Regional Science and Urban Economics 93 (2022) 103760

Contents lists available at ScienceDirect

Regional Science and Urban Economics

journal homepage: www.elsevier.com/locate/regec

Homeowner associations and city cohesion

Ron Cheung [a,*], Timothy C. Salmon [b], Kuangli Xie [b]

[a] Oberlin College, Department of Economics, 10 North Professor Street, Oberlin, OH 44074, USA
[b] Southern Methodist University, Department of Economics, 3300 Dyer Street, Suite 301 Umphrey Lee Center, Dallas, TX 75275-0496, USA

ARTICLE INFO

Jel classification:
C91
H7

Keywords:
Homeowners associations
Secession
City cohesion

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 o⁄ 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. 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. Both results suggest a previously unexamined benefit of allowing HOAs.

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 fees and then use those fees to provide public services and to 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 have been growing over the last five decades, as have 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, an impressive number given that HOAs barely existed as late as 1975.[1]

Given how quickly HOAs have risen in coverage and prominence, it is no surprise that there is an active debate 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, clublike 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 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 stemming from 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. 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

* Corresponding author.
E-mail addresses: rcheung@oberlin.edu (R. Cheung), tsalmon@smu.edu (T.C. Salmon), xiekuangli@gmail.com (K. Xie).

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

https://doi.org/10.1016/j.regsciurbeco.2021.103760
Received 11 November 2020; Received in revised form 22 November 2021; Accepted 27 November 2021
Available online 4 December 2021

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 et al. (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 for that study, 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 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.

There have been high-profile attempts at neighborhood secession, with perhaps the best known and well-studied example being the San Fernando Valley. The Valley has tried many times to secede from Los Angeles, the most recent referendum taking place (and failing) in 2002. The Valley residents 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 homeowners and businesses, which 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.

In a more recent example, there was a proposal in 2018 to de-annex Eagle s Landing, a wealthy neighborhood, from the city of Stockbridge in suburban Atlanta. Proponents of the secession claimed they wanted better control over their community to provide parks, senior centers and police and to attract upscale commercial development. Particularly alarming to the city of Stockbridge, to make the new town economically viable, large swaths of the commercial tax base were included in the secession area. Coupled with the racial undertones of a mostly-white neighborhood trying to secede from a majority-black city, the campaign attracted nationwide attention and scrutiny.[2]

HOAs may represent an alternative approach to wealthy residents providing localized public goods which can improve their standard of living at a much lower cost than secession without as substantial of a negative externality imposed on others. Our question is whether the existence of this HOA option might blunt the desire of wealthy city residents to exit a city. If so, the HOA may offer a way to increase city cohesion by giving wealthier residents an option to improve their own welfare at much less of a cost to the other city residents than the wealthy segments seceding. The HOA option would therefore be working as a safety valve to relieve some of the pressure from the inequality and allow the cities to stay whole.[3]

Given that many city secession attempts fail anyway, one might not see this as much of a benefit. We disagree. Ahn, Isaac, and Salmon (2008) and Ahn et al. (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 potentially a benefit even if they would not be able to leave after attempting it.

Our goal is to examine how the option to pursue an HOA-like option might affect the preferences of wealthier individuals regarding exiting from a group. Questions regarding how preferences change with and without an HOA-like option would be difficult to answer with field data on secession attempts and failures. The primary difficulty is that attempted secessions are rare, and successful ones rarer still. Given the number of confounds in any field data, this would make it impossible to draw out inference on these issues. Consequently, we will be conducting a set of lab experiments to explore these questions. Lab experiments provide a near ideal environment to questions regarding how preferences are formed and how contextual elements shift them. We believe that our approach to addressing this set of questions will yield useful insight on these fundamental issues.

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 initial 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 their exit causes 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 subsequent 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 themselves 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 also 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. 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 desire to exit.

We then add a treatment that involves a coordination cost among those trying to exit to mimic the substantial costs of attempting a succession campaign and failing. Finally, we explore a treatment where the wealthy residents leaving imposes no externality on those that remain. These treatments will help us identify some of the key issues driving our observed preferences regarding city secession.

A background point to this study is the need to understand why wealthy individuals may choose to remain in a city even if secession would improve their welfare. In the field, there are many possible

[2] Though even in this case, popular press demonstrates that within the new proposed city, residents were concerned about the impact of secession on Stockbridge. A financial project manager criticized the secession process by saying, “What would have happened to those 18,000 residents left over in Stockbridge?...ultimately, it could have resulted in the city of Stockbridge going insolvent.” Jarvie (2018).

[3] 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.

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. In an appendix we will provide two different models of social preferences, norm compliance and inequity aversion, which can produce this behavior. We provide both because while both can explain wealthy individuals not exiting, they predict very different patterns of behavior, both of which we observe in the data. Failing to examine both types of preferences reasonable individuals might have would lead to our being unable to explain substantial portions of our data. The hypotheses we examine in the data will largely be derived from these models.

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 as hypothesized. 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/remain choices, the coordination problem crowds out much of those concerns. This finding is important regarding how one might explain decisions of individuals to not secede in the field. One might be tempted to think that such behavior is primarily due to some form of other regarding preferences. We find that such an explanation is possible, but not necessary.

The paper proceeds as follows. Section 2 outlines the experiment, and Section 3 brie y describes the theoretical framework and hypotheses to be tested. Section 4.1 provides the results and the analysis. Section 5 concludes.

2 Experiment Design

We construct groups of subjects to form virtual cities. Each virtual city comprises 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, we divide the groups into 3 Type A (wealthy) citizens and 3 Type B (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.[4] At the end of the experiment, ECUs are converted to US dollars at the rate of 1 ECU = $0.35.

1.1. 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 and to make sure they have a clear understanding of the payoffs. 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%–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 Fig. 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 residents as the wealthier are subsidizing the public goods. Next, we 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-o✓ their own welfare for the B's, and it allows us to examine how demanding the B's are for that trade-o✓. 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.

1.2. Phase 2

Prior to phase 1, subjects are given complete instructions about phase 1, and are told that there would be a phase 2 with instructions given 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 explain three different treatments that we conducted that vary aspects of the exit decisions. Each session sees only one of these three treatments.

1.2.1. Free Exit treatment

We refer to the first treatment as our Free Exit treatment. In every round of phase 2, each B votes for a tax rate, just as in phase 1. However, each A will only choose whether or not to exit from the group. Specifically, for each tax rate between 10% and 65% (at 5% point intervals), A's are asked whether they prefer to remain in the 6 person group or exit to a group of only A's. A's do not vote on taxes, in part, to decrease the complexity of the experiment. We wanted them to vote on taxes in phase 1 to make sure they clearly understood the impact from different tax rates. In phase 2, having them vote on taxes was not essential to our research questions and posed an additional complication; we wanted them to focus on their exit decisions.

To resolve the payoffs, the random dictator mechanism is again used to select one of the three B players votes as the implemented tax rate. Then the exit choices by the A types at that tax rate are considered, and another random dictator mechanism is implemented to choose one of those votes of the A players to determine the exit outcome. These random dictator mechanisms again insure that subjects have a dominant strategy to report their true preference. 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.

[4] Random assignment of types could be concerning as there is some prior evidence suggesting that people who earn their positions in an experiment behave differently than those who have been put in those positions through other mechanisms, see for example Ku and Salmon (2013) and Hoffman et al. (1994). While this is true, our interest is in how treatments affect preferences, not at the levels of those preferences themselves. It is certainly possible that differential means of assigning the groups could change the base preferences but the treatment effects should still be the same.

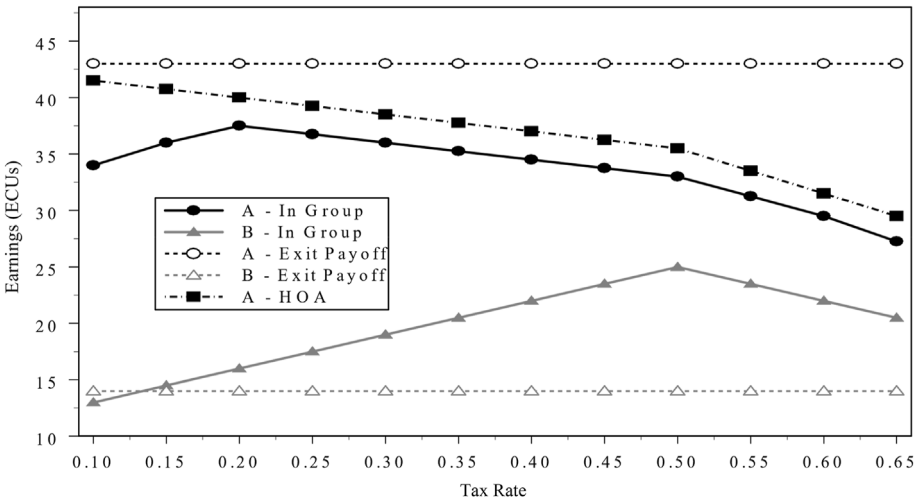

Fig. 1. Payoff functions for A and B types by tax rate and group outcome.

If Type A's choose to stay in the group, everyone's payoffs are determined using the same payoff function as phase 1 at the tax rate selected by the B's. If A's exit, then each type would receive a fixed payoff not dependent on the tax rate. One example of these exit payoffs is represented by the dashed lines in Fig. 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.

We take the subjects through four rounds of this interaction in which we vary the exit payoffs slightly. Each round is an independent choice exercise in that if the A's exit in round 11, they are still faced with a new choice of whether to exit in round 12. The set of exit payoffs are {(43,14), (40,14), (43,16), (40,16)}. We will refer to these as {HighALowB, LowALowB, HighAHighB, LowAHighB}. HighALowB is represented in Fig. 1. The other three specifications just shift the horizontal lines representing the exit payoffs accordingly. The exit payoffs are varied in this way for two reasons. First, we wanted to get multiple observations of the exit decision preferences, and these small differences across rounds help to make it understandable to subjects why we are having them make the same decision repeatedly. Second, the changes make exiting more or less attractive to an A type by shifting this exit payoff between 43 and 40. The payoff they are inflicting on the B types is also varied in a similar way. This variation allows us to determine whether these small shifts in the attractiveness of the exit option and the degree to which the others are harmed impact A types exit choices. 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. Each A type 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 Fig. 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 key 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.

Since we always have the same order of HOA rounds following No HOA rounds, there is a possible concern about ordering effects driving our results. While that is possible, the ordering effect would be the field relevant one. In the field, residents of a city had the option of seceding long before HOAs came into existence. Thus it is relevant to examine how preferences shift when the HOA option is added. Our research questions do not seek to address the issue of how preferences change when they are removed, and we are not interested in the question of what preferences to form an HOA might look like if exit options were not available.

Also, one key element of Phase 2 is that unlike in Phase 1, subjects are not told the results of a round immediately following the conclusion of the round. Thus, after each round 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. This choice also limits the possibility of ordering effects as choices in later rounds cannot be dependent on results from earlier rounds.[5]

Varying the existence of the HOA option like this is known as a within subject treatment test: subjects experience both treatments. The alternative design would have involved a between subject design, where some subjects experience the HOA option and some not. We chose the within subject test for several reasons. First, we wanted to make certain subjects fully understood the consequences of exiting versus not prior to experiencing the HOA alternative. Second, observing an individual shift their preferences is a more efficient way to examine the treatment effect rather than examining whether a population makes different choices on average. As we noted, while our choice does allow for the possibility of an ordering effect, our experiment was constructed to minimize any such effects.

[5] Of course since phase 1 outcomes are observed before phase 2 the actual tax levels chosen in phase 1 could affect behavior in phase 2. We control for this in our regression analysis.

1.2.2. Costly Exit treatment

In the above 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 treatment. Now the exit decision requires coordination: 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 set up the HOA or remain in the full group with no HOA is determined by choosing randomly from 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. This was represented for the subjects on their screens by showing them an additional line (or lines) on the equivalent of Fig. 1 which was the payoff for remaining in the city (and possibly HOA) shifted down by 4 ECUs.[6] This additional cost for exiting represents the existence of a cost differential between secession and setting up an HOA. Certainly setting up an HOA has costs as well, but the political campaign to successfully secede is assuredly more costly as it involves at least a city wide campaign while the HOA only involves the individuals affected by the HOA. What we are therefore trying to represent with the cost of trying and failing to secede is that this act is more costly than trying and failing to setup an HOA.

In the Costly Exit 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 Free Exit treatment due to the coordination element. Also, the decision to conduct these 8 rounds with no feedback might be more problematic here due to the coordination problem as our design eliminates any ability for the A's to learn to coordinate. Again, though, our concern is not to determine when or how groups could solve that problem. Our interest is whether the addition of the HOA alternative changes the likelihood of individuals to want to secede.

1.2.3. Costly Exit No Externality treatment

Our final treatment will be called Costly Exit No Externality. This treatment will be the same as the Costly Exit 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 No Externality treatment the B types are not pushed to those lower exit payoffs. Rather they simply retain the same payoff structure as if the A's remained in the group. This is represented on the equivalent figure of Fig. 1 by removing the exit payoffs for B leaving only the one line representing the payoffs to the B's in all cases. Thus, while B types can impact the A's payoffs by choosing a tax level, 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, due to an interest in understanding the degree to which choices in the Costly Exit treatment are due to a concern for the welfare of the B's versus difficulties coordinating on exit decisions. In this treatment, A's can exit freely with no concern for the B players so the only reason not to exit is the concern about whether the other A players will make the same choice. In the previous treatment, both motivations could have been present so comparing the results between the two can indicate which motivation may have driven behavior in the Costly Exit treatment.

[6] Examples of these and all other screens can be found in the experiment instructions which are included as an appendix.

We have conducted four sessions of each treatment 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 at the rate of 1 ECU = $0.35, 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.

2. Hypotheses

The main questions that we wish to examine are (1) whether the HOA option diminishes the desire of the wealthy to exit from the full group; and (2) 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. According to classical preferences in our setting, if the poor believe the rich will simply maximize their own utility, they will assume the wealthy would always prefer to exit whether the HOA option is available or not. Given that, poor residents should not pull back their tax demands to keep the wealthy in. We choose this stark environment to make it difficult to observe any choices to remain in the city.

On the other hand, we expect to observe some individuals choosing to remain in, and it is important to understand why some wealthy individuals might choose to stay against their self-interest. The obvious candidate explanation involves individuals possessing some form of social preferences in which they value the welfare of others to some degree. Standard models of social preferences are capable of explaining such a choice, but two popular versions of these preferences yield starkly different predictions regarding which tax rates wealthy individuals might choose to remain in for. A detailed examination of these models is contained in Appendix A for the paper. Here we will briefly sketch the main predictions these models make.

2.1. Phase 1

In phase 1, both types are voting on tax rates. Fig. 1 makes it clear that purely self-interested A's will vote for a 20% tax while self-interested B's would vote for a 50% tax. People may, of course, possess some sort of social preferences. If an A type possesses preferences that are consistent with a model of inequity aversion, Fehr and Schmidt (1999), or if they simply value total efficiency, they will vote for either a 20% tax rate or 50% tax rate depending on the strength of their social preferences. They should not vote for intermediate tax rates. A B type with these preferences would still vote for 50% because this is the socially efficient rate and the one that minimizes inequity as well as being in their own self-interest.

An alternative to inequity aversion is that individuals possess preferences consistent with a norm compliance model, Andreoni and Bernheim (2009), or that exhibit warm glow utility from complying with some norm, Andreoni (1990). These models are equivalent in this environment and produce a range of possible votes. For type A's, they could vote for any tax rate on the range 20%–50%. Their vote depends on what they view as the norm for a tax rate and the strength of their preference. The stronger is their preference for norm compliance and the higher they

Table 1
Number of sessions and subjects per treatment.

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

Table 2
Phase 1 vote predictions.

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

perceive the norm to be, generally the higher they will vote. For B's possessing this type of preference, if they perceive the norm tax to be less than 50% then they would vote for a rate less than 50%, depending on their degree of utility from norm compliance. These predictions are summarized in Table 2.

2.2. Phase 2

In phase 2, behavior involves tax votes by the B's and exit/remain choices by the A's. For the A's, if they are purely self-interested, then for the Free Exit treatment, they should always choose exit regardless of whether the HOA is an option or not. For the treatments with the coordination element, the payoff maximizing equilibrium for the A's is exit at all tax rates again with and without the HOA but, technically, there are equilibria in which all A's choose to exit at some tax rates but not others.[7]

If we assume that A's have some form of social preferences, then they may choose to remain in with the B's at tax rates above 20%. If they have preferences that match with a norm compliance model, then they will be most likely to remain in at tax rates close to 20% and begin exiting the group at some rate above 20%, depending on the strength of their preferences to comply with a norm to do the right thing and support the B's.

Alternatively, individuals with inequality-averse preferences would be mostly likely to stay in with the B's at a 50% tax rate, as that minimizes inequality. They will be less likely to stay as the tax rate falls below 50%. This is a very counterintuitive prediction, but it is due to the fact that remaining in the city at, say, a 25% rate does not address inequality much, but it requires a great cost to an A.

Both norm compliance and inequality aversion preferences thus predict that A's with strong enough social preferences will choose to remain in with the B's at tax rates above 20% and that, given a fixed level of such preferences, they will remain in with the B's for more tax rates when the HOA option is available. However, the norm compliance model essentially predicts that most would remain at 20% with fewer remaining as taxes increase, while the inequality aversion model predicts the opposite pattern: A's exit at 20% but being more likely to remain in as taxes increase.

In the Costly Exit treatment, there is an additional competing explanation for why A's might be choosing not to exit. Besides the existence of other-regarding preferences, there is the difficulty of coordinating. Coordination costs make it less attractive to try to exit in cases where the gain from exiting is not as large. Thus, rational A's may choose to remain in the city even with no social preferences because remaining is optimal if they believe any other A's will remain. To identify which motive is dominant, we added in the Costly Exit No Externality treatment. Because A's exit confers no externality on any B's payoffs in that treatment, the only reason to remain in the group is the coordination costs making the exit option more risky.

Finally, given the expected behavior of the A players, the B players may well decide to change their votes for tax rates compared with phase 1. If they believe that there will be some A's who will remain in the city if tax rates are low enough, B players have the incentive to choose tax rates less than 50% in phase 2. Further, if B players believe that the A's are more willing to remain in the city for higher tax rates under the HOA option, this could lead to voting for higher tax rates when the HOA option is available than when it is not. This requires quite subtle thinking on the part of the B players, and so it is unclear whether this behavior will emerge.

With this background in mind, we state our research hypotheses. We state them in the order that we will investigate them in the data. The support for each is contained in the discussion above and with further details in the Appendix. Our first hypothesis is 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.

Whether this hypothesis is true or not is the central question for this study. According to standard preferences, the HOA should have no effect in any of our treatments. As argued above, if individuals possess various forms of social preferences, the HOA option might have an impact in the Free Exit treatment. Either social preferences or the concern about others possessing such preferences combined with a coordination problem could drive an effect in the Costly Exit treatment. In the Costly Exit No Externality treatment, it is not clear whether the HOA should have an impact. Thus it is possible that if the HOA option does impact preferences, it may do so differentially in each of our treatments. This leads to our next two hypotheses.

Hypothesis 2. (Coordination Problem) There should be fewer exit decisions in the Costly Exit treatment than the Free Exit treatment.

Hypothesis 3. (Externality) There should be fewer exit decisions in the Costly Exit treatment than the Costly Exit No Externality treatment.

Hypothesis 2 is predicated on the possibility that adding a coordination problem onto the Free Exit treatment should be expected to make exiting more difficult, and thus individuals may prefer to exit at fewer tax rates. Hypothesis 3 is based on the idea that there are two possible explanations for exit decisions in the Costly Exit treatment, i.e. concern for others and coordination problems. The Costly Exit No Externality treatment eliminates the concern for others; if this motivation were driving the choices in the Costly Exit treatment, then we would expect more exits in the Costly Exit No Externality treatment.

We now turn to the hypotheses concerning voting behavior.

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

This hypothesis is stated assuming purely self-interested preferences. While we do not actually expect these preferences, we state it in this manner because (1) we do not have point predictions for votes assuming social preferences, and (2) it allows us to test for the existence of these social preferences by determining how behavior differs from these benchmark predictions.

The last two hypotheses concern Type B players voting behavior in phase 2 when the A players could choose to exit conditional on implemented tax rates and when they also have an option to form an HOA.

Hypothesis 5. (Strategic Voting) Type B players will vote for lower tax rates in phase 2 than phase 1 in the Free Exit and Costly Exit treatments. There should be no difference in the Costly Exit No Externality treatment.

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 Free Exit and Costly Exit treatments. We should observe no such difference in the Costly Exit No Externality treatment.

Rational B players should understand that in phase 2, they need to vote for tax rates that keep the A players in the group, at least in the Free Exit and Costly Exit treatments. They may well expect that imposing lower taxes on the A's should make it more likely for them to remain in. Given that the A's are making their exit choices contingent on whatever

[7] The variety of the equilibria exists due to the fact 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 collectively making different choices at different tax rates; they need only be coordinated at each tax rate and so long as they are perfectly coordinated, it is an equilibrium.

Table 3
Number of tax rates as which Type A subjects in Phase 2 chose to Remain in the Full Group, setup an HOA versus Exit from the full group.

		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
Costly Exit No Externality	No HOA	4.68	–	7.32	96
	HOA	2.65	3.70	5.66	96

tax rate the B's might choose, the B's should do this even if the A's do not know what tax rates the B's are actually choosing. All that is required for this behavior to be in the B's best interest is if in fact A players are on average more willing to remain in the city at tax rates lower than the ideal preferences of the B's. If the B's expect this, then they should exploit that behavior by voting for lower rates. In the No Externality treatment, the exit decision of the A's holds no consequences for the B players, and so there is no reason for their voting behavior to shift between phase 1 and 2. If Hypothesis 1 turns out to be valid and the HOA option leads to the A's being more willing to remain in the group at higher tax levels, *and* B players expect this, then this may lead to them voting for higher tax rates when the HOA is available than when it is not.[8]

3. Results

3.1. Tests of main hypotheses

We present our results in the order of our hypotheses. First, we investigate the exit decisions of the A players in phase 2. The core research question motivating our study is whether or not the existence of the option to form an HOA leads advantaged individuals to prefer to remain in the heterogeneous city even at higher tax rates. Table 3 provides summary statistics on the number of exit decisions made by the A subjects. We separate the data into the No HOA and HOA segments of that phase. In each period of Phase 2, A's were asked to make their contingent exit choices at twelve different possible tax rates. Table 3 shows that in the Free Exit treatment, we see that in the No HOA segment, A's choose to exit around 9 of those tax rates and remain for only 3 of them. When the HOA option is available, on average the A's choose to exit at around 7.28 tax rates, while they select the HOA at 3.31 rates. This sums to 10.6, so on average, only 1.4 tax rates cause A's to stay and not form the HOA.

As discussed in the Appendix, we can examine the basic incentives for the A players from Fig. 1 and observe that for any tax that might induce indifference between exiting and remaining in the group without an HOA, the tax rate 15% points higher will yield approximately the same trade-off for the A player when the HOA is an option. If one posits very simplistic preferences by the A's, this suggests the HOA option should be able to induce subjects to stay in for 2–3 more tax increments than without. We observe them staying for approximately 2 more.

Table 4 contains a set of regressions with standard errors clustered on individual subjects to allow formal testing of our first hypothesis for all data simultaneously and then separately by treatment. The dependent variable is the number of exit choices by an A subject in a period.[9] We are including only the exit decisions at tax rates at and above 20% because at tax rates below 20%, higher taxes are better for both the A and B subjects. This leaves us with choices over 10 tax rates per period. We begin with a pooled OLS regression across all treatments in Column 1.[10] Independent variables include an indicator variable for whether the HOA option is present, treatment variables, and indicator variables corresponding to the configuration of exit payoffs (HighALowB, LowALowB and LowALowB, leaving HighAHighB as the omitted case). As a control for phase 1 behavior, we include two tax rate variables:

- Phase1TaxVote, the average tax rate the subject *voted for* in phase 1. This is a general indicator of their type, as generally A's who vote for higher tax rates might also be more likely to remain in the full group. Also, including this variable helps to identify the treatment effect separated from any subject level heterogeneity which may have emerged between treatments.
- Phase1AvgBTax, the average tax rate the *B* subjects in that group voted for in phase 1. In phase 1, if B players on average submitted very high or low votes for taxes it may change the preferences the A players have regarding exiting or remaining in the city in phase 2.[11]

Table 4
Test of exit decisions. OLS and fixed-effects regressions with number of exit choices in a round as the dependent variable. Standard errors are clustered on the individual subject.

	(1)	(2)	(3)	(4)
	All Treatments	Free Exit	Costly Exit	Costly Exit No Externality
HOA	−1.103***	−0.815*	−1.352**	−1.146**
	(0.304)	(0.439)	(0.605)	(0.542)
Costly Exit	−1.247*			
	(0.706)			
Costly Exit No Externality	−1.053			
	(0.765)			
Phase1TaxVote	−0.153***			
	(0.040)			
Phase1AvgBTax	0.056			
	(0.085)			
HighALowB	−0.135	−0.037	−0.130	−0.250
	(0.194)	(0.385)	(0.315)	(0.310)
LowALowB	−0.301	0.037	−0.352	−0.625*
	(0.205)	(0.314)	(0.415)	(0.321)
LowAHighB	−0.282	−0.407	−0.222	−0.208
	(0.200)	(0.368)	(0.380)	(0.287)
Constant	8.894**	7.444***	6.417***	6.552***
	(4.153)	(0.360)	(0.359)	(0.360)
Obs. (Clusters)	624 (78)	216 (27)	216 (27)	192 (24)
Subject fixed effects?	No	Yes	Yes	Yes

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

[8] While we are quite interested in whether the B players will understand these incentives, we admit that the experiment was not designed to foster their learning about these strategic choices. A B player would have to be quite strategically sophisticated to figure these things out in our design. Had we provided feedback on outcomes between rounds in phase 2, B players might have been more likely to learn to vote strategically in this way. We made the decision to use the no feedback design because our primary interest is in the exit decisions of A's, and that design is better suited to give us inference on those issues. Thus it should be expected that our design makes it quite di' cult to observe this type of sophisticated voting by the B s.

[9] Our hypotheses are concerned with what happens to the number of exit decisions as treatments change and so the variable best suited to analyze those hypotheses is this aggregated variable. One could consider separate or perhaps linked regressions analyzing decisions made in a round for each tax rate separately, but it would make inference on these broad questions di' cult to address in so many regressions.

[10] We have conducted many alternative specifications to verify the robustness of our finding. For instance, we considered the Tobit specification because the number of exit decisions is bounded above by 10 and below by 0. We also explored clustering at the group level with small cluster correction using a wildbootstrap technique, see Cameron et al. (2008) and Esarey and Menger (2019). All specifications yield similar results.

[11] The A players did not observe information to fully calculate this value. They may be able to infer it from the average tax rate they experienced in phase 1. We have conducted all regressions with this variable instead and the results are unchanged.

Table 5
Test of difference across treatments. OLS regressions with number of exit choices in a round as the dependent variable, clustered at the subject level.

	Free Exit & Costly Exit		Costly Exit & No Externality	
	(1)	(2)	(3)	(4)
CostlyExit	−1.267*	−0.999	−0.150	−0.047
	(0.706)	(0.737)	(0.766)	(0.824)
HOA		−0.815*		−1.146**
		(0.435)		(0.535)
HOA_Costly Exit		−0.537		−0.206
		(0.740)		(0.804)
Phase1TaxVote	−0.143***	−0.143***	−0.169***	−0.169***
	(0.050)	(0.050)	(0.044)	(0.045)
Phase1AvgBTax	0.096	0.096	0.039	0.039
	(0.091)	(0.092)	(0.102)	(0.102)
HighALowB	−0.083	−0.083	−0.186	−0.186
	(0.246)	(0.246)	(0.219)	(0.220)
LowALowB	−0.157	−0.157	−0.480*	−0.480*
	(0.259)	(0.259)	(0.264)	(0.265)
LowAHighB	−0.315	−0.315	−0.216	−0.216
	(0.262)	(0.263)	(0.240)	(0.240)
Constant	6.150	6.557	8.536*	9.109*
	(4.801)	(4.796)	(4.722)	(4.742)
Obs (Clusters)	432 (54)	432 (54)	408 (51)	408 (51)

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

In Columns 2–4, we separate the treatments and run individual fixed-effects regressions, separated by treatments. We cannot conduct column 1 with fixed effects as time-invariant covariates such as Phase 1 tax rates, and the treatment variables drop out.

In all four columns, we test Hypothesis 1 by focusing on the variable HOA; we find its coefficient to be negative and significant to varying degrees in all specifications. This leads to our first main result.

Result 1. (HOA) Overall, A subjects choose to exit at statistically significantly fewer tax rates when the HOA option is available than when it is not. This effect is only marginally significant in the Free Exit treatment.

Our next two hypotheses concern differences across treatments. While one could build indicative tests for these hypotheses off coefficient comparisons from Table 4, we have constructed Table 5 to test Hypotheses 2 and 3 more directly. The first two columns consider only data from the Costly Exit and Free Exit treatments while the last two columns consider only data from the Costly Exit and Costly Exit No Externality treatments. We find these two results.

Result 2. *(Coordination Problem) There are marginally significantly fewer exit decisions in the Costly Exit treatment than the Free Exit treatment.*

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

Hypothesis 2 suggests that the introduction of the coordination element in the Costly Exit treatment should drive down exit choices below what we find in the Free Exit treatment. Table 3 shows that there are around 2 fewer tax rates per period at which A's choose to exit in the Costly Exit treatment compared to the Free Exit treatment. Column 1 of Table 5 shows that this difference is marginally significant, while Column 2 demonstrates that this decrease is largely due to a greater decrease under the Costly Exit treatment when the HOA is present than when it is not.

Hypothesis 3 concerned the difference between the Costly Exit and Costly Exit No Externality treatments. In the Costly Exit treatment, A subjects may be choosing not to exit due to either some concern for the well-being of the B's or due to concern over the coordination element. The No Externality treatment removes the potential concern for the B's by making their payoff to the B's independent on the exit decision for the A's.

Table 6
Average tax votes by type and experiment segment.

		Phase 1	Phase 2	
		1–10	11–14	15–18
			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
Costly Exit No Externality	Type A	25.98	–	–
	Type B	45.85	44.22	42.76

Any difference in exit decisions between these two treatments should indicate the degree to which social preferences were driving the exit decisions in the Costly Exit treatment. The summary statistics in Table 3 show that the number of exit decisions in both treatments are approximately the same, and Columns 3 and 4 of Table 5 indicate a clear lack of statistical significance in the number of exit decisions between these two treatments. This suggests that the main driver of A's failing to exit in the Costly Exit treatment was their concern about the coordination costs rather than concern over the well-being of the B's.

While we did not state formal hypotheses concerning how 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. Tables 4 and 5 do not show strong or robust responses to these changes in exit payoffs, and so we have chosen to save space and not comment much about these results. The two Phase 1 vote controls suggest two contrasting stories. An A's own average Phase 1 vote is related to their number of exit decisions in Phase 2; we discuss this further in the next section. On the other hand, there is no evidence that A's base their exit decisions on their perception of how B's voted in Phase 1.[12]

We next examine the voting behavior regarding tax rates. Table 6 shows the average votes by type in different segments of the three treatments. Fig. 2 shows the information round by round. As noted before, the baseline prediction is that Type A votes should be at 20%; the average is around 25% in all treatments. There should be no treatment differences in these votes as all the treatments are identical in Phase 1. The Type B votes should be at 50% in phase 1 and, again, with no differences between treatments. The average B vote is at 48% for the Free Exit and Costly Exit treatments but down to 46% for the Costly Exit No Externality treatment. Hypothesis 5 suggests that B votes should decrease in phase 2, and there does seem to be a modest decline between phases 1 and 2.

Fig. 2 demonstrates that for all three treatments, the Type A votes overlap almost perfectly. For the Type B's, the votes in the Costly Exit No Externality treatment may have been slightly below the other two. There also looks to be a small shift down between Phase 1 and Phase 2. From these summary statistics, 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. In addition to the average votes over time it will also be useful to understand the distribution of votes by players, and we provide density plots in Fig. 3 of A and B players for phase 1 and then only B for phase 2. In this Figure, we do not separate out by treatment as our interest here is in overall voting patterns, not how they differ by treatment. While there are definitely spikes of voting behavior at 20% and 50%, the self-interested predictions for A's and B's respectively, there are votes from both types over most of the range of possible votes. For the B

[12] This result is perhaps expected as the A's did not know this value. They could have inferred relative values of it from the average observed tax rate though and it could have therefore impacted the beliefs A's had about the behavior of the B's in their group.

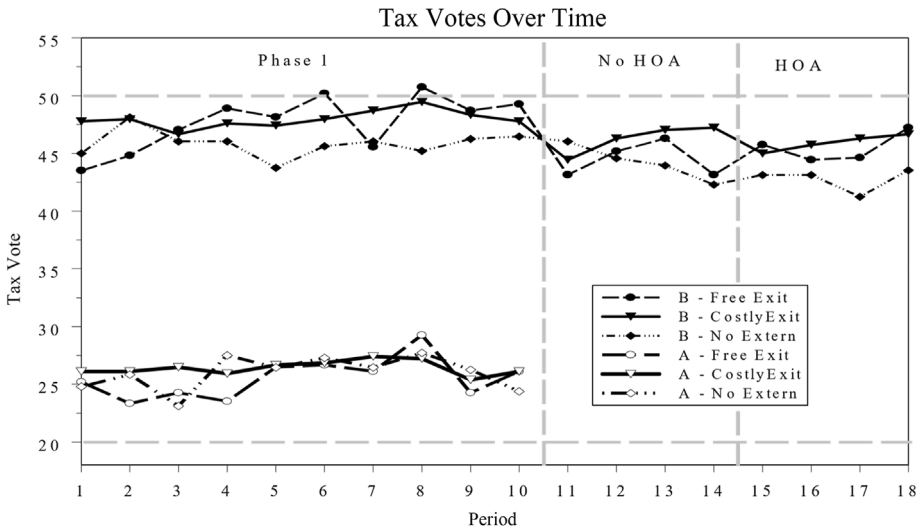

Fig. 2. Tax votes over time by type.

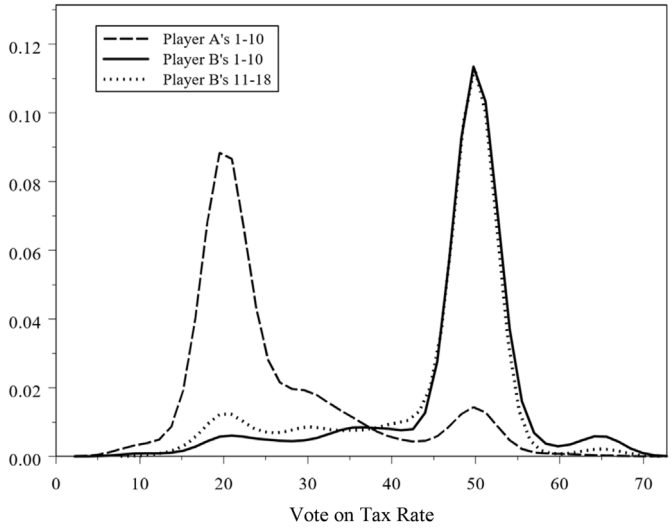

Fig. 3. Density plots of votes by A and B players in phase 1 and then B players in phase2.

players, we see the voting distributions for phases 1 and 2 exhibit substantial overlap except for a bump up in votes for taxes near 20% in phase 2.

Table 7 provides regressions to allow formal tests of our hypotheses regarding voting behavior. The regressions are OLS regressions with standard errors clustered at the subject level. The dependent variable is the tax rate vote of Type A's in phase 1. The first column looks at the votes of Type A's over all ten rounds of phase 1. The second column focuses on the second half of Phase 1, where subjects may have a clearer understanding of the situation. We first note that there should be no differences in behavior due to treatments (as phase 1 is identical across all treatments); indeed, no treatment variables are significant. In both columns, the constant was found to significantly different from 20, indicating A's vote for a slightly higher tax than what self-interest predicts.

Table 8 contains OLS and fixed 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.[13] These regressions include both phase 1 and phase 2 data since B's vote in both. Columns 1 to 4 separate

[13] Models with individual fixed effects yielded qualitatively similar results.

Table 7
Test for differences across periods. OLS regression of tax votes by Type A's in Phase 1, clustered at the subject level.

	Periods 1-10	Periods 6-10
	(1)	(2)
Costly Exit	0.907	0.111
	(2.100)	(2.400)
No Externality	0.461	−0.065
	(2.356)	(2.679)
Constant	25.519†††	26.481†††
	(1.548)	(1.818)
Obs (Clusters)	780 (78)	390 (78)

Robust standard errors in parentheses.
***p < 0.01, **p < 0.05, *p < 0.1.
Daggers indicate significance of test of difference of Constant from 20.

phase 1 from phase 2, while Columns 5 to 8 further divide Phase 2 into the HOA and No HOA segments. We find that the votes by the B's in phase 1 are generally significantly different from 50, though the actual difference is small. This 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.*

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. Hypotheses 5 and 6 explain the predicted strategic responses of the B voters but generally one might expect B's to vote for lower taxes in phase 2 than phase 1 in an attempt to keep the A's in the city, except in the No Externality treatment.

To test Hypothesis 5, we refer to Columns 1–4 of Table 8. The coefficients on Phase 2 suggest a very modest reduction in overall votes between phases 1 and 2. The result is strongly significant with all treatments pooled, but insignificant for the separate treatments. These findings are summarized in our next result.

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.*

Finally, to test Hypothesis 6, we refer to Columns 5–8 of Table 8. These columns allow us to look at the more nuanced hypotheses about

Table 8
Tests of Type B behavior. OLS and fixed-effects regressions of votes of B types in Phases 1 and 2. Standard errors are clustered at the individual level.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	All Data	Free Exit	Costly Exit	CE-No Ext	All Data	Free Exit	Costly Exit	CE-No Ext
Phase 2	−2.314***	−2.708	−1.875	−2.365				
	(0.821)	(1.592)	(1.223)	(1.479)				
NoHOA					−2.218***	−3.241*	−1.713	−1.635
					(0.839)	(1.752)	(1.238)	(1.321)
HOA					−2.410**	−2.176	−2.037	−3.094
					(0.927)	(1.584)	(1.465)	(1.846)
Costly Exit	0.648				0.648			
	(1.405)				(1.405)			
No Extern	−1.678				−1.678			
	(1.703)				(1.704)			
Constant	47.510†††	47.685†††	47.963†††	45.854†††	47.510†††	47.685†††	47.963†††	45.854†††
	(0.887)	(0.708)	(0.543)	(0.657)	(0.888)	(0.709)	(0.544)	(0.658)
Obs (Clusters)	1404 (78)	486 (27)	486 (27)	432 (27)	1404 (27)	486 (27)	486 (27)	432 (27)
Subject FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Robust standard errors in parentheses								
***p < 0.01, **p < 0.05, *p < 0.1								
Daggers indicate signficanceof test of difference of Constant from 20.								
P-value, NoHOA different from HOA					0.770	0.296	0.783	0.251

how votes might shift between the HOA and No HOA segments. Since we already found that most exit decisions are in the No HOA segment of the Free Exit treatment, if this is anticipated by the B's, then this is the segment where we should observe the most significant impact on B types voting behavior. We find in the combined data regression that the B's vote for lower taxes in the NoHOA segment compared to phase 1 and this result holds with marginal significance for the Free Exit treatment. It is insignificant for the other two. Of course we expect no significance here for the No Externality treatment. We also conducted hypothesis testing for whether the coefficients on No HOA and HOA were statistically significantly different. They are generally not different from each other.

Result 6. *(Strategic Voting 2) There is a moderately 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 not strong enough to be robust for individual treatments separately*.

The combination of these results evaluated with Fig. 3 suggest that there were some B players who understood the need for strategic voting, indicated by the rise in votes around 20% in phase 2, but there were not enough of these players to generate a statistically significant shift in average voting patterns unless all the data are pooled together.

3.2. Is behavior consistent with models of social preferences?

In the appendix we derive the predictions of two different models of social preferences showing that they lead to starkly different behavior. In this section, we will provide some analysis to determine if these models are at all useful in rationalizing the behavior of our subjects.

We can conduct an initial simple check on whether behavior is driven by social preferences by examining whether those who end up choosing to remain in the city more often voted for higher tax rates in phase 1. Any model of social preferences should predict this relationship. To examine this, in Tables 4 and 5, which examine the exit decisions of our A players, we have included in all specifications a variable for the average phase 1 tax the A subject voted for. The coefficient on this variable is negative and significant in all specifications and treatments. That suggests that people who vote for more generous taxes are also willing to remain in the city at higher tax rates as one would expect if the choices were related to any form of social preferences. We summarize this finding in Result 7.

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

We can push a bit harder on our data to see if we can determine which of our two models of social preferences is best capable of rationalizing the choice data by exploiting the divergent predictions. In phase 1, our norm compliant model suggests people may be most likely to vote for a tax near 20% while those with stronger preferences for complying with a social norm of helping the B players would vote for higher rates. Indeed Fig. 3 shows the highest spike in votes at 20% with declining mass in the 25–40% range consistent with this model. The figure also shows a spike at 50%, which might be puzzling except for the fact that this is predicted by the inequity averse model. This model predicts votes at either 20% or 50% depending on how averse an individual is to inequity. The voting data seems consistent with individuals possessing both types of preferences in the population.

To solidify that claim, we can examine the behavior in phase 2 and check for cross phase consistency. To quickly summarize the predictions for phase 2, if an A player possesses no concern for others, they should choose to always exit. If an A player possesses preferences consistent with a warm glow or norm compliance model, then they should be most likely to remain in the mixed city at a 20% tax rate and their likelihood of remaining in should decline as tax rates rise. If an A player possesses preferences consistent with inequity aversion, they should be most likely to remain in the full group at a 50% tax rate with their likelihood of remaining in dropping as the tax rate drops from 50%. This is a very unexpected pattern of behavior but is due to the fact that equity and efficiency are maximized at a 50% tax. Taxes different from that decrease both, and so at some point as the tax rate declines, the additional equality from being in the full group no longer compensates for the loss of self-interest from not exiting.

Figs. 4 and 5 show the pattern of exit decisions made by A types at each tax rate for each treatment. At each tax rate, stacked bar graphs show the percentage of A's who chose to exit as the base. The remaining mass is those who remained in the full group or split between those who remained and those who preferred to set up an HOA. The choice pattern shown in the figures is roughly consistent with the norm compliance behavior, in that remain decisions are most common near the 20% tax rate and decline at higher tax rates. This pattern is stronger when the HOA is present. While this is true overall, this aggregate view masks the heterogeneity suggested to exist in the voting data and if that heterogeneity is present it should lead to these figures looking somewhat muddled between the two models.

To uncover this heterogeneity, we have examined the choice patterns of all of our A subjects by round and labeled each set of choices by whether that set fits into one of 4 different categories. The first two choice patterns would be an individual choosing to exit at all tax rates, which is consistent with self-interest, and then an individual remaining in

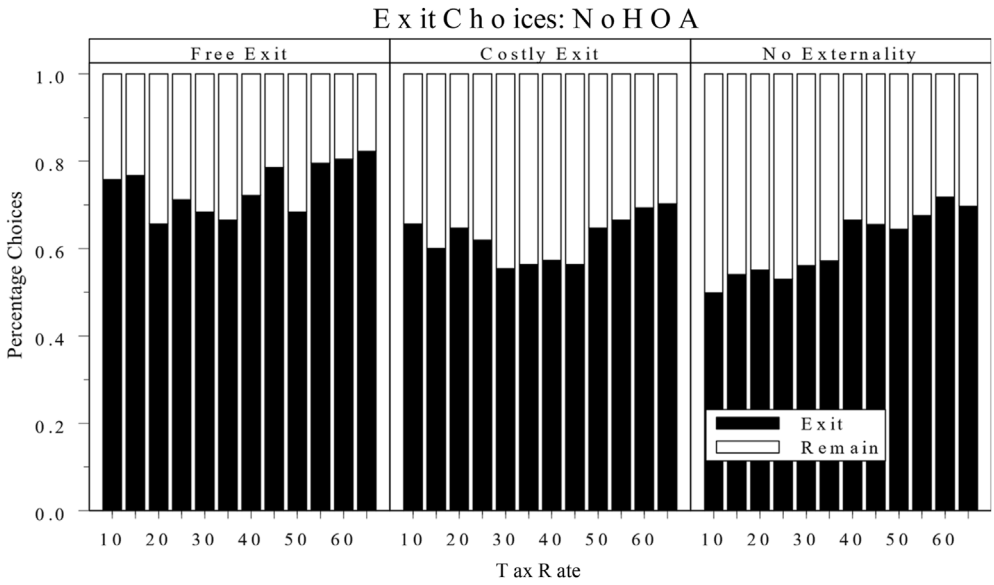

Fig. 4. Exit Decisions of A types by tax rates and treatment when there is no HOA option allowed.

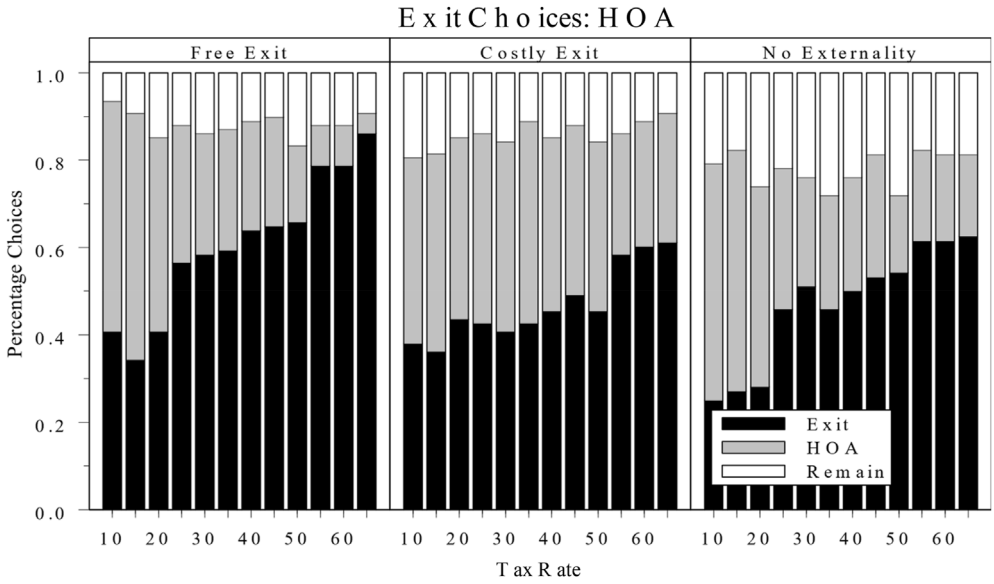

Fig. 5. Exit decisions of A types by tax round and treatment when the HOA option was allowed.

at all tax rates, consistent with very strong other-regarding behavior.

We label as Norm Compliant a choice pattern involving remaining in the full group at a tax rate of 20% and perhaps some higher tax rates, but with a choice to exit at some tax rate above 20% and continued exiting at all tax rates higher than that. We label as Inequity Averse a choice pattern involving remained in the full group at a tax rate of 50% and perhaps continued making that choice as tax rates declined towards 20%, but at some point switching to exiting the main group at some lower tax rate and continued exiting at all lower tax rates. For these two categories we are requiring the choices to perfectly follow the relevant pattern which makes the criteria quite stringent. Finally, we label as Indeterminate any pattern of behavior other than these four.

We have 78 A subjects making choices in 8 different rounds. This gives us 8*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 always exiting, and 60 (10%) involve always remaining in. That leaves 122 (20%) that could not be categorized. For our analysis, we will categorize each A player into one of these different types based on which category explains at least 4 of their 8 sets of choices.[14] We classify 20 subjects (26%) as Norm Compliant, 7 (9%) as Inequity Averse, 28 (36%) as Always Exit, 4 (5%) as Always In and 19 (24%) as Indeterminate. Table 9 breaks this down by treatment.

Given phase 1 and phase 2 behavior, we can examine them both together to determine if subjects exhibit the predictions of the two models consistently across phases. The simplest way to state a prediction

[14] 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 indeterminate. 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 indeterminate. We have labeled this person inequity averse. The other three had more complicated patterns and so have been lumped into the indeterminate group.

Table 9
Number of subjects in each treatment sorted into each behavioral type based on their exit choices.

	Free Exit	Costly Exit	Costly Exit No Externality
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 10
Average vote for Phase 1 taxes by A's sorted into each behavior type.

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

relating the two phases is that individuals classified as inequity averse should vote for higher tax rates than those who are norm compliant. We can investigate this by taking our classifications in phase 2 and examining how well they correlate with phase 1 voting behavior. Table 10 shows some simple summary statistics on the differences in average tax votes by behavioral type. The Always In types vote for the highest taxes, the Inequity Averse individuals are second with Norm Complaint and Always Out both close to 20%. To do a more formal test of these differences, we present a variation of Table 7. In Table 11, we augment the specifications examining voting behavior of A's found in Table 7 supplemented with indicators for the identified voting behavior. The baseline group are those identified as behaving consistent with the Norm Compliance model. In both specifications we see that the indicator variable for being classified as Inequity Averse is positive and significant. Those who exhibit inequity averse behavior in their exit decisions do indeed vote for higher tax rates on average, as the models predict.

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.*

It is important to caveat these last two findings and how to interpret the regressions. We are certainly not claiming a causal connection between someone s exit decisions in phase 2 driving their tax votes in phase 1 or vice versa. These regressions are instead an attempt to determine if the behavior in both phases is consistent with social preferences generally and then with the specific predictions of the underlying theoretical models. The two models of social preference predict very different behavior in *both* phases. Finding that for individual subjects their behavior is consistent with the model predictions in both phases makes it substantially more plausible that the behavior is actually driven by considerations present in the related model.

The implication from these results is that we do find consistency in the behavior between phases, suggesting each of the models of social preferences can help to rationalize the behavior of different subsets 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 despite the fact that the behavior predicted by the inequity aversion model is quite counterintuitive.

4. 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.

Table 11
Test of Social Preferences in A Votes. OLS regressions of tax votes by Type A's in Phase 1, clustered at the subject level.

	Periods 1-10	Periods 6-10
	(1)	(2)
Costly Exit	−1.580	−3.141
	(1.870)	(2.066)
No Externality	−1.126	−2.021
	(1.933)	(2.131)
Inequity 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	24.643†††	25.300†††
	(1.671)	(1.846)
Obs (Clusters)	780 (78)	390 (78)

Robust standard errors in parentheses.
***p < 0.01, **p < 0.05, *p < 0.1.
Daggers indicate signficanceof test of difference of Constant from 20.

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 o✓ 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 et al. (2008) and Ahn et al. (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. Our goal in pursuing this study was to investigate a previously unrecognized channel through which allowing HOAs might provide a benefit to the cohesion of a city rather than only serving as a wedge that drives city residents apart. Our results suggest that HOAs can serve this role of diminishing the desire of wealthy residents to exit a city while also allowing less wealthy residents to continue pushing for taxes high enough to support the citywide public goods they can avail themselves of. While these effects are important to consider in a city s deliberations regarding HOAs, it is of course only one dimension of a complex decision, and we do not suggest that these effects guarantee that HOAs have a net positive benefit to all city residents.

Appendix A

In this appendix we will explain the theoretical foundations for the hypotheses specified in the text. To do this we will develop models of inequity aversion and of norm compliance and explain the behavior each predicts in this experiment.

A.1. Phase 1

We begin with phase 1 of the experiments where both A and B types are voting on tax rates. Based on Fig. 1, it is very clear 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.[15] This leads to a simple utility function such as

$$U^A_{IE}(x_A, x_B) = x_A - \beta(x_A - x_B).$$

As noted, in the range of taxes between 20% and 50%, for every 1.5 ECU drop in x_A, x_B rises by 3 ECUs. This means that if $\beta > \frac{1}{3}$, then $\frac{\partial U^A}{\partial t} > 0$ in that range. Consequently, an A type who possesses an inequity averse utility function with a $\beta > \frac{1}{3}$ 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.[16]

It is important to note that not all models of social preference yield the same predicted behavior. As there is no general consensus in the literature regarding a single form of such preferences it is important to note how behavior might be different depending on what form of social preference individuals possess. For example, instead of inequity averse preferences one might propose 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

$$U^A_{NC} = x_A(t|t_A) - \gamma|t_A - \bar{t}|$$

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.[17] 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 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 were 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.

[15] 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'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.

[16] 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%.

[17] 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 its convenience in making these incentives clear.

The predictions for A and B types under these three specifications can be found in Table 2.

A.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. Fig. 1 again makes the default prediction of the exit decisions obvious, as the payoff functions were constructed so that in the range of 20%–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. The Pareto dominant equilibrium from the perspective of just the A's 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.

Of course the premise of the paper is based on the notion that we expect to see some A's choosing not to exit despite the fact that this choice is dominated by exiting. Such an expectation requires a theoretical justification and we can examine the two models of social preferences we discussed above to see what they predict about this choice. As we noted above, it turns out that these models predict very different behavior and so we present both to demonstrate this point. This is necessary to try to determine what predictions can be made in common by both types of preferences as well as to help rationalize choice data we will see from our subjects as without this analysis some of the choices we observe in the experiment would seem quite problematic.

For the Free Exit treatment, if an A player possesses preferences similar to a norm compliance model, then they 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

$$U^A_{NC} = \begin{cases} x_A(Exit), \ if\ Exit \\ x_A(t) + \delta, \ if\ Not\ Exit \end{cases}$$

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.[18] 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 $\hat{t} > 20\%$ at which this is no longer true.

At that rate and for any $t \geq \hat{t}$, 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 $\hat{t}$. In fact, examining Fig. 1 shows that for any $\bar{t}$ 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

$$U^A_{IE} = \begin{cases} x_A(Exit) - \beta(x_A(Exit) - x_B(Exit)), \ if\ Exit \\ x_A(t) - \beta(x_A(t) - x_B(t)), \ if Not\ Exit \end{cases}$$

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 does not 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 would expect to see fewer exits when the HOA is present than when it is not.[19]

[18] 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.

[19] 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.

The key point is that these two (perhaps somewhat similar seeming) models of other regarding preferences predict almost exactly inverse patterns of behavior. The norm compliance model predicts A's being most likely to remain in the full group at taxes close to 20% and be less likely as the tax rate rises to 50% while the model of inequity averse preference predicts the exact opposite pattern. Thus while both can explain an A type voting to remain in the group, the mechanisms behind that and at which tax rates they might do so are completely different. We take no *a priori* stance on which model is most likely to describe subject behavior but having both understood will better allow us to understand either pattern of behavior we might see from subjects.

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 strategic considerations into account. Even if we assume a population purely of self-interested individuals, the need for coordination means it is no longer the case that all A's would necessarily choose to exit. 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 heterogeneous 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 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 the 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 Free Exit as there is no belief a self-interested could have in the Free Exit 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 Costly Exit treatment are due to social preferences and/or beliefs about them versus the coordination problem itself, we introduce the Costly Exit 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 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.[20]

While all A's would prefer to exit in the Costly Exit 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 have 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 the A behavior explained, we can now explain how the B's might vote in Phase 2. The most important point here is that it is no longer the case that a purely self-interested B's should necessarily vote for a 50% tax rate. The vote of a B player depends on their expectation of what tax rates they expect the A's to remain in the group. Generally, a B player should only vote for a 50% tax rate if they believe that the A population consists mostly of people whose preferences satisfy the inequity aversion model and would therefore remain in the group at a tax of 50%. Otherwise, they should vote for the highest tax rate at which they believe the A's would likely remain. This is because if they vote for a tax rate that induces the A's to exit, then this would be a worse outcome for the B's than voting for a lesser tax rate which induces the A's to remain.

As the beliefs on the part of the B players are unknown, we cannot make a point prediction about their vote but any B player who understands their impact on the exit decisions of the A players should be expected to vote lower when the exit option is available to the A's. Given the prior predictions of the A's behavior being that they might remain in the group for higher tax rates when the HOA option is available, B players who understand that might vote for higher tax rates when the HOA option is available than when it is not under the expectation that A's will stay in the group at those higher tax rates. Of course even under the HOA option condition, the tax votes of the B's should still be lower than when A's are not allowed to exit. These predictions are complicated if a B player possesses norm compliance preferences and, even under the no exit condition, would vote for a tax rate lower than 50%. Whether these individuals drop their votes or not when exit is allowed depends on whether their initial vote is above the level they expect is needed to induce A's to remain in the group or not.

[20] 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 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 No Externality treatment is due to the coordination problem. The presence of the HOA does not appreciably change these predictions.

References

Ahn, T., Isaac, R.M., Salmon, T.C., 2008. Endogenous group formation. J. Publ. Econ. Theor. 10 (1), 171–194.

Ahn, T., Isaac, R.M., Salmon, T.C., 2009. Coming and going: experiments on endogenous group sizes for excludable public goods. J. Publ. Econ. 93 (12), 336–351.

Andreoni, J., 1990. June). Impure altruism and donations to public goods: a theory of warm-glow giving. Econ. J. 100 (401), 464–477.

Andreoni, J., Bernheim, B.D., 2009. Social image and the 50-50 norm: a theoretical and experimental analysis of audience effects. Econometrica 77 (5), 1607–1636.

Cameron, A.C., Gelbach, J.B., Miller, D.L., 2008. Bootstrap-based improvements for inference with clustered errors. Rev. Econ. Stat. 90 (3), 414–427.

Cashin, S., 2001. Privatized communities and the secession of the successful: democracy and fairness beyond the gate. Fordham Urban Law J. 28, 1675–1692.

Cheung, R., 2008. The interaction between public and private governments: an empirical analysis. J. Urban Econ. 63 (3), 885–901.

Esarey, J., Menger, A., 2019. Practical and effective approaches to dealing with clustered data. Political Science Research Methods 7 (3), 541–559.

Fehr, E., Schmidt, K.M., 1999. A theory of fairness, competition, and cooperation. Q. J. Econ. 114 (3), 817–868.

Glaeser, E., Resseger, M., Tobio, K., 2008. Urban Inequality. NBER Working Paper.

Hasselhoff, K.D., 2002. Motivations for the San Fernando Valley secession movement: the political dynamics of secession. J. Urban Aff. 24 (4), 425–443.

Hoffman, E., McCabe, K., Shachat, K., Smith, V., 1994. Preferences, property rights, and anonymity in bargaining games. Game. Econ. Behav. 7 (3), 346–380.

Hogen-Esch, T., 2001. Urban secession and the politics of growth: the case of Los Angeles. Urban Aff. Rev. 36 (6), 783–809.

Jarvie, J., 2018. Nov). After a Suburban Secession Movement Is Defeated in Georgia, a Community Takes Stock. La Times.

Ku, H., Salmon, T.C., 2013. Procedural fairness and the tolerance for income inequality. Eur. Econ. Rev. 64, 111–128.

Manzi, T., Smith-Bowers, B., 2005. Gated communities as club goods: segregation or social cohesion? Hous. Stud. 20 (2), 345–359.

Meltzer, R., Cheung, R., 2014. How are homeowners associations capitalized into housing and land values? Reg. Sci. Urban Econ. 46, 93–102.