

Group Members

For this project, I will be working alone.

Field of Interest

As Hobbes famously put it, without government, life is “nasty, brutish, and short.”¹ In game theoretical terms, Hobbes meant that without some sort of structure compelling people to cooperate, people – in pursuing their self-interest – receive lower payoffs for themselves and for the larger society. Following Hobbes, I want to explore the way that government can be structured as to incentivize cooperation *within government* in order to benefit society. Specifically, I am interested in an element of Massachusetts state politics that leads to non-optimal outcomes for society. When legislators want to pass bills that they filed, they will often attach their bill to another bill as an amendment. Often, this is a more effective way to pass a bill than for it to pass through numerous committees as a standalone bill. However, the Speaker of the House often coerces legislators to not submit amendments to bills (if they do, he can punish them by giving them inferior committee assignments, or blocking their other bills from passing), even for amendments that would likely benefit society if passed. I am interested in why this is.

Specific Question

Given an amendment to a bill that would be good for society, why does the Speaker of the House in Massachusetts block it from being filed?

List of References

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- Brams, Steven J. *Game Theory and Politics*. Courier Corporation, 2013.
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A Mathematical Approach

The relationship between the Speaker of the House and a legislator can be described by an asymmetrical two-player game. Both players receive payoffs based on the “credit” they get for

¹ Hobbes, Thomas. *Hobbes’s Leviathan*. Oxford: Clarendon Press, 1929.

passing a bill. This “credit” translates into political success: thus, the more “credit,” the more likely the player is to be re-elected, and increase their political prestige. In this game, the Speaker has two options: Allow (give the legislator permission to file an amendment) and Disallow (refuse the legislator permission to file an amendment). The legislator also has two options: File or Not File (the amendment). Thus, the legislator has the option to either cooperate with the instructions of the Speaker, or disobey.

Legislator’s Payoffs: Allow-File: ap_1 , Allow-Not File: 0, Disallow-File: $ap_1 - g$, Disallow-Not File: h .

- a = legislator payoff from passing amendment, p_1 = chance of passing bill with attached amendment, g = Speaker’s punishment for disobeying, h = Speaker’s reward for obeying
- $a > 0$, $0 < p_1 < 1$, $g > 0$, $h > 0$

Speaker’s Payoffs: Allow-File: $(1+b)p_1$, Allow-Not File: $1p_2$, Disallow-File: $(1+b)p_1 - f$, Disallow-Not File: $1p_2 + i$

- 1 = Speaker payoff for passing bill (not including amendment), b = Speaker payoff for passing amendment, f = Speaker’s loss of power due to legislator disobeying, p_2 = chance of bill passing without amendment, i = Speaker’s gain of power due to legislator obeying
- $1 > 0$, $b > 0$, $f > 0$, $0 < p_2 < 1$, $p_1 < p_2$, $i > 0$

This model assumes that if the amendment passes attached to the bill, then the Speaker and legislator will always receive a positive payoff, because we assume the amendment has popular support ($a > 0$, $b > 0$). It also assumes a political capital model of politics, whereby if political agents cooperate, they receive a positive payoff in terms of trust and future productive interactions, and inversely, if they do not work together, they lose political capital and seek revenge. Thus, the legislator receives a positive payoff for cooperating with the Speaker ($h > 0$) and a negative payoff for disobeying them ($g > 0$), and the Speaker receives a positive payoff if they are obeyed ($i > 0$) and a negative payoff if they are not ($f > 0$). The model also assumes that adding an amendment to a bill decreases the chance of that bill getting passed, as the more multifaceted a bill is, the less likely it is to get majoritarian support.

For the Speaker, File-Allow > File-Disallow, and Not File-Disallow > Not File-Allow. We don’t know if File-Allow or Not File-Disallow has a bigger payoff. For the legislator, File-Allow > Not File > Allow, but we don’t know if File-Disallow is greater than Not-File Disallow.

I hope to explore what values of the parameters allows for the legislator to choose an Always-File strategy, and the Speaker to choose an Always-Allow strategy, as these paired strategies is assumed to generate the highest social welfare in this model. I plan on initializing a complete graph of legislators, half with Always-File strategies, and half with Always-Cooperate with the Speaker strategies (File-Allow, Not File-Disallow), who in each turn play a round of the game with the Speaker. Their fitness at the end of the turn determines their fitness in a Moran process with death-birth updating (simulating incumbents losing elections). The Speaker has a memory-one strategy that plays Allow if in the last turn the legislator cooperated, and Disallow if

in the last turn the legislator defected. For both legislators and the Speaker, there is a mutation rate u for their strategies.