perhaps even more sophisticated and expect the impact of the HOA option on the exit preferences of the A's and they expect that the A's will be willing to remain in the group at higher tax rates when the HOA option is available, then this might lead them to vote differently between the HOA and No HOA segments of Phase 2.

Hypothesis 6 (Strategic Voting 2) *Type B players will vote for lower tax rates in the No HOA rounds of phase 2 than in the HOA rounds, in the FE and CE treatments. We should observe no such difference in the NE treatment.*

A final set of hypotheses concern the behavior of the A's between Phase 1 and Phase 2. Here we are interested in understanding how good our models of other-regarding preferences are at organizing the decisions of the A's, and, in particular, whether the decisions in Phases 1 and 2 are consistent. As we note above, there are predicted differences between those who possess preferences for norm compliance and those who possess inequity averse preferences in both phases. There are two ways to examine behavior between these two phases to check for consistency. The first way is straightforward and allows the specification of an easy to test hypothesis. Simply put, those who are willing to remain in the group at more tax rates should be those that have stronger other-regarding preferences. These preferences should be represented in their votes in Phase 1 such that those who vote for high taxes in Phase 1 should be expected to remain in the group more often (or exit less often) in Phase 2.

Hypothesis 7 (Consistency I) *The number of tax rates at which an A is willing to remain in the group in Phase 2 should be negatively related to their votes for taxes in Phase 1.*

The other way to check for consistency requires somewhat more qualitative comparisons. In Phase 1, we expect that those with inequity averse preferences should vote for extreme tax rates, either 20% or 50% in the extreme while those with norm compliance preferences should either vote for 20% or higher depending on the strength of their desire to comply with a norm of voting for taxes above 20%. Thus we might expect most of the vote observations for those with norm compliance preferences to be at 20% and then decay from there. There should be unlikely to be many votes for high tax rates near 50% . If we examine the exit decisions in Phase 2 and can separate subjects into those who make decisions consistent with inequity aversion and those who make decisions consistent with a norm compliance model, we can then examine their voting behavior and phase 1. Those we identify as inequity averse from Phase 2 exit decisions should evidence multi-modal tax votes with some voting for 20% and others voting for 50%. Those we identify as behaving consistent with a norm compliance model in Phase 2 should have voting behavior that is uni-modal, likely that model should be at 20, though technically it could be higher depending on the strength of their preferences. There should be very few individuals who are identified as having norm compliance preferences who vote for extreme tax rates. Thus we can state another hypothesis that allows somewhat of a test of this prediction.

Hypothesis 8 (Consistency II) *A types identified as possessing inequity averse preferences should be more likely to vote for extreme high tax rates than those with norm compliance preferences.*

There is an important caveat to these last two hypotheses for the CE and NE treatments. Given the coordination element in both and the lack of the externality issues in the NE treatment, the application of the social preference models to explaining the pattern of exit decisions is much more complicated than for the FE treatment. We will discuss this issue more in the results section as this is largely an empirical question as to whether or not these models are at all useful in those treatments given those difficulties.

| | | Phase 1 | Phase 2 | |
		1-10	No HOA	HOA
Free Exit	Type A	25.52	-	-
	Type B	47.69	44.44	45.51
Costly Exit	Type A	26.43	-	-
	Type B	47.96	46.25	45.93
No Ext	Type A	25.98	-	-
	Type B	45.85	44.22	42.76

Table 3: Average tax votes by type and experiment segment.

4 Results

4.1 Summary Statistics

We begin with a set of summary statistics to provide an overview of the data and then in subsequent sections we will provide formal tests of our hypotheses. Table 3 shows the average votes by type in different segments of the experiment by treatment. Figure 2 shows the information round by round. As noted before, the baseline prediction is that Type A votes should be at 20% and the average is around 25% in all treatments. There should be no treatment differences in these votes as all the experiments are identical in Phase 1. The Type B votes should be at 50% according to a standard self-interest prediction in Phase 1 and again, with no differences between treatments. They are at 48% for the FE and CE treatments but down to 46% for the NE treatment. Hypothesis 5 suggests that B votes should decrease in Phase 2 and there does seem to be a modest decline between Phase 1 and 2.

Figure 2 demonstrates that for all three treatments, the Type A votes overlap almost perfectly. For the Type B's, the votes in the NE treatment may have been slightly below the other two. There also looks to be a small shift down between Phase 1 and Phase 2. Since these are repeated observations, we do not present any simple distribution tests for significance as such tests are misspecified. We will present formal tests of the hypotheses in the next section. We can say that at this point, it appears that self-interest does not completely dominate the tax voting for Type A subjects as their votes are robustly above 20% on average. There may be a drop in aggressiveness of voting by B players when the exit option is allowed, though it may not be a substantial effect.
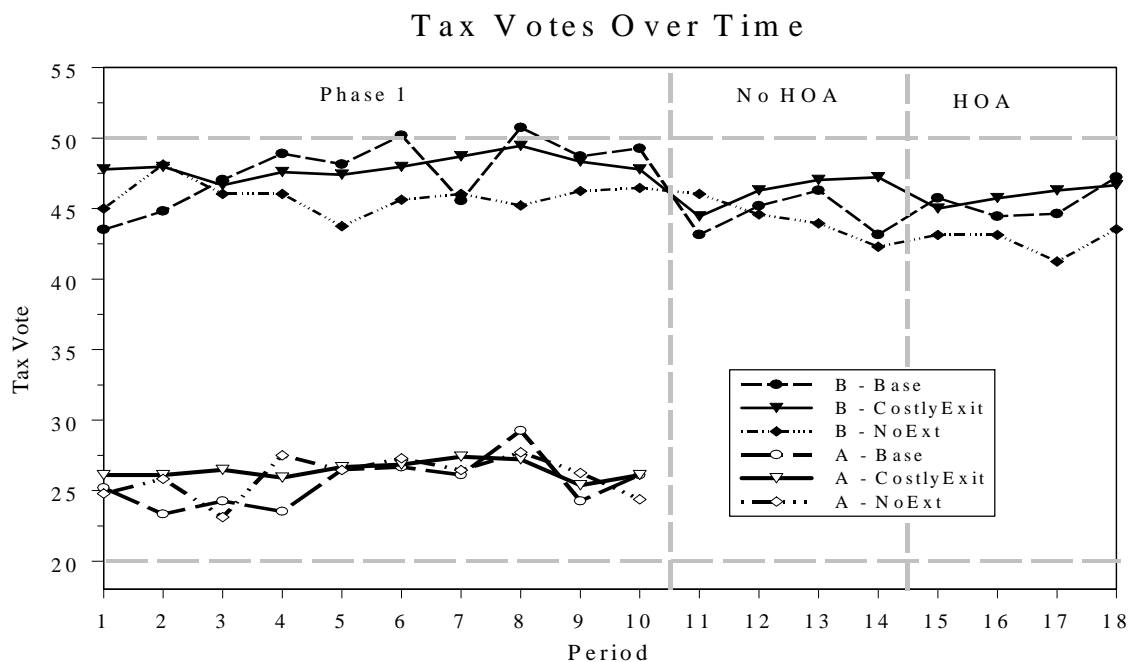
Figure 2: Tax votes over time by type

We provide Table 4 to summarize the exit decisions of the Type A's in Phase 2. We separate them into the No HOA and HOA segments of that phase. Obviously, in the No HOA segment, the Type A's cannot choose the HOA option. There are 12 tax rates for which choices must be made. In the Free Exit case, we can see that in the No HOA segment, A's choose to exit around 9 times. When the HOA option is available they drop down to exiting 7 times. While there is still on average one choice to be in the Full Group, most of the non-exit choices are to form the HOA. These choices show that apparently there are at least some A types who will prefer to refrain from exiting the group at some tax rates and that there is at least a small increase in the willingness to stay in when the HOA option is present. Recall that the back-of-the-envelope prediction was that the HOA option should induce subjects to stay in for 2-3 additional tax levels and the observed difference is around 2. For the CE case, the number of exits is only around 7.5 for the No HOA segment, which is less than in the FE treatment. If we assume the preferences of the subjects are on average the same between the FE and CE treatment, this decrease should be due to the strategic considerations of the coordination element. This number drops even further down to around 5.5 when the HOA is allowed. The numbers are almost identical for the NE

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		Full Group	HOA	Exit	Obs
Free Exit	No HOA	3.13	-	8.87	108
	HOA	1.41	3.31	7.28	108
Costly Exit	No HOA	4.5	-	7.5	108
	HOA	1.70	4.67	5.63	108
No Ext	No HOA	4.68	-	7.32	96
	HOA	2.65	3.70	5.66	96

Table 4: Summary of exit decisions by Type A subjects in Phase 2.

treatment. These numbers suggest that the coordination element substantially decreases exit attempts but even then an HOA option decreases them further.

Also of particular importance, the exit decisions are practically identical between the CE and NE treatments. This suggests that the driving force in the CE treatment is the coordination problem and the externality is having little additional impact. Any social preferences driving lack of exit in the FE treatment may be fully crowded out by the coordination problem in the CE treatment, at least for the marginal decision maker.

Figures 3 and 4 show the pattern of exit decisions made by A types at each tax rate split out by treatments. Based on the prior discussion, there are a few different patterns of choice behavior we might expect from type A's making consistent choices. A simple consistent pattern would involve a subject choosing to exit at all tax rates. This is the pattern predicted by simple self-interest in FE and then that coupled with a belief that others are likely to always exit in the CE and NE treatments.

A second pattern that would be consistent with the Warm Glow or norm compliance models would involve a subject being willing to be in the full group at a 20% tax rate and then perhaps at a few tax rates above 20%, but once the subject chooses to exit the group at one tax rate, they should do so at all higher rates. This pattern could emerge in CE and NE treatments if subjects believe that the higher is the tax rate, the more likely are others to choose to exit.

For convenience, we will lump both types of behavior together and label any A's who choose to always exit or to be in at 20% and exit at some higher rates as norm compliance behavior. This type of behavior would generally lead to the fewest exits decisions being seen around the 20% tax rate, with the number of exit choices increasing at higher tax
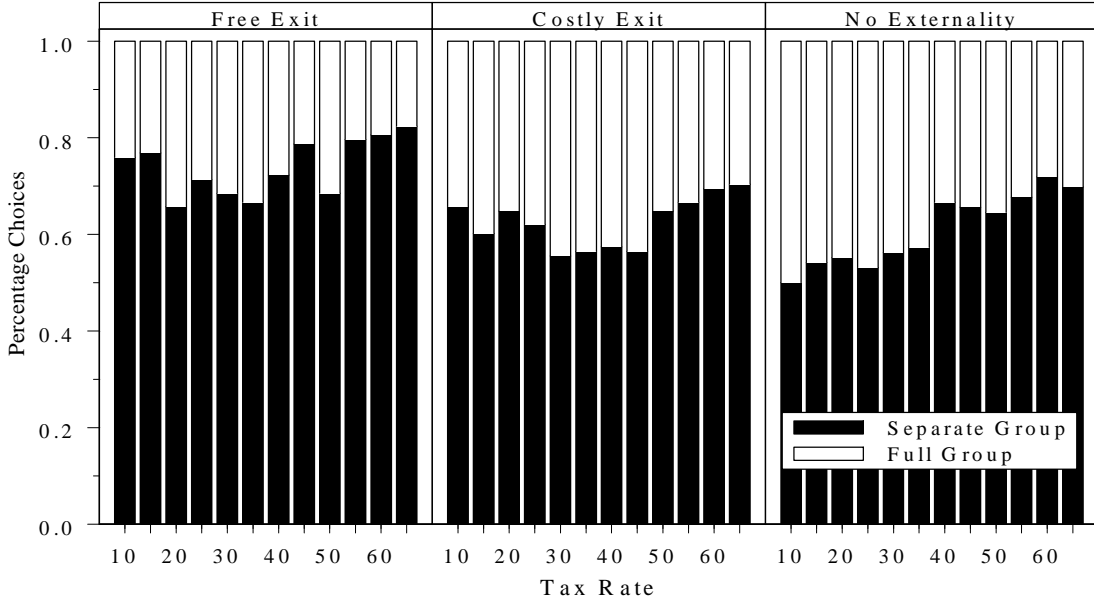
Exit Choices: No HOA

Figure 3: Exit Decisions of A types by tax rates and treatment when there is no HOA option allowed.

rates. This contrasts with the inequity averse behavior and with a few subjects who always choose to remain in the group. The inequity averse subjects are those who chose to exit the group at a 20% tax rate but then choose to remain in at higher tax rates and continue to stay in until the 50% rate. This behavior would lead to the fewest observations of exit choices being around the 50% mark, with the number of exits increasing as the tax rate decreases. While technically there is a pattern of beliefs that would be consistent with this due to coordination concerns in the FE and NE treatments, those beliefs involve assuming that others are most likely to remain in at 50% and their probability of exiting is increasing at lower rates. This is a very odd set of beliefs without social preferences being strongly present, though it is perhaps consistent with a belief that others are strongly inequity averse. What we see in the figures is a pattern that is roughly consistent with the norm compliance behavior, especially when the HOA option is allowed. We see a relatively strong pattern of the number of exit choices increasing in the tax rate. When the HOA option is not present, we observe more stable numbers of exit choices over the range of tax rates.

We can examine the choices by individuals to better understand this behavior and what
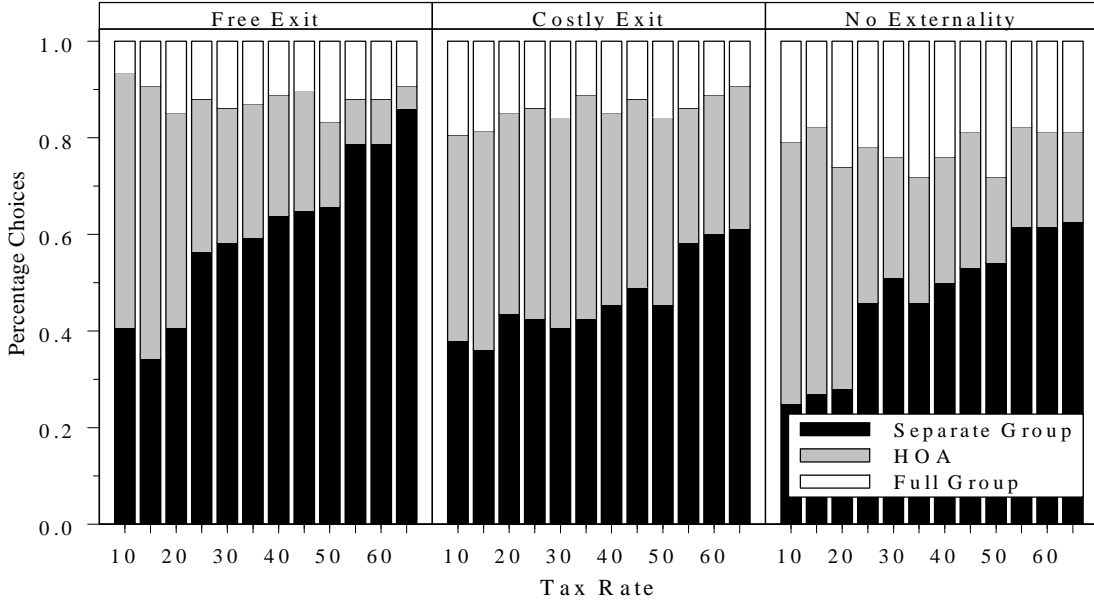
Exit Choices: HOA

Figure 4: Exit decisions of A types by tax round and treatment when the HOA option was allowed.

we find is heterogeneity in exactly the manner predicted by these two broad classes of models. We examined behavior by subjects and examined their choices over all 8 rounds of phase 2. We classified their choices in each period into four categories.

The first category indicates behavior that is consistent with the Norm Compliance model. This means the subject chose to remain in the full group at a tax rate of 20% and perhaps some higher rates. Then once they chose to exit at some rate, they continued exiting at all higher rates up to 65%. The second category indicates behavior that is consistent with the inequity aversion model. This is a choice path in which an individual chooses to exit the group at a tax rate of 20% and perhaps for some higher rates, but then chooses to remain for higher rates, up to 50%. To be categorized as either the first or second category, the choice path has to involve a single switch only. The third category is always exiting the group, while the fourth is always remaining in.

We have 78 A subjects making 8 choices each, and so there are $8 \times 78 = 624$ choice paths to categorize. Of those, 171 choice paths (27%) match the Norm Compliance pattern, 74 (12%) match the Inequity Aversion pattern, 197 (32%) involve the A always exiting, and 60

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	FE	CE	NE
Norm Compliant	7	6	7
Inequity Averse	0	5	2
Always Exit	13	8	7
Always In	0	3	1
Indeterminate	7	5	7

Table 5: Number of subjects in each treatment sorted into each behavioral type based on their exit choices.

(10%) involve always remaining in. That leaves 122 (20%) that could not be categorized. For our analysis below, we categorize A's into different types based on which category explains at least 4 of their 8 sets of choices.[9] We find 20 subjects (26%) to match the norm compliance type, 7 (9%) to match the inequity aversion type, 28 (36%) to match the always exit type, 4 (5%) to match the always in type and 19 (24%) to be indeterminate. This information is broken out into treatment in Table 5.

4.2   Analysis of Exit Decisions

We will now present a series of regressions to examine each of our hypotheses in order, beginning with the hypotheses concerning exit choices by the A's. Table 6 contains a set of Tobit regressions with standard errors clustered on individual subjects. The dependent variable is the number of exit choices by an A subject in a period. We are including only the tax rate choices at 20% and above, leaving us with choices over 10 tax rates per period. Since the number of exit decisions is bounded above by 10 and below by 0, and we observe many subjects at both bounds, the Tobit specification is necessary for proper inference.[10] The independent variables include an indicator variable for whether the HOA option is present, treatment variables, the average tax rate the A subject voted for in Phase 1 and

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[9]There were eight subjects who had 4 periods in which their choices matched one specification and their other 4 periods matched a second specification. Four of these subjects had 4 periods in which their choices matched the norm compliance pattern and three of those had their other 4 periods matching the always out pattern. The fourth subject had their other 4 periods be unclassified. We have labeled all four as norm compliant. We have one subject who had 4 periods match the inequity averse pattern and the other 4 be unclassified. We have labeled this person inequity averse. The other three had more complicated patterns and so have been lumped into the unclassified group.

[10]We note, though, that standard OLS panel regressions with random effects and clustered errors delivers the same qualitative results. We also conducted random effects Tobit regressions but without the standard errors clustered and again achieved similar results.

	All Treatments	Free Exit	Costly Exit	No Externality
HOA	-2.043***	-1.656**	-2.433**	-2.052**
	(0.551)	(0.839)	(1.119)	(0.910)
CostlyExit	-2.126*			
	(1.185)			
NoExt	-1.938			
	(1.233)			
Phase1Tax	-0.240***	-0.198*	-0.267**	-0.260***
	(0.060)	(0.110)	(0.107)	(0.091)
Exit1	-0.277	-0.161	-0.232	-0.453
	(0.309)	(0.563)	(0.610)	(0.450)
Exit2	-0.968***	-0.661	-0.905	-1.346**
	(0.368)	(0.558)	(0.746)	(0.603)
Exit4	-0.836**	-1.291*	-0.433	-0.713
	(0.368)	(0.677)	(0.723)	(0.511)
Constant	16.044***	14.680***	14.761***	14.700***
	(2.026)	(3.305)	(3.390)	(2.925)
Obs (Clusters)	624 (78)	216 (27)	216 (27)	192 (24)

Clustered robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 6: Tobit regressions with number of exit choices in a round as the dependent variable. Upper bound is at 10, lower at 0 and standard errors are clustered on the individual subject.

indicator variables corresponding to the configuration of exit payoffs.

The first column in the table pools all the treatments and allows us to test our Hypothesis 1, which claimed that A's would choose to exit at fewer tax rates when the HOA is present for all treatments. The other three columns examine the question considering the data one treatment at a time. The key variable of interest for this hypothesis is the one labeled HOA, which is 1 when the HOA option is present, 0 when it is not. We find the coefficient of this variable to be negative and significant in all specifications. This leads to our first main result.

Result 1 *(HOA) In all treatments, A subjects choose to exit at fewer tax rates when the HOA option is available than when it is not.*

Our next two hypotheses concern the treatment differences we expect. The regressions used to investigate these two questions can be found in Table 7. These are similarly specified

Tobit regressions with the number of exit attempts by an A player as the dependent variable but different subsets of the data are used to allow us to focus on testing hypotheses 2 and 3. The first two columns contain regressions considering only data from the CE and FE treatments while the third and fourth columns contain regressions with data from only the CE and NE treatments. These regressions support our next two results.

Result 2 *(Coordination Problem) There are marginally significantly fewer exit decisions in the CE treatment than the FE treatment.*

Result 3 *(Externality) There is no significant difference in the number of exit decisions between the CE and NE treatments.*

Hypothesis 2 suggests that the introduction of the coordination element in the CE treatment should drive down exit choices below what we find in the FE treatment. Indeed, column 1 shows a modestly significant decrease in exits due to the CE treatment. This decrease is largely due to a greater decrease under the CE treatment when the HOA is present than when it is not, as indicated by column 2.

Hypothesis 3 concerned the difference between the CE and NE treatments. Since the coordination and social preference elements are present in the CE treatment while only the coordination element is present in the NE, we should observe fewer exits in the CE than NE treatment. Any exits in the NE treatment should capture the pure coordination effect. The difference between them shows the increase to city cohesion due to social preferences.

The results show that there is no difference in the number of exits between these two treatments. That suggests that the coordination problems are fully crowding out any lack of exiting due to social preferences for the marginal decision maker. This is quite reasonable; in treatments with the coordination element, we already see fewer exit decisions than in the FE treatment. The NE treatment is likely pushing most subjects to stay in the full group at tax rates above what they would due to their concern about the B subjects. Consequently, when we add that potential concern back in with the CE treatment, there are no tax rates left at which they were choosing to exit the group where the reintroduction of concern for the B's would tip the balance back in favor of remaining in the group. Thus, we argue that the coordination concerns fully crowd out the social preferences. It is important to note

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	FE & CE		CE & NE	
	(1)	(2)	(3)	(4)
CostlyExit	-2.144*	-1.850	-0.178	-0.069
	(1.193)	(1.340)	(1.236)	(1.416)
HOA		-1.739**		-2.133**
		(0.841)		(0.906)
HOA_CE		-0.596		-0.218
		(1.260)		(1.304)
Phase1Tax	-0.229***	-0.229***	-0.262***	-0.264***
	(0.079)	(0.080)	(0.068)	(0.069)
Exit1	-0.209	-0.196	-0.344	-0.340
	(0.404)	(0.404)	(0.374)	(0.375)
Exit2	-0.839*	-0.793*	-1.163**	-1.122**
	(0.471)	(0.460)	(0.489)	(0.482)
Exit4	-0.936*	-0.892*	-0.613	-0.578
	(0.494)	(0.487)	(0.446)	(0.442)
Constant	14.737***	15.572***	13.698***	14.786***
	(2.505)	(2.575)	(2.328)	(2.339)
Obs (Clusters)	432 (54)	432 (54)	408 (51)	408 (51)

Robust clustered standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Table 7: Tobit regressions with number of exit choices in a round as the dependent variable. Upper bound is at 10, lower at 0 and standard errors are clustered on the individual subject.

that this does not mean that social preferences are not behind the exit decisions for some of the A subjects in the NE and CE treatments. It means simply that for the marginal subject there is not an increase in willingness to stay in between the NE and CE treatments due to the fact that the social preferences concern is now greater.

While we did not state formal hypotheses concerning how the exit payoffs would affect the decisions by the A subjects, these different outside options were included to see if they did impact the choice behavior. The prior regressions show that the second configuration, where the A's receive 40 and the B's 14 if the A's exit, reliably leads to fewer exit choices than the third configuration, {43, 16}. This was expected as the third configuration is the most generous to both types based on an exit choice, and option 2 is least generous to both. There is no effect from configuration 1, {43, 14}, but an occasionally significant effect from configuration 4, {40, 16}. The indication here is that the lower payoff to the A players

in configuration 2 and 4 for exiting makes exit slightly less attractive and has a marginal impact. There seems to be little impact from reducing the payoff of the B type. Note that for the NE treatment, it is only the exit payoff of the A types that changes across these conditions as the B's receive the same payoff in that treatment whether the A's exit or not. For that treatment, conditions 1 and 3 are equivalent, and then 2 and 4 are equivalent.

4.3 Analysis of Voting Behavior

Our next results will examine the voting behavior regarding tax rates. The predictions regarding type A subjects in Phase 1 were straightforward. The self interest prediction is that they should vote for a 20% tax rate. Table 8 contains random effects panel regressions with standard errors clustered at the individual level[11] examining the voting behavior of Type A subjects in Phase 1.

The first two columns contain all votes by Type A's while the last two columns focus on the behavior in the second half of the rounds from Phase 1 allowing us to focus on the rounds where we might expect that they have a clearer understanding of the situation. We first note that there should be no differences in behavior due to treatments as all treatments are the same in Phase 1 and indeed, no treatment variables are significant. By examining the constants in Columns 1 and 3, we can determine if the A's on average vote for 20% tax rates and we find that in both cases, the constant is significantly different from 20.

Table 9 contains random effects panel regressions with the standard errors clustered at the subject level with the dependent variable being the tax vote of a B type in a round. These regressions include both Phase 1 and Phase 2 data since B's vote in both. Columns 1 to 4 separate Phase 1 from Phase 2, while Columns 5 to 8 further divide Phase 2 into the HOA and No HOA segments and compare both with Phase 1. We provide specifications with all treatments pooled and then separated out. We find that except for the CE treatment, the votes by the B's in Phase 1 are indeed generally significantly different from 50, though the actual difference is perhaps small. There is a weak effect even for the B's in the CE treatment. This is indicated by the Constant in each regression being slightly below 50 and significantly so, though only marginally significant for one of the CE regressions. This

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[11] Note, we do not use the Tobit specification for voting decisions because we observe virtually no tax votes on the boundaries at 0 and 65%. As such there is little gain from the Tobit structure.

	Periods 1-10		Periods 6-10	
	(1)	(2)	(3)	(4)
CostlyExit	0.907	-1.580	0.111	-3.141
	(2.100)	(1.870)	(2.400)	(2.066)
NoExt	0.461	-1.126	-0.065	-2.021
	(2.356)	(1.933)	(2.679)	(2.131)
Ineq Averse		7.379***		9.378***
		(2.842)		(2.986)
Always In		-1.499		-1.433
		(1.682)		(1.831)
Always Out		11.698*		16.061***
		(5.975)		(6.164)
Unclassified		6.161***		7.219***
		(2.353)		(2.648)
Constant	25.519†††	24.643†††	26.481†††	25.300†††
	(1.548)	(1.671)	(1.818)	(1.846)
Obs (Clusters)	780 (78)	780 (78)	390 (78)	390 (78)

Clustered robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The †symbol represents significance of test of difference of Constant from 20.

Table 8: Random effects panel regression of tax votes by Type A's in Phase 1.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All Data	Free Exit	Costly Exit	No Ext	All Data	Free Exit	Costly Exit	No Ext
Phase 2	-1.318***	-1.327	-1.096	-1.557*				
	(0.484)	(0.871)	(0.746)	(0.933)				
No HOA					-2.218***	-3.241*	-1.713	-1.635
					(0.839)	(1.752)	(1.238)	(1.321)
HOA					-0.192	1.065	-0.324	-1.458
					(0.655)	(0.998)	(1.167)	(1.238)
CostlyExit	0.648				0.648			
	(1.405)				(1.405)			
NoExt	-1.678				-1.678			
	(1.703)				(1.704)			
Constant	47.360†††	47.366†††	47.860†	45.841†††	47.510†††	47.685††	47.963	45.854†††
	(0.876)	(0.997)	(1.221)	(1.407)	(0.888)	(1.064)	(1.296)	(1.407)
Obs (Clusters)	1,404 (78)	486 (27)	486 (27)	432 (24)	1,404 (78)	486 (27)	486 (27)	432 (24)

Clustered robust standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

The †symbol represents significance of test of difference of Constant from 50.

Table 9: Random effects panel regressions of votes of B types in Phases 1 and 2.

brings us to our fourth result.

Result 4 (*Phase 1 Votes*) *The voting behavior of both A and B types is statistically significantly different from the self-interest prediction, though the effect is weak for B's in the CE treatment.*

Result 4 is not surprising, nor is it terribly interesting, on its own, as it is rare that point predictions of self-interested behavior are observed precisely. Of greater interest is the possibility of strategic reactions by the B subjects to the exit decisions of the A subjects in Phase 2.

There are many possible responses of the B's depending on what they expect from the exit decisions by the A's. If they expect the A's will behave mostly in line with the norm compliance model, then the B's might vote for less aggressive tax rates in Phase 2 than Phase 1. If they expect that A's will act more in line with the inequality averse model, then they should not adjust their votes between phases. In the treatments with the coordination element, if they expect that this will lead to fewer overall exits, then the incentives of the B's to temper their aggressive voting are also lessened.

Columns 1-4 investigate this overall and find a very modest reduction in overall votes between Phase 1 and 2. This may indicate that some B's did indeed believe that A's would

behave according to the norm compliance prediction, and they tried to take advantage of it, but such behavior was not frequent enough to shift the overall average vote by much.

Oddly enough, while the treatment that we expected should show the least difference between Phase 1 and Phase 2, the NE treatment where the actions of the A's do not affect the B's in Phase 2, we actually find the largest difference between phase 1 and phase 2 votes.

Result 5 *(Strategic Voting) There is a modest decrease in votes for tax rates between Phase 1 and 2 among type B subjects when all sessions are pooled. This effect is not strong enough to be robustly significant for individual treatments.*

Columns 5-8 of Table 9 allow us to look at this strategic voting question a little more carefully as those specifications separate out the No HOA and HOA segments of Phase 2. Since we already found that the most exit decisions are in the No HOA segment of the FE treatment, if this is anticipated by the B's then this is the segment where we should observe the most significant impact on voting behavior of the B's. Also, if the effect of the coordination element is expected to limit exits, we shouldn't expect strong effects for the treatments with the coordination element.

In fact, this is exactly what we see. Overall, the largest drop in votes for tax rates is in the No HOA segment of Phase 2 and the dominant impact on that overall effect comes from the FE treatment. There is no significant effect for either segment in the other two treatments. We argue that the reason that the overall effect in the FE treatment in column 2 is insignificant is because this effect combines the No HOA and HOA effects. These offset each other as shown in column 6.

Result 6 *(Strategic Voting 2) There is a significant decrease in the tax rates voted for by B types in the No HOA segment of Phase 2 compared to Phase 1. This effect is driven by the FE treatment as there is no significant shift in the other two but there is a large shift in the FE treatment.*

Type	Avg Tax Vote
Norm Compliance	23.78
Inequity Averse	30.57
Always Out	22.41
Always In	34.88

Table 10: Average vote for Phase 1 taxes by A's sorted into each behavior type.

4.4   Models of Social Preferences

We now turn to examining the degree to which our models of social preferences help us organize the behavior of the A players, as well as whether their behavior helps to separate between those models. Our first check is to examine the relationship between the number of taxes at which an A type is willing to exit and the taxes they vote for in Phase 1. Hypothesis 7 predicts a negative relationship. Tables 6 and 7, seen before, examine the exit decisions of our A players and all specifications include a variable for the average Phase 1 tax the A subject voted for. In all specifications, the coefficient on this variable is negative and it is significant in all cases. This leads to Result 7.

Result 7 *(Consistency 1) There is a negative correlation between number of times an A Player chooses to exit and their average tax vote from Phase 1.*

Our last hypothesis was based on the predicted difference in voting behavior between the norm compliance model and inequity aversion. The prediction is that those found to exhibit inequity averse behavior in Phase 2 should be more likely to vote for tax rates near 50% in phase 1. Table 10 shows some simple summary statistics on the differences in average tax votes by behavioral type while Table 8 contains regressions on the voting behavior of the A subjects with columns 2 and 4 including variables coding the type of behavior observed in Phase 2. The baseline group are those identified as behaving consistent with the norm compliance model.

In both specifications we see that the indicator variable for whether someone is classified as behaving in line with the inequity averse model is positive and significant. This indicates that those who exhibit inequity averse behavior in their exit decisions do vote for higher tax rates on average. This is clearly seen in the summary statistics as well.

Result 8 *(Consistency 2) A players identified as inequity averse from Phase 2 behavior vote for higher tax rates in Phase 1 than subjects identified as behaving in accord with a norm compliance model.*

The implication from these results is that we find consistency in the behavior between phases that suggest that both of our models of social preferences can help to rationalize the behavior of our subjects. The dominant model of social preferences appears to be the norm compliance model, but we do observe a few subjects that behave in a manner predicted by the inequity aversion model.

5   Conclusion

The motivation for this study was to understand the effect that the rise of HOAs might have had on the impetus of wealthy city residents to secede. Our initial thought was that allowing wealthy citizens the option to provide some form of localized and excludable public goods might make them more willing to remain in a city, even if it involved giving up some of their own welfare to do so. An HOA certainly allows residents to provide such public goods, but they are not the only option, as private schools perform a similar function.

Our experiment provides evidence supportive of this hypothesis. We find that those we place in the position of wealthy city residents indicate a willingness to stay in their group at higher tax rates when the HOA option is present than when it is not. We find this to be true, even when we implement a coordination problem among the wealthy residents that depresses exit attempts.

We also find some interesting results regarding how the individuals in the role of the poor citizens adjust their tax demands based on the presence or absence of an exit option for the wealthy. There are indications that some of those in the role of the poor citizens understand the need to ask for lower tax rates when the wealthy have the option to secede, but then realize that they may be able to push taxes a bit higher when the HOA option is allowed.

The potential implications of these findings for the role of HOAs in cities are important to understand carefully. As inequality has been rising across the country, it seems that

HOAs may have been serving as a pressure relief valve for some of the concerns wealthy city residents may be having regarding subsidizing the public goods consumed by less wealthy residents. While HOAs imply that members end up with more (or better) public goods than the less wealthy, and while the wealthy have may have pushed for lowering their contributions to the city, it may be the case that the poorer residents of the city are still better off than had HOAs been disallowed. Without the HOA option, the threat of the wealthy moving to the suburbs or seceding en masse looms large, and either of these actions would be very damaging to those remaining in the city due to the substantial loss of the tax base. Simply preventing the wealthy from trying to exit the city in the absence of an HOA option does not solve the problem. First, the wealthy may push for even lower tax rates if they are to remain. Second, prior research has shown that preventing individuals from exiting a situation like this can lead to substantial bitterness and resentment, which can degrade their willingness to contribute even further (see Ahn, Isaac, and Salmon (2008) and Ahn, Isaac, and Salmon (2009)). If allowing wealthy individuals to form HOAs (or send their children to private schools) makes them more willing to remain in the city and less likely to even desire or attempt to secede, then this could well be a benefit for the less wealthy.

Of course, given that our data derive from a laboratory experiment, we cannot provide a measurement of this effect calibrated for any individual cities. Indeed, there likely do not exist data on secession which would allow such a calibrated estimate. Whatever the size of this effect, we would certainly not argue that it swamps all other concerns both poor and wealthy city residents might have regarding secession or the existence of HOAs.

These concerns, which can deal with, for instance, HOA governance, accountability or their impacts on property values, are unlikely to be fully offset by the mechanism we show here. We would, however, argue that our results point in the direction of a potential benefit not previously considered from cities allowing HOAs, private schools and other ways that individuals might provide localized and excludable public goods, that is worth considering when assessing the merits of these types of organizations.

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