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Interpreting sociopolitical change by using Chaos Theory: A lesson from Sparta and Athens

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Abstract: In the present paper we introduce the concept of optimal rate of political and social change as a benchmark to explain the successful or unsuccessful development of societies facing both internal change and external shocks. Societies face two extremes: volatility, e.g. rapid changes that lead to instability and possibly to collapse, or rigidity, which does not permit necessary adaptation and change and thus may again lead to collapse. Optimal is thus a rate of change between the two extremes. We develop a model to illustrate this and then analyse two cases from ancient Greece: Sparta, as a society and state with too many institutional and balances, that led to rigidity and collapse, and Athens that in the 5th century BCE had an institutional setting with almost no checks and balances (the citizens' body, the *Assembly*, which was all powerful and dominant), which again led to near collapse, but then, during the 4th century BCE, introduced new institutions that enabled the state to survive in a world of changing circumstances and balances of power.

Keywords: political and social change, Athens, Sparta

Introduction

The issue of change in society and states has been a central one with philosophers, historians, political scientists and economists, since at least the time of the ancient Greek philosophers and historians such as Plato, Thucydides and Aristotle. This issue was addressed in their works and sometimes proposed idealised (mainly Plato) and sometimes more practical solutions (mainly Aristotle).¹ The issue was revived again by 17th-18th century authors such as John Locke, David Hume, Adam Smith, Montesquieu, Voltaire, Jean Jacques Rousseau etc., and was continued during the next centuries by Karl Marx, his followers and his opponents such as Toynbee (1946) as

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¹ See Plato Book Rep. VIII, Thucydides Hist. Book I LXX.8-LXXI.4 and Aristotle Pol., Book 5.

well as institutional economists such as D. North (1978, 1981, 1990).

In the next section we develop a theoretical model of change, by making use of some of the basic elements of the Chaos Theory. We consider such an interactive analysis innovative, since Chaos models so far have been used mainly in the fields of astronomy and biology. We expand the analysis for the first time, as far as we know, to the field of Political Science, in order to interpret a regime's political and social change. Then, in sections 3 and 4 we offer an analysis of the institutions of Sparta and Athens, giving also interpretations of why Sparta's politico-economic system collapsed, while that of Athens managed to transform and finally come to an end, not because of collapse and internal pressure, but because of defeat by an "external" factor, the Macedonian navy in 322 BCE in the so-called Lamian War.

Finally, we proceed to a comparison between Sparta and Athens, based on our previous argumentation, which leads us to a series of conclusions.

A model of social and political change

In the following model of political and social change the political decision-makers of a state-society face a set of choices in each period of time. According to the institutional setting of each state, the decision-makers are different. They may be a king with his supporting elite, a more diffuse oligarchic body to an all-powerful citizen body as in ancient direct democracies, with many more "mixed" cases in between. We postulate that the decision-makers try to maximise their individual welfare, which may be a mixture of economic values and "intangible" ones such as prestige, religion, a particular way of life, freedom etc.

Thus, the rate of change of the political framework depends on two factors: i) How many strategies are introduced into the choice set to be decided upon at each time period, and ii) How often new strategies are being adopted. Thus, in theory there may be two extremes: In the first case, it is possible that many new strategies can be introduced. New ones can be adopted with high frequency and older ones may be discarded. This could lead to a political system that is very adaptable, but also too fickle and variable, with a high degree of uncertainty and low predictability. In the second case, the system seems to be characterized by great stability and predictability, with very few new strategies being introduced, and even fewer being adopted, no breaks, low adaptability to new ideas, being unable to successfully face new challenges, a system that tends to be "ossified". Such a political system resembles a

deterministic model with perfect predictability in future steps. Over time, these decisions shape the new regime, which may be either stabilised, changed or destroyed.

In the following figure 1 we distinguish three cases of regime change: Regime 1 (rc_1), with great stability, almost rigidity, regime 2 (rc_2) with extreme volatility, where its intensity increases through time as depicted by the ongoing series of curves described in Fig. 2. Case rc_1 is characterised by great certainty and predictability, while case rc_2 by great uncertainty and no predictability, while rc_3 refers to a situation that describes gradual change through time, where the new values and principles that are introduced into the system interact with each other and finally lead to a regime change, with the abolishment of the old regime (for example, the regime of case 1) and the adaptation of a new one (rc_3).

Thus case 3 (rc_3) shows an optimal rate of change and adaptation that prevents collapse, which is a high probability in the previous two cases due both to internal and external shocks. Fig. 2 illustrates the three cases:

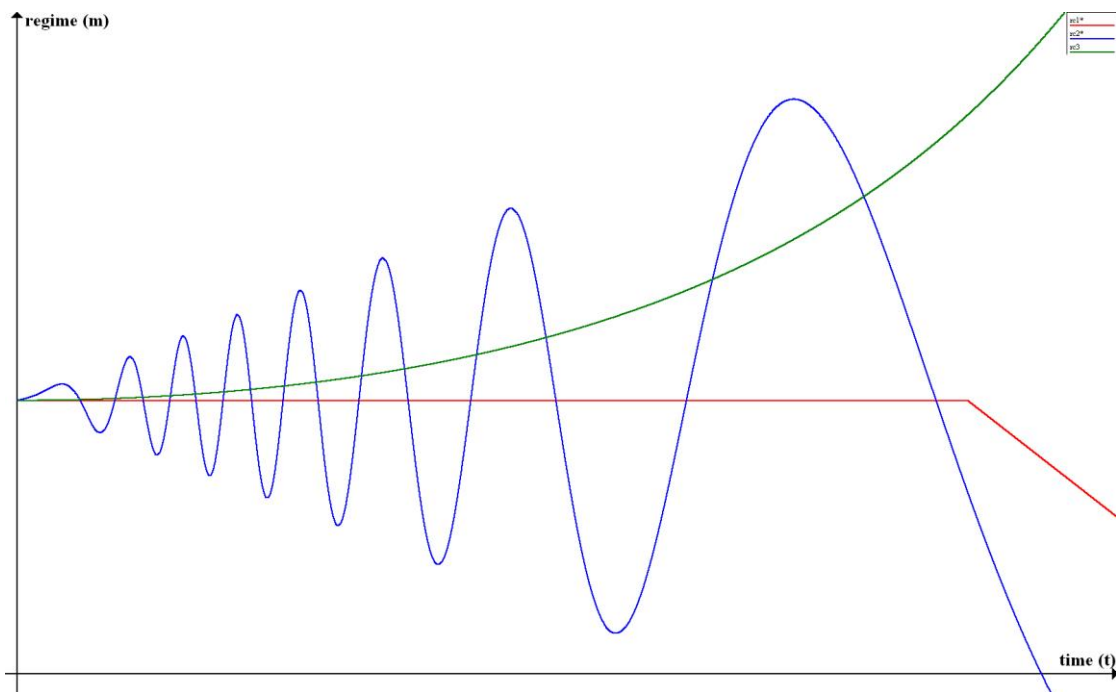


Figure 1: The three different cases (rc_1 in red, rc_2 in blue and rc_3 in green of a regime change).

The three cases are given by the following relations:

- (1) $rc_1 = \alpha$, with α being a positive constant. The constant line breaks down to a

genuine decreasing line following the relation: $rc_1 = -\varepsilon \cdot t + \zeta$, where ε and ζ are positive constants.

(2) $rc_2 = \alpha + t \cdot \sin(1 - \beta/(\gamma + t^2))$, where α , β and γ are positive constants.

(3) $rc_3 = \alpha + e^{\delta \cdot t^2}$, where α and δ are positive constants, while δ represents the optimal rate of change.

In Fig. 1, the meaning of the asterisk (*) beside the relations rc_1 and rc_2 denotes that a regime finally collapses, either because of the case of extreme volatility (case 2) or because it is too rigid to adapt even to minor but possibly crucial social and political changes that at some specific historical time may become necessary for the continuity of its existence (case 1).

Uncertainty is a state of having limited knowledge, where it is impossible to predict any or more than one possible outcomes. Predictability is the degree to which a correct prediction or forecast of a system's state can be made either quantitatively or qualitatively. However, there exists no general rule to predict a political or social regime's equilibrium point when time passes. The best-known examples of such systems are the chaotic ones. Their predictability usually deteriorates with time. To quantify predictability, the rate of divergence of system trajectories in phase space can be measured (Kolmogorov-Sinai entropy, Lyapunov exponents).

The main characteristic of a chaotic system is sensitivity to initial conditions. A political system that has many strategies to choose from resembles a mathematical model, which is close to a chaotic state. In such a state the predictability of the next step or the choice of a new strategy is rather impossible. Limitations on predictability could be caused by factors such as a lack of information or excessive complexity. Two close strategies, in a chaotic system, may lead to two totally different results, two totally different political decisions. For instance, one can be the selection of a peace strategy of a state, but the other can be warfare.

A very useful tool for our study is the bifurcation diagram. This diagram depicts the long term states of our system as a function of one of the varying parameters. The bifurcation diagram shows the way that the stable orbit loses its stability and becomes unstable, while at the bifurcation point we have the appearance of two branches, which represent the two new fixed points of the dynamical system. At the first bifurcation point we say that the 1-periodic orbit increases its period from 1 to 2.

At each new bifurcation point the orbit doubles its period (i.e. from 2 to 4, from 4 to 8 etc). It has been proved that the period doubling is one of the main routes to chaos.

For the sake of better understanding, we choose parameter α and we vary it from 0.8 up to 1. For $\alpha < 0.8$ the system is stable (i.e. we have just one stable branch, not shown on the diagram) and thus we focus at the bifurcation diagram (Figure 3) starting at $\alpha = 0.8$, where we can observe a single curve up to $\alpha = 0.83$. At this point we have a period doubling from 1-period to 2-period. Increasing further our parameter, we reach the value $\alpha \cong 0.95$, where the 2-period orbit becomes 4-period. At $\alpha \cong 0.96$ we have an 8-period orbit, while for higher values of the varying parameter, the transition to 2^n -period orbit is undistinguishable. Near the value of $\alpha \cong 0.99$, the successive period-doubling bifurcations lead to chaos. We may also study our dynamical system by the variation of another parameter, e.g. parameter β or γ , δ etc. This variation would lead to a similar bifurcation diagram, but the bifurcations would occur at different values of the varying parameter, which means that if we follow a different path of the varying parameter, this would affect mainly the rate of political change and we would have totally different political changes.

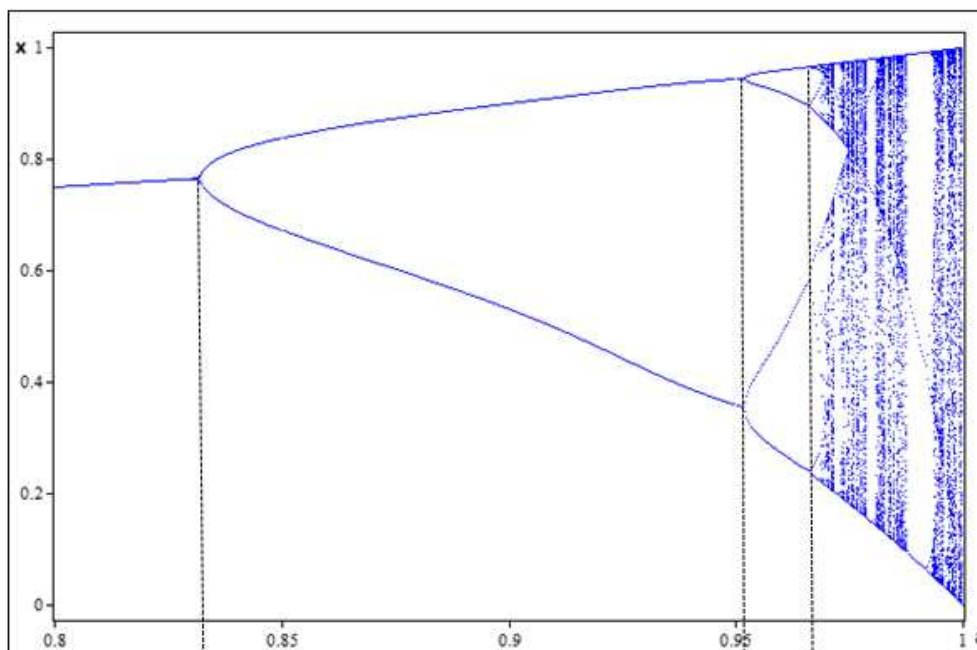


Figure 2. The bifurcation diagram for the Saperstein arms race model.

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On the other hand, a political system that has few strategies as alternative solutions resembles a deterministic model with perfect predictability in future steps, i.e. a non-chaotic system. This is a central issue of all democracies old and new, to find an optimal rate of change, not too sudden and fast, not too slow and inadaptable. A system of checks and balances, in modern terminology, would thus be considered as successful if it comes close to the ideal benchmark of an optimal rate of change. A way to find an optimal rate of change, not too sudden and fast, not too slow and inadaptable, is a central issue of all democracies. A system of checks and balances (see Tullock, 1959; Buchanan and Tullock, 1962), in modern terminology, would thus be considered as successful if it comes close to the ideal benchmark of an optimal rate of change.

We now apply our theory to two case studies, Sparta and Athens, both being characteristic historical examples where, useful results can be unveiled.

Sparta

The structure of political institutions

The institutional setting of Sparta, after the 7th century BCE, introduced allegedly by the mythical law-giver Lycurgus, incorporates a complex system of checks and balances: Two kings provided by two royal families (the *Agiadai* and the *Eurypodidai*), the Council of the *Five Ephors* known also as the *Ephorate* (who were high ranking officials, elected annually and sharing power with the Spartan kings), the *Gerousia* of 30 (the Senate) and the *Apella*, or popular Assembly of all male Spartan citizens, the so called *homioi* (literally meaning “equals”, that is, full citizens).

The Spartan political system (constitution), was considered already by Aristotle (Pol. 1224B 20-35) as a combination of elements of “pure” constitutions, a mix that was characterised by some as a democracy, by others as an aristocracy, or an oligarchy (Pol. 1293B7 ff) or even a tyranny, because of the tyrannical power of the Ephorate (Pol. 1270B 17-18). Rhodes (2007, pp. 58-60) in a modern interpretation characterised Sparta “*as a peculiar kind of oligarchy*”. One the many particularities of the Spartan constitution was the fact that it retained during the Classical period a

monarchy, and two kings at that, when monarchies no longer existed except on the fringes of the Greek world, as in Macedonia.

The kings were the military commanders during war, when one (but almost never both on the same campaign) commanded the army (but never the navy which was almost nonexistent up to the beginning of the Peloponnesian War) as virtually an absolute monarch. Rivalry between the two kings did exist, and sometimes led to the exile of one of them, as for example by Kleomenes I who managed to depose his rival Demaratos who then sought refuge at the Persian court.

Once back in Sparta, the king could in effect be called to account by being on trial before his peers, in which case the 30-member Gerousia (which included the two kings) sat as a mixed ad hoc supreme court together with the five ephors. Through their exclusive power of jurisdiction the *gerontes* (old men, being over 60 years of age) in these and other capital cases, wielded a strong influence on the conduct of foreign and domestic policy. Even strong kings such as Kleomenes I and Pausanias (in 403 BCE) faced trials (St. Croix, 1972: 349-350). As Cartledge (1987) analyses, strong kings such as Kleomenes I or Agesilaos could achieve a position of dominance above and beyond their formerly limited powers, if they were skillful in manipulating the extensive funds of patronage at their disposal.

The Gerousia was the most senior political body and its members served for life. Gerontes were elected by the Assembly in a very unusual procedure and probably only those from aristocratic families could be elected. Apart from functioning as a Supreme Court, empowered to put even kings on trial, the Gerousia had two other crucial functions. Together with the Council of the Ephors it had a general supervision of Spartan laws, which were unwritten. This entailed two separate functions: i) Interpretation of the laws and since they were unwritten, the Gerousia had a wide latitude in sharing the legal system, which was somewhat akin to common law practise ii) According to the *Great Rhetra*² the Gerousia was empowered to both introduce and refuse to introduce proposals at the Assembly, thus controlling its agenda and policy-making in general. In modern terminology, the Gerousia enjoyed the right of both prospective and retrospective veto (Hodkinson, 1983; Cartledge,

² The *Great Rhetra* is a fragment of a 7th century BCE text that may be interpreted as a kind of constitution for Sparta, making Sparta the oldest state ever to have a written constitution (Plut. Par. Liv. Lyk. 6).

1987, pp. 124-5).

The *Five Ephors* were elected for a year and probably could not be re-elected. They were possibly elected, in the same manner as the Gerousia, or they were somehow nominated or co-opted by the Gerousia. The ephors had executive, judicial and religious duties. They controlled contacts between Spartans and foreigners, received foreign embassies, they had the power to send away foreigners residing in Sparta (a procedure known as *xenelasiai*), they granted or withheld permission of Spartans to reside aboard, and they engaged in negotiations with other states, having more or less the functions of a modern Foreign Office. Together with the Gerousia, they had the power to bring kings to trial. They also judged all civil suits individually. One of the ephors presided at the Assembly's meetings. Thus, the ephors combined elements, in today's terminology, of the executive branch (foreign affairs, finance, defense) and the judiciary.

Lastly, the Spartan Assembly had very limited powers: It made the final decisions concerning war and peace and legislation, but without the power of initiative, since the agendas and the proposals were introduced by the Gerousia placed before it by the presiding ephor. No ordinary citizen had the right to speak and the voting was carried out, as mentioned above, by shouting! (Cartledge, 1987, pp. 128-129).

Apart from this institutional setting, Spartan society was characterised, in general, by respect for the laws and the officials and its military discipline, and the system of common messes to which all citizens were obliged to participate (and contribute) up to the age of 60. Finally, another peculiarity of the Spartan state was that women possessed more rights than was usual in other Greek city-states as, for example, the right to own land, and to manage their estates. Spartan men, being full time professional soldiers, did not have the possibility and time to devote to other tasks, such as running their estates etc. (Fleck and Hansen, 2009) This brings us to a brief examination of the Spartan economy.

The economy

Sparta's peculiar institutional system extended to the economy, which was also unique among Greek city-states. The main characteristics were: i) Being professional soldiers, Spartans did not have civilian occupations like in other city-states, as farmers, handicraft workers, employment in services (e.g., trade, banking, shipping like in Athens) and entrepreneurs (bankers, factory owners, ship-owners etc.). Sparta

was, to a higher degree than the average city-state, an agricultural state, but agriculture was served by helots with Spartan owners of plots being absentee landowners and perioikoi. We do not have sufficient extant comparative evidence to see if this absenteeism led to lower efficiency and productivity in Sparta, compared to other states, where farmers, being owners and labourers at the same time, had incentives to maximise output and efficiency.

The services sector was very small, mainly concerning trade, probably again in the hands of perioikoi and possibly some foreigners. There were no Spartan banks and almost no commercial shipping activity. Foreign trade was also relatively small since the Spartan way of life frowned at luxuries or works of art and had as its ideal autarky.

Manufacturing and handicrafts were again in the hands of helots and perioikoi, and possibly some foreigners, but catered mainly to basic needs, like weapons, utensils, furniture, but not luxuries, and nothing for export. An even greater peculiarity was the aversion to a monetised economy, money, according to Spartan ideals, and morals. Thus Sparta had originally only unwieldy iron coins, and not silver (and, as some Greek city-states with goldmines, such as the islands of Thassos and Siphnos and of course, the Persian Empire, gold coins). As we will analyse in the next section, the introduction, out of necessity, of silver and gold coins did “corrupt” the Spartan state.

We again do not have sufficient extant evidence, but the inference we can draw from ancient sources seems to indicate that the Spartan economy, as the political institutions, was stationary, e.g., it did not show any growth (in contrast to Athens and other city-states) and was ill adapted to face serious challenges, as we will analyse in the next session.

Evaluation of Sparta’s social and political system

In this section we argue that Sparta, with its systemic checks and balances failed to undertake an efficient management of geopolitics and internal affairs, failed to follow the new trends in military organization, though a militarist society itself, and finally failed to make the necessary socioeconomic changes so as to avoid its final collapse.

Rigidity in managing geopolitics and internal political affairs

The Spartan politico-economic system was probably in place already by the second half of the 7th century BCE and endured to the second half of the 3rd century BCE, when it broke down. During this period, Sparta faced the challenges of the

Peloponnesian War during 431-404 BCE, and the so-called Corinthian (395-387 BCE) and Theban wars (378-376 BCE).

The long-drawn-out Peloponnesian War, especially during its last phase (411-404 BCE), was fought in the Aegean Sea and was a naval war, for which Sparta was badly prepared. It had to contribute ships (although on a small scale since its allies, such as Corinth, contributed the most) but also leadership. Spartan admirals had to learn the hard way, suffering numerous defeats at the hands of the more experienced Athenians (they lost the naval battles of Kyzikos, Abydos, and Arginoussai) till they found a good commander in Lysander, who surprised the Athenian fleet on land at Aigos Potamoi (Goat River) and thus brought the war to an end.

Sparta was then at the apex of its power and had to inherit the Athenian empire, a task it undertook by establishing Spartan supervisors (Greek: *harmostes*) in many city-states. This per force opened Sparta to foreign influences. In general, *harmostes* mismanaged their tasks, so much so that in less than a decade from the end of the Peloponnesian War, old allies like Corinth and Thebes took arms against Sparta, together with a revitalised Athens (Mitchell, 2002: 85-86). The wars continued with changing alliances up to 362 BCE, when the Spartan army suffered a crushing defeat at Mantinea (after two previous defeats at Tegara and Leuktra in 371 BCE, where the Spartan king and commander Kleomvrotos died).

After Mantinea, the Theban commander, Epaminondas, freed the Messenian helots from Spartan rule. Sparta thus lost half its territory, which it never regained, and became a second-rate power. During the following years, Sparta chose a short-sighted isolationist policy and did not participate in the coalition of southern Greeks against the Macedonians. One wonders what the outcome of the hard-fought battle of Chaeronea would have been, if the anti-Macedonian coalition had fielded an additional force of say about 5000 Lakedaimonians. Sparta chose not to participate in the Macedonian-led big Greek coalition against Persia, established by Philip and Alexander, but in 330 BCE chose to challenge alone the Macedonian regent in Greece (Alexander fighting against Persia in Asia). It suffered a crashing defeat at Sellasia (Diod. Hist. Libr. 17.62.1-63.4).

Continuing its isolationist policy, Sparta chose not to participate in the two great southern Greek federations, the Achaean and the Aetolian, but neither to fight against them or remain neutral in their wars against Macedon. During the second half of the 3rd century King Agis IV tried to introduce reforms (cancelation of debts), but was

murdered by the ephors. His successor, Kleomenes III, did introduce them in a revolution that abolished the old system of reforms. He abolished the ephors and the Gerousia, and governed with almost absolute power, much like a Roman emperor, at the same time introducing social reforms by granting Spartan citizenship to many non-citizens like perioikoi, as well as land reform (Cartledge and Spawforth, 2002, pp. 35-54). But again, he had to face the Macedonians alone and suffered a crushing defeat by King Antigonos Dosson, again at Sellasia in 222 BCE, and was forced to go into exile. This spelled the end of Sparta, which transformed into a kind of dictatorship under Nabis and then fell under Roman rule. We have illustrated above the failure of Sparta to accommodate itself to its new role as a leader of an extensive and past naval empire, and then to participate in new (mainly anti-Macedonian) coalitions and federations.

We believe that this mismanagement of foreign policy and geopolitics which affected Sparta's geopolitical decline during the 4th and 3rd century BCE, must be attributed to the rigidity of the Spartan political system which did not accommodate change after external and internal shocks. Spartan policymakers proved incapable of managing the Spartan victory against the Athenian alliance, and we think that a main reason that this happened was because Spartan policymakers were unable to improvise or take initiatives as far as handling Sparta's grand strategy after 403 BCE because, as we have shown in 3.1., the Spartan political regime was characterised by a peculiar system of checks and balances, which discouraged the implementation of new ideas, a system with only small, occasional shifts of power as when a strong king reigned (like Kleomenes I).

Failure to adapt new trends in military organisation

At the same time, Sparta showed an inability to adopt military innovations. It did not introduce military reforms, for example equipping itself with a strong cavalry arm, which proved to be necessary during the Peloponnesian War. It neglected the new, lightly equipped skirmishes (*peltastai*), in whose hands it suffered a grave defeat at Lechaion during the Corinthian war. During the 4th century, Greek armies became more and more combined arms armies, with heavy and light infantrymen and cavalry, while the Spartan army remained mainly a heavy infantry one. But even in this, we believe that it suffered because the percentage of professional Spartan soldiers in its ranks diminished sharply, because the number of Spartan *homioi* fell dramatically

from about 8000 in the 480's to about 3000 at the beginning of the 4th century.

So, in order to keep the numbers of the phalanx, perioikoi and *neodamodeis*³ were increasingly serving in the ranks of the phalanx, alongside Spartans. But perioikoi and neodamodeis were not professional soldiers, and thus we presume that they were no better than the average hoplite of other Greek city-states. But even in the tactical field, in which the Spartans were supreme to the end of the 5th century they failed to adapt during the 4th century, thus suffering repeated defeats at the hands of the outnumbered Thebans and Boeotians, when Epameinondas introduced his so-called “oblique” approach.

Failure to establish a series of necessary socioeconomic changes

The Spartan institutional setting failed also to accommodate internal pressure. A common theme among contemporary writers was the diminishing number of the *homioi* citizens, which did not happen (at least to the same degree as in other city-states).⁴ This shortage of manpower (*oliganthropia*) intrigued contemporary writers like Herodotus, Hist. 7. 234. 2 and Aristotle Pol. 1270a 29-32 and modern writers (Cartledge, 1979, pp. 307-318; Crawford and Whitehead, 1983, pp. 503-504). The Peloponnesian War forcefully brought Sparta into contact with the mainstream of Greek socio-economic developments, thus creating underground tensions, beneath the constitutional facade, which emphasized the equality of the Spartan citizens and their ideal of concord (same-mindedness, *homonoiia*), among themselves.

Shortage of manpower was the result of increasing concentration of landed properties. In fact, there always had been rich and poor Spartans, but the Peloponnesian War increased this disparity: The wealthy upper class possessed land additional to the *klaros* (allotment), the minimal land plot attributed to every Spartan citizen, which enabled it to contribute to the common mess and provide itself with

³ Neodamodeis (new citizens) as the term implies, were given citizenship whenever the state deemed it necessary, mainly, we guess, when the city needed to replenish the ranks of the citizens after severe manpower losses as, for example, after the earthquake of about 461 BCE and the losses from the Peloponnesian War.

⁴ For the Spartan army's organisation, see Cartledge (1987, pp. 427-431). The Spartan army was organised originally in six *Morai* (one *mora* comprised four battalions), each of 1280 men nominal strength, thus giving a total of 7680 men. This number was reduced to 3000 by the beginning of the 4th century, and to 1000 at about the middle of century (*ibid.*, pp. 121, 355).

hoplite equipment. Rich Spartans, in order to preserve their social status, apparently aimed to limit their male offspring to a single son. They would seek to marry off their daughters to the sons of other wealthy families.

Poor Spartans, also tended to restrict their offspring, because if they had many sons, then their *klaros* would have to be divided among them, thereby being too small to permit any of them to retain the necessary minimal mess contribution. These social forces of the institutional setting brought about a gradual decrease of fertility. To this, another source of demographic decrease was manpower losses, which were severe also for Sparta, especially during the last period of the Peloponnesian War in the sea-battles which they lost.

During the Peloponnesian War, Sparta had to acquire fleets in order to combat Athens in the Aegean. But fleets were very costly, both to build and in their upkeep and the rudimentary non-monetised Spartan economy had to turn to contributions, in money (coins), to their allies and even more to Persia. So, in a decade, Sparta became de facto a monetised economy, a tendency which continued after the war with the Spartan governors and garrisons in many city-states, who were paid again in coins. But the distribution of this monetary inflow was uneven: admirals, ships captains, governors (*harmosts*) and officers serving abroad received the lion's share, increasing the gulf between rich and poor.

Thus, rich Spartans had now a surplus of liquid funds to invest. But since the backward Spartan economy did not offer a diversity of investment opportunities (like the Athenian, Corinthian or Rhodian economies did), the only investment outlet they had within the Spartan state was the acquisition of additional land. Poor Spartans might fall into debt by a raising a “mortgage” from a rich one on the security of the crops raised on his land, or on the land itself in return of coined money which the rich Spartans had now in surplus.

This led to land concentration, downwards social mobility from Spartan status to *hippomiones* (those who did not have sufficient land for the mess contributions and their hoplite equipment) and this explains the accelerating trend of the diminishing number of Spartan citizens during and after the Peloponnesian War (Cartledge, 1987, pp. 169-170). As we have mentioned in 4.1., Kings Agis IV and Kleomenes III tried to stop this trend, but the final result was a failure.

This is why we stated above, that the monetisation of the Spartan economy “corrupted” the Spartan citizens, which could be seen as a “curse in disguise”. We

conclude that the Spartan regime with its checks and balances, diffusion of power, the respect for authority and tradition, the lack of incentives and alternatives for economic activity, the stifling of the initiative of outstanding individuals, the total absence from the arts and sciences and the mismanagement of geopolitics and grand strategy, was the outcome of an endogenous systemic rigidity and as a result, the lack of adaptability both to internal change and external shocks leading to its breakdown at the end of the 3rd century BCE.

Athens: An adaptable society with collective decision making procedures

The political structure

Since Athenian political history is relatively well-known, we will not analyse it in detail. The Athenian democracy emerged in 510-507 BCE through the reforms of Kleisthenes and was strengthened gradually through the introduction of the Athenian Naval Law (Decree of Themistocles) which initiated Athens' "turn to the sea" (Kyriazis and Zouboulakis, 2004) and opened the way to full political rights for all citizens. It was further enhanced by the reforms of Ephialtes, in the 460's and Pericles.

By the mid-5th century BCE, Athens was the most complete direct democracy the world had known, with major decisions about all aspects of the state being taken by the popular Assembly through regular voting, while judicial powers were vested in the popular courts to which jurors were elected by lot, as was also the case with the Council of 500 which set the agenda for the Assembly's meetings, as well as posts like the *eponymos archon*, who was the "president" of the State for one year.

The Assembly decided on all state issues, from external policy (war, alliances, new colonies etc), internal reform and laws (through decrees voted there) and economics (taxation, monetary issues such as Nicophon's Law). The only posts which were not covered by election by lot were those deemed to demand a proven ability and experience by the occupant, these being those of the *ten generals* (leaders of the army, requiring military ability) and during the 4th century BCE, the *tamiai* ("Finance ministers"), requiring economic expertise (Ober, 1993; Hansen, 1999; Raaflaub et al. 2007; Tridimas, 2010; Kyriazis and Paparrigopoulos, 2011).

The Athenian regime was based on equality of rights and opportunities (all had the same opportunity to occupy state posts through election by lot), which was made clear by the word "iso" (equal), such as *isonomia* (equality in front of the law) *isegoria*

(equality of all to speak, e.g., to introduce proposals for policy, laws and decrees to be voted by the Assembly) and *isokrateia* (equality of political rights, to be elected to all state positions and the courts).

Contrary to the Spartan system, the Athenian political setting by the second half of the 5th century did not provide almost any checks and balances, since the people (demos) were supreme both in political (through the Assembly) military (through the Assembly and the election of the ten generals) the judiciary (through the popular courts) and the economy (through the Assembly deciding on taxes, *liturgies*⁵ etc.). This entailed the risk of too high volatility in decision making, as will be analysed in the evaluation section.

Economy

The Athenian economy was flourishing and growing during the 5th and 4th centuries BCE. It was highly diversified, export oriented and had strong incentive. It had established a regime of property rights protection and implementation of the contracts and for the first time in history, the contribution of the manufacturing (metallurgy, carpentry, shipyards, dockyards for warships, the *triremes* and merchant ships) and services sectors in areas such as trade, shipping, maritime loans and banking services, even primitive versions of joint-stock companies exceeded that of the primary, both as to GDP and employment, giving thus to Athens the characteristics of the “first modern economy” (see among others, Cohen, 1973, 1997; Gabrielsen, 1994, 2013; Kyriazis and Zouboulakis, 2004; Kaiser, 2007; Amemiya, 2007; Kyriazis, 2007; 2009; Halkos and Kyriazis, 2010; Karayannis and Hatzis, 2012; Slatyer, 2012; Lyttkens, 2013 and Bergh and Lyttkens, 2014).

During the 5th century, Athens benefited from the revenues of its empire. What is amazing is that during the next century, when it had lost its empire, it made an economic and financial recovery, by introducing various economic policy measures promoting trade, such as Nicophon's monetary law which permitted the parallel circulation of all good coins, including non-Athenian minted coins. Under these policy measures, Piraeus became the entrepôt of the Mediterranean world and Athens

⁵ *Liturgies* were a very special type of taxation and service levied on rich Athenians as, for example, *trierarchy* (See Gabrielsen, 1994; Kaiser, 2007; Kyriazis, 2009). Under this, a wealthy Athenian undertook the running expenses (not wage costs) for the upkeep of a trireme warship for a year, of which he undertook also the command.

one of the main manufacturing centers, mainly for high quality and value added goods, like jewelry, works of art, utensils, pottery, honey, figs, etc.

After the reforms of Euboulos and Lycurgus, (the finance ministers during ca. 340 to 323 BCE), who introduced extensive public work programs as opposed to a continuing war strategy, public revenues increased from a low of 130 talents in the 350's to 400 talents in the 340's and 1200 talents in the 330's (Hansen, 1999: 260; Amemiya, 2007: 91; Burke, 2010: 401) the last number being comparable to the empire period of the 440's, but this time only from internal sources. This economic flourishing permitted the introduction even of a kind of social contract, as we analyse in the next section.

Evaluation

Contrary to the Spartan system of diffusion of power, the Athenian system was characterised by a concentration of power in the hands of the citizens, through their presence in the Assembly and at the courts. There was no blocking (or vetoing) power. Because one of the pillars of the direct democratic Athenian institutional procedures was *isegoria*, gifted individuals, mainly politician-orators, but increasingly during the 4th century “financial and economic experts” (like Nikophon, Euboulos, Lykourgos) played an important or even, dominant, role in politics, through the possibility of introducing proposals at the Assembly, and through their power to introduce lawsuits against generals, politicians etc., in the popular courts, touching every aspect of policy and, almost, of life.

Contrary to Sparta, where gifted individuals could make an impact only under special circumstances and for short periods of times (as, for example, Lysander during the 400's and 390's and Antalkidas during the 380's in shaping external policy in part, and strong kings like Kleomenes I and Agesilaos), in Athens the opposite was true. The Athenian system brought forward many gifted politicians who shaped both external and internal policy. So long as these politicians made correct proposals⁶, and so long as more progressive politicians like Themistocles, Ephialtes, Pericles and Demosthenes, were counterbalanced by more “conservative” or moderate ones such as Aristeides, Kimon, Aischines, Euboulos and Lykourgos, the Athenian state faced

⁶ Correct in the sense that they proved ex-post to be growth and welfare enhancing and advancing also the interests of the poorer citizens.

successfully both external shocks and internal change.

Problems arose in periods when no such politicians were forthcoming and the external shock was very grave, as during the Peloponnesian War, after the death of Perikles. This was the period of the so-called “demagogues”, who introduced a high volatility in the system through their too frequent changes of policy (see case rc_3 in figure 2 or path 2 case in figure 4 of our model). We will illustrate this with two examples: In 415 BCE, Alkibiades persuaded the Assembly to undertake the Sicilian expedition. Just before the expedition sailed under his leadership, he was accused of participating in the desecration of the Hermes road markings, a very serious religious offense. He was acquitted, but having already sailed, he was again accused in absentia of the same crime and this time he sought refuge in Sparta.

The Athenians continued the expedition under the inept general Nikias, the man who, in front of the assembly, previously argued against the undertaking of the expedition. The result was the Athenian disaster at Syracuse. During the last phase of the war, the Athenians won the hard-fought sea battle of Arginoussai (Thuc. Hist. 6.1; Fields, 2008).

When the victorious generals (who functioned also as admirals) returned to Athens, they were accused of not collecting the Athenian dead for burial (which was impossible due to a gale following the battle). They were condemned to death and six of them were executed (406 BCE). As in 415 BCE, this deprived the state of its best generals. Those that replaced them were inept and lost the last Athenian fleet, being surprised on land at Aigos Potamoi. This brought to an end the Athenian democracy in 404 BCE with the introduction of the so called “Thirty Tyrants”, an oligarchic-dictatorial regime. But the Athenian democratic culture proved to be very resilient, and within one year, Thrasiboulos and his democratic followers overthrew the Thirty Tyrants in a revolution and reintroduced democracy.

Recognizing the weak point of the previous period, with its too high volatility in decision-making and too extreme policy changes, they introduced institutional change which made decision-making more stable. We emphasize “extreme” or radical policy changes as against small policy changes which occur due also to changed circumstances. Extreme or radical would thus mean reversal of previous policies and not gradual incremental change.⁷ The most important one was the *graphe paranomon*

⁷ We owe this clarification to a comment by G. Tridimas.

a procedure under which all new proposals were examined to make certain that they were “constitutional” e.g. were not in conflict with the existing institutional set up. By the 340's BCE, the Athenians were even able to implement a de facto “social contract”, which balanced the various conflicting interests of mainly rich as against poor citizens (Kyriazis and Economou, 2013b).

The Athenian democracy was abolished in 322 BCE (after Athens was defeated by the Macedonians, but showing again its strong roots, it revived in the beginning of the 3rd century and more or less functioned till about the middle of the 2nd century and the Roman conquest although we do not possess sufficient extant information by contemporary sources to be able to trace institutional changes and although Athens was no more a major power in Greece (Tridimas, 2015). But it did make an unsuccessful effort to expulse the Macedonian garrison in the 3rd century Chremonidean war and later managed to do so, paying the garrison off, as an inducement for them to leave Athens. Thus, Athenian society during the period 430-403 BCE comes close to the model's high volatility cause, but after 403 BCE seems to be closer to a system with an optimal rate of change that successfully accommodates external shocks and internal changes, as our mathematical model predicts.

Concluding remarks

We have presented a model of political rigidity versus volatility and in between, as a benchmark, the idea of an optimal rate of change that permits a political regime to adapt both to external shocks and internal change, making it thus durable. We have presented Sparta and Athens as two examples, the first for rigidity, the second during the 5th century BCE for high volatility and then, during the 4th-3rd centuries BCE as approaching the ideal of an optimal rate of change.

Cases of rigidity and volatility are found in many other historical cases and may be thus analysed, as for example, for rigidity Spain in the 16th century; France during the 16th-18th centuries which led to the breakdown of the old regime, the “ancien regime”, with the French revolution; the Indian Mughal empire to its breakdown at the beginning of the 18th century and the Soviet regime in 1989. Cases of high volatility appear to be more rare in the past, an explanation being, perhaps, that they are linked to democratic regimes of which history, to the 20th century, has known only very few.

But the issue of checks and balances which may give characteristics of rigidity is always present, as for example the recent political situation in the USA shows,

demonstrating how difficult it is to implement even relatively minor changes, like “Obamacare” and financial issues linked to budgets deficit and debt, as well as the recent difficulties the EU has faced in order to introduce new instruments to face the economic downturn and the debt crisis of some of its members during 2010-2015 (Greece, Portugal, Ireland, Cyprus) but also to go forward on the way to becoming a full federation with a democratic structure.⁸

There are also a few historical cases which seem to approach the ideal of an optimal rate of change, thus safeguarding society’s durability. Notable examples are Switzerland, with its long tradition of direct democracy going back to the independence of the three original cantons after 1291 (with some breaks), and England (Great Britain after 1707) which shows a steady development towards democratisation, especially after the Glorious Revolution of 1688-89, which successfully accommodated numerous external shocks (in the form of wars) and internal change, creating new efficient institutions and organisations as, for example, stock exchange, banking, joint stock companies etc., which has transformed London into the financial capital of the world, a position it still holds more or less.

Thus, we suggest that analysing further historical cases under the aspect presented here would lead to useful policy proposals for today.

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References

Ancient Authors

Aristotle “Politics” (Ar. Pol.).

Diodorus of Sicily “Historical Library” (Diod. Hist. Libr.).

Herodotus “History” (Her.).

Plato “Republic” (Plat. Rep.).

Plutarch “Parallel Lives”, (Par. Liv.).

Thucydides, History” (Thuc.).

⁸ On this issue see Economou, Kyriazis and Metaxas (2015).

Modern Authors

- Amemiya, T. (2007). *Economy and economics in ancient Greece*, London: Routledge.
- Bergh, A., Lyttkens, C. H. (2014). Measuring institutional quality in ancient Athens. *Journal of Institutional Economics*, 10(02), 279-310.
- Buchanan, J. & Tullock, G. (1962). *The calculus of consent: Logical foundations of constitutional democracy*. Ann Arbor: University of Michigan Press.
- Burke, E. M. (2010). Finances and the operation of the Athenian democracy in Lycurgan era. *American Journal of Philology*, 131(3), 393-423.
- Cartledge, P. (1979). *Sparta and Laconia, A regional history c. 1300-362 BC*. London and Boston: Routledge and Kegan Paul Ltd.
- Cartledge, P. (1987). *Agesilaos and the crisis of Sparta*. Baltimore: The John Hopkins University Press.
- Cartledge, P. and Spawforth, A. (2002), *Hellenistic and Roman Sparta. A tale of two cities*. New York: Routledge.
- Cohen, E. E. (1973). *Ancient Athenian maritime courts*, Princeton. New Jersey: Princeton University Press.
- Cohen, E.E. (1997). *Athenian economy and society: A banking perspective*. Princeton: Princeton University Press.
- Crawford, M. & Whitehead, D. (1983). *Archaic and Classical Greece. A selection of ancient sources*. Cambridge: Cambridge University Press.
- de St. Croix, G.E.M. (1972). *The origins of the Peloponnesian War*. London and Ithaca: Gerald Duckwoth & Co. Ltd.
- Economou, E.M.L., Kyriazis, N., & Metaxas, T. (2015). The institutional and economic foundations of regional proto-federations. *Economics of Governance*. 16(3): 251-271. doi: 10.1007/s10101-014-0155-4.
- Engen, D. (2005). Ancient greenbacks, Athenian owls, the law of Nicophon, and the Greek economy. *Historia*, 54(4), 359-381.
- Engen, D. T. (2010). *Honor and profit: Athenian trade policy and the economy and society of Greece: 415-3-7 B.C.E*. Ann Arbor: University of Michigan Press.
- Fields, N. (2008). Syracuse 415-413 BC. Osprey, *Campaign Series*, 195.
- Fleck, R.K. & Hansen, F. A. (2009). Rulers ruled by women: An economic analysis of the rise and fall of women's rights in ancient Sparta. *Economic of Governance*, 10, 221-245.
- Gabrielsen, V. (1994). *Financing the Athenian fleet: Public taxation and social relations*, Baltimore: John Hopkins University Press.
- Gabrielsen, V. (2013). Finance and Taxes. In, H. Beck (Ed.) *A Comparison to Ancient Greek Government* (pp. 332-348). West Sussex, UK: Willey Blackwell.

- Halkos G. & Kyriazis, N. (2010). The Athenian economy in the age of Demosthenes. *European Journal of Law and Economics*, 29, 255-277.
- Hansen, M. H. (1999). *The Athenian democracy in the age of Demosthenes*. Bristol Classical Press: London.
- Hodkinson, S. (1983). Social order and the conflict of values in Classical Sparta. *Chiron* 13, 239-281.
- Kagan, D. & Viggiano, G. F. (2013). *Men of bronze: Hoplite warfare in ancient Greece*, Princeton, New Jersey: Princeton University Press.
- Kaiser, B. A. (2007). The Athenian trierarchy: Mechanism design for the private provision of public goods. *The Journal of Economic History*, 67(2): 445-475.
- Karayannis, A. & Hatzis, A.N. (2012). Morality, social norms and rule of law as transaction cost-saving devices: The case of ancient Athens. *European Journal of Law and Economics*, 33(3): 621-643.
- Kyriazis, N. & Zouboulakis, M. (2004). Democracy, sea power and institutional change: An economic analysis of the Athenian Naval Law. *European Journal of Law and Economics*, 17, 117-132.
- Kyriazis, N. (2009). Financing the Athenian state: Public choice in the age of Demosthenes, *European Journal of Law and Economics*, 27(2): 109-127.
- Kyriazis, N. & Paparrigopoulos, X. (2011). The birth of democracy: Values in war and politics in classical Greece. In, P. Hermann (Ed.), *Democracy in the Theory and Action* (pp. 277-287). New York: Nova Publishers,
- Kyriazis, N. & Economou, E.M.L. (2013b). Social contract, public choice and fiscal repercussions in the Athenian Democracy. *Theoretical and Practical Research in Economic Fields*, 1(7), 61-76.
- Lyttkens, C.H. (2013). *Economic analysis of institutional change in ancient Greece. Politics, taxation and rational behaviour*. Abingdon: Routledge.
- Mitchell L.G. (2002). *Greeks bearing gifts: The public use of private relationships in the Greek world 435-323 BC*. Cambridge: Cambridge University Press.
- North, D. (1978). Structure and performance: The task of economic history. *Journal of Economic Literature*, 16(3), 963-978.
- North, D. (1981). *Structure and change in economic history*. New York: W.W. Norton and Company.
- North, D. (1990). *Institutions, institutional change and economic performance*. Cambridge: Cambridge University Press.
- Ober, J. (1993). The polis as a society: Aristotle, John Rawls and the Athenian social contract. In, M.H. Hansen (Ed.) *Symposium on the occasion of the 250th Anniversary of the Royal Danish Academy of Science and Letter* (pp. 129-160). Munksgaard: Copenhagen.

- Ober, J. (2008). *Democracy and knowledge. Innovation and learning in Classical Athens*, Princeton: Princeton University Press.
- Raaflaub, K. A. (2007). The breakthrough of demokratia in mid-fifth century Athens. In, K. A. Raaflaub, J. Ober, & R.W. Wallace (Eds), *Origins of Democracy in Ancient Greece* (pp. 105-154) Berkeley: University of California Press.
- Slatyer, W. (2012). *Ebbes and flows of ancient imperial power. 3000 BC–AD 900*. Singapore: Trafford Publishing.
- Toynbee, A. J. (1946, repr. 1965). *A study of history*. Oxford: Oxford University Press and Dell Publishing Co.
- Tridimas, G. (2010). Referendum and the choice between monarchy and republic in Greece. *Constitutional Political Economy*, 21(2), 119-144.
- Tridimas, G. (2015). War, disenfranchisement and the fall of the ancient Athenian democracy. *European Journal of Political Economy*, 38, 102-117.
- Tullock, G. (1959). Problems of majority voting, *Journal of Political Economy*, 67, 571-579.