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ORIGINAL PAPER

Constitutional choice in ancient Athens: the evolution of the frequency of decision making

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Abstract Contrary to modern representative democracies where elections tend to take place years apart, in the direct democracy of ancient Athens the assembly of the citizens met to decide policy up to forty times per year. The paper explores a model of constitutional choice where self-interested citizens decide how long to wait until they vote by maximising the net gain from an uncertain voting outcome. It is found that the frequency of voting increases unambiguously when the probability of being a member of the winning majority increases, and decreases with the loss from being a member of the losing minority and the resource cost of the vote. Under some plausible conditions, the frequency also rises with increases in the utility gain from the vote, the discount rate, and the required majority to pass a policy motion. It is argued that those conditions were met in Athens.

Keywords Voting frequency · Direct democracy · Ancient Athens · Constitutional choice

JEL Classification D7: Analysis of collective decision making · D72: Political processes · N4: Economic history–government · N93 – Europe: Pre-1913 regional and urban history

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1 Introduction

In the direct democracy of Athens, 508—322 BCE, decisions about public affairs were taken at the meetings of the assembly of the citizens, where those attending deliberated and voted.[1] From ten meetings per year in the early days of democracy, the number of times the assembly met rose sharply to forty per year in the second half of the fourth century. Compared to modern representative democracies where elections are typically held years apart, the frequency of voting is staggering. This observation motivates the question addressed in the present paper. Specifically, what factors may explain the length of time until a vote is taken on issues of public interest?

In studying the process of democratisation constitutional political economy has examined at length questions regarding the extension of the right to vote from a small enfranchised elite to the middle class and the poorer groups of the population,[2] and the choice of the electoral rule, majoritarian or proportional representation, for making collective decisions,[3] but has paid no attention to the question of how often citizens chose to hold elections. An important exception is work on the political business cycle which recognises that the discretion of governments to call an election before one is due may affect significantly expectations and thence the short–run equilibrium values of output and inflation. However, the constitutional decision of the number of years lapsing from one election to another has been ignored. Nor do indices of democracy and political rights, like those published by the Polity Project and the Freedom House, commonly used in econometric work, measure the constitutionally stipulated frequency of elections. Holding of elections is tantamount with democracy, but how often those elections are held is overlooked. The present study focuses on this issue.

In a direct democracy democracy the constitution mandates how citizens choose the policies by which they govern and they are governed; in a representative democracy the constitution states the set of rules by which citizens choose the persons to govern them. It was perhaps imperative that in the direct democracy of Athens citizens assembled more often to decide policy than they do in the modern indirect democracies. A factor facilitating frequent meetings was the size of the citizen body, which was arguably sufficiently small to allow such assemblies to take place. Only Athenian men above the age of 20 years enjoyed full political rights, a total of about 30,000 citizens in the fourth century when the quorum stood at 6000 representing 20% of the eligible population. In modern democracies universal franchise includes men and women above the age of 18 years, and voter turnout is

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[1] Aristotle's Constitution of Athens (1984) is the most important source describing the meetings of the assembly.

[2] For theoretical and empirical examination of the extension of the franchise see amongst others Acemoglu and Robinson (2006), Lizzeri and Persico (2004), Engerman and Sokoloff (2005), Llavador and Oxoby (2005), Przeworski, (2009), Ansell and Samuels (2010), Congleton (2011), Munshi (2011), Hicks (2013), Aidt and Franck (2013) and Aidt and Jensen (2014). More specifically, Fleck and Hansen (2006) and McCannon (2012) present formal models of the emergence of democracy in Ancient Athens.

[3] See Rokkan (1970), Boix (1999), Andrews and Jackman (2005), Blais et al. (2005), Cusack et al. (2007), and Ergun (2010).

significantly higher than in Athens, where amongst other constraints space availability limited the number of those attending assembly meetings. Sheer volume of numbers makes impossible for modern democracies to organise nationwide assemblies for their citizens. Even though referendums are often held, they are seen as supplementing representative democracy rather than supplanting it—see Matsusaka (2004, 2005a, b), Tridimas (2007, 2010). Pritchard (2015, p. 152) emphatically states "But elections are still only held every 2 or 3 years. On the issue of voting frequency, therefore, modern democracies are less democratic than the Athenian one."

The paper is structured as follows. Since the frequency of elections for electing the government in a modern representative democracy mirrors the frequency of voting for deciding policy in the direct democracy of ancient Athens, Sect. 2 describes election frequencies in selected modern democracies. Section 3 presents historical information on the Athenian assembly of the demos. Section 4 discusses earlier studies which recognised that one of the concerns of the constitutional framer is to choose the time interval between elections, and studies of post–constitutional policy making that treat the timing of elections as endogenous. Section 5 presents a model of constitutional choice of the time interval between voting based on the calculus of the expected net benefit from voting on a public issue against continuing the current policy. Intuitively, this choice raises the following fundamental trade–off: A citizen who benefits from the current policy may wish to postpone a vote for as long as possible, because of the risk that a policy change will harm his interests, while providing more time until taking a new vote allows the collection of more information, more reflection and presumably better choices. On the contrary, a citizen who suffers a utility loss from the current policy may wish to vote sooner on the hope that a favourable outcome will reverse his losses. In addition, frequent voting allows swift policy actions as circumstances change and allows citizens to quickly remove recalcitrant public officials, but it also increases the resource cost of policy making. The constitutional choice is modelled to depend on the probability that a citizen benefits from the vote, the size of the benefit, the resource cost of voting, the rate of discount, the required majority to secure passage of a motion and the size of the franchise. Based on the theoretical findings Sect. 6 offers an explanation of the large number of Athenian assembly meetings and the increase of that number over time. Section 7 concludes.

2 Election frequencies in representative democracies

In modern indirect democracies, voters vote in parliamentary and presidential elections by choosing party candidates. This way they select the government which then decides policy for as long as it enjoys a parliamentary majority or, in presidential systems, its stipulated term in office. In ancient Athens voters voted directly on policy, and then delegated responsibilities of implementing policy to various public office holders. Voting frequency, or equivalently, election periods for parliaments and presidents vary across different countries, while, in addition, terms of service also vary across different public offices and across time for given

countries. Moreover, "Westminster–type" parliamentary democracies stipulate maximum terms for parliaments, but elections can be called at an earlier date under specific conditions, for example when the government seeks a fresh mandate to deal with an important issue of national interest, or the government loses a vote of confidence; on the other hand, terms for presidents and parliaments in presidential democracies are fixed.

The following examples illustrate the variety of election frequencies and parliamentary terms in modern representative democracies. In the UK, the Parliament Act of 1911 reduced the term of the House of Commons from 7 to 5 years. The questions of the discretion of the government to call an election before the term of the parliament expires and of how many years the parliamentary term should be re–emerged in the context of the Conservative—Liberal Coalition that governed the UK in the period 2010–2015. Against a convention that it was the prerogative of the Prime Minister to dissolve the Parliament at a time of his/her own choosing and often after 4 years instead of the maximum five, one of the first acts of the Coalition was to legislate for a fixed 5 year parliament. The parliamentary debate (Hansard 2011) brought to the surface a variety of arguments relating to both political expediency and principle. A fixed term meant that neither coalition partner would be able to force an election at a time unsuitable for the other partner. On the contrary, the Government and the Opposition will have to face the electorate on a predetermined date, whatever the political conditions at that time. The overwhelming argument against a fixed parliamentary term was that a fall in the frequency of election leads to diminished accountability of Members of Parliament to their constituents and reduces the accountability of the Government to electors. Regarding the length of the parliamentary term, a 5–year parliament was seen as allowing the governments to implement its programme before having to start worrying about the timing of the electoral cycle. On the other hand, it was argued that previous governments in the last year of a 5 year cycle were exhausted, reactive and bereft of new ideas.[4]

The term of the French National Assembly is 5 years and that of the (indirectly elected) Senate is 6 years (down from nine until 2004). Following a referendum in 2000, from 2002 the President serves a 5–year term (reduced from 7 years). In Italy members of the House of Deputies and Senate are currently elected for a maximum of 5 years, but Senators served for 6 years before a constitutional change in 1963; the President is indirectly elected for a 7–year term. In Switzerland where referendums are an integral part of the law making process, the members of the National Council (House of Representatives) and most members of the Council of States are elected every 4 years. The Lower House of Germany and the Greek Parliament are elected for 4 years, but the Presidents of these two states are (indirectly) elected for 5 years. In the USA the President is elected for a fixed 4–year term, Senators serve a 6–year term and members of the House of Representatives are elected for a 2–year term. In Brazil the Deputies of the

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[4] Nevertheless, the Act allows an early election for the House of Commons if a two-thirds majority of MPs votes for such an election, or if it passes a motion of no confidence in the government and within fourteen days it passes no motion expressing confidence in any alternative government.

Chamber are elected for 4–year terms, Senators for 8–years and the President for four. Similarly, in Argentina the members of the Deputies of the Chamber are elected for 4–year terms, Senators are elected to 6–year terms and the President serves for 4 years but the 1853 constitution had fixed the term to 6 years. The Indian Lower House of Parliament is elected for a 5–year period, as is the indirectly elected President, while the indirectly Upper House is elected for a 6–year term. In Australia, the House of Representatives is elected for a maximum term of 3 years, but Senators are elected for a period of 6 years. The (unicameral) parliament of New Zealand is elected for a maximum time of 3 years.

3 The Athenian assembly

In comparison to Athens, modern voter preferences are expressed discontinuously and irregularly. In the fifth century BCE the assembly of Athenian citizens (*Ekklesia tou Demou*) was the principal decision making body. Hansen (1999) divides the decisions of the assembly into three types, decrees, judicial sentences and elections. Debating and passing decrees ("*psephismata*") was the most important task of the assembly and claimed most of its time. They concerned foreign policy, war and peace, alliances and defence matters, construction of public works and their funding, administration of justice, religious matters, laws and procedures, and grants of citizenship to foreigners (which was guarded jealously given the political and civic rights, and economic benefits associated with citizenship in the ancient city–states). Judicial sentences related to denouncement ("*eisangelia*") the procedure used to prosecute generals and political leaders for corruption and treason. This function was transferred to the Popular Court (*Heliaia*) in the middle of the fourth century.[5]

Elections were used to elect a small number of officials, namely the Ten Generals elected annually, who served as commanders of the army and the navy and carried out other domestic and external policy functions, financial officers and envoys. The financial offices included the treasurer of the Military Fund, the members of the Board of the Theoric Fund responsible for distributing 'theatre money',[6] and the Controller of the Finances; these posts were established in the middle of the fourth

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[5] The 'People's Court' (*Heliaia*) of 6000 had been set up by 594 reforms of the "law–giver" Solon to hear appeals against the decisions of the officials of the polis. Every year 6000 citizens were chosen by lot among all the male citizens over 30 years old and not in debt to the state to serve as jurors ("*dikastai*"). After swearing the relevant oath, they were allocated to cases by lot sitting in sessions with a normal jury size of 501 or bigger as the case may be (201 minimum) and their decisions were taken by secret ballot to secure verifiable outcomes. In the classical period, fifth and fourth century, the Court was trying both civil and penal cases. Pericles introduced pay for jury services most probably in 462 BCE (Aristotle 1984); in the fourth century daily pay for the jurors was equal to half the average wage.

[6] In the fifth century theorica money of two obols per day for the 3-day Dionysia festival was paid to poor citizens to attend theatre performances. The payment was gradually extended to other festivals and in the fourth century was paid to all citizens. The *Theoric* Fund (probably established by Eubulus around 355) became a permanent feature of the fiscal landscape receiving fixed funding by law. Over time, the fund acquired additional responsibilities, unrelated to theatre and festivals, including finance of public buildings and roads and the administration of the navy. In the middle of the fourth century it oversaw public finances along with the Council of Five Hundred.

century and, interestingly, the post–holders served terms of 4 years. Elections took place in a special assembly meeting held in the spring.

In the fourth century, after the brief oligarchic rule of 404–403 ended (see Sect. 6 for details on the interruption of democracy), a distinction was drawn between laws ("*nomoi*") and decrees; the former described "general norms without limit of duration" (Hansen 1999, p. 167) and could only be ratified through a special board of legislators ("*nomothetai*") called by the assembly. Laws codified constitutional provisions and private, criminal and procedural laws. The legislators were picked by lot from the panel of 6000 citizens who had sworn the relevant juror's oath and acted as jurors in the Popular Court. Decrees, on the other hand, were the measures passed directly by the assembly and had to be in accordance with the laws (with the exception of decrees on foreign policy decisions).

Assembly meetings were held in the *Pnyx*, a low hill in the city of Athens, where according to Hansen's calculations (ibid.) the auditorium could accommodate between 6500 and 8000 attendees. If more people came they could stand or seat outside the auditorium. Scouring through the extant sources, Hansen concludes that assembly meetings started at daybreak and, apart from just a few exceptional circumstances, they lasted until noon; they were at least nine items on the day's agenda and one item might involve several decrees. Assembly participants were a cross–section of the demos; farmers, artisans, smiths, rich landowners, city–dwellers, that is, grand and humble folk, were present in the meetings. Nevertheless, given the distances that people from the villages of Attica had to travel to attend the meetings at the city centre, most participants must have been from the city of Athens and the suburbs. Although assembly decisions were considered as taken by the entire Athenian citizenry, in practice only a part of the demos took part in the deliberations and votes of the assembly. Voting on motions and elections took place by a show of hands, which was repeated in case of doubt. The vote was administered by nine chairmen selected by ballot. Actual ballot voting was used in ostracism votes (see Tridimas 2016) and decisions to grant Athenian citizenship to foreigners to ensure a formal and verifiable result.

Hansen (1999) infers from the sources that in the early days of democracy "the Athenians had ten fixed assembly meetings a year called *ekklesia kyria* [chief meeting] and in addition extra meetings were called ad libium" (p. 133). The exact number of meetings cannot be established with certainty because in addition to policy issues the assembly had also to conduct political trials. In 355 approximately such trials were transferred to the People's Court and in a law of that period it is implied that the Assembly met thirty times a year. This did not last long since according to Aristotle's Athenian Constitution that relates to the 330 s there were forty meetings a year, which implies an average of one meeting every 9 days, ten chief meetings and thirty plain ones. In addition to Hansen, Cartledge too (2016, p. 112, and p. 223) asserts that the number of assembly meetings increased from the fifth to the fourth century. In other words, the Athenians must have deliberated about how often to hold assembly meetings and have chosen to increase their frequency.

In the fourth century, in order to secure a quorum of 6000 participants, the Athenians introduced payment for attending the meetings of the assembly of the demos. Hansen (1999, p. 150) writes:

> Soon after the restoration of democracy in 403/2 Agyrrhios made a proposal for the payment of 1 obol to every participant; Herakleides raised the bid to 2 obols and Agyrrhios promptly outbid him with 3, and that is how it was fixed… By Aristotle's time the rate was a drachma [6 obols] for a plain ekklesia and a drachma and a half for an ekklesia kyria [chief meeting]… At the same period a day's pay was $1\frac{1}{2}$ – $2\frac{1}{2}$ drachmas; but normally an Assembly meeting lasted only half a day, so the ekklesiastikos misthos [fee for attendance] was full compensation for half a day's lost employment, and we can reject the view that poorer citizens were prevented de facto from attending the Assembly because of the inadequacy of the pay.

Pay for assembly attendance is a unique example of motivating voters to participate in politics. If the certain costs of getting informed about policies and the opportunity cost of giving up work to participate in the assembly exceed the expected benefit that a voter may cast the decisive vote which wins a majority for his preferred policy, he may decide not to participate in the political process. Pay for attending the assembly partly mitigates this problem and *ceteris paribus*, increases the incentive to attend its deliberations.

All in all, the Athenians decided to increase the number of assembly meetings a year. More frequent assembly meetings allow (a) a given policy issue to be discussed and voted upon more frequently, and (b) more issues to be included in collective decision making. Nevertheless, a clarification is in order. It would be erroneous to compare the number of meetings of the Athenian assembly with the number of meetings of modern parliaments as the two are fundamentally different. The members of the assembly were ordinary citizens, while the members of the modern parliaments – legislatures are politicians, who during the parliamentary term of their service are expected to be fully occupied by political activities. In truth, a modern parliament is closer to the Athenian Council of Five Hundred ("*Boule*") which met every working day, 275 days a year (Hansen 1999, p. 251). The Council prepared the agenda for the assembly sorting out the matters to be discussed, oversaw the policies voted by the assembly and implemented the day–to–day administration of the state relating to foreign policy, public finances, public buildings, etc. Its members were selected by lot from the Athenian citizenry willing to serve in it and served for a term of 1 year. A man could only serve twice in his lifetime on the Council but in non–consecutive years.[7] Nevertheless, the Council was not a decision making body in the sense of modern legislatures; that task belonged to the assembly of the demos.

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[7] Tridimas (2012) examines in detail of appointment to office by lot.

4 Related literature

In a democracy, when citizens choose policy, either directly in an assembly or indirectly through their elected representatives, they confront the fundamental question of how long to wait until they decide again whether to continue with the same policy or choose a new one, that is, when to hold a new assembly or an election for a new parliament. The question can be stated as follows. The majority of voters pass a policy because they benefit from it and other things being equal they would like to continue with that policy for a prolonged period of time. On the contrary, the minority of voters loses from the policy passed by the majority and would like to try and bring its favourite policy as soon as possible. Preventing a vote on the policy goes against the grain of democracy, while having a new vote immediately after the first vote is at the very least wasteful and may indicate a form of "tyranny of the minority". What is then the optimal time interval between voting?

Noting that even a democratically elected government enjoys wide discretionary powers that may lead to abuses, it is no surprise that scholars have already raised this question. Discussing checks and balances on the government, Mueller (1996, p. 253) writes:

> The more fearful the constitutional convention is of an elected parliament's action, the shorter the interval between elections it will wish to stipulate. James Madison, often cited as a champion of checks and balances, regarded frequent popular elections as 'no doubt the primary' constraint on the government'.

In other words, Mueller explicitly recognises that the frequency of voting is part of the decision rules of the constitution; however, he does not examine what factors may affect the choice of the constitutional writer in settling this issue. Instead, Mueller focuses on the choice of the optimal majority rule.

The constitutional choice of the frequency of elections at the constitutional stage is recognised in the work of Amacher and Boyes (1978). First they present evidence in favour of the hypothesis that the longer the electoral period the more elected officials are able to behave in an independent fashion relative to the preferences of their constituency members. Then, following the well known work of Buchanan and Tullock (1971) they suggest that the choice of election frequency can be constructed as a problem of minimising the decision and external costs of voting.[8] Decision costs are the costs of operating the polls (registration of voters, printing ballots, manning polling stations) and the time it takes voters to become informed about policies and candidates. Decision costs are decreasing the longer the time interval between elections. On the other hand, the longer an official stays in power, the more likely that she may abuse her position for personal benefit; therefore the external costs increase as the frequency of election decreases. The total costs are the sum of the above two and display the U shape shown in Fig. 1. The optimal interval between voting is the time which minimises the above total cost, given by point t^* in Fig. 1.

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[8] For recent extensions and formalisation of Buchanan and Tullock analysis, see Dougherty and Ragan (2016) and Dougherty et al. (2015).
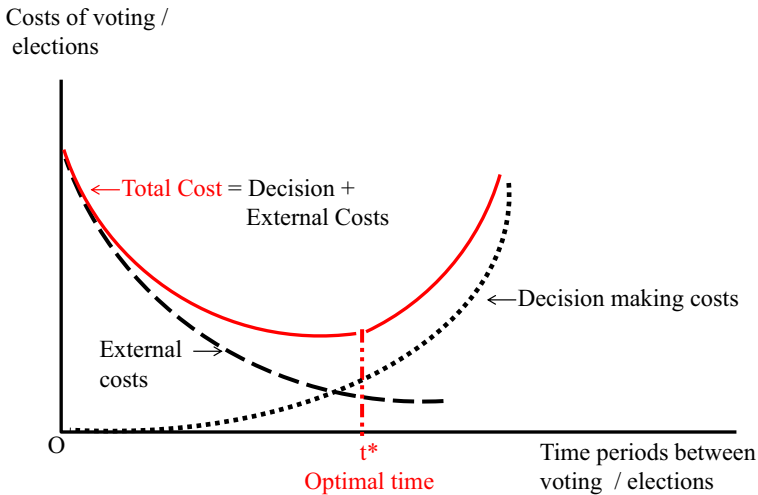
Fig. 1 Choice of optimal time interval between elections

Leaver ([2009](#)) adds a further distinctive perspective to the length of office term. She studies a setting where public regulators care about both policy outcomes and their reputation (in the sense that they suffer disutility when found to have made mistakes in regulating firms), the regulated firms are better informed about the environment (cost conditions) than regulators, and different regulators have different decision making abilities, so that more able ones obtain more accurate signals about the environment. The model predicts that able regulators try to make decisions that lead to socially good outcomes. However, less able regulators mix between attempting to make good decisions and being generous to the regulated firms, so that the latter do not draw public attention to the decisions of the regulators, what she terms "minimal squawk behaviour". Using data from the US State Public Utility Commissions, she presents evidence supporting her hypothesis. The model implies that longer terms of office for regulators increase the probability of good decisions (and decrease regulatory capture), for longer contracts allow officials to focus on making good decisions rather than worry about their reputation and future career prospects.

Recognising that parliamentary democracies grant the government the right to dissolve the parliament before the end of its term and call for an early election, a second branch of literature studies the endogeneity of the election timing at the post–constitutional stage of policy making. A number of studies in the tradition of political—economic cycles,[9] have examined the deviations of output from its

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[9] The literature on political economics starts from the premise that incumbents may manipulate economic policy to improve their chances for re–election, or alternatively competing political parties aim to deliver different economic outcomes to appeal to their partisan bases. These incentives generate respectively electoral and partisan cycles in the economic variables of interest, like output, inflation, budgetary deficits and the size and composition of public expenditure. See the pioneering contributions of Nordhaus ([1975](#)), Hibbs ([1977](#)) and Alesina ([1987](#)); for comprehensive reviews see amongst others Mueller ([2003](#)) and Franzese and Jusko ([2006](#)).

natural level and the equilibrium inflation rate when the election date is endogenously determined by the government and the expectations of rational households depend both on the uncertainty about the electoral outcome and the uncertainty of the election date; see Chappell and Peel (1979), Lächler (1982), Ellis and Thoma (1991), Heckelman and Berument (1998) Palmer and Whitten (2000) and Heckelman (2001). Closer to the present inquiry, a small number of studies have inquired factors that influence the decision of an office–seeking party to do so. Balke (1990) endogenises the election time by treating the decision of the government to choose the election date as a mathematical stopping problem, that is, one of cost minimisation, in an environment where its future popularity and election outcomes are uncertain. Similarly, Ellis and Thoma (1991) apply an optimal stopping rule to examine the conditions under which governments may call an early election in a political business cycle model. Smith (1996) endogenises the timing of elections in a multi–stage game where the electorate has incomplete information about the competence of the government.

Analytically, a rational incumbent will call an early election if the expected benefits from doing so exceed the costs. In choosing an election date an office motivated incumbent would like to maximise the chances for re–election, but does not want to waste the rents accruing from occupying office, so other things being equal elections would not be called before they are due or close to that date. Nevertheless, incumbents enjoying high approval rates may call an early election to capitalise on their popularity. There is, however, a countervailing factor, because even popular incumbents are worried that voters may consider a government that calls an early election as incompetent (that is, unable to supply welfare increasing micro and macro–economic policies). Thus, competent governments will wait longer until they call an election before one is due. However, several factors complicate and qualify this conclusion. If government competence varies over time and voters place more emphasis on the recent performance of the government than on its distant past, a few bad outcomes will drag down voters' assessment of the government. As a result, popular governments have an incentive to call early elections. In addition, when the value of holding office after an election is greater than the value of holding office before, as for example when the incumbent is a minority government, or a new mandate is needed to introduce new policies, the government will tend to call an early election. On the other hand, if the government is better informed about the future than the general public (for example, because it manipulates the policy instruments), as it is most likely the case in reality, calling an early election may be interpreted by the voters as a signal of bad times to come; voters may then penalise the incumbent. Hence, if governments are better informed than the voters, they will tend to call elections late in the cycle. This literature has examined factors that may affect the choice of the election time before the end of the parliamentary term but has left unexplored the question of what determines the constitutionally mandated maximum time between elections.

5 A formal model of constitutional choice of the election timing

This section models formally a citizen who at the constitutional stage has to choose how often to call a vote to decide an issue of public interest. The model explored is based on the framework of constitutional choice elaborated by Mueller (1996, 2003), who conceives of a constitution written and ratified by the citizens for their benefit. At the constitutional stage the rational citizen behind a veil of ignorance does not know whether he will be a member of the winning or losing coalition resulting from the collective choice process. He will then adopt the institutions of collective decision making expected to maximise his payoff. Hence, in choosing the features of the voting mechanism the constitutional writer calculates the expected net benefits from an uncertain voting outcome and the transaction cost of voting. In this context, contrary to the political budget models of rational election timing, in choosing the time between voting, the constitutional framer is not concerned with office rents or popularity, but only with how the policy supported by the majority affects his utility.

In the present analysis Mueller's essentially static model is modified as follows to account for the inherently dynamic nature of the problem of how long to wait until a vote is called. Assume that a collective decision has been made, so that the citizen–voter knows whether he is in the majority and therefore benefits from the policy decided, or the minority in which case he suffers a loss. He then faces the question of when exactly to hold a new vote—how long to wait until he votes again. The choice of the length of time until he votes again involves the following trade–off. If the citizen is a member of the winning majority, the benefit from the current policy depreciates over time in the light of changing circumstances, like new constraints, or shifting preferences on public policy issues, or strong opposition from the current losers. But holding a new vote involves (a) the risk of losing and suffering a financial or other utility loss, and (b) the resource cost of the new vote, that is, the expense of collecting and processing the relevant information and attending the assembly deliberations. Similarly, assume a voter who is a member of the current losing minority. He is assumed to experiences an increasing loss over time, while a new vote risks a new loss and the additional resource cost of voting. If it is optimal to hold a vote a short period after the last vote taken, then the frequency of voting rises, as witnessed in the Athenian democracy. If on the other hand the waiting time until the next vote increases, the frequency of voting falls and votes are taken years apart as in modern democracies.

Let $G > 0$ denote the benefit that the citizen—voter obtains when a policy that he supports wins a majority in a direct ballot on the policy issue, and let $L > 0$ be the loss he suffers when a policy that he opposes wins majority support. Let P be the probability that the policy that the citizen supports wins; correspondingly $1-P$ is the probability that the voter is in the losing minority. Following Mueller (1996, 2003), it is assumed that P increases with the majority M required to reach collective action, where $0 < M \leq 1$, and $\frac{\partial P}{\partial M} \equiv P_M > 0$ and $\frac{\partial^2 P}{\partial M^2} \equiv P_{MM} < 0$. It is further assumed that the sizes of G and L vary with the width of the franchise N, that is, the number of individuals with the right to vote. There are two possibilities here. First, an

increase in the franchise may increase the gain that an individual citizen receives from a new policy that benefits him, that is, $\frac{dG}{dN} \equiv G_N > 0$, and decrease the loss he suffers if the new policy hurts his interests, that is, $\frac{dL}{dN} \equiv L_N < 0$. This is the case where a franchise extension is sought by the previously enfranchised voters to increase funding for public goods for defence or amenities, or for ideological reasons.[10] Second, as in the case where the vote outcome relates to private goods or transfer payments,[11] an increase in the franchise to poorer groups may decrease the distributional gain that an individual voter receives from a new policy that benefits him, that is, $G_N < 0$, and increase the loss he suffers if the new policy hurts his interests, that is, $L_N > 0$.

Next, let $C > 0$ denote the voter's transaction cost of the vote. This contains three elements. First, the resources invested in becoming informed about public policy issues, ascertaining one's preferences and the resource cost of conducting the vote, including time and travelling expenses. Such resource costs are denoted by K. Second, C is assumed to vary with the size of the majority required to pass legislation, M, and, third, with the size of the franchise, N. We may then write $C = C(K, M, N)$. We adopt the standard assumption that the cost of voting is increasing with the volume of resources, the required majority and the size of the franchise, and that marginal costs are increasing. That is, $\frac{\partial C}{\partial K} \equiv C_K > 0$ and $\frac{\partial^2 C}{\partial K^2} \equiv C_{KK} > 0$; $\frac{\partial C}{\partial M} \equiv C_M > 0$ and $\frac{\partial^2 C}{\partial M^2} \equiv C_{MM} > 0$; and $\frac{\partial C}{\partial N} \equiv C_N > 0$ and $\frac{\partial^2 C}{\partial N^2} \equiv C_{NN} > 0$.

On the basis of the above, the benefit that the citizen expects to receive form a vote at time t is $V = PG - (1 - P)L - C$. For tractability it is assumed that P, G, L and C do not vary through time. Denoting the rate of discount by r, the present value of the expected benefit from a vote taken at time t is

$$V(t) = (PG - (1 - P)L - C)e^{-rt} \tag{1}$$

5.1 How long until the next vote when the voter is a member of the current majority

Assume that at time $t = 0$ a vote takes place and the policy supported by the citizen has won a majority, so that his actual benefit is G. Policy can only change after a new vote; otherwise the current policy holds. Over time, in the light of new circumstances the current policy confers less utility to the voter that supported it at $t = 0$. Let the utility from the current policy be a function of time according to the formula $Ge^{f(t)}$, with $f(0) = 0, f'(t) < 0$ and $f''(t) > 0$, where the $(')$ notation denotes the derivative with respect to time. Thus, the present value of the utility from the current policy pursued at time t is

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[10] This follows the work of Lizzeri and Persico (2004) who emphasize that the elite is willing to expand the suffrage to poorer urban groups to increase tax revenue for financing public goods. Thus, it trades voting rights for more public goods.

[11] Such formulations are examined by Bueno de Mesquita et al. (2003) and Acemoglu and Robinson (2006).

$$U(t) = \left(Ge^{f(t)}\right)e^{-rt} \tag{2}$$

The present value of the net benefit from taking a vote at t is the difference between $V(t)$ and $U(t)$. Subtracting (2) from (1) we have

$$B(t) = (PG - (1-P)L - C)e^{-rt} - \left(Ge^{f(t)}\right)e^{-rt} \tag{3}$$

When writing the constitution the citizen chooses the time of holding a vote t^* in order to maximise the above net benefit. A small size of t^* indicates that it is optimal to take a vote after a short period of time from $t = 0$, and therefore the frequency of assembly votes should be high. Maximising (3) we obtain

$$\frac{dB(t)}{dt} \equiv B_t = \left[(r - f'(t))Ge^{-f(t)} - r(PG - (1-P)L - C)\right]e^{-rt} = 0 \tag{4}$$

Note that with $f'(t) < 0$ by assumption, we have that $r - f'(t) > 0$ and consequently the first order condition (4) requires that $PG - (1-P)L - C > 0$. The latter can be re–written as $P > \frac{L+C}{L+G} \equiv \hat{P}$. The condition for optimality is that the probability of gaining from a vote must exceed the (certainty—equivalent of the) proportion of total costs $L + C$, to total gains from the vote $L + G$. This is the static constraint for a citizen to participate in collective decision making by voting. The lower the value of $\hat{P}$ the more likely is that the citizen participates in collective decision making by majority rule.[12]

The second order condition for maximisation is

$$\frac{d^2B(t)}{dt^2} \equiv B_{tt} = \left(-f''(t) + f'(t)\left(r - f'(t)\right)\right)Ge^{f(t)} < 0 \tag{5}$$

The latter is certainly satisfied because of the assumptions $f''(t) > 0$, $f'(t) < 0$ and $r - f'(t) > 0$ from the first order condition.

5.2 How long until the next vote when the voter is a member of the current minority

Now assume the opposite case where at time $t = 0$ a vote takes place and the policy preferred by the citizen is supported by the minority, so that he suffers an actual loss L. Let the utility from the current policy be a function of time according to the

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[12] Using a slightly different formulation, Mueller (1996, 2001, 2003, and 2009) identifies the implications of the static condition for the optimal majority. It is clear from its definition that $\hat{P}$ is decreasing in G, increasing in C and increasing (decreasing) in L for $G > (<)C$. The latter in turn implies that, when the gain secured by the majority exceeds the cost of voting, if the policy passed by the majority inflicts a very large loss on the minority, the likelihood of participating in the collective decision making by majority voting falls. As a result, citizens worried about the losses suffered as members of the minority may not consent to majority voting. Cases like this may therefore be decided by applying the unanimity rule, so that citizens that would otherwise suffer severe losses relative to the gain experienced by the majority can veto such policy measures. As a cheaper alternative to unanimity, citizens may be granted inviolable constitutional rights to protect them from those severe losses.

formula $-Le^{h(t)}$ with $h(0) = 0, h'(t) > 0$ and $h''(t) < 0$. The present value of the utility loss from the current policy pursued at time t is

$$U(t) = \left(-Le^{h(t)}\right)e^{-rt} \qquad (6)$$

Taking the difference between $V(t)$ in (1) and $U(t)$ in (6), the present value of the net benefit from taking a vote at t is

$$X(t) = (PG - (1 - P)L - C)e^{-rt} - \left(-Le^{h(t)}\right)e^{-rt} \qquad (7)$$

As before, the citizen chooses the time of holding a vote t^* in order to maximise the above net benefit. Maximising (7) with respect to t we obtain

$$\frac{dX(t)}{dt} \equiv X_t = \left[(h'(t) - r)Le^{h(t)} - r(PG - (1 - P)L - C)\right]e^{-rt} = 0 \qquad (8)$$

For consistency with the case examined before, it is assumed that $PG - (1 - P)L - C > 0$, which also implies that for (8) to be satisfied it must be $h'(t) - r > 0$. The second order condition for maximisation is

$$\frac{d^2X(t)}{dt^2} \equiv X_{tt} = (h''(t) + h'(t)(h'(t) - r))Le^{(t)} < 0 \qquad (9)$$

The first order conditions (4) and (8) offer only implicit solutions for the optimum number of time periods t^* elapsing until a vote are taken. However, their comparative static properties can be exploited to study how the optimum t^* varies with respect to the determinants included in the present model. A negative derivative sign indicates that when the corresponding variable, P, G, L, K, r, M, and N, increases the citizen chooses a shorter period of time from one vote to the next, resulting in a higher vote frequency. A positive derivative sign indicates a longer time period between taking votes. Since at the constitutional stage citizens do not know whether they will emerge as winners or losers from the collective decision making process, we are interested in identifying the conditions where both winners and losers choose the same institutions of collective choice, that is when both agree to increase or decrease the time until the next vote.

The full set of comparative static results is shown in Table 1. Inequalities (10.1) and (11.1) show that for both winners and losers from the current policy, the time chosen until a new vote is held decreases, or equivalently the optimal frequency of voting increases, when it is more likely that the citizen benefits from the outcome of the new vote. On the other hand, for both winners and losers the optimal frequency of voting decreases when (a) the loss from the policy chosen after the vote increases, and (b) the resource cost voting increases, as demonstrated by inequalities (10.3) and (11.3), and (10.4) and (11.4) respectively. These results accord well with prior intuition: a citizen is better off with a shorter time between voting, the greater is the probability of gaining from the vote, the smaller the loss suffered if he is a member of the losing minority and the smaller the resource cost of voting.

Table 1 Comparative static properties of the equilibrium vote frequency t^* when

The voter benefits from the current policy (he is a member of the current majority)				The voter loses from the current policy (he is a member of the current minority)			
$B_t = (r - f'(t))Ge^{-f(t)} - r(PG - (1-P)L - C) = 0$				$X_t = (h'(t) - r)Le^{h(t)} - r(PG - (1-P)L - C) = 0$			
$B_{tt} = (-f''(t) + f'(t)(r - f'(t)))Ge^{f(t)} < 0$				$X_{tt} = (h''(t) + h'(t)(h'(t) - r))Le^{(t)} < 0$			
	Derivative	Condition	Sign		Derivative	Condition	Sign
10.1	$\frac{dt^*}{dP} = -\frac{r(G+L)}{B_{tt}}$		−	11.1	$\frac{dt^*}{dP} = -\frac{r(G+L)}{X_{tt}}$		−
10.2	$\frac{dt^*}{dG} = -\frac{(r - f'(t))e^{f(t)} - rP}{B_{tt}}$	$rP > (f'(t) + r)e^{-f(t)}$	−	11.2	$\frac{dt^*}{dG} = -\frac{rP}{X_{tt}}$		−
		$rP < (f'(t) + r)e^{-f(t)}$	+				
10.3	$\frac{dt^*}{dL} = -\frac{r(1-P)}{B_{tt}} > 0$		+	11.3	$\frac{dt^*}{dL} = -\frac{(h'(t) - r)e^{h(t)} + r(1-P)}{X_{tt}} > 0$		+
10.4	$\frac{dt^*}{dK} = -\frac{rC_K}{B_{tt}}$		+	11.4	$\frac{dt^*}{dK} = -\frac{rC_K}{X_{tt}}$		+
10.5	$\frac{dt^*}{dr} = -\frac{Ge^{f(t)} - (PG - (1-P)L - C)}{B_{tt}}$	$PG - (1-P)L - C > Ge^{f(t)}$	−	11.5	$\frac{dt^*}{dr} = -\frac{-Le^{h(t)} - (PG - (1-P)L - C)}{X_{tt}}$		−
		$PG - (1-P)L - C < Ge^{f(t)}$	+				
10.6	$\frac{dt^*}{dM} = -\frac{r(P_M(G+L) - C_M)}{B_{tt}}$	$P_M(G+L) > C_M$	−	11.6	$\frac{dt^*}{dM} = -\frac{r(P_M(G+L) - C_M)}{X_{tt}}$	$P_M(G+L) > C_M$	−
		$P_M(G+L) < C_M$	+			$P_M(G+L) < C_M$	+
10.7	$\frac{dt^*}{dN} = -\frac{(r - f'(t))G_N e^{f(t)} - r(PG_N - (1-P)L_N - C_N)}{B_{tt}}$	$G_N > 0; L_N < 0; C_N > 0$	?	11.7	$\frac{dt^*}{dN} = -\frac{(h'(t) - r)G_N e^{h(t)} - r(PG_N - (1-P)L_N - C_N)}{X_{tt}}$	$G_N > 0; L_N < 0; C_N > 0$	?
		$G_N < 0; L_N > 0; C_N > 0$	?			$G_N < 0; L_N > 0; C_N > 0$	+

An increase in the gain from the vote G has a more nuanced effect. Note that an increase in G may be the result of increasing significance of an existing policy issue or an extension in the range of issues under the jurisdiction of the assembly, which in turn may originate from increasing economic and political complexity as a society evolves. As shown by (11.2), a citizen who suffers a loss from the current policy is keen to vote sooner in an effort to reverse such losses, but according to (10.2) a citizen who receives a gain will do so only when the expected marginal gain from winning the vote, rP, is greater than the marginal gain from continuing with the current policy $(r - f'(t))e^{f(t)}$. In the opposite case, he chooses a longer period to elapse until the vote is taken. This finding implies that if for some reason the gain G associated with a policy falls and the loss L rises, other things being equal, the citizen would prefer to vote on the policy more often, and vice versa. For example, when Athenian prosperity becomes more dependent on international trade, where the gain from each individual partner is small, rather than a single domestic or foreign resource, the assembly may decide to hold more frequent votes on foreign policy. Moreover, if for a voter the marginal gain from a current policy exceeds the expected gain from winning the next vote, $(r - f'(t))e^{f(t)} > rP$, he will prefer to prolong the pursuit of that policy.

The effect of the rate of discount r is similarly fine–grained. For the beneficiaries from current policy, Eq. (10.5) reveals that if the static net expected benefit from the vote at time $t, PG - (1 - P)L - C$, exceeds the gain conferred by the current policy at t, $Ge^{f(t)}$, then a higher discount rate, r, is associated with higher frequency of voting; that is, less (more) patient citizens choose to vote more (less) often. On the other hand, Eq. (11.5) makes clear that the less patient are the losers from the current policy the more often they prefer to vote, as a new vote offers them the chance to overturn their losses.

According to (10.6) and (11.6) an increase in the majority required to pass a motion, leads both current winners and current losers to choose more (less) frequent voting when the expected marginal gain from an increase in the required majority is larger (smaller) than its certain marginal cost, $P_M(G + L) > (<)C_M$. Analytically, securing the benefits from voting requires to vote more often.

Finally, inequality (10.7) implies that as far as the current winners are concerned, the effect of the extension of the franchise on the frequency of voting is ambiguous irrespective of whether such an extension confers a lower or a higher marginal gain (similarly, a higher or a lower marginal loss) to them. On the other hand, according to (11.7) as far as the current losers are concerned, an extension of the franchise encourages them to demand less frequent voting if the marginal gain from franchise extension is negative $(G_N < 0, L_N > 0)$.[13]

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[13] The simultaneous determination of voting suffrage, optimal majority rule and frequency of voting is left for future research.

6 Explaining the frequency of the Athenian assembly meetings

The comparative static results can now be used to explain the large number of the Athenian assembly meetings and their increase through time. To begin with, as the issue of suffrage was settled in the Cleisthenes reforms of 508/7 which established the direct democracy of Athens (see Tridimas 2011, 2012; Lyttkens 2013, and the literature therein), it is legitimate to treat suffrage as a determinant of the frequency of assembly meetings. Similarly, since the construction of the Athenian democracy was a piecemeal process[14] it is valid to take the majority rule as exogenous to the choice of the frequency of assembly meetings.

An obvious inference from the previous analysis is that different policy issues may call for different time intervals between votes. There is no reason to expect that different policy issues confer the same benefits to voters, or generate equal decision or external costs, etc. Indeed, this is observed in the Athenian democracy where issues of foreign policy and defence occupied most of the deliberations of the Athenian assembly throughout the year. On the other hand, once a decision to, for example, build a temple had been made, and construction had started, reversing the decision would be very costly; similarly, election of the Ten Generals was an annual occurrence.

The theoretical model of the previous Section showed that both winners and losers choose to establish more frequent votes when (1) the probability of being a member of the winning majority increases; (2) the loss from being a member of the losing minority decreases, which is the mirror image of the former; and (3) the resource cost of the vote decreases. It follows that in so far as the Athenian assembly decides on public goods that confer benefits to every citizen, (1) and (2) are satisfied and the constitutional writer chooses to establish more assembly meetings. However, (1) and (2) are not satisfied when the assembly votes on redistribution measures that make some citizens better off and others worse off. Nevertheless, as the Athenian democracy empowered the many ("*hoi polloi*"), the middle and poorer classes of citizens against the landed aristocracy, one may surmise that in so far as members of the middle classes and the poor constituted a majority of those attending the assembly they expected to benefit from the decisions of the assembly on issues regarding redistribution. Therefore acting as constitutional framers they instituted more assembly meetings.

Turning to the resource cost of voting, it clearly decreased in the fourth century as a result of the fee payment for assembly attendance. Specifically if W denotes the fee paid and Q the probability of receiving it (since only the first 6000 attendees received it), in the fourth century the ex ante resource cost fell from K to $K-QW$ which as proposition (3) shows unequivocally led the demos to increase the number of annual meetings. To see it from a different angle, introducing pay for assembly attendance made it more likely that the typical assembly–goer was a poorer citizen, making more likely that the poor were the majority. They in turn had a strong incentive to want to vote more often to increase total benefits accruing from voting.

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[14] See Congleton (2011), for the distinction between 'piecemeal' or gradual, and 'whole cloth' or big–bang, change in the emergence of representative government.

It follows that assembly participants not only derived instrumental benefits, but enjoyed direct financial benefits too. This conclusion is in line with recent political economy research on the Athenian democracy which shows that its institutions and policy choices can be explained by applying the rational actor model without recourse to normative theories or democratic ideology.[15]

Further, the comparative static findings lead us to infer that citizens unanimously decide to increase the frequency of assembly votes when (4) the gain from the vote increases and the expected marginal gain from winning the vote exceeds the marginal gain from continuing with the current policy—recall (10.2); (5) the discount rate increases, provided that the ex ante instantaneous net benefit from an uncertain vote exceeds the benefit from the current policy at the time of voting; and (6) the required majority to approve a policy motion increases, provided that the marginal benefit from the increase in the majority exceeds its marginal cost.

Although we do not know how far the above conditions were satisfied in Athens, the following inferences can be made. Towards the end of the fifth century, the Athenian democracy was overthrown twice. First, in 411, following the comprehensive defeat of Athens in the Sicily campaign, an oligarchic dispensation was installed granting political rights to 5000 men (from the 30,000 male citizens that enjoyed full political rights under democracy), but after only 4 months in 410 the navy reinstated the democratic constitution. The democracy was overthrown for a second time after the 404 final victory of Sparta in the Peloponnesian War, when Athens was ruled by a cruel 30–member strong oligarchic commission, known as the "Thirty Tyrants". The democrats who managed to flee regrouped and in 403 they defeated the oligarchs and restored the democracy. Such experiences must have led the citizens to appreciate the benefits of democracy (even if it meant that no citizen may always be in the winning coalition of voters). This implies that perceptions of the gain from a vote must have increased leading to institute more frequent votes. On the other hand, expertise in financial matters was an essential condition to fully exploit the opportunities offered by managing the Theoric Fund. Such expertise could not be developed over a short time period; continuity was required for devising and managing successfully a financial plan. Thus, the benefit from expertise in this and analogous posts can be maximised only if the appointment is made for a long period of time (recall the comparative static result 10.2). This may, at least partly, explain that the Treasurer of the Theoric Fund and the Controller of the Finances (instituted after 338) were appointed for terms of 4 years instead of the standard 1 year.

An increase in the rate of time preference may have been the response to increased uncertainty. Several reasons account for this. It is plausible that the experiences of war defeat and deposition of democracy heightened insecurity and consequently the rate of time preference at which the future was discounted leading to the introduction of more frequent votes. In the same vein, after the 404 defeat and the loss of the economic benefits from its hegemony, the prosperity of Athens relied heavily on international commerce and market networks, a factor that increased

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[15] For detailed political economy approaches to Athens and further illustrations see amongst others McCannon (2012), Lyttkens (2013) and Tridimas (2012, 2013, and 2016), and the literature therein.

exposure to economic risks. In addition, McCannon (2012) presents evidence of significant wealth volatility across the generations of Athenians, a factor that most likely contributed to the increase in the rate of time preference.

Moving on to prediction (6) of the list above, as already explained, in the fourth century the Athenians reduced the policy making powers of the assembly by subjecting its decisions to the scrutiny of the popular court through the *graphe paranomon* (impeachment) procedure, a prosecution against a proposer of a measure for being against the constitutional law brought by any citizen. This effectively rendered the popular court as a veto player. Adding a veto player was equivalent to requiring passage of policy by a higher majority than the simple majority rule (Tsebelis 2002). Thus, the extension of the role of the popular court may also be an additional reason behind the higher frequency of assembly meetings during the fourth century.

Finally, at this level of generality it is not possible to establish whether there is a trade off between the extension of the franchise and the frequency of voting—recall (10.7) and (11.7)—although it cannot be ruled out. A practical example of franchise extension in the ancient Athenian democracy was the grant of full citizenship rights to metics (resident aliens) and ex–slaves.[16] Such grants were rare but not impossible, since a few non—Athenians settled in Athens were eventually accepted to body politic by virtue of their significant financial contributions to the polis (Hansen 1999).

7 Conclusions

In any democracy the constitutional writer faces the question of how often voters should be asked to decide issues of public interest, for example by holding elections to select representatives who subsequently choose policy. Although such arrangements seem to change little over short periods of time, over the last century or so constitutions have been revised to provide for shorter office terms and therefore more frequent elections. In modern representative democracies the frequency varies from between 2 years up to 6 years. These figures are in sharp contrast to the direct democracy of Ancient Athens, where the assembly of the demos which decided public policy met several times every year, culminating in forty meetings per year in the second half of the fourth century.

In order to explain the large number of assembly meetings and their growth, the present study explored a model of constitutional choice, where rational, self-interested, citizens adopt the institutional mechanisms expected to maximise their welfare in an uncertain environment. The model predicts that the time interval between votes decreases, or equivalently, the frequency of voting increases, when the probability of benefitting from a proposed policy (that is, the probability of being in the winning majority) increases, the loss inflicted to the voter from the proposed policy decreases, and the resource cost of voting decreases. In addition, provided that some reasonable conditions are satisfied, the frequency of voting

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[16] I owe this example to an anonymous Referee.

increases when the gain from the policy voted increases, the rate of discounting the future increases, and the required majority to pass a motion increases. These predictions accord well with intuition. Next, it was argued that the circumstances that lead to an increase in the frequency of voting were actually met in Ancient Athens. Unnoticed by earlier literature, the significant increase in the number of assembly meetings that took place during the fourth century, was attributed to the decrease in the resource cost of voting resulting from the introduction of fee for attendance, the possible increase in the rate of time preference associated with the turbulence that hit the democracy towards the end of the fifth century, and the effective increase in the majority required to pass legislation after parts of the powers of the assembly were transferred to the Popular Court.

Two additional points are also worth emphasising. First, the paper directed attention to another difference between direct and indirect democracy, namely, citizen preferences in the former are more frequently revealed than in the latter. Second, in common with recent studies in the political economy studies of Ancient Greece, the present inquiry has shown that building rational actor models as reduced representations of reality sheds considerable light to complex processes characterising not only modern but historic societies too. This not only allows us to see particular features more clearly, but also provides a better understanding of the uses and limitations of economic theory.

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