Athens, Rome, and the Political Economy of Ancient Assemblies

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Citizen assemblies were the core institutions of the democracies of the ancient Mediterranean world. Assemblies had the power to make laws and elect magistrates. These assemblies have been widely criticized by both ancient and modern observers for making poor decisions, but the reasons they would have done so are not well understood. This paper develops a public choice model of ancient assemblies to illuminate the challenges they faced and explain why their decisions may not have enjoyed popular support. The model assumes that policy conflicts stem from different preferences between urban and rural citizens, and that voting was more costly for rural than urban citizens because of travel costs. In this framework, ancient assemblies faced a structural challenge of preventing urban masses from dominating the much more numerous citizens in the countryside. The model provides a method to quantify the amount of policy distortion compared to perfect majority rule. I analyze different institutions that ancient democracies used to manage the representation problem, in particular, Athens' program to pay citizens for attending, and Rome's use of a unique group voting system. I show that the Roman system offers some representation advantages.

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1. Introduction

Two thousand years ago the Mediterranean world was home to many states that, to varying degrees, operated as democracies. This included small cities throughout Greece and Italy, as well as the imperial powers of Athens, Carthage, and the Roman Republic. These democracies would fall short of modern standards in many respects, especially their limited suffrage and large slave populations, but they did involve a sizeable fraction of the population in government decisions and the choice of leaders. These states – in some ways familiar but in others quite alien – increasingly attract the attention of scholars interested in the origins of democracy, the long-run performance of democratic states, and the causes of democratic failure.[1]

The primary institution through which citizens participated in ancient democracies was the citizen assembly. These assemblies have been viewed with skepticism if not disdain by writers, both modern and ancient, who have seen them as destabilizing, prone to bad decisions, and contributing to the failure of democracy. These negative views present a puzzle since, as Ober (2008) among other has argued, assemblies have certain epistemic advantages in terms of aggregating diffuse information, and the most successful modern states are democracies. What were the disadvantages that may have outweighed the apparent advantages?

The purpose of this paper is to develop a model of ancient assemblies that incorporates a core historical political conflict, apply the model to interpret important historical episodes, and investigate institutional design choices made by the ancients to mitigate the problem. I abstract away from epistemic issues, and focus on conflicts arising from fundamental differences in preferences between groups, in particular, the conflict between urban and rural interests. This conflict was a perennial challenge for ancient democracies: because assemblies met in person, and travel was costly, urban residents who lived near the meeting place were more likely to attend than their more numerous fellow citizens who lived in the sometimes distant countryside. This created what historian Simon Hornblower (2011, p. 140) describes as a common feature of the Greco-Roman world: "ancient states, being reliant on agriculture, faced a permanent struggle to prevent civic assemblies from being dominated by the urban population."

The model consists of a polity comprised of a majority of rural citizens and a minority of urban citizens, who have different preference distributions over policy. The rural citizens pay a cost to travel to the assembly. If the assembly operates under simply majority rule with an open agenda, its

[1] A partial list: Fleck and Hanssen (2006, 2013), Ober (2008), Tridimas (2011, 2015), Stasavage (2020), Jankowski (2021), Carugati and Ober (2024).

policy choices are assumed to reflect the ideal point of the median voter (Black 1958). With these assumptions, equilibrium assembly decisions are slanted toward policies favored by the urban masses, such as public provision of grain in the cities, taxes on the landowners in the countryside, and a tendency toward war, which (as explained below) often had more to offer urban than rural voters. The model can be used to quantify the distance between the policy outcome and the ideal point of the median voter, which allows statements about how well an assembly performs in terms of majority rule.

The ancients were aware of the danger of assembly domination by the urban masses. I explore potential solutions inspired by practices in classical Athens and the Roman Republic. At the start of the fourth century BC, Athens instituted pay for citizens that attended assembly meetings, a wage that was increased by a factor of nine over the subsequent 80 years until it comprised a nontrivial fraction of the state budget. Rome went down a completely different path, adopting a group-based voting system in which citizens were assigned to geographic voting districts, each of which cast its vote based on the majority view of member of the district. Theoretically, I find that Athens' approach exacerbates the problem of urban domination, and is better understood as rent-seeking capture by urban voters than as a serious attempt to solve the problem. Rome's approach, on the hand, is effective in offsetting the travel advantage of urban citizens, but creates a bias in the other direction in favor of rural citizens. It also introduced the modern problem of gerrymandering. Overall, however, the Roman system is exposed to much less potential policy bias than the Athenian system.

My goal here is both theoretical and empirical. Theoretically, by developing a formal model, I seek to bring out underlying forces that were important in the functioning of ancient assemblies. Historically, I wish to offer new perspectives into historical events, provide a lens for historical analysis, and suggest new directions for research. Because the goals are as much historical as theoretical, the paper discusses select historical episodes in some detail.

The paper is related to the literature on how democratic institutions can be used to address political economy problems. The branch of this literature related to ancient states includes papers by Fleck and Hanssen (2006, 2013) that trace the development of democracy in ancient Greece to the efficiency of assemblies in solving commitment problems associated with investment in agricultural production; Ober (2008) on the epistemic value of assemblies; and a series of papers by

Tridimas (2011, 2012, 2015, 2016) on various Athenian institutions.[2] Unlike much of this work, my analysis does not focus on efficiency, but on distributional concerns, in particular, the question of how well assemblies were able to balance competing interests and select policies that were acceptable to a majority of citizens.

The paper is particularly interested in comparing the ability of different assembly procedures to bring about majoritarian policies, and establishes bounds on how far policies can stray from majority rule. This part of the analysis is motivated by the issue of legitimacy and citizen support for democracy. Legitimacy, while widely viewed as important for democratic survival, is an elusive concept. I argue that part of legitimacy is selecting policies that benefit the citizens broadly, rather than policies that benefit only a narrow minority. Policy making that veers far from the preferences of the majority will come to be seen as captured by special interests and erode support for democratic institutions.[3] In this way, the paper connects to the literature on democratic stability and survivability.

Finally, the paper is related to the literature on direct democracy. It is conventional in direct democracy research to note that citizen lawmaking has been practiced since ancient times (Matsusaka 2020, Qvortrup 2018). Direct democracy in the ancient world, however, was quite different from direct democracy today, which usually takes the form of ballot propositions or referendums, not citizen assemblies. Studying direct democracy in assemblies provides an opportunity to probe ideas that have emerged from the study of ballot measures, and test their sensitivity to different institutional assumptions. Recently, some activists have called for a return to in-person deliberation and decision-making in the form of randomly selected citizen assemblies (Landemore 2020). Subnational jurisdictions in Canada, Ireland, and the United States, among others, have experimented with convening such assemblies to discuss important policies and make recommendations. Examination of ancient assemblies may give insight into how these modern assemblies would work if they were given actual law-making power, and the challenges that would have to be managed to ensure representative outcomes.

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[2] Although there is a substantial literature on ancient political institutions, because of the paucity of data there is little empirical research on the actual workings of ancient democracies: elections, campaigns, voting, etc. Gray and Smith (2022) is a notable exception, studying candidate electoral success in the Roman Republic.

[3] Manville and Ober (2023, p. 15) argue (p. 15) that democracy becomes "impossible" when "an organized body of citizens systematically excludes the rest of the citizens from effective participation" in making policy.

2. Historical and Institutional Background

A. Athens

Athens was an ancient city-state comprised of the city of Athens and the surrounding countryside and villages of Attica, a triangular peninsula in Greece. For much of the classical age it was the leading Greek state in terms of trade, wealth, and culture (Ober 2008). It was also the leading military power in the fifth century BC, when its reach extended across the Aegean through its quasi-imperial Delian League. Athens was a democracy with an active citizen assembly from 509 to 323 BC, with two short interruptions in 411-410 BC and 404-403 BC by oligarchic coups. Its population during the democratic period is estimated to have been in the range of 200,000 to 300,000, with one-sixth to one-third of the people living in the city of Athens and its port Piraeus.

Athenian institutions evolved over time; the summary here captures the main enduring features of its Assembly (*ekklesia*).[4] The Athenian Assembly was mainly a legislative body. It made almost all of the important political decisions: it passed all laws, determined taxes and spending, declared war and peace, and approved treaties.[5] The Assembly did not play a role in selecting the city's 1,200 or so magistrates, who were chosen by lot, with the notable exception of the 10 generals, the city's high official position. The Assembly also had the power to determine punishments for political crimes, and could impeach and exile high officials. The Assembly met frequently, with at least 40 scheduled meetings per year plus ad hoc meetings that could be added if necessary.

The Assembly had fewer procedural rules than modern legislatures. An agenda was prepared and posted a few days in advance by a rotating executive body, but proposals could be amended from the floor, and all citizens had the right to speak and make proposals. Voting was by a show of hands; the presiding official did not actually count the hands but declared a winner based on his assessment of the majority position. A quorum of 6,000 citizens was required for most business.

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[4] Hansen (1991) is an excellent resource for social scientists seeking details about Athenian institutions. Historians have been able to piece together a surprisingly detailed picture of the Athenian Assembly even though the surviving sources are fragmentary; few details are known about the democratic institutions of the other Greek cities in the Classical period.

[5] In the fourth century BC, the Assembly appears to have lost much of its lawmaking power. Reforms after 403 BC restricted the Assembly to the passage of "decrees" (*psephismata*: approval of public actions that expires after the action is completed, such as a one-time tax for a specific purpose) and left the passage of "laws" (*nomoi*: general norms with unlimited duration, such as stipulated punishments for crimes) to a more restricted body. During this period, it also seems that courts gained the ability to nullify decrees passed by the Assembly. See Hanssen (1991).

All free, male Athenian citizens over the age of 18 were entitled to vote. To vote, citizens had to physically attend the meeting; there was no provision for absentee voting. Athens was stingy with citizenship, restricting it to those who could prove that both of their parents were citizens. Partly as a result, the number of citizens appears to have shrunk over time.

B. Roman Republic

The Roman Republic was a state in central Italy based on the city of Rome. It was a democracy from 509 BC to about 49 BC. During this period it grew from a city-state covering about 800 square kilometers to a sprawling empire that included modern France, Spain, the Balkans, Turkey, the Levant, Egypt, and North Africa. The Roman Republic is sometimes overlooked by democracy researchers, but its institutions were no less democratic than those of Athens, and it scores well on democracy indexes used in social science research (Matsusaka 2025).[6] The Republic's census figures reported an adult male population of about 130,000 in 508 BC, growing to 910,000 in 70/69 BC (Brunt 1971, Table I).

Rome had several different assemblies, with partially overlapping spheres of authority. The most important were the Tribal Assembly (*comitia tributa*), equivalent to the Plebeian Assembly (*concilium plebis*), and the Centuriate Assembly (*comitia centuriata*).[7] These assemblies approved all laws, declared war and peace, approved treaties, and had the power to expend and raise public funds. In contrast to Athens, the Roman Assemblies also directly elected all of the Republic's approximately 70 magistrates each year.

Roman Assemblies assigned significant agenda control to elected officials. Meetings could be called and were presided over by the highest magistrates (consuls, praetors) or by one of 10 tribunes of the plebs. Other officials, called augurs, could cancel a meeting if they determined it was inauspicious. Laws had to be posted 24 days before they came to a vote, and were discussed and debated in a series of smaller public meetings called *contios*, held across the city. On the day of an election, there was no debate and no amendments – the presiding magistrate made some comments and then directed the citizens to vote on the proposal as written. Elections were not decided by a simple majority vote of those in attendance, but through a system in which citizens were assigned to groups, each of which had one vote that was determined by majority vote of the members, and the winner of the election was determined by the majority of group votes. The details of this system are

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[6] The term "Roman Empire" refers to the state that succeeded the Republic when it became an autocracy around 49 BC or perhaps 27 BC.

[7] The foundational historical references on Roman citizen assemblies are Taylor (1990, 2013).

described below. Romans initially voted orally, telling their choices to election officials one by one, but in the late second century BC they switched to casting secret ballots into an urn.

All free, male citizens above the age of 18 were entitled to vote in the assemblies. To vote, a citizen had to physically attend a meeting, although the Republic appears to have experimented with absentee ballots in its final years. Rome was relatively generous in granting citizenship. From the earliest times, allied cities received citizenship rights, often but not always including voting rights. Following the Social War in 90 BC, the Republic gave voting rights to essentially all Italians. Remarkably for an ancient state, the Republic also gave voting rights to freed slaves, of which there were many.[8] We do not know how many citizens attended assembly meetings – Taylor (1990) estimates that the voting structures could accommodate up to 70,000 persons, but it's unlikely that this number was often reached.

This paper does not address the Roman Senate, which played an important but difficult-to-pin-down role in the constitutional system. Its name evokes a legislative body, but it did not have the power to pass laws or appoint or remove magistrates. The Senate supervised foreign affairs and had informal authority to disburse funds from the treasury, but all of its decisions could be overruled by an assembly. Sometimes seen as an oligarchic body, the Senate was in fact comprised entirely of former high-ranking elected officials and there was no right to membership based on family or wealth.

C. Distance and Travel

Ancient democracies required citizens to physically attend an assembly to vote. This would have presented a considerable burden to citizens who lived far from the capital city.

To get a sense of distances, the territory of the Athenian state, Attica, covered an area of about 2,500 square kilometers; it was hilly terrain, scattered with villages, farms, and pastures. The city of Athens was on the western coast of the triangular peninsula. It is likely that there was a network of unpaved carriage roads, at least partially connecting the large towns. The distance between Athens and its major outlying population centers was approximately: 23 km for Eleusis in the northwest, 55 km for Rhamnous and 40 km for Marathon in the northeast, and 77 km for Sounion in the south. For the outlying regions, travel to Athens was a multiday journey. This was especially so since Assembly meetings began at dawn, meaning that attendees had to arrive the night before or travel

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[8] On Roman citizenship, see Sherwin-White (1973).

during the night, which could be hazardous. Travel was usually by foot since horse travel could be precarious over hilly and mountain terrain.[9]

The distances involved in attending Roman assemblies were even greater, and grew as the Republic expanded. By the first century BC, when the Republic controlled all of Italy, the distance between Rome and the most distant Italian voting districts (tribes) was approximately: 580 km for the Oufentina tribe (covering modern Milan); 530 km for the Scapta tribe (covering modern Venice); 700 km for the Maecia tribe on the toe; and 620 km for the Fabia tribe on the heel.[10] Attending assembly meetings at these distances could have been a multiweek affair. The difficulty of attending was partially offset by clustering some meetings around games and festivals so that a citizen could combine assembly meetings with business and entertainment, but many lawmaking meetings were held irregularly.

The upshot is that attending assembly meetings was costly for citizens that did not live in the capital. Not only did they pay the opportunity cost of spending one or more days in meetings, but they sacrificed one or more days of work or personal business at home and had to pay out-of-pocket costs for travel and lodging.

D. Political Cleavage

Distance and travel costs would not matter for policy decisions if citizens that lived in the city had the same preferences as citizens that lived in the country. Hower, urban and rural residents did not have identical preferences, and their differences constituted an important political cleavage in the political economy of ancient states.

In pre-modern societies, one expects 90 percent or more of the population to be engaged in agriculture. In Athens and Rome, most citizens were small landholders who farmed their own land, sometimes with the help of slaves, or tenant farmers or sharecroppers. Other rural citizens who did not work the land directly provided services related to farming and herding, such as agricultural supplies, storage and processing, animal husbandry, and so forth, which linked their economic interests to those of the farmers. City residents were typically artisans, merchants, bankers, construction workers, naval and port workers, and various types of day laborers.[11]

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[9] Hansen (1983) and McHugh (2019) discuss the challenges of travel and the time involved in classical Attica.

[10] Locations of the tribes are taken from maps in Taylor (2013).

[11] Major cities were also home to the very rich, who may have had substantial landholdings, or were merchants, bankers, public contractors. The analysis here does not focus on these citizens because they were numerically too few to have had an important effect on assembly outcomes.

The nature of the economic activity of urban versus rural residents gave them different preferences over three important dimensions of policy. First, property taxes vs. customs or import taxes: property taxes were costly for country residents while customs taxes were costly for city dwellers, especially in Athens where trade was a large part of the economy. Second, the nature of public expenditure: urban residents benefited from investments in port facilities, public buildings in the capital city, and public provision of bread, which offered little benefit to rural citizens.

A final difference in preferences concerns war. The ancients believed that urban citizens were more bellicose than rural citizens. According to the Old Oligarch [2.15]:

> [O]f the Athenians, the farmers and the wealthy curry favor with the enemy, whereas the people [urban workers], knowing that nothing of theirs will be burnt or cut down, live without fear and refuse to fawn upon the enemy.

This view also comes through in the plays of Aristophanes, written in the fifth century BC: In *Ecclesiazusae*, the lead character comments that when it comes to launching ships the poor vote in favor, the rich and the countrymen vote against. In *Acharnians*, the lead character is a rustic farmer who attends the Assembly in order to advocate for peace, although he expects to be shouted down.

While war has an obvious common-good component, the costs of fighting and benefits from victory are distributed unequally. In Athens, there is reason to believe that the costs fell disproportionately on the rural citizens and the benefits accrued disproportionately to the urban citizens. In a war, Athens could withdraw its population behind the long walls of the city – which it did for seven years during the Peloponnesian War – protecting them physically but exposing their lands to ravage by invaders. An invading army did not merely confiscate existing produce, but could do long-term damage to the capital stock, such as tearing up olive trees, which can take 10-20 years to reach maturity, or burning buildings and destroying infrastructure. Urban residents, except to the extent they held land outside the city, were not exposed to these costs.

On the other hand, war could be good business for those in the cities. It required public spending on shipbuilding, repairing, and outfitting; and created demand for weapons, supplies, and other war materiel. This was profitable for those in associated industries (such as the wealthy Athenian who operated a shield factory, or the Roman publicans who held the public contracts). The urban poor would have benefited in general as demand for workers in the affected industries drove up wages across the city. Moreover, in Athens urban workers were paid a good wage to serve on

naval ships. Thucydides [6.24] attributes urban citizens' desire for naval wages as an important factor in the Assembly's vote to send an ill-fated expedition to conquer Sicily in 415 BC.

In short, urban and rural citizens were likely to differ on several key policy issues: who should bear the tax burden, how public funds should be spent, and how often and aggressively to engage in military action. Nathan (2022) offers a more extensive discussion of the divide between urban and rural political thought in Athens that reaches similar conclusions, including the lower enthusiasm of rural citizens for the empire project. The model that follows pivots on this political cleavage.

3. A Model of the Ancient Assembly

A. The Model

A state is comprised of a unit mass of citizens with preferences over a policy $x \in \mathbb{R}$. A fraction θ of citizens live in the city and $1 - \theta$ live in the country, where $\theta < 0.5$.

Citizens have single-peaked preferences over the policy choice. For there to be political conflict, citizens must have some level of disagreement over the policy choice. The ideal points of urban citizens are distributed according to $G_U(x) = F(x)$. The distribution F is continuous and has full support on the real numbers. To create a cleavage, the ideal points of rural citizens are assumed to be distributed according to $G_R(x) = F(x + \Delta)$, where $\Delta > 0$. See Figure 1. These distributional assumptions imply that for any given level of x, more country than city dwellers have ideal points below x. A working example is that x is the intensity of warfare, with more city than country residents favoring any given level of warfare. The distribution of ideal points across the population is $\theta F(x) + (1 - \theta)F(x + \Delta)$.

The policy x is determined at an assembly of citizens. Each citizen independently decides whether to participate in the assembly or abstain. All citizens receive the same benefit b from participating. This can be thought of as an expressive benefit linked to a sense of citizen duty or a desire to express a point of view (Riker and Ordeshook 1968). All citizens pay a baseline random cost from participating of $z \in \mathbb{R}$, distributed according to H. At this level of abstraction, z could represent, for example, a random health shock, the sudden appearance or disappearance of an employment opportunity, or a personal characteristic such as enjoyment or aversion to attending large public events. The distribution H is assumed to be independent of x, and to have a unimodal density that is increasing to the left of the peak and decreasing to the right, such as a normal distribution. Rural residents pay an additional cost of $T > 0$ associated with traveling to the

Figure 1. Distribution of Ideal Points, Rural (G_R) and Urban (G_U)
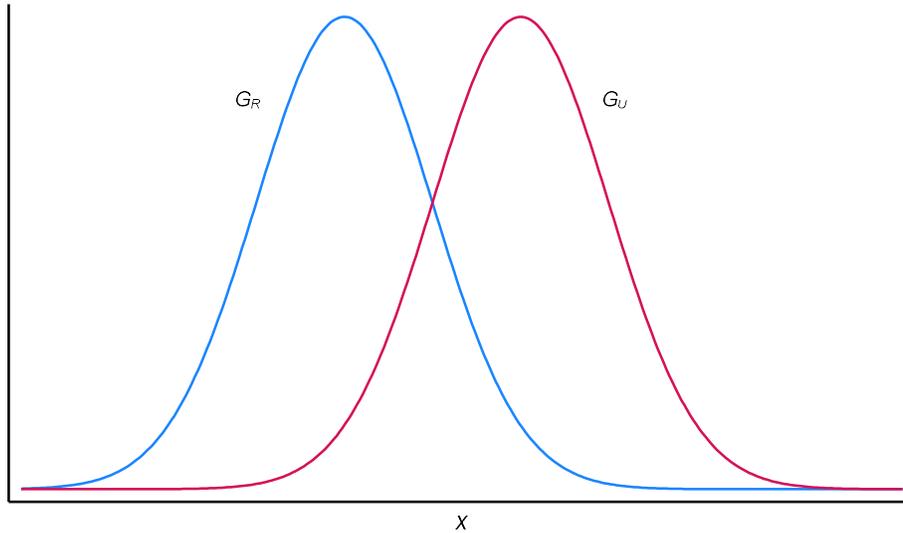
assembly site.[12] City dwellers then participate if $b > z$, and the fraction of them participating is $H(b)$; while country dwellers participate if $b > z + T$, and the fraction of them participating is $H(b - T)$. The overall turnout rate is $V(b,T) = \theta H(b) + (1 - \theta)H(b - T)$.

In order to focus on the role of voting costs, the model abstracts away from pivotality considerations. This is a common assumption in political research when the probability of casting a pivotal vote is too small to meaningfully drive turnout (Downs 1957, Fiorina 1976, Brennan and Lomasky 1993). It is also descriptively accurate in this case (Hansen 1991, p. 351): "For many Greeks political activity was seen as a positive value and participation in the decision-making process and end in itself and not just a means to self-advancement." The vote-counting mechanics reinforced the idea that no one vote was pivotal. The Athenians did not cast and count ballots; rather, voting was by a show of hands, with those overseeing the election declaring the winner based on their visual impression.[13]

The median policy preference among the entire citizen body x_m satisfies:

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[12] The model is easily extended to the case in which travel costs increases with distance instead of being fixed.

[13] "The vote was taken by show of hands, but the hands were never counted. The majority was assessed by the nine *proedroi* [presiding officials] who made their decision based on a rough estimate. A citizen who doubted the assessment was entitled to lodge a sworn objection against the decision made by the *proedroi* whereupon the show of hands was repeated." Hansen (1991, p. 332). More generally, see Hansen (1991, ch. 6). In contrast, in Athenian trials jurors cast votes and they were counted.

$$\theta F(x_m) + (1 - \theta)F(x_m + \Delta) = 0.5 \qquad (1)$$

Denote the median of the urban and rural citizens as x_m^U and x_m^R, respectively. Election outcomes are assumed to be determined by the median voter among those in attendance. The assembly's equilibrium policy choice x^* thus satisfies:

$$\left(\frac{\theta H(b)}{V(b,T)}\right) F(x^*) + \left(\frac{(1-\theta)H(b-T)}{V(b,T)}\right) F(x^* + \Delta) = 0.5. \qquad (2)$$

It is sometime convenient to define $A = \theta H(b)/V(b,t)$. In a fully majoritarian system, the assembly would select the median voter policy, $x^* = x_m$. When this does not happen, we say the policy is "distorted." One way to quantify the distortion is in terms of the fraction of the population that would prefer a policy less than the assembly choice. The benchmark case – if the assembly chooses the median policy – is that 0.5 of the population prefers a smaller policy. The fraction that prefers a smaller policy under the assembly choice is $\theta F(x^*) + (1 - \theta)F(x^* + \Delta)$. The measure of distortion D is then the absolute difference between the two: $D = |\theta F(x^*) + (1 - \theta)F(x^* + \Delta) - 0.5|$, which theoretically ranges from zero to 0.5.

The assembly equilibrium has the following properties:

Assembly Equilibrium Properties. $x_m < x^*$ and $D > 0$. *The maximum distortion for all possible values of Δ and T is $\max\limits_{\Delta,T} D = .5(1 - \theta)$.*

Proof: Equation (2) can be expressed $AF(x^*) + (1 - A)F(x^* + \Delta) = 0.5$. Note that $\partial x^*/\partial A > 0$ given $\Delta > 0$. Because $\theta < \frac{\theta H(b)}{\theta H(b) + (1-\theta)H(b-T)}$, it follows that $x_m < x^*$ when $T > 0$. This immediately implies that $D > 0$. To establish the bounds on D, note that distortion is increasing in T, and that as $T \to \infty$, $x^* \to x_m^U$. As Δ grows, the fraction of rural dwellers that prefer a policy less than the one chosen goes to 1, and therefore the fraction of the total population preferring a policy less than the median goes to $0.5\theta + (1 - \theta)$, implying that $\max D = 0.5(1 - \theta)$. ∎

The difference between the population and assembly median stems in a straightforward way from the disproportionate participation of urban compared to rural citizens. There are disproportionately more city voters because their travel cost is lower on average than the travel cost of country dwellers. Even if travel costs are not large enough to create an absolute urban majority, because urban voters prefer a larger x, the assembly median is slanted toward their

preferences. This simple model thus expresses the basic representation challenge in an assembly. To be clear, the model does not imply that city dwellers necessarily constituted an absolute majority; only that they *disproportionately* attended Assembly meetings.

How much can outcomes be biased? The maximum bias, setting the policy equal to the ideal point of the median urban voter alone, is approached as travel costs go to infinity. In this case, half of the urban voters would prefer a lower policy choice. As Δ increases, the fraction of rural voters preferring a lower policy goes to one. Thus, in the limit, half of the urban voters and all of the rural voters prefer a lower x than the assembly choice. If $\theta = 0.25$, the approximate urban share of the population of Athens, $D = 0.375$, meaning that 87.5 percent of the population prefers a smaller x than the assembly choice. One virtue of the model is that the maximum bias can be characterized without making functional form assumptions on the distribution of preferences F or costs H.

B. *Historical Examples*

The model assumes that an important cleavage in ancient societies was between rural and urban citizens; to this is added the idea that because of travel costs that made it difficult for rural citizens to attend assembly meetings, urban citizens had power beyond their numbers, causing policy decisions to be slanted toward their preferences. The overrepresentation of (poor) city voters is a recognized feature of Athenian democracy (Hansen 1983, p. 233; Markle 2004), but its policy consequences and the challenges of managing it (Hornblower 2011, p. 140) have received little attention.

One implication is that assemblies were more likely to impose taxes on landowners than city dwellers, and more likely to provide benefits such as free grain to city dwellers, compared to what a majority of the population would have preferred. A less obvious implication is that assembly democracy may have led to excessive bellicosity because the urban masses were more inclined toward war than the country dwellers. Athens was extremely warlike, even for an ancient state, which appears to have been a point of pride for citizens in the assembly. Perikles told the Assembly (Thucydides 2.64) approvingly that Athens had "expended more life and effort in war than any other city." Athens' proclivity to violence was tightly interwoven with its aggressive foreign policy and imperial expansion. In 478 BC, Athens took the lead in forming the Delian League, a defensive alliance against the Persians. But the League was soon transformed into an Athenian hegemony (empire), in which Athens taxed the member cities, required them to provide naval ships and other

war materiel, fiercely crushed any city that attempted to withdraw from the alliance, and forced other cities to join.[14]

Consider the interesting and important Assembly vote to launch the Peloponnesian War in 431 BC. The war came at the end of a period of 50 years of relative peace in which Athens had emerged as the leading state in Greece both economically and politically. The "true" causes of the war continue to be debated but it's clear that Athens was not forced to fight – it was "not a defensive war but an optional war that Athens chose in order to flex its muscle" (Mitchell 2015, p. 167).

Thucydides (1.139-1.146) provides a narrative of the Assembly meeting in which the decision to go to war was debated and adopted. He mentions that some citizens spoke in opposition to the war, but doesn't tell us how many or their identity, and he describes the strategy proposed by the pro-war faction, represented by the general Perikles, who acknowledged that Athens' ground forces were too weak to defend the city's rural areas, and it would have to rely on its naval forces. Athens would abandon its territory outside the city walls and move the entire rural population into the city for the duration of the war, which turned out to be years. The consequences were devasting for the rural population: their lands were repeatedly devastated by invading forces, with no place to live in the city they were forced to create makeshift shelters in whatever spaces they could find, and when the plague descended on the city in the second year of the war, they suffered disproportionately because they had no homes to shelter in.[15] Because the burdens of the war were so heavily laid on the rural citizens, it's plausible that they were the ones who spoke against it in the Assembly, but apparently not enough to carry the day. Athens eventually lost the war.

Another interesting case was the Assembly decision to send a massive expedition to conquer Sicily in 415 BC, at a time when Athens was still engaged in the war in Greece. Again, we know there was a healthy debate about this – Thucydides (6.8-6.26) reports three long speeches, one in favor

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[14] The view that the urban masses made Athens excessively bellicose was shared by ancient observers, many if not most of whom viewed its assembly as dangerous and irrational (Hansen 1991, pp. 23-25). Aristotle (*Ath. Pol.* 32, 34) alluded to the warlike nature of the urban majority several times and viewed the dominance of urban workers who had no wealth in land as one of the greatest problems with assembly-based democracy (Mitchell 2015, p. 266). The Greek historian Polybius (6.43), writing in the second century BC, long after Athenian democracy had ended, considered its assembly to have been "a mob of exceptional savagery and brutality" (he did not feel the same way about the contemporaneous Roman assembly).

[15] Thucydides (2.16) writes: "Deep was their trouble and discontent at abandoning their houses and the hereditary temples of the ancient state, and at having to change their habits of life and to bid farewell to what each regarded as his native city."

and two against – but we do not know the groups that voted for and against it. However, Thucydides (6.24) does say that the urban masses voted for the expedition in order to acquire paid employment, so we can infer that their support was important. The expedition was a major debacle for Athens, resulting in the complete destruction of its expeditionary navy and army, and the near complete depletion of the treasury. After the two defeats the Athenian empire collapsed and Athens never regained its leading position in the Mediterranean, being replaced first by Sparta and then by Macedonia, although it continued to enjoy some economic and cultural prosperity (Ober 2008).

One could add to this list of questionable decisions. After the naval victory at Arginusae in 406 BC, Aristotle (*Ath. Pol.* 34) writes that "when the Lacedaemonians wished to retire from Dekelea and return home and conclude peace on the terms that each side should retain what they held, some were anxious for it, but the masses would not listen to the proposal." This led to the decisive defeat at Aegospotami one year later that essentially ended the Peloponnesian War. There was also a "disastrous" expedition to Egypt in the 450s BC, a failed attempt to take over Boeotia in the 440s BC, and the "debilitating" Social War in the 350s BC in which Athens tried to suppress a change of government in its allies (Ober 2008, p. 41).

The interesting point is not that the Athenian Assembly made mistakes – all governments make mistakes – but that Athens' mistakes *were all in the same direction*: too much war and not enough peace. The Assembly is not criticized for being unwilling to fight, or for an excessive insistence on peaceful resolution of disputes. While these decisions are often viewed as failures of uneducated and intemperate commoners, the model suggests instead that the urban masses may have been voting based on a rational reflection of self-interest – the problem was that distorted representation allowed a warlike urban minority to drive policy to extremes.

The idea that Assembly policies differed from those favored by a majority of citizens is suggested by political developments after the major defeats. In 411 BC, the democracy was overthrown and replaced by an oligarchy of 400 men. It is revealing that the oligarchy's first order of business was to begin peace negotiations to end the war (Aristotle *Ath. Pol.* 32). The 400 were overthrown and democracy restored in 410 BC, but it was overthrown again in 404 BC when another pro-peace oligarchy (the 30) was established. This oligarchy was overthrown in 403 BC after a full-blown civil war, and democracy was restored once again, this time on a more restricted model that curtailed the Assembly's powers (Hansen 1991, pp. 300-304). Even so, Athens remained bellicose, engaging in the Corinthian War in 395-387 BC that ended up with Sparta in the dominant position in the region; then coming into conflict with Thebes in the 360s BC; and fighting and losing a war with the kingdom of Macedon (355-338 BC), after which Athens became a Macedonian

Table 1. Pay to Attend Assembly Meetings

Year	Pay/day	Total Expenditure/Year
402 BC	1 obol	6 talents + 4,000 drachmas
~401-391 BC	2 obols	13 talents + 2,000 drachmas
391 BC	3 obols	20 talents
320s BC	1 drachma for ordinary meetings; 1.5 drachma for longer assemblies	45 talents

Note. 6 obols = 1 drachma. 6,000 drachmas = 1 talent. Total expenditure is calculated assuming 40 meetings per year with an average attendance of 6,000 citizens per meeting.

protectorate. In 322 BC, the Macedonian general Antipater forced the Athenian Assembly to disenfranchise all citizens with less than 2,000 drachma of property, stripping the urban masses of their votes, and ending the democracy for good (Mitchell 2015, p. 293).

How do we understand 411 and 404 BC? Carugati and Ober (2024, p. 28) argue that Athenian democracy broke down because it had lost its legitimacy in the eyes of many citizens due to poor wartime decisions: there was "a breakdown in the belief that democracy was a fair system of social cooperation." The model shows how this could have happened as urban voters distorted policy toward their preferences, leaving a majority of citizens dissatisfied with the policies. After numerous military setbacks, those who had lost faith in the system overthrew it when their opponents were away with the navy. Unfortunately, while we know the names of many (elite) coup leaders, we do not know the base of their support, other than that it was not the urban poor who served in the fleet. An alternative explanation of this episode is as a coup by the rich against the poor, but the coup leaders targeted much of their violence against other elites, not the poor themselves, suggesting that elites were not a cohesive class but rather served as leaders of broader coalitions, possibly urban and rural citizens. It seems relevant that the coup leader did not propose replacing democracy with a king or narrow hereditary oligarchy, but rather something similar to the previous system but without voting by urban masses.

4. Athens: Pay for Attendance

With the model in place, let's now examine how the ancients tried to address the problems. Around 403 BC, after restoring democracy from the second oligarchic coup in less than 10 years, the politician Agyrrhios proposed and the Assembly approved a proposal to pay citizens a wage (*misthos*) to attend Assembly meetings. The initial pay rate was 1 obol, which the Assembly increased over time, reaching 1 or 1.5 drachmas per meeting in the 320s BC (1 drachma = 6 obols). Table 1 shows the evolution of the program over time. By way of comparison, the daily wage at the

Figure 2. Effect of Payment on Turnout
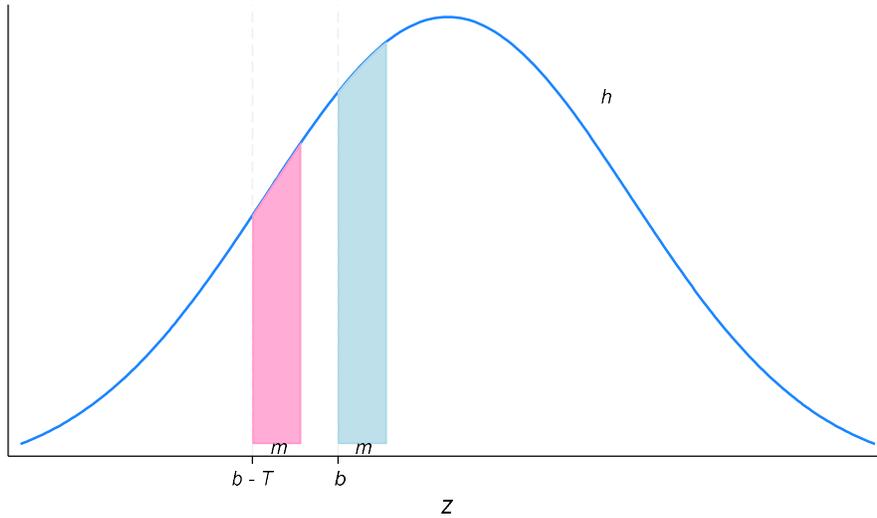
time for a worker on a public construction project ranged from 1.5 to 2.5 drachmas depending on skill level, and 2.5 obols would be enough to feed a family of four for a day (Markle 2004).

Aristotle (*Ath. Pol.* 41) attributed the introduction of pay to a desire to increase attendance ("as the people were not attending the Assembly"). Attendance was a problem in the late fifth and early fourth century BC; apparently it was difficult to achieve the quorum of 6,000 members. Failure to achieve a quorum was a big problem given the volume of business that the Assembly had to consider in its 40+ meetings each year. It is also possible, although I have not seen an explicit reference, that some proponents hoped that paying for attendance would encourage more participation by rural voters and offset the power of the urban masses.[16]

A.   Effects of Paying for Attendance

We are interested in the effect of the payment scheme on turnout, and more important, how it affects the distortion of policy decisions. If the payment is m, then urban voters choose to attend if $b + m > z$, and rural voters attend if $b + m > z + T$. Turnout increases for both groups because H is an increasing function.

Historians have debated whether the payment m fully offset the foregone wages from attending. The conclusion appears to be that m was below wages initially, but by the end exceeded wages. This

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[16] Azoulay and Ismard (2025) argue that attendance pay was intended to encourage punctual attendance since it seems that only the first 6,000 were paid; and also intended to symbolically signal the higher status of citizens compared to foreigners.

fact puts the payment in perspective, but is not critical for understanding the turnout effect. Even if m is less than wages, it has a positive effect on turnout, and even if it exceeds wages, it does not induce full turnout because of the individual cost shocks.

To understand the effect of the payment program on the policy decision, we need to understand its relative effect on the two groups of voters. Note that turnout before the policy was probably a little short of 6,000 out of an enfranchised citizen body of approximately 30,000, roughly 20 percent. This suggests that turnout by both urban and rural voters was less than 50 percent, and so they were on the left part of the cost density function, as depicted in Figure 2.[17] The incremental effect of a payment of m is the area under the density, also indicated in the figure, red for rural voters and blue for urban dwellers. Under the conditions depicted in the figure (such as a normal distribution), the payment plan increases the propensity to vote of urban voters more than rural voters.

The net effect on the makeup of the Assembly depends on the incremental likelihood of participation by a member of each group, weighted by the number of members of each group. If higher turnout propensity for urban citizens outweighs their smaller number, the proportion of urban residents in the Assembly could increase. If it does, the policy choice would become even more distorted from the median than before.

Result 1. *Paying citizens to attend the assembly increases participation of both groups. When the initial turnout of both groups is less than 50 percent and H is logarithmically concave, an incremental payment (i) increases the propensity to vote of urban citizens more than rural citizens* $\left(\frac{\partial H(b+m)}{\partial m} > \frac{\partial H(b+m-T)}{\partial m}\right)$, *and (ii) increases the policy distortion toward the favored position of urban citizens,* $\partial x^* / \partial m > 0$.

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[17] It is logically possible that urban turnout exceeded 50 percent, but unlikely because that would imply an implausibly low rural turnout rate. Suppose the population share of the city was approximately 26 percent, inferred, following Hansen (1999, p.103), from the fact that the city was assigned 26 percent of the seats on the Council of 500. If urban turnout was, say, 55 percent (= 4,290 men), then rural turnout had to have been 7.7 percent (= 1,710 men) for overall turnout to be 20 percent. This huge difference runs against the views of Hansen (1999, p. 127) that although country people were likely underrepresented the sources present a "less unbalanced" picture than might be expected, and Ober (1989, p. 137) that there is no evidence that farmers were "grossly" underrepresented.

Proof. Consider an incremental change in m.

(i) The effect on turnout is $\partial H(b + m)/\partial m = h(b + m)$ for city dwellers and $\partial H(b - T + m)/\partial m = h(b + m - T)$ for country dwellers. Since the density is increasing to the left of the median, $h(b + m) > h(b + m - T)$, which establishes (i).

(ii) To determine the effect on policy, apply the implicit function theorem and differentiate (2):

$$\frac{\partial x^*}{\partial m} \cdot \left(A \frac{\partial F(x^*)}{\partial x^*} + (1 - A) \frac{\partial F(x^* + \Delta)}{\partial x^*} \right) = \frac{\partial A}{\partial m} \cdot \left(F(x^* + \Delta) - F(x^*) \right) \tag{3}$$

The parenthetical term on the left-hand side is positive and the parenthetical term on the right-hand side is positive for $\Delta > 0$. With some algebraic manipulation, it can be shown that $sign\left(\frac{\partial A}{\partial m} \right) = sign\left(\frac{h(x^*)}{H(x)} - \frac{h(x^* + \Delta)}{H(x^* + \Delta)} \right)$. The function $\frac{h(x)}{H(x)}$ is decreasing for log concave distributions, implying that $sign\left(\frac{\partial A}{\partial m} \right) > 0$ and establishing (ii). Note that log concave distributions include normal, uniform, exponential, and logistic distributions. ∎

That the program increases turnout by urban voters and by enough to increase the distortion is somewhat surprising. One might think that attracting more citizens to the Assembly would offset the overrepresentation of the urban poor. That reasoning is incorrect because urban citizens are more likely than rural citizens to be on the margin for attending. For example, an urban worker deciding whether to take a job for 1 drachma, may be swayed by a 1 drachma payment, but a rural resident who has to travel for an entire day may require a larger amount to attend. As a result, the payments attract more urban than rural residents, increasing the overrepresentation of city dwellers, and further distorting the policy decision.

B. The Political Economy of Assembly Pay

We have little evidence on how Assembly pay in Athens affected participation, although achieving a quorum doesn't seem to have been a problem after it was introduced. Archaeological evidence suggests that the effect on turnout may have been modest: the dimensions of the meeting place (*Pnyx*), which was reconstructed around the time that Assembly pay was introduced, reveal that it was closed on all sides and could not accommodate much more than 6,000 people (Hansen 1991, p. 131) – apparently attendance wasn't expected to go much beyond the quorum.

The cost of the program, however, was substantial. Assuming 40 Assembly meetings per year (this counts only scheduled meetings, not special meetings), and attendance of 6,000 persons per meeting, the cost ranged from almost 7 talents originally, to approximately 45 talents by the end. To put this in comparison, funding a small fleet of 10 triremes, 2,000 hoplite infantry, and 200 cavalry for a year cost 92 talents (Hansen 1991, p. 316). Total state revenue in the middle fourth century

ranged from 130 to 400 talents (Hansen 1991, p. 260). While this program on its own did not deplete the treasury, it claimed a nontrivial fraction of public funds that otherwise would have been available for military and other purposes (and this was a period in which the state's military forces regularly suffered for lack of money (Markle 2004, p. 108).

This presents a mystery: why did the Assembly approve such an expensive program that had only a modest effect on turnout? Aristotle (*Ath. Pol.* 41) attributed it to a need to increase attendance, but this does not explain why the rate continued to rise, reaching a very generous level.[18] Modern historians have struggled to find an answer; some tentatively suggesting that it was done simply to demonstrate the state's commitment to democracy (Sing 2021).

Political economy theory suggests a different answer. A central tenet of public choice research is that policies are formed to distribute resources among competing interest groups. "The theory tells us to look, as precisely and carefully as we can, at who gains and who loses, and how much, when we seek to explain a regulatory policy."[19] When seeking to understand the purpose of contemporary laws, researchers don't seek the answer in the law's preamble and assertions, but in the identity of its beneficiaries.

Who benefited from the Athenian payment program? The most obvious beneficiaries were the approximately 6,000 citizens who regularly attended Assembly meetings before the law, and now were being paid for it. For these citizens, attendance already passed a benefit-cost test, so the payments were a pure rent. Not coincidentally, these 6,000 citizens were also the ones who approved the law. Because the effect on turnout was apparently small while the financial transfers were substantial, a natural hypothesis is that the purpose of the law was simply to pay out funds to citizens who attended the Assembly. It was a welfare program that transferred some 7 to 45 talents each year from taxpayers to the 6,000 citizens who attended Assembly meetings.[20]

There is nothing odd in the idea that the Assembly would authorize a welfare program targeted at the urban masses. Athens distributed grain for free or at low cost in times of scarcity, provided cash payments to disabled persons, and even had a Theoric Fund that made cash payments to the

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[18] Markle (2004, appendix) reviews food prices and finds no evidence of price inflation during the period, which might otherwise have explained the increase.

[19] Stigler (1975, p. 140). Shepsle (1989) makes the same argument.

[20] Podes (1993) makes an argument similar the one I advance here. The number of Assembly meetings increased dramatically after participation pay was introduced; Tridimas (2017) argues that this was another form of rent-seeking: the attendees approved more meetings to increase their attendance income.

urban masses to allow them to attend shows in the theaters and festivals. The cost of the Theoric Fund likely rivaled the amount paid to Assembly attendees.

This view is also consonant with what we know about the politics surrounding adoption of jury pay in the people's courts. Athenian juries sat 175-225 days per year, with 1,500-2,000 jurors per day, selected by lot (Hansen 1991, ch. 8). Jurors were paid 3 obols each, making the total expenditure of jury pay less than Assembly pay, but the same order of magnitude. The Assembly adopted jury pay sometime in the 450s BC, after the statesman Perikles proposed it. Perikles introduced jury pay in order to gain popularity over his rival Cimon. As told by the ancient historian Plutarch (*Pericles* 9):

> [P[itted as he was against the reputation of Cimon, [Perikles] tried to ingratiate himself with the people. And since he was inferior in wealth and property, by means of which Cimon would win over the poor, … [he] had recourse to the distribution of the people's own wealth. … And soon, what with festival grants and jurors wages and other fees and largesses, he bribed the multitude by the wholesale.

Finally, the structure of the program itself suggests that increasing turnout was not the main goal. It would have been feasible to calibrate payments to travel distance, or only pay those who lived outside the city, producing a similar effect on turnout at a much lower cost to the treasury.

C. Another Approach: Hold Meetings Outside the City

I note in passing another potential solution to the policy distortion problem that is suggested by the oligarchic coup of 411 BC. After establishing fragile control over the city, the coup leaders convened an Assembly and persuaded the attendees to adopt a new constitution. The interesting thing is that coup leaders held the meeting one mile *outside* the city, at a temple of Poseidon (Thucydides 8.67-8.68). It's plausible that they did this to reduce participation by the urban masses most supportive of the democracy, and attract more rural residents opposed to the war.[21]

This raises the question if the distortion problem can be solved by holding Assembly meetings outside the urban center. The answer is yes, in principle. To see this, suppose that locations can be represented as a point on a line, and that the travel cost T is proportional to (equal to, for simplicity) the number of miles t that a person must travel from home to the Assembly site, so that $T = \phi t$.

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[21] The plotters also exploited the fact that many urban citizens were away with the fleet across the Aegean.

Suppose that the city and country are T miles apart, so that if the assembly is held in the city, our default case, rural residents pay a travel cost of T and city dwellers pay a travel cost of zero.

Now the suppose the meeting is held $t \in (0, T)$ miles outside the city. Then turnout by city dwellers will be $H(b - \phi t)$ and turnout by rural residents will be $H(b - \phi(T - t))$. The policy choice, as before, is the solution to (2), where in this case

$$A = \frac{\theta H(b - \phi t)}{\theta H(b - \phi t) + (1 - \theta)H(b - \phi(T - t))} \tag{4}$$

The policy choice is the no-distortion policy of (1), $x = x^*$, if $A = \theta$. By inspection, this happens if $H(b - \phi t) = H\big(b - \phi(T - t)\big)$ or $t = T/2$. This is intuitive: by holding the meeting at a point equidistant from the two groups, all citizens are equally likely to attend, the Assembly accurately represents the distribution of preferences, and the policy is the median ideal point of the entire citizen body. Locations outside but near the city ($t < T/2$) reduce but do not eliminate the distortions, and locations closer to the countryside than the city ($t > T/2$) create a distortion in favor of rural interests. We do hear of rare Athenian Assembly meetings outside the city, but there is no indication that Athens used the location systematically to address the excess influence of the urban residents. Perhaps the urban voters resisted having their influence diluted. Or perhaps the assumption that citizens can be located along a line is too large an abstraction for a population that in fact was distributed in a two-dimensional space.

5. Rome: Group Voting

In contrast to Athens, the Roman Republic operated its assemblies on the very different principle of group voting. All citizens were assigned to one of 35 tribes based on place of residence or property holdings, each of which had a geographic basis, somewhat like a modern electoral district, although a tribe could be broken up into as many as five or six separated areas. The city of Rome itself was divided into four tribes. When voting in the Tribal or Plebeian Assembly, each tribe had one vote that was cast based on a majority vote of its members in attendance.[22]

As will be shown, group voting has two main effects on Assembly decisions. First, by giving citizens in each district exactly one vote, it potentially eliminates the effect of differential turnout on

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[22] In the Centuriate Assembly, group votes were based on division of citizens into 193 centuries that depended on wealth, age, tribe, and other things. The analysis here focuses on the Tribal Assembly; it is difficult to capture the idiosyncrasies of the Centuriate Assembly in a tractable model.

the election outcome. Second, the Assembly policy becomes dependent on exactly which citizens are assigned to which district. That is, the outcome becomes dependent on where the district lines are drawn, the problem of gerrymandering in contemporary politics.

To show these effects, suppose that citizens are divided into K groups, each with an equal number of citizens. Furthermore, suppose that each group is comprised of only urban or only rural citizens. This is descriptively accurate for Rome since were four entirely urban tribes that covered the city, while the other tribes covered only areas outside the city. Then there are $K_U = \theta K$ urban districts and $K_R = (1 - \theta)K$ rural districts (for ease of exposition, I assume that all fractions are integers). Each group's vote is cast for the median ideal point of its members, and the assembly decision is the median of the votes cast by the K groups. This median-of-medians approach has been used to study gerrymandering in contemporary elections (Gilligan and Matsusaka 2006).

Consider first the case in which the preferences of each group follow the same distribution as the overall urban or rural population from which it is drawn. This can be thought of as the no-gerrymandering case because it is equivalent to randomly assigning citizens to districts of their type (urban or rural).

Result 2. *If preferences in urban and rural districts reflect the overall distribution of preferences of those types of citizens, the assembly outcome is the ideal point of the median rural voter, $x^* = x_m^R < x_m$. The maximum distortion is $\max\limits_{\Delta,T} D = 0.5\theta$.*

Proof: Since turnout rate within a district is the same for all citizens, and the distribution of preferences in each district mirrors the distribution of preferences in the population of that type of citizen (urban or rural), the median voter in each urban district is x_m^U and the median voter in each rural district is x_m^R. Because there are more rural than urban districts ($\theta < 0.5$), the median district is a rural district, implying that $x^* = x_m^R$.

In terms of the distortion, the policy is biased below the median. Consider the maximum bias in that direction. As Δ grows, the urban and rural preference distributions move apart, and the fraction of urban citizens that prefer a larger policy choice goes to 1. The fraction of rural citizens preferring a larger policy choice is always 0.5. The distortion does not depend on T. The maximum distortion is then $\max\limits_{\Delta,T} D = \theta + 0.5(1 - \theta) - 0.5 = 0.5\theta$. ■

In this situation, the urban districts have a median preference equal to x_m^U and the rural districts have a median preference equal to x_m^R, independent of travel costs. The policy is set by the median district, which is a rural district, so $x^* = x_m^R$. Group voting then induces a distortion away from the population median in favor of rural citizens. This is opposite to what we observed in the simple

majority voting system used by Athens. Observe that this is the case even if few rural votes show up to vote because their group still casts its full one-unit vote. This is the sense in which group voting insulates against the travel penalty imposed on participation by rural voters.

The maximum possible distortion intuitively is increasing in the fraction of the population in the city. The maximum distortion is lower under group voting than under the unfiltered majority rule system used by Athens. This is because the group voting system distorts outcomes in favor of the majority while the unfiltered system distorts in favor of the minority. If 25 percent of citizens live in the city, then the maximum distortion under group voting is 0.125. Recall that the maximum distortion under unfiltered majority voting is 0.375. As mentioned above, these limit results do not require any assumptions on the distribution of preferences.

The assumption that districts had equal populations is inaccurate for the Roman Republic. There is reason to believe that the tribes might have originally been roughly the same size, and also some reason to believe that the officials in charge of assigning citizens to tribes made an effort to keep the rural districts balanced, but the overweighting of the urban districts appears to have been a design choice (Taylor 1949, p. 53). Interestingly, such malapportionment has no theoretical effect on the policy. If preferences in each rural district reflect the distribution of the rural population overall, all rural districts still have a median of $x = x_m^R$, and the median district is still a rural district regardless of whether the urban voters are packed into disproportionately few districts. The group system appears to be somewhat immune to malapportionment.

Now consider the effect of gerrymandering on the assembly decision. Suppose that citizens are assigned to districts so as to minimize (or maximize) the policy choice. It is widely understood that nonrandom assignment of citizens can change the ideal point of the median voter in the median district, and thus the outcome. We can characterize this potential distortion:

Result 3. *If voters are nonrandomly assigned to K equal-population districts, then the maximum distortion is* $\max\limits_{\Delta,T} D = 0.5 - (K + 1)/4K$.

Proof: Suppose citizens are assigned to districts so as to maximize the distortion. As Gilligan and Matsusaka (2006) show, this is achieved by a "cracking and packing algorithm." If the goal is to create a downward bias in the policy choice, the optimizing algorithm is to first create a district with a bare majority of the lowest-x citizens and a bare minority of the highest-x citizens, and repeat with the remaining citizens district by district until a majority of districts are so constituted. Once a majority of districts are assigned, the median has been determined and the composition of the remaining districts is arbitrary.

This algorithm cannot be implemented directly because of the constraint that urban citizens only be assigned to urban districts and similarly for rural citizens. However, as Δ becomes sufficiently large, there will not be enough low x urban citizens to create a district with a median less than the median rural district. Therefore, the policy will be determined by the $\left(\frac{K+1}{2}\right)$st district among the rural districts only. The algorithm can then be applied to the rural districts alone.

Consider the first district (with the lowest ideal point). It contains $1/K$ citizens, half (plus 1) with the lowest ideal points and half with the highest ideal points. The number of rural citizens in the population with an ideal point less than this district's median is half the people in the district $\frac{1}{2K}$. The second district consists of $1/K$ citizens, half (plus 1) of whom have the lowest remaining ideal points and half have the highest remaining ideal points. The number of rural citizens with an ideal point less than the median of this district is $2 \cdot \frac{1}{2K}$. The fraction of citizens with an ideal point less than the median of the third district is $3 \cdot \frac{1}{2K}$, and so on. Since the median district is the $\left(\frac{K+1}{2}\right)$st, the number of rural citizens with ideal points less than the median district's median is $\left(\frac{K+1}{2}\right) \cdot \frac{1}{2K}$. The number of rural citizens with ideal points greater than the median district's ideal point is then $(1-\theta) - \left(\frac{K+1}{2}\right)\left(\frac{1}{2K}\right)$. In the limit as Δ grows, the fraction of urban citizens with preferences greater than the median is 1. The distortion does not depend on T. The overall fraction of the population with a preference greater than the median, the maximum deviation, is then $\max D = \theta + (1-\theta) - \left(\frac{K+1}{2}\right) \cdot \left(\frac{1}{2K}\right) - 0.5 = 0.5 - \frac{K+1}{4K}$. ∎

The result tells us that if group-based districts are gerrymandered specifically to distort the policy outcome, the maximum distortion is $0.5 - (K+1)/4K$. For the Roman Tribal Assembly, with $K = 35$, this comes out to a maximum distortion of 0.26. As $K \to \infty$, the maximum distortion goes to 0.25. Thus, for all practical values the maximum distortion is 0.25. Note that even with gerrymandering, the potential distortion is lower in the group-based system used by Rome than the Athenian straight majority voting system.

Although sometimes criticized as being undemocratic, the Roman group-based system has some advantages over the simple majority voting system used by Athens. It removes the urban bias that arises from travel costs for rural citizens. To the extent it produces biased policies, they are biased toward the preferences of the rural majority, not the urban minority. Also, the maximum potential distortion under majority rule is lower under group voting, even with deliberate gerrymandering, than the maximum potential distortion under simple majority voting.

6. Discussion and Limits

Citizen assemblies were common in the ancient Mediterranean world, yet these early democracies were turbulent and often short-lived. This paper develops a theory of citizen assemblies to explain an important challenge that arises in this form of government: because

ancient assemblies required citizens to physically attend meetings, the set of decisionmakers was biased toward those who lived in the cities where the meetings were held. This led to a distortion of policy decisions in favor of urban interests, a distortion that grew as the state expanded geographically.

While I do not model democratic failure, the theory points to a reason that legitimacy may have been a problem for ancient democracies. To the extent that urban voters were overrepresented, policy decisions would have been biased away from the preferences of the rural majority. Over time, this would have undermined support for the system of government, particularly as the costs of those decisions grew. Carugati and Ober (2024, p. 28) argue that Athenian democracy collapsed because of a "crisis of legitimacy" that "manifested as a breakdown in the belief that the democracy was a fair system of social cooperation – that the costs I incur for my cooperation as a member of the group are compensated by the benefits that participation bestows on me." The model here provides an explanation of why this could happen.[23]

For analytical clarity, the model focuses on how distance disadvantaged rural citizens by increasing their cost of participating, but distance likely disadvantaged them in another way that I do not model, by increasing their cost of organizing politically. A longstanding theme of political economy research has been the advantages that accrue to groups that are better able to solve collection action problems and exert political "pressure" (Olsen 1965; Stigler 1975). The urban poor lived in close proximity to each other, were likely to see each other frequently on the street, at shops, in public spaces, and could either gather for political purposes. Rural voters, on the hand, who lived in much less dense communities, sometimes at considerable distance from each other, would have found it more difficult to communicate and organize. Pressure in this context could include organizing and coordinating to support candidates in elections, lobbying public officials to influence decisions and the agenda of meetings, managing crowd dynamics such as heckling to influence assembly decisions (Ober 2008, pp. 160-165), and in the extreme, organizing armed bands to exert pressure as became common the late Roman Republic.

The analysis is necessarily incomplete in other respects. Here I briefly comment on two important omissions. One is knowledge – the model assumes that all citizens are fully informed and that political differences arise from fundamental economic interests – so there are no epistemic issues to be addressed. One might wonder why the policy distortions emphasized in my model were

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[23] There may be parallels with European city-states in the Middle Ages (Boucoyannis 2021, p. 157): "historians have concluded, that city-states failed to effectively accommodate rural populations within the republican framework was a key reason why republican governments collapsed."

not offset by epistemic benefits from information aggregation as in the Condorcet Jury Theorem. Some speculative thoughts: information is effectively aggregated only if three conditions hold: (i) the underlying decision must be one of common values, where disagreement arises only from information differences; (ii) the information signals received by the citizens must be sufficiently independent; and (iii) each citizen must vote based on his own signal. As discussed above, condition (i) does not apply for many important policy decisions, such as taxes, spending, and to some extent war. In terms of (ii) there is reason to expect correlated signals within groups. If errors are correlated, overrepresentation of urban voters would amplify their errors, leading to an epistemic bias. In terms of (iii) if citizens observe each other's views, herding can arise in which a person ignores his own information to follow the vote of others (Bannerjee 1992; Bikhchandani, Hirshleifer, and Welch 1992). Athenian assemblies would have been susceptible to herding because participants could learn the positions of their fellow citizens through speeches from leaders and shouts and gestures from the crowd.

Another important omission is behavioral considerations and social pressure. Ancient assemblies are frequently criticized for their intemperance, mercurialness, hastiness, vindictiveness, and susceptibility to manipulation by rhetoric, and intuition suggests that social pressure would have been important in small states where many citizens knew each other, and each person's vote was public. These would be promising lines of inquiry. It may also be illuminating to compare Greek and Roman assemblies on these grounds because the Romans utilized a very different set of procedures that were likely to have mitigated these factors, including secret ballots, stating the issues to be decided weeks before the vote, and not allowing amendments from the floor during the meeting. Taylor (1990, p. 30) observes that people stood in Roman assemblies while they sat in Greek assemblies, and suggests that Rome did this deliberately to avoid the frivolous discussions of Greek assemblies.

One other weakness of ancient assembly-based democracies was their inability to scale up (Stasavage 2020). Because these states were small, they struggled to muster force on a large enough scale to resist pressure from larger autocratic states, such as the Persian Empire or the kingdom of Macedonia. It is conceptually possible to run an assembly-based democracy on a large scale, but the model illustrates the problems that are going to arise when doing so: as the population outside the capital city grows, the assembly becomes increasingly unrepresentative, and the policy decisions

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become increasingly distorted.[24] An apparent counterexample is the Roman Republic, which was able to achieve scale, to an unprecedented degree. However, this case actually offers some support for the model, which predicts that Rome's group voting system would have allowed it to expand without experiencing urban domination of the assembly, and without suffering significant policy distortion in favor of urban interests.

Finally, one should be cautious in drawing conclusions about contemporary politics from ancient examples, but the underlying logic in this model suggests modern parallels. In the United States, some states hold caucuses instead of conventional primary elections. A caucus requires citizens to assemble in small groups at a location such as a home, discuss the candidates, and arrive at a favored choice. The caucus process, because of its time-intensive nature is likely to screen out citizens with a high cost of time. Similarly, some countries hold elections on weekends or declare holidays while others, such as the United States, hold them on workday – this choice is also likely to screen participants based on attributes correlated with policy preferences. The same logic applies to the location of polling places and their distance from citizens. In all of these cases, the participation costs to cut differently across groups and therefore have the potential to distort.

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[24] Stasavage (2010) identifies a scale problem associated with *representative* democracy – constituents in districts far from the capital city may find it costly to monitor their representatives, increasing agency costs. He also observes that distance was an important factor in pre-modern representative bodies in general.

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